Methodological aspects of determining the innovative potential of the Arctic regions of the Russian Federation

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Abstract. The paper deals with issues related to the assessment of the Arctic regions: it is currently considered a major strategic development priority warranting some study. Innovative potential is taken to mean the readiness and ability of regional business organizations to exploit innovative capacities. The article considers methods for assessing the innovative potential of the Arctic regions and proposes an algorithm for the assessment of the innovative potential level of the Arctic regions. This assessment makes it possible to determine a strategy for managing innovations in the regions and to identify the needs for resourcing innovations. Continuous monitoring of innovative potential and its components will contribute towards a more pertinent design and implementation of a regional policy for the innovative development of the Arctic regions. Further research is intended to utilize the proposed algorithm to make forecast calculations on the basis of statistical data with the aim of determining prospects for the development of the innovative potential of the Arctic regions with due account for main resource categories.

1. Introduction

These days, increasing globalization and regionalization make the competitive growth of the Arctic region a top priority of its economic development. The Russian sector of the Arctic possesses an accumulated natural resource (estimated at tens of trillions of US dollars), research production and technological potential that will provide for the socio-economic and innovative development of the country over the long term. It contributes 12% of the GDP and constitutes 30% of the total exports of Russia. There are over 2.5 million people living in the Russian Arctic, which is more than half the overall Arctic population [1-4].

It should be pointed out that the ranking prepared by the Association of Innovative Regions in Russia in 2018 [5] classifies the Arctic regions of Russia as “medium innovators,” “medium-weak innovators” and “weak innovators,” attesting to their innovative underdevelopment. At present, the only way for some regions of the Russian Arctic Zone to improve their competitive position is to develop and implement innovative products and exploit innovative technologies, which is attainable through a better use of the available innovation potential.

Since the economy is currently in a stage of transitioning towards being innovation driven, the present level of innovation potential is of utmost importance. The evaluation of the innovative potential of the Arctic regions must recognize the specific context of innovative development: e.g., it should not be overlooked that in the Arctic setting, the adoption of innovative technologies requires much bigger investments into the establishment of the system of science, research, design and
experimental institutes than it does in other regions. Accordingly, the primary concern for the Arctic regions is to set up infrastructure and provide support for potential investors, all to substantiate the economic attractiveness of a certain line of business [6]. To devise a policy for the innovative development of the Arctic region, it is necessary to constantly monitor levels of its innovative potential. So, this study aims to analyze different methods to assess innovative potential and to design an algorithm for assessment of innovative potential [7-10].

2. Lines of research

Modern Russian and international economics literature on innovative development rarely attends to the essence of innovative potential, especially in relation to regions. Also, scholarly literature displays a lack of comprehensive research, methodological solutions and conceptual approaches pertaining to the assessment of innovative potential for regional development and the efficiency of its utilization.

2.1. Defining the essence of innovative potential

The innovation potential of a region is a combination of its financial, personnel, informational, material and technical resources operated via the corresponding infrastructure related to the implementation of innovations.

However, in addition to an array of resources, enabling innovative activities, regional business organizations have to utilize and develop the existing potential and be willing to conduct innovative activities. Consequently, innovative potential can be understood as the readiness and ability of regional business organizations to exploit innovative capacities (Fig. 1).

![Diagram of regional innovative potential]

Figure1. Formal feature diagram of regional innovative potential
It is difficult to define what innovative development potential is since there is no uniform understanding of the term among researchers and there is a lack of comprehensive methodical research in this area [11-13].

There is a wide range of definitions given to the category of “innovation potential.” The most common of them are:

- Innovation potential is a combination of various resource categories essential to conducting innovative activities.
- Innovation potential is opportunities to achieve target innovative objectives.
- Innovation potential is a combination of different resource categories, including material, production, financial, intellectual, scientific, technical and other resources required for conducting innovative activities.
- Innovative potential is a measure of readiness to perform tasks that ensure the achievement of a target innovative objective, i.e., a measure of readiness for the implementation of a project or a program of innovative strategic changes [9].

The authors suggest using the concept of “development potential” in connection with innovative regions. In a broader sense, potential is a combination of available factors that can be utilized and activated to achieve a certain objective or result, and it must comprise a resource constituent (material and technical, informational, financial, personnel and other components) [2]. It also includes an element of commercialization. In addition, potential can be explicit or implicit, utilized or non-utilized. It can be defined as the capacity of a structure to satisfy the current or recurrent needs of the innovator, consumer, market and such in the long run. Therefore, development potential is a sort of characteristic referring to the ability of a system to transform, improve and progress.

In view of this, regional development potential is to be taken as capacities available in the region, i.e., different categories of resources, such as material, financial, intellectual, informational, personnel and other, essential to the achievement of regional development objectives.

There are several methods to determine the innovative potential. One of them is detailed and, in the authors’ opinion, more suitable to regional research. The approximate phase-by-phase scheme of the detailed method for the assessment of innovative potential is as follows:

- describing a problem;
- stating an objective;
- determining qualitative and quantitative values that measure by units levels of potential required to implement innovations;
- developing an innovative potential model;
- determining the true state of resource and organizational capacities;
- appraising the level of ability to achieve tangible results;
- measuring target values against actual values;
- identifying strengths (actual values matching target ones), identifying weaknesses (actual values significantly departing from target ones);
- making an integral estimation of the organization’s capabilities;
- determining the attainability of the innovative objective.

To improve weaknesses, an action plan is designed.

When establishing a system of innovative potential indicators, it is critical to ensure that potential can be assessed in all areas of activities in the given region. Alongside this, the structure of the indicator system must align with the structure of strategies to be shaped (overall strategy, competitive (business) strategy, functional strategies).

The aforementioned indicators can be included in an adaptive monitoring system of the most significant factors. Projections of trends in monitoring indicators within permissible limits allow forecasting undesirable deviations and hereby detecting the sources and reasons of emerging deviations in a timely manner (Fig. 2).

High efficiency of the suggested scheme is attributable to the fact that the necessity for forecasting possible deviations in indicator values arises only when deviations are severe as well as to the
adoption of deterministic forecasting methods. When there is a need, adaptation to environmental changes is accomplished by means of corrective actions.

**Figure 2. Flow chart for managing the innovative development of an innovative region**

2.2. **Methodological aspects of determining the innovative potential**

At present, the Russian economy shows an imbalance between available innovative capacities and their use caused by a lack of comprehensive research, methodological solutions and conceptual approaches pertaining to the assessment of the innovative potential for regional development and its utilization efficiency. There is also a strong correlation between the competitive position of a region and its innovative potential.

This study presents a system-based scheme for evaluating the components of regional development potential, i.e. its financial, production, business (intellectual), management, research and development (R&D) constituents. The system is characterized by its integrity: it comprises system-forming element factors. This system can be instrumental in conducting an overall assessment of activities in a region,
appraising its current state and outlining directions for improvement so as to ensure its sustainable development. It is also suggested that strategic management of regional innovative development is effective as long as there is a constant monitoring of the environment and the choice of position is dependent on its conditions.

The development potential of an innovative region is all categories of resources that can be used to achieve its objectives. Assessment of development potential takes into account the whole scope of regional activities. Assessment of the development potential of the innovative region is based on the following conditions:

1. An overall assessment of development potential is comprehensive and multilevel. It relies on indicators reflective of the specifics of the innovative region, its scope of activities, industrial specifics and, etc. For instance, such activity indicators as a number of patents, expenses on R&D and the purchase of licenses for inventions and know-how, adoption of digital economy elements, and so forth are of great importance for the assessment.

2. Assessment of development potential is not limited to one absolute indicator, it is based on comparing a set of indicator values in the given region against the corresponding values in the major competitive regions. The technique for assessing the development potential is premised on identifying an innovative constituent in all regional activities, i.e., assessment is conducted by areas, such as R&D, production sphere, marketing, financial activities, etc. The following components of the development potential of an innovative region can be considered:

- **The production component** is provided for by its stable and commercially successful functioning as well as sustainable endowment with required resources;

- **The financial component** is reflective of the availability of financial resources in the innovative region that are sufficient to cover investments into planned innovations and to ensure uninterrupted production and sales;

- **The business (intellectual) component** provides for generating knowledge used to create and implement innovative solutions. Criteria for the assessment of regional intellectual potential can be qualitative and quantitative;

- **The management component** is provided for by the regional management strategy and is dependent on the ability of the management to introduce mechanisms for the implementation of innovative solutions;

- **The R&D component** is indicative of the level of research and technological development in the innovative region and thus can help gauge how fitted regional business organizations are to adopt and implement technological innovations and scientific achievements.

Figure 3 graphically represents the preliminary algorithm for assessing the development potential of an innovative region that takes account of all its components.
Figure 3. Procedure for assessing the development potential of an innovative region
3. Research findings
Finding themselves in a volatile economic environment these days, business organizations experience a need for new, different management methods. An ever-shortening product life cycle, growing market and consumer demands force manufacturers to adjust to changing circumstances. Leadership belongs to those who are the quickest to adapt and turn ideas into reality, i.e., to utilize their development potential.

At present, the Russian economy shows an imbalance between available innovative capacities and their use caused by a lack of comprehensive research, methodological solutions and conceptual approaches pertaining to the assessment of regional development potential and its utilization efficiency. Economically speaking, the Arctic macroregion today is characterized by single-industry resource-based specialization. Being a region of significance, the Russian Arctic is gradually turning into an autonomous subject of state management. Innovative activity when conducted in the context of the Arctic economy is affected by a great number of various factors: macroeconomic, financial, etc. The situation is complicated by the sanctions imposed by the EU, Norway, the USA, etc. In regard to this, assessing the innovative potential is becoming a topical issue.

4. Conclusions
The algorithm presented in this paper allows for the assessment of the development potential of an innovative region. The appraisal indicative of the achieved level of development potential makes it possible, firstly, to determine activity areas that are to become the focus of a strategy for managing regional innovative activity and, secondly, to identify needs for resource provision of innovative activity (with all resource categories).

5. Directions for future research
In keeping with the government program for the strategic development of the Arctic Zone, assessing the development potential of the Arctic Zone is critical to the development of the innovation-driven economy that is now in state of transition. The next urgent step is to perform a long-term forecast analysis to predict development of the innovation potential in different Arctic regions, including all main resource categories. The analysis is to rely on statistical data and to utilize the foregoing algorithm.

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