



Practical Application of Methodologies and Mechanisms of Formation of Regional Innovation Development Strategies

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Abstract: Various methodologies exist in the national and international practice for a more or less correct assessment of the competitiveness of individual regions in terms of innovation development. The present paper considers the inefficient government performance in shaping a favourable innovation climate and proposes a developed mechanism for forming the implementation stages of a Russian regional development strategy based on the findings of regional innovation development assessment.

Index Terms: assessment methodology, regional infrastructure, regional innovation development profile, strategy.

I. INTRODUCTION

As may be currently observed, even despite certain steps to promote innovation, the government has not succeeded to reverse negative trends in this field. One of the signs is the extremely low profile of public-private partnership in innovation project implementation. The relative share of organisations receiving budget funds for this purpose is approximately 1%. The public policy of small innovation business support is also underperforming. Russian business circles commit less than 30% of investment toward research requirements nationwide [1]. Another point is the inefficient government performance in shaping a favourable innovation climate. The existing government regulation of innovative activity can be described as less than efficient tax regulation aimed at the entrepreneurial sector (corporate income tax break available for two years) [2]. For instance, in June 2018,

the Doing Business ranking of business climate put Russia in the 40th place among 190 countries.

II. METHODOLOGY

The regulation of innovative activity in federal subjects of the Russian Federation usually operates through the development of innovative programs and strategies, as well as innovation project support. One of the most important factors to reinforce regional innovation processes is the implementation of regional innovation development programs, which is expected to bring about new high technologies and their subsequent extension into international markets [3], [4].

The elements in the mechanism of formation of a regional innovation development strategy are determined through a preliminary assessment of the region's innovation profile. The algorithm of the above assessment is set out in Fig. 1 [5].

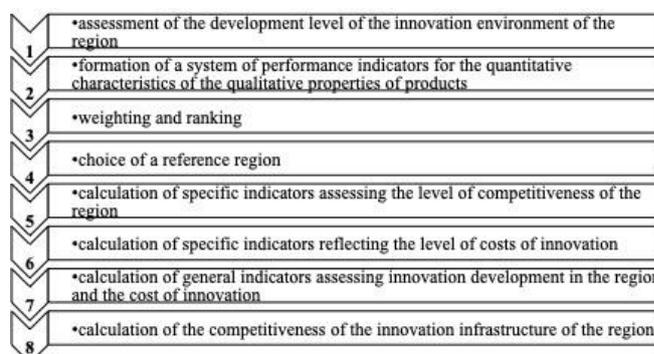


Fig. 1: The algorithm of assessment of regional innovation development profile.

A. Assessment of regional innovation environment profile

At this stage, regional innovative activities are analysed across four dimensions:

- 1) assessment of innovation infrastructure in terms of susceptibility for shaping a high-tech environment;
- 2) assessment of the existing opportunities for regional authorities to promote the development of innovation environment;
- 3) assessment of the aggregate potential of innovation-active entities (including the regional production subsystem);

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4) assessment of conditions for the formation and implementation of innovative projects and programs and the level of development of such projects.

B. Formation of an assessment criteria system for quantitative profiling of qualitative properties of products

Various methodologies exist in the national and international practice for a more or less comprehensive assessment of regional innovation development profiles.

Based on a review of methods described in literature [6], we proposed optimisations of the methodology of regional innovation infrastructure assessment, including reviews under a number of criteria arranged in blocks (Table I).

Table I. Blocks of criteria in the assessment of regional innovation infrastructure profile.

Block	Criterion
Financial potential (financial sources and their structure)	<ul style="list-style-type: none"> • Budget, • Private sector, • Venture investment in total investment, • Foreign direct investment in innovative products.
Human resources	Staff engaged in the development, research and implementation of innovations, including: <ul style="list-style-type: none"> • staff with scientific degrees, • staff without scientific degrees, • Employment in advanced technology industries.
Intellectual potential (composition and allocation)	<ul style="list-style-type: none"> • Number of developed technologies of the Sixth Wave, • Number of developed technologies of the Fifth Wave, • Number of developed technologies of the Fourth Wave and below, • Share of innovation-active enterprises in the total count of enterprises, • Number of patents granted in the region.
Monetisation of technologies	<ul style="list-style-type: none"> • Relative share of innovative products in the gross regional product, • Relative share of regional innovative products channelled to exports, • Innovative product turnover, • Scope of products owned by small innovation enterprises. • Compliance of innovation infrastructure with international standards.

C. Assignment of weights and criterion ranks

At this stage, each criterion reflecting regional innovation position should be analysed for significance. There are various methods of weight assignment.

In our view, the assignment of weights by the method proposed by the authors of [7] will be the most objective approach, as it combines expert assessment with additional stages based on mathematics and neutralising the conformism aspect related to the human factor. On the one hand, additional stages complicate the assessment process. However, on the other hand, the resulting output shows high

reliability and independence in determining the weights contributed by different experts.

The first stage involves an expert assigning weights of 1 to 10 for each criterion, relying on their competence, fundamental and applied research, experience and professional intuition.

At the second stage, the expert is asked to evaluate, from 0 to 100%, their confidence as to the level of compliance of the values attached at the previous step with the actual situation, whereby the expert's relevance is graded.

The final stage of questionnaire completion consists in indicating the level of influence of various argumentation sources over the expert's thinking: own research, experience, intuition.

The conclusive stage of the algorithm represented in Fig. 1 involves weight calculation for each criterion using the following equation [8]:

$$B_{ij} = \frac{\sum_{k=1}^n n_{ijk} \times B_k}{\sum_{k=1}^n B_k} \quad (1)$$

where B_{ij} – is the weight of each assessed parameter, n_{ijk} represents expert estimates of scores for each assessed parameter attributed by each of k experts listed, B_k is the weight of a particular expert, k is the number of experts in the expert group.

D. Choice of a reference region

A reference region is a region taken for comparison to decide whether the discussed region is advanced or lagging behind. Reference regions may be of the following types:

- regions of average socioeconomic profile by national standards;
- advanced regions in terms of socioeconomic development by national standards;
- regions of average innovation profile by national standards;
- advanced regions in terms of innovation development by national standards;
- advanced regions in terms of innovative activity development by global standards.

An analysis shows that an acceptable reference in terms of innovation for many Russian regions is Saint Petersburg.

Currently, Saint Petersburg is home to 37 higher education institutions and research institutions actively engaged in innovation and science in the region. A special regional innovation support fund is established to provide free funding opportunities for innovation project development [9] and finance the following projects, awards and prizes:

- Holding dedicated events at the Saint Petersburg Import Substitution and Localisation congress and exhibition centre;
- Productivity award for industrial enterprises in Saint Petersburg;
- High-tech job creation award;
- Saint Petersburg Government award – the badge of honour for Excellence in the Quality of Products/Works/Services.



Wide-ranging government support is also provided in the form of free and non-repayable subsidies. Depending on the type of subsidies, the recipients can be small, medium and/or large entities of Saint Petersburg. Subsidies only cover expenses already incurred by the organisation.

III. RESULTS

The analysis showed a relatively low profile of the innovation environment in a variety of regions of the Russian Federation. Meanwhile, it is exactly the innovation environment that facilitates the establishment and support of innovation-active enterprises, research teams and technology start-ups in a region. Generally, the main functions of regional innovation environment are represented in Fig. 2.

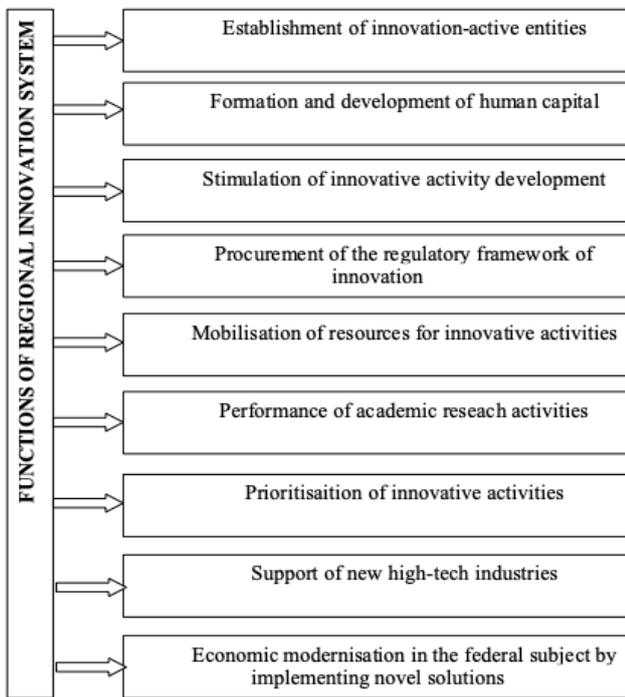
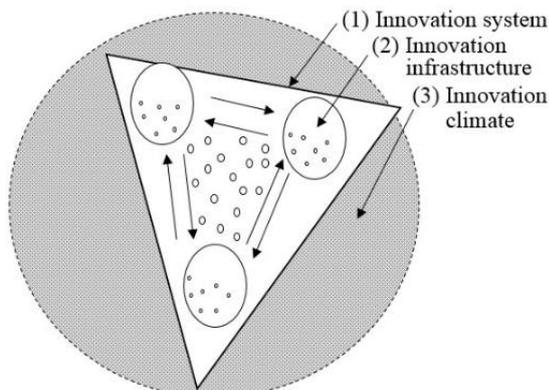


Fig. 2: Main functions of regional innovation environment.

Fig. 2 lays out a system of functions of regional innovation environment to form the development of a functional scheme of regional innovation environment (Fig. 3), which comprises the following regional elements: innovation system; innovation infrastructure; innovation climate.



*Developed by the authors

Fig. 3: Functional scheme of innovation environment for a Russia region.

An analysis of the functional scheme of the innovation system in a Russian region as shown in Fig. 3 helps to outline the elements of the mechanism for forming the regional innovation development strategy (Fig. 4).

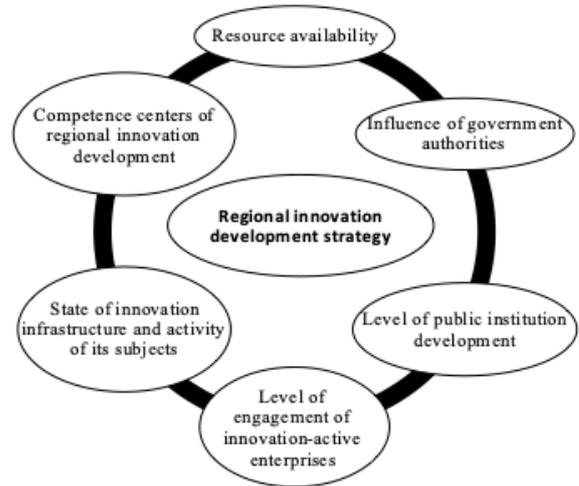


Fig. 4: Outline of the elements in the mechanism for forming a regional innovation development strategy.

An efficient government innovation policy is an influential and important political and legal factor of regional innovation development.

IV. CONCLUSION

The scope of the government's methods of influence on regional innovative activity can be represented as three groups of factors: legislative and regulatory; financial and economic; organisational (Table 2).

Table II. Factors of government influence on innovative activities in the Russian Federation regions.

Legislative and regulatory factors	Financial and economic factors	Organisational factors

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<p>- formation of the legal framework of relations between the participants of innovation processes; - ensuring the rights of the parties of innovative activities (for instance, intellectual property protection).</p>	<p>- implementation of tax policies aimed at innovation; - provision of tax breaks for enterprises engaged in innovative activities; - provision of financial support for innovative companies; - promoting domestic innovative products in the international markets; - facilitation of technical modernisation; - development of external economic ties in the innovation field; - direct public investment aimed at financing innovation projects; - leasing development for research-intensive products.</p>	<p>- information, infrastructure and human resources support of innovative activities; - promoting regional ties in innovative activities; - promoting international cooperation in innovation.</p>
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To conclude, it should be noted that the proposed methodology of assessment of regional innovation environment profile and the mechanism for forming a regional innovation development strategy enable the government and authorities to identify the most practicable dimensions of regional development.

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