

# Regional Innovation Sustainability: Evaluation Features

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**Keywords:** Innovation Development, Innovation Sustainability, Characteristics of Regional Innovation Development.


**Abstract:** The article presents the study results of evaluation methods for the regional innovation development (both used in statistical observations and proposed by scientists). It was detected that they all rely on the "basic" definition of the innovation development, consisting in the innovation process implementation, the indicators are not related to sustainable innovation development. The studies, describing innovation development evaluation (both domestic and foreign), are not focused on the problem of innovation sustainability as an innovation development characteristic. The author proposes the "regional innovation stability" concept as a property of the regional innovation, consisting of the ability of the economic system to maintain a certain (predetermined) level of achieving goals in conditions of dynamic equilibrium, "dynamic balance". The article identifies the attributes of innovation sustainability: effective formation and innovation potential management (a dominant feature), the use of disruptive or gradual innovations, closed and open innovations, lean production organization and activation of digitalization of innovation, a combination of flexibility and rigidity of integration forms of cooperation in organizing innovation activities.

## 1 INTRODUCTION

Increased investment in research and innovation is recognized as the core of virtually all national sustainable development strategies. According to (Karayannis and Grigorudis, 2016): This is the only way to "ensure smart, sustainable and inclusive economic growth"; the key element of the regional innovation policy will be the so-called "smart specialization; the priority of regional innovation is the formation and strengthening of "its own scientific and innovation potential in accordance with business needs to use emerging opportunities and market trends without duplication and fragmentation of efforts" (Karayannis and Grigorudis, 2016). The importance of innovation in the region is discussed in (Audretsch, 1998), noting that: "Just a few years ago, according to the current opinion, globalization would result in the disappearance of the region as a significant unit of economic analysis. However, the obsession of world politicians to "establish the next Silicon Valley" confirms the growing importance of geographic proximity and regional agglomerations <...> the irony of globalization is that while the corresponding geographic market for most goods and

services is becoming increasingly global, the increased importance of innovation in the leading developed countries has resulted in the significance of local regions as a key source of comparative research." (Audretsch, 1998). Moreover, innovative activities within the region are useful and effective not only for the "region" but for the regional enterprises. According to (Antonioli et al., 2014), many companies, having received the right to participate in research and development, with financial support, will not only improve their innovation results, but also change their participation in the innovation process at the regional level (activating it), and innovation behavior models can be identified both inside and outside of regional companies. Innovation is a complex process involving different groups of participants and interactions between industries and territories (Antonioli et al., 2014).

The assessment of the innovative development of regions is carried out according to various methods (statistical compilations, author's methods are proposed by various scientists), but they all rely on the "basic" definition of the innovation development essence, consisting in the process implementation.

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And most importantly, all indicators are not related to sustainable innovation development. In our opinion, any activity, including innovation, should also "work" for the sustainable development of the country, region, and enterprise.

The author studied many techniques of innovation development evaluation (both domestic and foreign), they are not focused on the problem of innovation sustainability as an innovation development characteristic. The importance of economic sustainability is self-evident. Considering the regional innovation sustainability, it is important to identify the assessment problems: innovation processes heterogeneity, and "double" heterogeneity: the heterogeneity of innovation processes carried out by enterprises in the region, their different ability, and readiness and opportunities are different (Shilova, 2015) and the heterogeneity of the innovative development of individual regions, territories (regional differentiation) (Babich, 2017).

It demands either individual approaches to assessment or the use of certain "boundaries", the values, adjusted for this individual feature. But in this case, the "objectivity" and comparativeness of the assessment of the regional innovation sustainability are lost, and this is the problem of assessing the regional innovation sustainability. But, perhaps, individual assessments are needed to manage innovation development? In our opinion, the assessment of innovation sustainability will help identify the problems of regional innovation development and determine a set of certain individual management decisions aimed at innovation development.

As the study object, the author considers the regional economic innovation sustainability. The study subject includes features of the regional innovation sustainability assessment.

The purpose of the study is to investigate the proposed and used methods and indicators for assessing the regional innovation development propose a new characteristic of the regional innovation development - its innovation sustainability, determine its attributes and identify the assessment features of the regional innovation sustainability.

Study objectives:

1. To analyze existing methods and indicators to assess the effectiveness of the regional innovation development;

2. To propose and substantiate a new characteristic of the regional innovation development - its innovation sustainability;

3. To determine the main attributes of the regional innovation sustainability;

4. To identify the assessment features of the regional innovation sustainability.

## 2 RESEARCH METHODOLOGY

During study, the provisions of the theory of management of the regional economy, the theory of innovation management, the concept of sustainable development, the scientific foundations of strategic management set out in the works of famous Russian and foreign scientists, methods, mechanisms, and tools for managing the economy of the region, balanced management, methodology and tools for assessing the effectiveness of activities were used. We used a dialectical approach (identifying the performance of regional enterprises and the result of regional innovation development), competence (assessment of the control over regional innovation potential), an approach based on balanced management (formation and use of regional resources). It made it possible to ensure valid results and conclusions.

## 3 RESEARCH RESULTS

The use of innovation sustainability as a property of the regional innovation development was proposed.

The essential content of the concept of regional innovation sustainability was substantiated.

The main attributes of the regional innovation sustainability were proposed;

The assessment features of the regional innovation sustainability were analyzed.

## 4 DISCUSSION OF STUDY RESULTS

Sustainable innovation development. The regional innovation development and its effectiveness have always been the subject of scientific research. An important issue of sustainable innovation development is the issue of assessment. After all, it is known that you can only manage what can be measured and assessed (classic management). Various scientific results are presented in scientific publications, various groups of indicators characterizing innovation infrastructure, innovation activity, and innovation policy are considered. But,

officially it is possible to assess innovation development (and then, perhaps, its sustainability) using a certain system of indicators. For example, in Europe (European innovation scoreboard, 2020) four types of indicators, ten dimensions and 27 indicators are included: conditions (human resources, young scientists and their scientific activity), investment (financing and support for innovation), innovation activity, small and medium innovation business, patent activity, types of innovations), "export" of innovations.

The following indicators are used (Gokhberg et al., 2020): socio-economic conditions of innovation, innovation scientific and technological potential, innovation, the export activity index (since 2019) and the index innovation policy quality (regulatory legal framework for innovation policy); since 2019, it has been proposed to assess digitalization potential (previously it was called informatization potential) by indicators: specific weight of organizations and households with Internet access, the number of computers, etc.). These indicators are necessary and important, but they allow either assessing the events that have already taken place (achieved values), or assessing the regional innovation activity. The used ranks of innovation development are very similar to the assessment of the "competition" effectiveness, with difficult to determine further actions. The assessment of innovation sustainability should assume otherwise.

Regional innovation sustainability. The concept of innovation sustainability in the analysis of domestic and foreign scientific literature showed that the innovation sustainability concept is sometimes present as a part of economic sustainability (as a rule, an enterprise). The types of sustainability are classified, sometimes innovative sustainability its mentioned among its types, but without the concept interpretation.

The author proposes a refined content of the "innovation development" concept, which is defined as a balanced innovative state (Merzlikina, 2020), it is proposed to recognize the main property of innovation development - the achievement and maintenance of innovation sustainability as the ability of the economic system to maintain a certain (predetermined) level of achieving goals in conditions, dynamic equilibrium, "dynamic balance" characterized by certain features-attributes: effective formation and management of innovation potential (dominant feature), use of breakthrough or gradual innovations, closed and open innovations, lean production organization and activation of innovation digitalization, a combination of flexibility and rigidity

of integration forms of cooperation in the organization of innovation activities.

The main attributes of the regional innovation sustainability.

1. Formation and use of innovation potential (dominant feature).

Innovation potential as a concept, an economic category, has been studied by scientists for a long time in terms of the so-called resource, resultant, inclusive and integrated approaches. The innovation potential structure and the purpose of each of its elements are analyzed. There are many scientific publications on the problem of formation and use of innovation potential, but not to turn this article into a scriptorium, we will refer to the publication by Merzlyakova, with a detailed analysis of the "innovation potential" definitions. The results of the regional innovation activity depend not only on the size of its innovation potential, but also on how fully and effectively it is used. In this regard, the efficient use of innovation should be studied.

Therefore, innovation sustainability should be determined by the availability of innovative potential (its structure and assessment methodology is an independent problem) and its efficiency. What do you see as "balance", "sustainability"? In the adequacy of the response (formation, maintenance, and use of innovation potential).

2. Use of disruptive or gradual innovation. Without being distracted by the classification of innovations as such, we note in this case that it is important to balance both resources and activity in the types of innovations (a kind of innovative ambidexterity) (Kortmann, 2015; Machikita, 2015) that is, skillfully use both "revolutionary" and "evolutionary" innovations. Clayton Christensen (Christensen, 1997), an author of the innovation matrix (with parameters: the problem (task) to be solved and the scope of innovation) notes the importance and necessity of breakthrough, disruptive innovations and not to get carried away with "continuous improvements" (in his opinion, it is utterly dangerous), but we also need and small supporting innovations. Each region needs its own "balance" of disruptive and gradual innovations.

3. Use of "closed and open innovations". A fundamentally innovative business develops in two directions. The first direction involves the development of "closed innovations", the innovations, developed and implemented within the region (at regional enterprises) (R&D, pilot research, pilot production, product promotion, etc.). Advantages: entering the market, staying ahead of competitors, high financial results; disadvantages -

the need for a "large" amount of all resources, inability to implement all the innovations. Disadvantages - a high burden falls on the protection of inventions and innovations from copying, including patenting, registration of designs, and copyright (Lambert and Franz, 2008). The second direction is the implementation of open innovations - innovations, created by the scientific community or within a corporation, but "working" outside the organization. Advantages: the problem solution rate increases, the cost of development is lower, etc.) (No. 18 of the criterion), disadvantages - high risks of "information leakage" and loss of professional staff ("recruiting") (Sukhareva, 2021). Recently, an opinion has been formed that "innovations can be implemented as a result of the integration of knowledge, experience, the results of good analytics, socialization; "physical and digital platforms involve representatives of various industries and scientific disciplines in co-production, and promote "cross-pollination"" (Wise et al., 2016). That is, it is important to maintain a "balance" of open and closed innovation.

4. Lean production organization and activation of digitalization of innovation activities. The active and obsessive digitalization of technology based on robotics, neurotechnology, artificial intelligence, the Internet, etc. The author Kostin identifies three main effects from the introduction of digital technologies: differentiation (based on targeted online advertising), formation of new income sources of income (based on online sales growth), cost reduction (based on "revenue" management) (Kostin, 2017). Seemingly endless opportunities for business development appear (although we already talk about "digital fatigue"). But the organization Disruptive digital innovation (DDI) requires costs and considerable costs (Darlington et al., 2021) for example, in Russia alone, "Digital Region" federal project included in the "Digital Economy" program will require 247 bln. rubles over five years (Korolev, 2020): infrastructure, software, communications, personnel training, etc., "contradicting" "lean production" principles (Thorbjörn, 2019). Sometimes a model of "lean start-ups" is proposed, which implies increased flexibility and a reduction in the innovation process duration (Wise et al., 2016), but such models are not numerous. Therefore, it is so important to find a "happy medium" for digitalization and rational use of resources.

5. Combinations of flexibility and rigidity of integration forms of cooperation in the organization of innovation. The regional innovation potential, the search for a balance of open and closed, disruptive or

gradual innovations, the costs of digitalization and lean manufacturing, we assume the possibility of forming integration structures in the region, both new rigid organizational forms and consortia. Implementation of certain innovations may require a "rigid" management structure, for others - only temporary "creative" project-type unions. Within a separate region (territory, it is possible to establish and efficiently operate a regional innovation project (RIP) with inclusion of all stages of innovation formation and implementation (from organization of research work to the specific innovative product production (Antonioli et al., 2014). It is important to ensure a balance of interests of the participants in the integration structure and optimize its structure.

The assessment features of the regional innovation sustainability. Strategies for regional innovation development should consider significant differences between regions (orientation towards export or import, industry, agriculture, tourism) (Karayannis and Grigorudis, 2016), it is necessary to consider the resources, advantages and potential of a particular region. The success of innovation development in any country is determined by innovation activities in individual regions, the ability of individual territories to create and promote innovations, organize and operate a regional innovation system based on mutual understanding, optimization of creative functions, and a combination of economic interests. A feature of regional innovation development in any country is probably the heterogeneity, unevenness of the implementation of innovative processes in different regions, implying uniform approaches to assessing innovation development, but with the obligatory consideration of a particular region-specific features, a certain territory. It is important to develop and implement measures to form and support innovation sustainability, considering specific features of a region:

- it is necessary to take into account the initial socio-economic state of the region (the level of performance of the regional economy); availability of resources (material, natural, scientific, technical, production);
- availability of resources (material, natural, scientific, technical, production);
- feasibility (combined in time and space) of various innovations: marketing, production, financial, product, organizational);
- the level of human capital development in the region (education level, age structure, employment);

- establishment and effective functioning of regional innovation structures (consortia), for the implementation of a specific regional innovation project (combination of economic interests of all participating structures).

Thus, the assessment of the regional innovation sustainability according to the proposed attributes will help determine true results of the regional innovation development and form proper management decisions; when assessing regional innovation sustainability, it is necessary to consider the socio-economic state of the region, and its resource base, innovation potential, and a balanced approach to determine the directions of innovation development.

## 5 CONCLUSIONS

1. The analysis of existing methods and indicators to assess the efficiency of regional innovation development; it was revealed that scientists offer various methods for assessing innovation development results, but in practice they use well-known "standard" statistically observable indicators that do not allow correct determination of the innovation development directions;

2. A new characteristic of the regional innovation development is proposed and substantiated - the regional innovation stability, which is the achievement and maintenance of the ability of the economic system to maintain a certain (predetermined) level of achieving goals in conditions of dynamic equilibrium, "dynamic balance";

3. The attributes of innovation sustainability: effective formation and innovation potential management (a dominant feature), the use of breakthrough or gradual innovations, closed and open innovations, lean production organization and activation of digitalization of innovation, a combination of flexibility and rigidity of integration forms of cooperation in organizing innovation activities were identified;

4. The assessment features of the regional innovation sustainability are determined: the socio-economic state of the region, resource base, innovation potential and use of a balanced approach to determining innovation development directions.

## REFERENCES

- Audretsch D.B. (1998). Agglomeration and the location of innovative activity. *Oxford Review of Economic Policy*, 14(2): 18-29.
- Babich, S.G. (2017). Index analysis of the differentiation of the Russian Federation regions by the main indicators of innovative activity. *Statistics and Economics*, 14(2): 3-13.
- Christensen, C. (1997). *The innovator's dilemma: How New Technologies Destroy Strong Companies*. The President and Fellows of Harvard College, Published by arrangement with Harvard Business School Press. © Translation, design. Alpina Publisher LLC.
- Darlington, J., Francis, M., Found, P. and Thomas, A.J. (2015). Targeting Lean Process Improvement Projects for Maximum Financial Impact. *Production Planning & Control*, 27(2): 643-651
- De Rozario, P. (2015). The innovation dilemma in the financial industry: French domestic credit institutions. *Critical Studies on Corporate Responsibility, Governance and Sustainability*, 11: 161-177.
- European innovation scoreboard 2020. URL:[https://ec.europa.eu/growth/industry/policy/innovation/scoreboards\\_en](https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en)
- Gokhberg L.M., Didkovsky G.A., Evnevich E.I. et al. (2020). *Innovation Indicators: 2020: statistical collection*. National Research University Higher School of Economics. M.: NRU HSE.
- Karayannis, E. and Grigorudis, E. (2016). Four-link spiral of innovation and "smart specialization": knowledge production and national competitiveness. *Foresight*, 1: 31-42.
- Kostin, K.B. (2017). The Role of Digital Technologies in Promoting Goods and Services in Global Markets. *Russian Journal of Entrepreneurship*, 18(17): 2451-2460.
- Kortmann, S. (2015). The Mediating Role of Strategic Orientations on the Relationship between Ambidexterity-Oriented Decisions and Innovative Ambidexterity. *Journal of Product Innovation Management*, 32 -5: 666-684
- Korolev, I. (2020). Digitalization of Russian Regions Will Cost 250 Billion//Integration Infrastructure IT in Public Sector URL: [https://www.cnews.ru/news/top/2020-07-06\\_tsifrovizatsiya\\_rossijskih](https://www.cnews.ru/news/top/2020-07-06_tsifrovizatsiya_rossijskih)
- Lambert, R. and Franz, M. (2008). Open and Closed Innovation: A Comparative Analysis of National Practices. *Foresight*, 3(7): 16-31.
- Machikita, T. and Ueki, Y. (2015). Measuring and Explaining Innovative Capability: Evidence from Southeast Asia. *Asian Economic Policy Review*, 10-1: 152-173.
- Merzlikina, G.S. (2020). Innovative Development of the Region: Essential Architecture of Indicators. *Scientific and Technical Statements of SPbSPU. Economic Sciences*, 13(5): 55-64
- Shilova, E.V. (2015). Innovations as an ensuring factor of sustainable development of socio-economic systems. *Bulletin of Perm University*, 2(25): 23-30.

Sukhareva, A. Open and Closed Innovation Models URL:

<https://vc.ru/u/555472-aleksandra-suhareva/153752-modeli-otkrytyh-i-zakrytyh-innovaciy>

Thorbjörn Netland (2019). Those Who Expect a Quick Return on Lean Production Will Be Disappointed. *VII International Summit "Smart Manufacturing Systems"*.

URL: [http://www.up-pro.ru/library/production\\_management/lean/netland-lean.html](http://www.up-pro.ru/library/production_management/lean/netland-lean.html)

Wise, E., Berg, M., Landgren, M., Schwaag, S., Benner, M. and Vico, E.P. (2016). *Evaluating the Role of HEI's Interaction with Surrounding Society - Developmental Pilot in Sweden 2013-2016*.

