Evaluation of the Innovation Code of Economic Development of Russia and Its Partner Countries

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Abstract—The transition to a new level of the country's innovative development cannot be achieved without singling out its "invariant core", which determines the code "genotype", the predisposition of the territory to innovative processes of a certain level of complexity and type. The scientific result of the presented research is the development of a new code approach to the interpretation of existing knowledge about the innovation development of Russia and its partner countries, synthesizing elements of classical and evolutionary approaches for ensuring innovative growth of the country’s economy, as well as elements of genetic engineering. The result of applying this methodology is the definition of the innovation code of Russia’s economic development in a comparative aspect through rating. After the analysis of the each indicator, it can be possible to understand what measures can be found to improve the innovation development of Russia and to help partner countries to improve their innovation development.

Keywords—innovative code of development, code approach, scientific and technological partnership.

I. ACTUALITY AND BASIC ISSUE

It is generally accepted that the positioning of the state in the world economic system is largely determined by the development of new knowledge and innovative products, efficiency of research and innovation activities. The globalization processes based on the innovation processes acceleration have increased the share of innovation in the global gross domestic product and increased the importance in the global technological development. A knowledge-based economy, which growth key factor based on the high-level of science and technology, becomes the source of national welfare.

Numerous works have been devoted to the issue of ensuring regional innovative development. It is possible to identify various theoretical and methodological approaches. The most well-known in the scientific literature approaches can be listed as follows: approaches to the formation of growth poles; approaches to ensuring structural and innovative regional development and approaches to identifying hidden sources of "new" growth. Despite the substantial differences, the general approach is to study the static and dynamic processes occurring in the particular territory at particular time. At the same time, previous studies have not formed a universal effective scheme of solutions the issues of innovative development of the economy. Therefore, we make a hypothesis that when examine the issue of innovative development of regions, first of all it is necessary to start from the analyze of the business and economic past of the territories; their specifics and traditions of doing business; culture and values of civil society. Without this data it is impossible to design and model a "new" future. Also it is impossible to make the transition to the new level of innovative development without identification the "invariant core" [2], representing the socio-economic context of the studied territory, and which determines its "genotype" [3] as a predisposition to innovation processes of certain type and level of complexity. In this work, we sought to develop the identification of innovative codes of Russia and its partner countries, which allows us making the comparative analysis for future improvement of the positions in terms of scientific and technological integration with other partner countries.

II. ANALYSIS AND APPLICATION OF METHODS FOR ASSESSING THE INNOVATIVE DEVELOPMENT OF THE COUNTRY’S ECONOMY

The relevance to develop a new methodology for assessing Russia's innovative development is supported by the fact that the Strategy for Scientific and Technological Development of the Russian Federation, approved in December 2016 by Presidential Decree and establishes the principles, priorities, main directions and measures for implementation of the state policy in this area, among the necessary measures mentioned transition to modern models of statistical observation, analysis and evaluation of economic and social efficiency of research and innovation activities.

A. Analysis of Existing Methods for Assessing the Innovative Development of the Economies of Different Countries

This section provides a brief overview of analytical annual reports, where the analysis is based on composite indices and consists a number of indicators selected depending on goals and objectives of the study. The key indices of innovative development can be listed as follows: Global Innovation Index (GII), Networked Readiness Index (NRI), Knowledge Economy Index (KEI), and Global Competitiveness Index (GCI). Moreover, we should mention Rating of Innovative Development of the Subjects of the Russian Federation, made by Institute for Statistical Studies and Economics of Knowledge National Research University Higher School of Economics (Russia).

One major drawback of foreign analytical reports is the usage of indicators that are not always present in Russian sta-
The above graph clearly demonstrates the effect of "saturation", in which the increment value of the global innovation index at the level of R&D expenditure of more than 2% of GDP is far behind the line.

The application of the method of calculation of the Global Innovation Index-2018 made it possible to actualize the need to develop an authoritative evaluation technique that excludes subjectivism due to the expert's personal context and ensures the operative reproducibility of indexing results.

III. METHODOLOGICAL APPROACH TO THE EVALUATION OF THE INNOVATION CODE OF ECONOMIC DEVELOPMENT OF RUSSIA AND ITS PARTNER COUNTRIES

Our methodology is based on the innovative code of economic development of the territory. The index of the innovative code of economic development (IICED) is calculated on the basis of eleven selected indicators GII 2018, which have analogues among the target indicators in the Strategy for Innovative Development of the Russian Federation for the period up to 2020:

- I1 Expenditure on education (%GDP),
- I2 Tertiary enrolment (% gross),
- I3 Gross expenditure on R&D (%GDP),
- I4 QS university ranking (average score top 3),
- I5 ICT access,
- I6 Patent families 2+ offices/bn PPP$ GDP,
- I7 High-tech net imports (% total trade),
- I8 Patents by origin/bn PPP$ GDP,
- I9 Scientific & technical articles/bn PPP$ GDP,
- I10 Citable documents H index
- I11 High-tech net exports (% total trade).

The use of the selected indicators is caused by the need to discuss innovations at the international level in order to identify the world's best practices, and IICED allows for an ongoing assessment of the factors affecting innovation. IICED was calculated for countries of The Eurasian Economic Union (EEU) and potential partners (China, India, Pakistan, Iran) as the sum of the values of the indicators for each country, translated into a ten-point scale. The result of applying this methodology is the definition of the innovation code of Russia's economic develop-
development in a comparative aspect through rating. This technique allows identifying the limitations of Russia’s innovative development and adjusting the possibilities for Russia’s intercountry scientific and technological cooperation with partner countries.

IV. THE RESULTS OF THE EVALUATION OF THE INNOVATION CODE OF ECONOMIC DEVELOPMENT OF RUSSIA AND ITS PARTNER COUNTRIES

The initial data are presented in Table 2.

|        | Armenia | Belarus | China | India | Iran  | Kazakhstan | Kyrgyzstan | Pakistan | Russia |
|--------|---------|---------|-------|-------|-------|------------|------------|----------|--------|
| I1     | 2.8     | 5       | 4     | 3.8   | 3.4   | 3          | 6          | 2.8      | 3.8    |
| I2     | 1       | 87      | 48.4  | 26.9  | 68.8  | 49.6       | 45.7       | 9        | 9.7    |
| I3     | 0.2     | 0.5     | 2.1   | 0.6   | 0.3   | 0.1        | 0.1        | 0.2      | 1.1    |
| I4     | 0       | 16.9    | 82.3  | 49.8  | 24.6  | 35.9       | 0          | 21.9     | 49.6   |
| I5     | 65.1    | 78.7    | 55.8  | 36    | 67.4  | 75.5       | 45.2       | 33.4     | 72.3   |
| I6     | 0.1     | 0.1     | 0.8   | 0.2   | 0     | 0.2        | 0.1        | 0        | 0.1    |
| I7     | 5.5     | 5.7     | 24.3  | 9.1   | 4     | 7          | 8.1        | 11       | 8.1    |
| I8     | 5       | 3.3     | 56.6  | 1.5   | 9.6   | 2.3        | 4.2        | 0.2      | 7      |
| I9     | 25.7    | 7       | 5.3   | 11.7  | 5.6   | 17.2       | 1.8        | 3.5      | 8.1    |
| I11    | 9.8     | 9.5     | 52.7  | 37.7  | 17    | 3.5        | 1.4        | 13.8     | 36.7   |
| I11    | 0.5     | 2.1     | 28.7  | 3.2   | 0.5   | 1.9        | 0.8        | 0.8      | 2.3    |

The Ranked Results of calculating IICED are the following:
1. China-93,87
2. Russia-52,57
3. Belarus-41,54
4. Iran-39,99
5. India-39,86
6. Armenia-36,21
7. Kazakhstan-34,03
8. Kyrgyzstan-29,14
9. Pakistan-24,25

As we can see Russia shows quite good results among the other countries, only China has better results in innovation development. After the analysis of the each indicator, it can be possible to understand how to improve the innovation development of Russia and to help countries – members of EUU and partners to improve their innovation development.

V. CONCLUSION

The scientific result is the development of a new code approach to the interpretation of existing knowledge about the innovation development of Russia and its partner countries, synthesizing elements of classical and evolutionary approaches, as well as elements of genetic engineering. The practical result is a higher degree of reliability to index estimates and the appearance of the additional capabilities of multiple calculations of possible structural innovation and economic shifts of integration interaction of a given country with other countries. The identification of innovative codes cannot be based only on estimates. It is necessary to create a macro model based on a huge amount of experimental and historical material and a careful analysis of historical trends, and the dynamics of modernization transformations, which will serve as a further direction of this research.

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