Prospective forms of innovative cooperation Russia with China and India

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Abstract. The reorientation of Russia's foreign economic relations toward the Asian vector (primarily toward China and India) will inevitably affect the field of scientific and technical cooperation as well. The purpose of the study: justification of the prospects of development of scientific and technological cooperation of Russia in the form of technological platforms through the inclusion of business participants from China and India. The study is based on a comparison of the number of technology platforms in Russia and major business companies from the Forbes Global rating in China and India, as well as an analysis of the performance of technology platforms (the share of business participants and the geographic coverage of international cooperation). The analysis leads to the conclusion that there are prospects for expansion for most technology platforms in Russia, due to the inclusion of business participants from China and India. The novelty of the work lies in the methodological approach used to substantiate the possibility of expanding Russian technological platforms by including business participants from abroad. The practical significance of the results of the study lies in the possibility of using them to adjust the programs for the development of technological platforms in Russia.

Keywords: S&T cooperation · Russia · China · India · Technological platforms.

1. Introduction

The growing confrontation and a new round of sanctions against Russia by the Western countries led to a turn away from partnership with the countries of the European Union, towards expanding cooperation with Asian countries, primarily China and India. This also applies to the field of scientific and technical cooperation. There is a positive experience of scientific and technical cooperation between Russia and these countries in the field of the military-industrial complex (MIC) and energy infrastructure. In other sectors, such cooperation is less developed due to the different interests of the parties. As the world practice shows, for the convergence of interests of the parties within the framework of S&T cooperation, it is not so much the priorities of development of partner countries that matter, as the forms of its implementation. This actualizes the search and justification of effective forms of S&T cooperation between Russia and China and India.

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Most of the sources on the topic of scientific, technical and innovative cooperation between Russia and China and the BRICS are devoted to the study and description of the main directions, priorities, indicating the forms of such cooperation without analyzing their effectiveness. Thus, the article by Lenchuk E. describes major projects of scientific and technical cooperation within the framework of BRICS in such fields of cooperation between Russia and China and India as military aviation and nuclear energy (which have become traditional), pharmaceuticals (promising) and a number of others (the total number of joint 170 research projects, of which 60 are being implemented) (Lenchuk, 2013). In the article by Belikova K.M. provides data on joint ventures (JV) created by scientific organizations of Russia and China, including the founders and areas of research, and also lists the forms of scientific and technical cooperation between Russia and China in the profile agreement (Belikova, 2019). Golubeva A.S. lists in her article the areas of scientific and technical cooperation between Russia and China (defense industry, energy, metallurgy, transport), and indicates that these areas are preferable for China in order to improve the technological level of its industry (Golubeva, 2020). In the article by Shlyndov A.V. an analysis of cooperation between Russia and China in the areas of space exploration, energy, shipbuilding, electronics was carried out, problems and prospects were identified (Shlyndov, 2008). In the article by Sokolova A.V., Shashnova S.A., Kotsemir M.N., Grebenyuk A.Yu. the strategic documents of the BRICS countries are analyzed; according to the results of the analysis, 14 priority areas of scientific and technical cooperation are selected (Sokolov et al., 2017). The article by M. Kahn analyzes the directions of publications of scientists from the BRICS countries in the Scopus database, as well as the largest challenges of scientific and technological development formulated by each of the countries, considers the feasibility of their specialization in five thematic areas of the Declaration of the Ministers of Science, Technology and Innovation of the BRICS countries of 2015 (Kahn, 2015). There are no unambiguous conclusions about the priorities of cooperation in M. Kahn's article. The article by Danilin I. indicates that cooperation in the field of Hi-Tech has an imbalance of interests of the parties, when China imports advanced technologies and prototypes from Russia, and Russia imports Chinese products and equipment, a "small scale" and a lack of "systematicity and depth" of such cooperation is also noted (Danilin, 2020).

In the monographs of Kuzyk B.N., Titarenko M.L. (Kuzyk and Titarenko, 2006), in the articles by Lavrikova Y.G., Andreeva E.L., Ratner A.V. (Lavrikova et al., 2018), as well as Bakharev I. (Bakharev, 2021) it is pointed out that scientific and technological cooperation between Russia and China has a high potential of mutual supplementation, because each party has its own advantages: Russia has a high level of development of fundamental and applied sciences, while China has accumulated successful experience of commercialization of scientific developments, which can be the subject of experience exchange.

Another block of sources on S&T and innovation cooperation between Russia and China and BRICS is devoted to the analysis of the forms of such cooperation. M.V. Balashova, E.E. Bukhaeva, I.R. Kuklina, O.P. Luksha, A.E. Yanovsky point out that the main form of S&T cooperation within BRICS is "joint multilateral projects" implemented within the BRICS Framework Program, using the BRICS TTN network platform as a search for foreign partners for technology transfer (Balashova et al., 2016). T.N. Leonova and N.V. Malanicheva note that technology transfer in the BRICS countries is incited through "the development of platforms of interaction between business and the academic environment", "the use of ... technology platforms ... to find foreign partners", "the creation of a network of science parks" (Leonova and Malanicheva, 2018). Gawer A. points out that there is a conflict on the term "technology platforms": it can be understood either as software for finding partners, or as cooperation of big business, scientific institutions, start-ups, universities for the implementation of a scientific and technical program / project, which reflects the popular world concept of "triple helix" (Gawer, 2014). The abovementioned article by Y.G. Lavrikova, E.L. Andreeva, A.V. Ratner declares the need to search for and implement "optimal forms" of scientific and technological cooperation between Russia and China (Lavrikova et al., 2018).

A number of sources are devoted to the analysis of the prospects of creating innovation clusters in the BRICS countries. The article by I.V. Tsvigun, M.A. Balashova, Y.A. Sukhodolov states that a

number of clusters operating in Russia have active cooperation with partners from China and India; their products are oriented to the markets of China and Southeast Asia (Tsvigun et al., 2015). The same article substantiates the need to create new clusters in Russia on a parity basis with China, because the countries mutually complement each other in terms of competitive advantages. E.A. Sidorova substantiates the expediency of creating and developing innovation clusters and alliances of science and business in BRICS countries (Sidorova, 2018). It is worth noting that such alliances are possible not only within innovation clusters, but also within technological platforms, in accordance with the concept of "triple helix". The information material of the International Center for Scientific and Technical Information about innovation clusters lists the factors restraining the development of clusters in Russia, including weak interaction between small, medium and large businesses, "unfair competition", "low production culture", "low level of development of associative structures" (Innovation and technology clusters of ICSTI member countries, 2013). It should be added, that territorial concentration of clusters and technoparks in terms of international scientific and technological cooperation also refers to their disadvantages, because to form a network of cooperation between participants from different countries it is required either to create a network of technoparks or to attract foreign companies to national clusters and technoparks. Technological platforms are initially cooperation networks, which can be both national and international, i.e. they are free from the above-mentioned disadvantages of territorial concentration.

It follows from the above that the most promising form of S&T cooperation between Russia, China and India (including BRICS) is technological platforms as a reflection of the "triple helix" and "open innovation" concepts. Russia and the European Union have technological platforms in this context, while China and India do not. This can be seen as another competitive advantage of Russia. On this basis, the task of substantiating the prospects for the development of technological platforms in Russia by including participants from China and India is relevant.

2. Materials and Methods

The purpose of the study is to substantiate the prospects for the development of S&T cooperation in Russia in the form of technological platforms through the inclusion of business participants from China and India.

This study uses methods of comparison and analysis of indicators of development of technological platforms in Russia (the share of business – participants, industry affiliation, countries of international cooperation) and the number of large business – companies from China and India in the context of their industry affiliation. The results of this comparison and analysis are interpreted as follows. If the number of business companies from China, India exceeds the number of technology platforms in Russia in the context of the same industry, and the share of business participants in the latter is at the level of other technology platforms and lower, then the conclusion is positive: there is potential for expanding this network of cooperation at the expense of business participants from China and India. Otherwise, the conclusion is negative: there is a low probability of attracting business participants from China and India, or the number of Russian business participants of the technological platform is sufficient and does not require expansion.

The sources of source data for the analysis were:

- compilation "Russian technological platforms" prepared by the Ministries of Economic Development and Industry and Trade (Ministry of Economic Development and Ministry of Industry and Trade) of Russia (Russian technological platforms, 2019);
- Forbes Global 2000 rating of the largest companies for 2019-2021 with a list of the largest business companies from China and India (Forbes Global 2000, 2022).

3. Results

The authors hereof have analyzed the data from the compilation "Russian Technological Platforms", prepared by the Ministry of Economic Development and the Ministry of Industry and Trade of Russia (Russian technological platforms, 2019). The analysis revealed that the share of business participants in most Russian technological platforms ranges from 30% to 55%. At the same time, there are a number of technological platforms in Russia, with a lesser indicator. This refers to such Russian technological platforms as "National Supercomputer Technological Platform" (0%), "Air Mobility and Aviation Technologies" (13%), "National Space Technological Platform" (24%), "Managed Fusion" (18%), "High-Efficiency Clean Thermal Energy" (20%), "Promising Renewable Energy Technologies" (25%), "New Polymer Composite Materials and Technologies" (28%), "Food and Processing Technologies of the Agricultural Industry – Healthy Food Products" (25%). For a number of Russian technological platforms this indicator is above average. This refers to the following technological platforms: "Textile and light industry" (67%), "Construction and architecture" (60%). In terms of industry, Russia's technological platforms are distributed as follows: Biotechnology and Medicine – 3, Electronics and Computers – 3, Aerospace – 4, Energy – 6, New Materials – 2, Resource Extraction – 3, Machine Building and Robotics – 2, Ecology – 2, Automotive – 1, Construction – 2, Railways – 1, Food Industry – 1, Light Industry – 1. International cooperation of Russian technology platforms is as follows: cooperation with the European Union – 17 platforms, with the countries of the Eurasian Economic Community – 11 platforms, with the USA and Japan – 3 platforms, with China – 5 platforms, with India – 2 platforms. Given the current geopolitical situation, there is an urgent need to reorient Russia's technology platforms that cooperate with European Union countries to cooperation with China or India.

The authors hereof analyzed the Forbes Global 2000 ranking of the largest companies for 2019-2021 with a list of the largest business companies from China and India [20]. As a result, the following industry distribution of the largest business companies in China was revealed as follows: production of electronics and household appliances – 22, metallurgy – 21, construction – 19, energy – 18, food industry – 18, logistics – 14, automotive – 13, information technology – 13, mining of raw materials – 12, biotechnology and medicine – 12, chemical industry – 8, telecommunications – 7, engineering – 4, light industry – 2. The sectoral distribution of India's largest business companies is much more modest, both in terms of industries and the number of companies: raw material extraction – 13, information technology – 7, metallurgy – 6, automotive – 4, telecommunications – 2, food processing – 2, chemicals – 1, biotechnology and medicine – 1, machine building – 1.

As a result of comparing the above two blocks of data, the following conclusions were drawn. Since only two Russian technological platforms have a share of business participants noticeably above the mentioned range, and since the industry affiliation of most other platforms is such that the number of business companies in China exceeds the number of these platforms, they have prospects for expansion to include business companies from China. In the direction of India, there are prospects for expansion only for platforms in four industry areas: raw material extraction, information technology, metallurgy, and automotive industry.

4. Discussion

There are a number of Russian publications devoted to the analysis of the advantages and disadvantages of technology platforms in Russia. Of these, at least three indicate the lack of subsidies from the state, the problems of attracting business structures to Russian technology platforms and the feasibility of expanding them through foreign business partners from the BRICS countries. This refers to the published scientific report of Bodrunov S.D. (Bodrunov, 2013), as well as the articles by A.M. Kretchmer (Krechmer, 2013), Babikova A.V. and Sarafanov A.D. (Babikova and Sarafanov, 2015). Thus, the results of this study correlate with the results obtained by the above authors.

5. Conclusion

As a result of the study, the prospects for the development of scientific and technical cooperation between Russia in the form of technological platforms by including business participants from China

and India are substantiated. The data of the compilation "Russian technological platforms", prepared by the Ministry of Economic Development and the Ministry of Industry and Trade of Russia, were analyzed, in particular, the share of business participants, industry affiliation, countries of international cooperation. These data were compared with the list of the largest business companies from China and India from the Forbes Global 2000 rating of the largest companies. As a result of this comparison, it was concluded that most technology platforms in Russia have prospects and potential for expansion by attracting and including business participants from China and, to a lesser extent, India. The exception to this conclusion is the technological platform of Russia in the field of light industry (due to the small number of large companies from China and India in this industry). The prospects for cooperation between Russian technological platforms and business participants from India are limited to four industries: raw materials extraction, information technology, metallurgy, and automotive industry.

The practical significance of this study lies in the possibility of using its results when adjusting programs for the development of technological platforms in Russia. Prospects for further research are related to the analysis of the possibilities of interaction between technological platforms, clusters of Russia and elements of the innovation infrastructure of China and India.

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