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Perspectives of mutual collaboration of BRICS countries in innovation sphere of enterprise activities

Perspectivas de la colaboración mutua de los países de BRICS en el ámbito de la innovación de las actividades empresariales

S.V. VDOVINA
ORCID: http://orcid.org/0000-0002-7452-411X
vdovina_kki@mail.ru
Kazan Federal University, Institute of Management, Economics and Finance, Kazan, Russia

L.V. GUSAROVA
ORCID: http://orcid.org/0000-0002-6082-2626
gusarova5@yandex.ru
Kazan Innovative University named after V.G.Timiryasova (IEML), Kazan, Russia

M.A. PUGACHEVA
ORCID: http://orcid.org/0000-0002-2515-5661
pugacheva.m@mail.ru
Kazan Federal University, Institute of Management, Economics and Finance, Kazan, Russia

E.A. PETROVA
ORCID: http://orcid.org/0000-0002-6342-9061
dzhenya@mail.ru
Kazan Innovative University named after V.G.Timiryasova (IEML), Kazan, Russi

ABSTRACT

The article analyzes the prerequisites and reasons for the unification of BRICS countries. It considers the level of innovative development of the participating countries in the light of international ratings, and conducts a SWOT analysis of the strengths and weaknesses of BRICS countries in innovation. Today there are many works devoted also to the economic development of BRICS countries. In this regard, an important task is the need to study possible "points of contact" in the development and use of the innovative potential of BRICS countries for cooperation in this area.

Keywords: BRICS countries, innovations, mutually beneficial cooperation, single innovation system.

RESUMEN

El artículo analiza los requisitos previos y las razones para la unificación de los países BRICS. Considera el nivel de desarrollo innovador de los países participantes a la luz de las calificaciones internacionales, y realiza un análisis FODA de las fortalezas y debilidades de los países BRICS en innovación. Hoy en día hay muchos trabajos dedicados también al desarrollo económico de los países BRICS. En este sentido, una tarea importante es la necesidad de estudiar posibles "puntos de contacto" en el desarrollo y uso del potencial innovador de los países BRICS para la cooperación mutua en esta área.

Palabras clave: Cooperación mutuamente beneficiosa, innovaciones, países BRICS, sistema único de innovación.

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1. INTRODUCTION

BRICS is a group of five rapidly developing countries: Brazil, Russia, India, China, and the Republic of South Africa. It is generally recognized that the creation of BRICS implied, first of all, the response of the five largest countries of the world to the imbalance of the modern political system and the global economy. For Russia, participation in BRICS is an important factor in maintaining geopolitical ambitions. Even according to the most favorable forecasts, in the next 20 years, the Russian Federation together with members of the Eurasian integration group (Kazakhstan and Belarus) will not be able to ensure more than 5% of global GDP. At the same time, the conditional addition of the Russian potential with the potential of China and India, as well as Brazil and South Africa is a value that the leading world powers and economic blocks cannot ignore. Relations with BRICS countries correspond to the tasks of modernizing the Russian economy, diversifying the foreign economic relations of Russia, primarily strengthening its Asian vector. The Russian Federation is interested both in the formation of bilateral economic partnership with individual states and in deepening multilateral relations within the community as a whole.

Under cooperation between the BRICS countries in the field of innovation, issues of the relationship between Russia and China should be given priority. Note that among all the participating countries, China and Russia have the largest number of common points of contact: this is the common socialist past, the level of economic, social, and educational development, and already having a positive experience in mutually beneficial cooperation in many areas.

One of the main tasks for all the BRICS countries is a gradual transition from a slow raw material to a model of a rapidly developing, innovative economy. However, both the economy and the innovative infrastructure of the BRICS countries are different.

2. MATERIAL AND METHODS

Based on the application of a systematic approach, methods of empirical and situational analysis and synthesis, statistical analysis and abstract-logical and expert assessment of the strengths and weaknesses of the innovation systems of the BRICS countries, the main perspectives of their cooperation in the field of innovation are examined; possible directions for the development of regional innovation systems of BRICS countries are identified; ways of international cooperation in the framework of a group of BRICS countries in innovative areas are proposed.

The practical significance lies in the possibility of using the results of the study in the work of the state bodies of the BRICS countries in the formation of a single innovation system.

3. RESULTS

The analysis of the views of domestic and foreign scientists and politicians revealed a mixed attitude towards the unification of the BRICS countries. According to the executive director of the National Committee for the Study of BRICS, director of the Center for Asian Strategy of Russia, Institute of Economics of the Russian Academy of Sciences - G.D. Tolorai,

> The historical mission of the BRICS as a new community of countries and civilizations is not to confront the West within the framework of the existing system but to propose a new ideology for the development of mankind that meets the needs of sustainable development. BRICS is a largely elitist project, which is based on political will. However, it should neither be simplified nor presented as "anti-Western". BRICS has matured as a tool designed not to oppose but to promote a more equitable balance of power in the world, taking into account the interests of all countries since during the second half of the XX century there was a clear tilt towards the West in politics and economics" (Toloraya:

2015, pp. 128-139; Mohammadi & Yekta: 2018, pp. 1-7; Ramírez, Lay, Avendaño y Herrera: 2018; Rincón, Sukier, Contreras y Ramírez: 2019).

Academician V.A. Sadovnichii believes that BRICS is an association of a new generation that lays the foundation for an integral, humanistic-noospheric civilization (Sadovnichev et al.: 2014; Annía, Villalobos, Romero, Ramírez & Ramos: 2018; Kalogeropoulos et al.: 2020).

According to the deputy director of the Department of Foreign Policy Planning of the Ministry of Foreign Affairs of the Russian Federation A.M. Ovchinnikov,

> Among the strategic interests that unite the BRICS participants, we should note the desire to reform the international financial and economic system in accordance with the realities of the world economy; interest in strengthening the rule of law in international relations and the central role of the UN and its Security Council in maintaining international peace and security; the desire to use the complementarity of economies to accelerate the development of our countries, as well as the urgent need for modernization and implementation of innovations (Radulescu et al.: 2014, pp. 605-613; Nooradi et al.: 2017, pp. 71-75).

The World Intellectual Property Organization "WIPO" together with the INSEAD Business School and the Graduate School of Management at Cornell University annually compiles a rating of countries with a comprehensive comparison of their innovative activities under the name "GII" (Global Innovation Index). The index is calculated based on more than 80 indicators, they are combined into subgroups, which are included in two large groups: "Innovation Input" and "Innovation Output". (Davydenko et al.: 2017; Laureano et al.: 2018, pp. 4-7) The indicators reflect the country's potential in innovation (Innovation Input - the available resources and conditions for innovation), and the results of the implementation of this potential (Innovation Output - achieved practical results of innovation). The ratio of these groups reflects the country's effectiveness in the Innovation Efficiency Ratio, and their arithmetic average coefficient reflects the country's Global Innovation Index. The first group of indicators - “Innovation Input” - combines such indicators as the quality of institutions, human capital, and research, the country's infrastructure, as well as the development of the domestic market and business. The second group of indicators - “Innovation Output” - combines the indicators of technology development in the country and the results of creative activity. The analysis of the dynamics of changes in these groups of indicators by BRICS countries (Table 1) allowed us to draw the following conclusions (Armijo: 2007, pp. 7-42; Konkin).

Countries	(Innovation Input) The available resources and conditions for innovation										(Innovation Output) The achieved practical results of innovation			
	Quality of institutions		Human capital and research		Infrastructure		Internal market development		Business development		Development of technologies and knowledge economy		Results of creative activity	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
Brazil	96	85	62	63	60	67	89	87	37	37	65	72	64	82
Russia	88	80	30	26	51	65	111	94	60	44	34	33	72	79
India	106	104	96	103	87	87	50	72	93	116	50	49	82	95
China	114	91	32	31	39	32	54	59	32	31	2	3	59	54
South Africa	44	43	70	75	84	89	18	23	68	73	62	58	70	76

Table 1. Dynamics of the BRICS countries in the ranking of “Global Innovation Index” for 2016-2017

China and Russia maintained the status of rapidly developing countries in innovation; in 2017, the total number of growth points for China was 31, for Russia - 25. The remaining three indicators dropped significantly and finished 2017 with a minus mark. South Africa, like India, has a downturn in human capital development and ranks 75th in the world. Indicators of infrastructure, the development of the domestic market and business also worsened. Despite the decline in the domestic market, South Africa remains the leader in this field among the BRICS countries and ranks 23rd in the world.

A significant decline in Brazil is associated with creative activity (by 18 points), as a result of which the country ranked 82nd in the world. Positions in infrastructure and the level of technology development worsened (by 5 points). At the same time, thanks to the improvement of the business environment in the country, the rating in the field of quality of institutions has grown significantly (by 10 points).

Although Russia takes the last place in the development of the domestic market among the BRICS countries, in 2017 it presented more than 15 points in this area thanks to an improvement in lending and business. Given the current political situation, an improvement in the quality of institutions by 8 points looks advantageous. Russia occupies a leading position (26th place) in the BRICS group in human capital and research, and 13th in the world in the number of specialists with higher scientific and technical education. However, there are also negative indicators, for example, a decline of 14 rating points in infrastructure.

The analysis of the level of innovative potential as a whole showed that among the BRICS countries it was the lowest in South Africa (46th in the world), and the highest - in China (24th). At the same time, in terms of innovation and invention, Russia took the lowest position of all the BRICS countries, taking only 75th position.

One of the most important criteria for a country's innovative potential is an indicator of R&D expenditures (Table 2).

	2012		2013		2014		2015		2016		2017 (forecast)	
	bln. dollars	% to GDP	bln. dollars	% to GDP	bln. dollars	% to GDP	bln. dollars	% to GDP	bln. dollars	% to GDP	bln. dollars	% to GDP
Brazil	30.0	1.25	31.9	1,3	37.18	1.21	38.62	1.21	37.04	1.20	37.22	1.20
Russia	26.9	1.08	38.5	1,48	53.52	1.5	55.77	1.5	55.32	1.5	55.93	1.5
India	41.3	0.85	45.2	0,9	61.85	0.85	67.7	0.85	72.85	0.85	77.46	0.84
China	198.9	1.6	220.2	1,65	373.78	1.95	372.81	1.98	400.93	1.94	429.54	1.96
South Africa	5.5	0.95	6.0	0,95	6.49	0.95	6.87	0.95	6.16	0.85	6.2	0.85
Total, BRICS countries	302.6	-	341.8	-	532.82	-	541.77	-	572.3	-	606.35	-
Total in the world	1469.0	1.77	1496.1	1,77	1803.1	1.7	1926.48	1.71	1998.18	1.72	2066.3	1.72

Table 2. R&D expenses in the BRICS countries in 2012-2017, billion dollars (Grueber & Studt: 2014, pp. 1-35.)

The analysis of Table 3 allows us to conclude that R&D expenses have a positive trend in all BRICS countries, while their share in the countries' GDP has not changed.

Countries	2012	2013	2014	2015	2016	2017
China	135	14.7	20.7	19.4	20.1	20.8
India	2.8	3.0	3.4	3.5	3.6	3.7
Russia	1.8	2.6	3.0	2.9	2.8	2.7
Brazil	2.0	2.1	2.1	2.0	1.9	1.8
South Africa	0.4	0.4	0.40	0.4	0.3	0.3
TOTAL	20.6	22.8	29.6	28.1	28.6	29.3

Table 3. Share of R&D expenses of the BRICS countries in the total volume of world R&D expenses in 2012-2017, %

The R&D expenses in China in 2017 increased by 7.1% compared to 2016 and amounted to $400.93 billion (Mañana-Rodríguez: 2014, pp. 343-354.).

Another criterion for innovative potential is the indicator of scientific publications and their citations. The results of the analysis of the level of scientific publications by BRICS countries are given in Table 4.

Indicators	Brazil	India	China	Russia	South Africa
Number of scientific publications	834,526	1,472,192	5,133,924	956,025	241,587
Number of cited publications (SCI)	794,371	1,379,217	39,244,368	936,928	220,567
Share in global cited publications (%)	10.44	8.58	7.64	7.07	12.94
H index	489	521	712	503	391

Table 4. Scientific publications in the BRICS countries for 1996-2017

As we can see, China is significantly ahead of other countries of the union, both in the number of scientific publications and in the level of their citation. By the number of publications and citations, Russia ranks third after China and India (Moiseeva & Mazol: 2013, pp. 366-373).

Thus, comparative analysis revealed the strengths and weaknesses of the BRICS countries and the huge gap in the level of development and contribution to the formation of the regional innovation system by various participating countries. The need to develop mechanisms for comprehensive international cooperation in the framework of the BRICS group of countries in innovative areas of activity requires the development of a long-term cooperation program in this area. The first step in this direction was the adoption in October 2016 of the BRICS Work Plan in the field of science, technology, and innovation for 2016–2018 (Sidorova: 2018, pp. 34-50; Ngqulunga & Walwyn: 2016, pp. 1713-1731; Pakdel & Ashrafi: 2019) and the BRICS Economic Partnership Strategy, which are aimed at further cooperation based on mutual benefit for BRICS countries and provide for new research and innovation initiatives. Five priority areas of cooperation were identified, distributed between the responsible countries. To coordinate activities within the framework of the research and innovation network platform of the BRICS countries, it was decided to designate contact centers and establish a direct channel of communication between stakeholders.

4. CONCLUSIONS

Thus, BRICS is a new type of integration grouping that has become the result of the transition of the global economy from a unipolar to a multipolar world. The main goal is to increase the international competitiveness of the BRICS countries through the establishment and development of national innovation systems with their subsequent integration into a single innovation system.

Close cooperation in the innovation field, as well as a complemented exchange of experience between countries, will give a substantial and effective growth of the economy to slowly developing states, as well as to draw up the weaknesses of the economy. BRICS have all the necessary resources for economic growth and the innovative potential of these countries.

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BIODATA

S.V. VDOVINA: Svetlana Demitrievna Vdovina has a Ph.D. at Kazan Federal University, Institute of Management, Economics and Finance, Kazan, Republic of Russia. The research area is Industrial Organization, Econometrics, Business Administration, Labor Economics, Labor Statistics, Financial Economics, International and Comparative Labor, Development Economics, Labor History, Environmental Economics.

L.V. GUSAROVA: Liubov V. Gusarova has a Ph.D. at Kazan Innovative University named after V.G.Timiryasova (IEML), Kazan, Republic of Russia, is a member at Iniurcolleguia Moscow, Russia, and is a lawyer serving Moscow in General Civil Law, International Trade Law, and International Business Law cases. The research area is Environmental Economics, International Trade Law, and International Business Law cases.

M.A. PUGACHEVA: Maria A. Pugacheva has a Ph.D. at Kazan Federal University, Institute of Management, Economics and Finance, Kazan, Republic of Russia. The research area is Industrial Organization, Econometrics, Business Administration, strategic analysis, competitiveness, engineering, Environmental Economics, Development Economics, International Business.

E.A. PETROVA: Evgenia A. Petrova has a Ph.D. at Kazan Innovative University named after V.G.Timiryasova (IEML), Kazan, Republic of Russia. Is a Director at Kazan Innovative University named after V.G.Timiryasova (IEML). The research area is Industrial Organization, Econometrics, Business Administration, Financial Economics, International Business, Development Economics, Environmental Economics.

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