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### **BRICS COUNTRIES IN A PERIOD OF UNCERTAINTY AND TURBULENCE: OPPORTUNITIES FOR THE FORMATION OF A NEW CONFIGURATION OF THE GLOBAL ECONOMY<sup>3</sup>**

*The increasing uncertainty and turbulence of the external environment create new conditions for achieving global leadership. The study aims to conduct a comparative assessment of the economic, scientific, educational, and digital potential of the BRICS countries under conditions of uncertainty to identify opportunities to strengthen their leadership position in the global economy. The article presents the author's vision of the causes and factors of increasing uncertainty and its impact on modern states. The article proves the hypothesis that the BRICS countries are increasing their economic, scientific, educational, and digital potential in comparison with the developed countries of the G7. It concludes that the BRICS countries are superior in economic potential and lag in terms of scientific, educational, and digital potential. It is argued that the uncertainty and turbulence caused by the 2020-2021 pandemic helped the BRICS countries to increase their potential and align their positions with the G7 countries. The identification of the strengths and weaknesses of the BRICS national economies allowed the authors to identify their points of growth in the implementation of the outperformance strategy. It was determined that the most appropriate development strategy for the BRICS countries under conditions of uncertainty is an ambivalent adaptation strategy that allows them to increase their influence in the global economy.*

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*JEL: F01; F02; F62; F63*

## **1. Introduction**

Modern realities are such that every year an increasing number of uncertain factors have an impact on the socioeconomic life of society. In the last century, socioeconomic upheavals were primarily associated with world wars, the Great Depression, and the crisis of technology companies (Kose, Ohnsorge, 2019).

In the XXI century, the causes of numerous economic fluctuations and the growth of social tension were the financial crises that became more frequent over time (Yussuf et al., 2022). Some of them were global in nature, others were distinguished by their local manifestation. In particular, the collapse of the dot-com bubble dealt a crushing blow to the stock market of high-tech American companies and in 2001-2002 created the prerequisites for the development of the global crisis of the “new economy”. The collapse of the banking system in the United States in 2008 and the collapse of the securities market caused the development of a global recession that engulfed most developed and developing countries. The recession of 2008-2009, associated with a sharp increase in public debt, a decline in world trade, and unstable dynamics of commodity prices, eventually led to a payment imbalance in the global economy.

Pandemics of various diseases and viruses, natural disasters, extreme weather conditions, and geological catastrophes are other types of uncertainty factors that provoke the emergence of global crises and recessions through a decline in business activity but also bring significant damage to the population of the planet. One of the most devastating epidemiological threats of the last century was the Spanish flu pandemic (“Spanish flu”, 1918-1919), which claimed a significant number of lives and caused significant socioeconomic damage (Eichenbaum et al., 2020).

The COVID-19 pandemic has become a new source of socio-economic uncertainty and the subsequent global crisis. It was distinguished by a high degree of the economic defeat of the world economy, including through a global “lockdown”, which for the first time in modern history almost completely suspended world trade, led to the destruction of global supply chains and settlements and put the established model of the global world economy on the brink of existence (Karpunina et al., 2022).

The impact of uncertainty factors in the period 2020-2021 forced governments of various countries to experiment with methods of saving economies, especially taking into account the novelty of the experience of introducing a global long-term lockdown, the destruction of established business criteria, a sharp decline in consumption and an extreme burden on business and the public administration system. The main result of the confrontation with the uncertainty and chaos associated with the pandemic was the consolidation of resources in the

recession zones and the organization of real and effective economic assistance to the population and the most affected industries.

However, the current sources of socio-economic uncertainty are not exhausted. The XXI century has not been spared by geopolitical conflicts, which have become an important component in the system of uncertainty factors.

The geopolitical instability that broke out in February 2022 intensified the processes of redistribution of global leadership and created conditions for launching a whole range of socio-economic and geopolitical changes related to the processes of production organization, reformatting international interaction, the transformation of business processes and management models (Yadigarov, 2022).

Such manifestations of uncertainty and turbulence can contribute to the redistribution of the centres of economic leadership from developed countries to developing economies (Kuznetsov, 2022).

Uncertainty reinforces existing trends, such as a slowdown in factor productivity in the economies of developed countries (TED, 2019; Gilbert et al., 2016; Crafts, 2018), growth of economic activity in developing countries in the context of increasing stable domestic demand (United Nations, 2019). Thus, PwC has formed a forecast according to which in 2030, 66% of the middle class and 59% of their consumption will be concentrated in developing countries such as Brazil, Russia, India, China, and South Africa, and their economic growth will exceed the growth of the developed G7 countries.

What are the possibilities of forming a new global landscape in the face of uncertainty of environmental factors? Currently, an assessment of the existing potential of the developing BRICS countries and the formation of recommendations on the choice of priority areas of public policy that contribute to the formation of the alliance of developing countries by world leaders is required.

## **2. Literature Review**

The BRICS Integration Association (Brazil, Russia, India, China, and South Africa) turned 16 in 2022. The features of the development of the BRICS economies at different stages of its existence are presented in the works of Lo, Hiscock (2014), Luckhurst (2013), Ogrean, Herciu (2010), Takebe, Mlachila (2011), Rodionova (2014). Most of these authors are inclined to believe that the BRICS countries will become one of the political forces that will change the future of the world economy and trade policy.

A whole block of research is devoted to the consideration of issues of industrial and trade-economic intra-integration cooperation of the BRICS countries in the context of new global challenges. Georgina (2018) explores this problem in terms of energy interaction. Kovalchuk (2015) considers the possibility of creating a new global monetary and financial system within the BRICS. Kolesnikov et al. (2018) conducted a comparative analysis of the implementation of the industrial policy of the BRICS countries and the countries of the European Union.

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Assessment of the innovative potential of the BRICS countries and the possibilities of its improvement is presented in the works of Matrizaev (2019), Drobot et al. (2021), and Petrenko et al. (2020). Nevertheless, many of the authors also note that the problem of internal underfunding of innovations is clearly expressed in the BRICS countries (Bek, Bek, 2013).

The period of digitalization has become a new stage for the BRICS countries to unlock their internal potential. Scientists claim that thanks to the intensive introduction of digital technologies and a competition policy in the field of digital development, the BRICS countries can make a breakthrough and achieve global technological leadership (Ignatov, 2020; Spartak, 2018; Yakovleva et al., 2020; Koshelev, 2022).

However, the current stage of development is characterized by a high level of uncertainty and turbulence. This applies not only to regularly occurring crises and recessions of a financial and economic nature. We are also talking about the impact of the pandemic and geopolitical instability on the development of economic systems (Podorova-Anikina et al., 2022; Karpunina et al., 2022). Bordachev T. et al. (2020), and Lisovolik (2022) call the period of exposure to epidemiological threats a pandemic of rivalry, noting that the COVID-19 pandemic contributed to the weakening of global governance and the strengthening of global rivalry, the struggle for world leadership. Thanks to this, the issue of reducing the dependence of the leading developing economies (first of all, the BRICS alliance) on the US dollar, creating alternative financial and economic instruments and development institutions becomes relevant again.

How optimistic are the researchers' forecasts regarding the formation of the BRICS countries as a new pole of global economic growth? This study is devoted to the research of this issue.

### **3. Methodology**

*Hypothesis 1.* The BRICS countries are increasing their economic, scientific, educational, and digital potential compared to the developed G7 countries. Uncertainty and turbulence in the external environment contribute to the expansion of the BRICS countries' influence on the global economy.

*Hypothesis 2.* The BRICS countries transform the sectoral structure of their economies by the trends of the global conjuncture.

*Hypothesis 3.* The implementation of an ambivalent strategy of adaptation and growth by the BRICS countries will allow them to provide a leading edge in the formation of a new configuration of the global economy.

The study aims to conduct a comparative analysis and assessment of the economic, scientific, educational, and digital potential of the BRICS countries in the period of increasing uncertainty to identify opportunities for strengthening their leadership position in the global economy.

*Research objectives:*

- to reveal the specifics of the manifestation of uncertainty in the modern world, to highlight the stages of its manifestation;
- to propose a methodology for conducting comparative analysis and evaluation of the economic, scientific, educational, and digital potential of BRICS countries in conditions of uncertainty;
- to justify the choice of development strategy for the BRICS alliance countries in the formation of a new geopolitical order.

Research methods: the method of analysis and synthesis, the method of systematization, the method of grouping, the method of economic analysis, the method of statistical analysis, including the method of calculating integral indicators, the method of comparative analysis, graphical method, the method of expert survey, a systematic approach.

In the first stage of the study, the authors apply the method of analyzing scientific literature, as well as the method of analysis and synthesis to identify the specifics of the manifestation of uncertainty in the modern world and highlight the characteristic features of its manifestation.

The second stage of the study is associated with a multidimensional analysis of statistical data on the socio-economic development of the BRICS and G7 countries, as well as an assessment of their potential.

To assess the economic, scientific, educational, and digital potential of the studied countries, the method of calculating integral indicators based on:

- selection of the reference value of the indicator for each group and calculation of normalized indicators:

$$x_i = X_i / X_{max} \quad (1)$$

where:

$x_i$  is normalized indicators;

$X_i$  – the value of the initial indicator for each country;

$X_{max}$  – the reference (maximum) value of the initial indicator (Vasilieva, 2017).

- application of the expert survey method to determine the weight of each indicator;
- calculation of integral indicators by multiplying each normalized indicator by its “weight” and then summing by a group with division by the number of indicators (Alpeeva et al., 2020):

$$I_i = (\sum_1^n x_i) / n \quad (2)$$

where:

$I_{am}$  – the integral indicator of the country's potential;

$n$  – is the number of structural components of the potential;

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- groupings of countries with their subsequent ranking.

In the third stage of the study, methods of comparative analysis and a systematic approach are used to form conclusions based on the results of the work and determine effective tools for strengthening the potential of the BRICS countries in the global economy.

The information base is the statistical data of the OECD, the World Bank, Statista, IMD, national statistical agencies, and international organizations.

## **4. Results**

### *4.1. Uncertainty and turbulence of modern reality as prerequisites for the formation of a new configuration of the global economy.*

Let's highlight some of the reasons contributing to the increase in uncertainty and turbulence in the modern world.

Firstly, the growth of socio-economic tensions. If we look at the development of the world economy over the period from 1990 to the present, we can identify several key stages of economic growth. The points of extreme recessions are the crises of 2008 and 2020 and the periods of economic recovery from the “shock” effects of recessions on economic growth in developed countries. During the analyzed period, there were also more weak crises, for example, the crisis of 1997-1998 (the Asian crisis and the subsequent banking crisis) (Aleksashenko et al., 2012). Indeed, in the XXI century, global financial and economic crises have become regular: 1990-1998 – the period associated with the Asian banking crisis, 1997-2007 – the recovery period after the Asian crisis and the crisis of the high-tech economy in 2000, 2008-2009 – the periods of the global recession, 2010-2018 – the period of recovery after the global recession, 2019-2021 – the development of the global coronavirus pandemic and the beginning of the corresponding period of instability and economic crisis (Karpunina et al., 2022).

Secondly, the transformation of the traditional way of life of society under the influence of digitalization. Indeed, in the 21<sup>st</sup> century, the processes of digital development have become more intense and profound. The emergence of digital technologies of flexible production, the improvement of management systems using artificial intelligence, customer-oriented solutions, and optimized logistics, enhanced integration of cyber-physical systems into production processes and the use of online communication technologies have allowed solving numerous problems of socio-economic and social development at the present stage (Davies, Schwab, 2018).

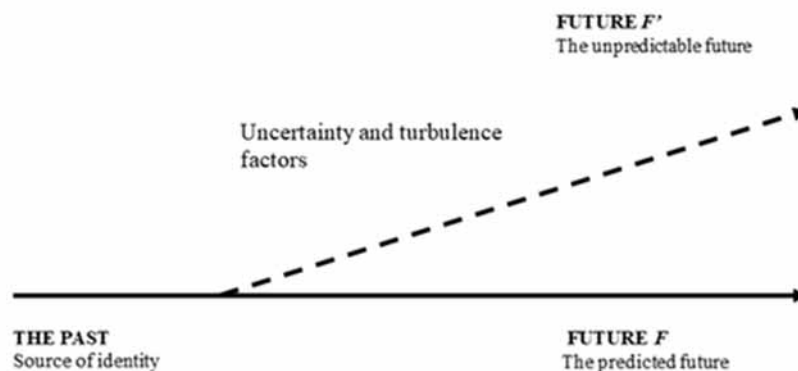
Thirdly, the COVID-19 pandemic, as an unpredictable and multidimensional phenomenon, has had a significant impact on the growth of instability around the world. This was facilitated by the introduced sanitary knockdowns and restrictions, violation of interregional and international communications, and sanitary measures taken by governments (Fraymovich et al., 2021; Korolyuk et al., 2021). As a result, the suspension of business activity created prerequisites for the development of a pandemic crisis in the form of a decline in GDP, a

reduction in real disposable incomes of the population, and an increase in unemployment (RBC, 2020). The pandemic has undermined the psychological stability of the population and the culture of tolerance (Pokhilko, Shabashova, 2020; Inghart, 2021).

As a result, these causes of uncertainty and chaos caused the growth of global turbulence, the divergence of interests, and the launch of processes of redistribution of global leadership, and, as a result, the aggravation of geopolitical conflicts that have a direct impact on the stability of national economies. In particular, economic methods of conducting a trade war at the global level can cause irreparable damage to the economic security of the enemy. The latter will worsen in the case of a strong dependence of the state on imports of foreign goods. Therefore, the use by states of the mechanism of economic sanctions restrictions may deprive national economies of the inflow of foreign investments that ensure their sustainable development in strategically important areas (Idaten, 2022).

Thus, uncertainty and turbulence guide modern states along a new trajectory of development, where each state has a chance to make a breakthrough and take the desired position in the new configuration of the global economy (Figure 1).

**Figure 1. A model of the impact of uncertainty and turbulence on modern states**



*Source: compiled by the authors.*

We will conduct a critical analysis of the model of the impact of uncertainty and turbulence on modern states.

In the figure, you can see the predicted vector into Future  $F$ , the traditional vector of the life of the state and society with known and predictable factors of the development of the internal and external environment, as well as a certain set of threats. In the past, which is a source of identity, each state has experienced overcoming crisis phenomena by implementing state policy measures. Movement along this vector allows the state to successfully overcome minor fluctuations, returning to the point of sustainable development of the economic system (Karpunina et al., 2022).

Movement in the direction of vector  $F'$  acquires a different character. Socio-economic and geopolitical uncertainty exposes an individual, society, and the state as a whole to a state's

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lack of identity with the past. In the past, there has been no experience in overcoming such pronounced fluctuations (an indefinite pandemic, a geopolitical conflict that has grown for an unknown period, an invaluable digitalization, etc.). In critical conditions of the impact of threats, fears for life, health, and well-being arise, and confidence in the future, trust in the government, and faith in a possible positive outcome of the current situation are lost.

The decisions made become rash and spontaneous. An example is the models of consumer behaviour during the beginning of the pandemic (buying food, excessive demand for expensive goods, etc.). A similar situation developed in the labour market during the period of epidemiological threats: in conditions of uncertainty, rash decisions were made to massively reduce workers instead of implementing reasonable measures to adapt to the new reality (even with the implementation of state support for employment in particularly affected sectors of the economy). Such measures as the purchase of foreign currency and the excessive demand for sugar during the beginning of the special operation in Ukraine had a similar effect in Russia. Of course, they all come from a state of fear and uncertainty about the future (that is, the specifics of human perception of abrupt changes) and, as a rule, have long-term negative consequences. However, if you rebuild from fear and panic, then a completely new space opens up for the realization of the existing social potential, and new unfilled niches appear in various segments of the economy. For example, during the pandemic, the digital sector of the economy became such a direction.

With the beginning of the special operation in Ukraine and the introduction of new international sanctions restrictions, there was a surge in the development of charitable activities and NGOs, import substitution, logistics, the real estate market, tourism, new integration forms of interaction between individuals and the state (Muzykantov, 2022).

Thus, it can be concluded that global uncertainty and turbulence create prerequisites for changing the geopolitical landscape and opportunities for the redistribution of economic forces in the world.

Experts note a pronounced trend of shifting the centres of economic leadership from the economies of developed countries towards the developing world. Confirmation of this trend can be found in the slowdown in factor productivity of the economies of developed countries (TED, 2019; Gilbert et al., 2016; Crafts, 2018) and the strengthening of economic activity in developing economies, primarily in the countries of the BRICS alliance (United Nations, 2019).

Studies aimed at predicting the trend of leadership redistribution between developed and developing countries prove that the economic growth of developing countries will soon exceed the growth of the developed G7 countries, and their total GDP by 2030 may be twice as high as that of the G7 countries. Approximately the same dynamics can be seen in basic social indicators: experts predict that by 2030 66% of the middle class and 59% of their consumption will be concentrated in the developing countries of the BRICS alliance.

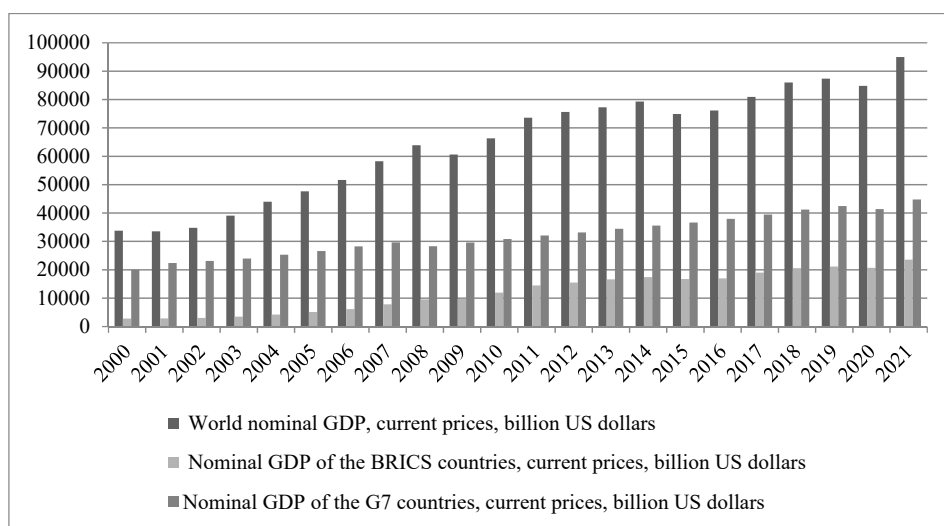
Is such a drastic change in the configuration of the global economy possible? What resources are needed for the advanced development of the BRICS countries? What factors of uncertainty and turbulence will contribute to the formation of a new world reality?



4.2. Analysis of the main indicators of the economic, scientific, educational, and digital potential of the BRICS countries.

Consider the position of the BRICS alliance on the world stage. The GDP of the group of countries currently included in the BRICS alliance in 2000 was 8.15% of global GDP (Prognostica, 2022). After 2006, when the BRICS international alliance was institutionalized, its share in the global economy began to grow. By 2010 it reached 17.99%, in 2019 it was 24.17%. The pandemic year 2020 provoked an increase in the share of the BRICS countries in world GDP (up to 24.39%), and in 2021 the dynamics of increasing the presence of the alliance countries in world GDP also remained positive at (at 24.78%) (Figure 2).

**Figure 2. Dynamics of changes in the world nominal GDP and nominal GDP of the BRICS countries, 2000-2021**



Source: compiled by the authors according to OECD (2022).

The change in the world nominal GDP for 2001-2021 amounted to 181.35%, while the growth of the nominal GDP of the BRICS countries over the same period amounted to 754.75%. For comparison, the same indicator for the G7 countries was 124%. In other words, the nominal GDP of the BRICS countries in the period 2000-2021 grew 4 times more than the world nominal GDP and 6 times more than the nominal GDP of the G7 countries.

In the period 2000-2021, the balance of power between the BRICS and G7 countries changed: in 2000 it was 1:8, and in 2015 it was 1:2, by 2021 the positions of the BRICS countries were even more strengthened against the background of the G7 countries.

Let's analyze the contribution of each of the BRICS countries to global GDP (Table 1).

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**Table 1. Share of GDP of BRICS and G7 countries in world GDP, 2000-2021 (%)**

Country	2000	2005	2010	2015	2019	2020	2021
Brazil	1.94	1.87	3.33	2.41	2.15	1.7	1.74
Russia	0.79	1.65	2.36	1.82	1.93	1.75	1.74
India	1.4	1.73	2.54	2.83	3.29	3.14	3.1
China	3.58	4.8	9.15	14.79	16.37	17.42	17.76
South Africa	0.44	0.58	0.61	0.45	0.43	0.38	0.44
BRICS	8.15	10.63	17.99	22.3	24.17	24.39	24.78
G7	65.43	59.8	49.85	46.48	45.52	45.67	44.72

Source: compiled by the authors according to OECD (2022).

The first place in the world in terms of the share of global GDP is occupied by the United States, in 2020 their contribution was 21.61%. The second position in the world is occupied by China with 17.42% of the global GDP. Japan's economy is in third position – 5.21% of global GDP, Germany is in fourth place (3.98% of GDP) and the United Kingdom is in fifth place, followed by India, France, Italy, and Canada. Thus, the top ten leaders include all G7 countries and two BRICS countries (China and India).

The leader in nominal GDP growth among the BRICS countries in the period 2000-2021 is China, where the value of this indicator was 1294.32%, followed by India with an increase of 521.89%, Russia (518.2%), South Africa (181.86%), Brazil (151.5%). At the same time, the most rapid growth of China's nominal GDP occurred in 2001-2010 (353.79%), whereas in 2011-2020. it was 96.11%. In the period 2001-2010, the nominal GDP of Russia, Brazil, and India also grew rapidly: 397.72%, 294.26%, and 243.78%, respectively. For comparison, the G7 countries are characterized by the following nominal GDP growth rates in 2000-2021: 170.70% – Canada, 123.77% – USA, 117.48% – Germany, 115.84% – France, 87.05% – Great Britain, 85.18% – Italy, 2.71% – Japan.

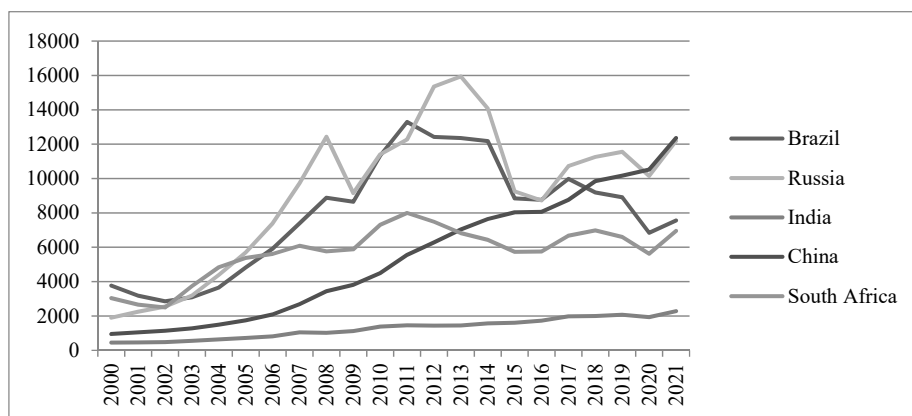
In general, the dynamics of nominal GDP growth in the BRICS countries outstrip the dynamics of global nominal GDP growth, as well as the dynamics of nominal GDP growth in the G7 countries. This allows us to substantiate our assumption about the intensification of the dynamics of the development of the BRICS alliance, including in the conditions of uncertainty of the external environment.

Nevertheless, when considering the dynamics of GDP per capita, the ratio of the BRICS countries becomes different (Figure 3).

According to this indicator, Russia was the leader of the BRICS alliance throughout the study period, but the pandemic period created conditions for strengthening China's leadership positions, for example, in 2020-2021. China has overtaken Russia in terms of the “GDP per capita” indicator, which in China reached the value of 12358,8 US dollars per capita.

A comparison of the BRICS countries in terms of GDP with the leading countries of the world, members of the G7, allows us to conclude that developing countries lag significantly behind in terms of “GDP per capita”. In 2019, the GDP per capita in the USA was 65280 US dollars, in Japan – 40246 US dollars, in the UK – 42300 US dollars, and in Germany – 46258 US dollars, which is 3.5 to 6 times higher than in most successful BRICS countries.

**Figure 3. GDP per capita in the BRICS countries, in current prices, 2000-2019 (USD)**



Source: compiled by the authors according to Statista (2022a).

The assessment of the economic potential of the BRICS countries is presented in Table 2.

**Table 2. Assessment of the economic potential of the BRICS countries and G7 countries, 2001-2021**

Country	The share of the country's GDP in world GDP, %, 2021	The share of foreign direct investment in the global volume of FDI, %, 2020	Exports of goods and services, % of total world exports of goods and services, 2020	Integral indicator of economic potential
<i>BRICS countries</i>				<b>0.09</b>
Brazil	1.74	3.31	2.9	0.036
Russia	1.74	0.83	4.6	0.028
India	3.1	5.64	6.1	0.065
China	17.76	22.18	33.3	0.315
South Africa	0.44	0.28	1.1	0.007
<i>G7 countries</i>				<b>0.08</b>
USA	24.16	13.05	15.3	0.232
Japan	5.38	5.39	5.7	0.075
United Kingdom	3.27	2.72	5.3	0.048
Germany	4.46	12.51	12.0	0.126
France	3.10	1.29	5.4	0.04
Canada	2.12	2.33	3.4	0.034
Italy	2.23	0	4.0	0.025

Source: compiled by the authors according to IMF (2021).

These tables allow us to assess the dynamics of foreign direct investment in the BRICS countries in comparison with the G7 countries in the period 2000-2020. Thus, China is the leader in terms of foreign direct investment in 2020, its share in the global volume of foreign direct investment is 22.18%. China's indicators surpass those of the United States, in the pandemic 2020 their share was 13.05%, as well as Germany (12.51% of the global volume).

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The positive dynamics of the increase in foreign direct investment by the developing BRICS countries in the period 2000-2020 is noticeable: 2.3 times growth in Brazil, 2.7 times growth in Russia, 12 times increase in India, 4,8 times growth in China and 2.1 times increase in South Africa. Such a trend should have a positive effect on the development of the BRICS countries and the strengthening of their positions on the world stage since there is a positive relationship between foreign direct investment, size, and the growth of the market of countries receiving investments. Thus, researchers have statistically confirmed the relationship between US foreign direct investment in the countries of the European Union and their gross national product (Artemkina, 2020).

The value of the indicator “share in world industrial output” also shows the economic potential of the country. However, the share of industry in the economies of developed countries and their GDP is declining, which is explained by the return of industrial production to developing countries, the emergence of new industries (due to a breakthrough in biotechnology and information technology), as well as the growth of domestic demand in developing countries. Certain changes have occurred under the influence of pandemic uncertainty factors (for example, an increase in the share of manufacturing industries, primarily knowledge-intensive) (Akhapkin, 2021). In general, the share of industry in global GDP has decreased to 30% by 2020. Currently, developing countries with a large number of minerals, primarily oil, and gas, have the largest share of production in the economy. For example, the total share of the developing economies of the BRICS countries in global industrial output in 2018 was 35.5%, while the same indicator for the G7 countries was only 23%.

The balanced development of the economy is evidenced by the indicator of the unemployment rate. Comparing the value of the unemployment rate in the BRICS countries, we note its significant differentiation in 2020: from 4.2% in China to 29.2% in South Africa. The average unemployment rate in the G7 countries is 6.6%. During the pandemic, the unemployment rate in the world as a whole increased, in 2021 there were 1.8% (or 21 million people) more unemployed in the world than there were in 2019, and the total drop in labour income in 2020 amounted to about USD 3.7 trillion (RG, 2022). However, the solution to the employment problem is determined by State policy. Most of the BRICS countries (China, Russia, Brazil) have chosen the option of an anti-covid restrictive policy to prevent crisis phenomena. On the contrary, most of the G7 countries (Japan, Great Britain, France) have emphasized the predominance of stimulating measures over restrictive ones. Other countries (Canada, the USA, and South Africa) have implemented anti-crisis policy measures to support the economy (Kuzyk, Zudin, 2020). Time will tell which policy option will have the greatest anti-crisis effect.

The value of the integral indicator of the economic potential of the BRICS countries exceeded the same indicator of the G7 countries: 0.09 against 0.08.

The leader in terms of economic potential is China (the value of the integral indicator is 0.315), followed by the USA (0.232), and Germany (0.126). In its group of BRICS countries, China is the engine of growth, since the value of the integral indicator for the rest of the countries ranges from 0.007 (South Africa) to 0.065 (India). Note that in some developed G7

countries, for example, Italy, Canada, and France, the value of this indicator is at the level of developing countries.

Thus, it should be concluded that there are positive changes in the economies of the BRICS countries that contribute to strengthening their positions in the global space, primarily in terms of increasing foreign direct investment, despite fluctuations in business activity under the influence of uncertainty and turbulence.

We will conduct a comparative analysis of the GDP structure of the BRICS countries and the developed G7 countries (Table 3).

**Table 3. Comparative analysis of the GDP structure of the BRICS countries and the G7 countries, 2021**

Country	Services	Industry	Agriculture
<i>BRICS countries</i>			
Brazil	59.38	18.86	6.89
Russia	53.0	33.21	3.8
India	47.69	25.87	16.77
China	53.31	39.43	7.26
South Africa	54.2	21.5	2.7
<i>G7 countries</i>			
USA	80.14	18.44	1.06
Germany	63.02	26.61	0.8
Japan	69.47	29.02	1.04
United Kingdom	71.63	17.7	0.6
France	70.16	16.78	1.63

Source: compiled by the authors according to Statista (2022b).

A comparison of the indicators allows us to conclude that the services sector has a significant share in the GDP structure of the developed G7 countries – from 63.03% of GDP in Germany to 80.14% of GDP in the United States. On the contrary, the service sector in the developing BRICS countries is less developed (from 47.69% of GDP in India to 59.38% of GDP in Brazil). It is worth noting that in the BRICS countries, in comparison with developed countries, the share of the agro-industrial sector is large. Thus, its value in the BRICS countries ranges from 3.8% of GDP in Russia to 16.77% of GDP in India, while the minimum size of the agricultural sector is typical for the UK (0.6% of GDP) and the maximum for France (1.63% of GDP).

The general trend of changes in the structure of GDP in the BRICS countries can be described as follows. In all countries in the period 2011-2020, there was an increase in the service sector: by 3.14% in Brazil, by 4.95% in India, by 20.32% in China, and by 1.69% in South Africa. The exception was Russia, where the share of services in GDP decreased by 1.49%. In general, such dynamics suggest that the BRICS countries are transforming the sectoral structure of their economies to the general trends of global development. Thus, in developed countries, the growth of the service sector is an established trend, since they are characterized by a fairly intensive pace of economic development and a significant level of development of productive forces, where most of the scientific, technical, and economic potential of the whole world is concentrated (Lomakin, 2012). For example, from 2011-2020, the growth of

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the service sector in the US was 3.35%, 2.44% in the UK, and 3.5% in Canada. Indeed, China stands out from all the countries of the BRICS alliance, it has transformed the structure of its economy as much as possible in the period 2011-2020: the agricultural sector shrank by 20,65%, the industrial sector shrank by 15.27%, and the service sector grew by 20.32%.

Thus, our assumption that all the countries of the BRICS alliance will transform the sectoral structure of the economy by the trends in the development of the global market situation cannot be fully confirmed. Since there are multidirectional vectors of development of countries within the BRICS integration alliance.

The scientific and educational potential can be assessed using the indicators in Table 4.

**Table 4. The scientific and educational potential of the BRICS countries and G7 countries, 2019-2020**

Country	Higher education among the population aged 25-64,%, 2019	Number of researchers per 1 million inhabitants, 2020	Gross domestic R&D expenditures total, % of GDP, 2020	Integral indicator of scientific and educational potential	The overall integral indicator for the groups of countries
<i>BRICS countries</i>					<b>0.128</b>
Brazil	20	887	2.26	0.15	0.15
Russia	57	3075	1.1	0.19	0.19
India	12	156	0.85	0.07	0.07
China	18	1089	2.40	0.16	0.16
South Africa	16	432	0.68	0.07	0.07
<i>G7 countries</i>					<b>0.236</b>
USA	50	4205	3.45	0.3	0.3
Japan	53	5328	3.28	0.3	0.3
United Kingdom	49	4227	1.71	0.22	0.22
Germany	31	4320	3.13	0.26	0.26
France	40	4715	2.35	0.24	0.24
Canada	60	4325	1.61	0.23	0.23
Italy	20	2307	1.51	0.14	0.14

*Source: compiled by the authors according to OECD (2019a), Unesco Institute for Statistics (2020).*

On average in the G7 countries in 2020, 43% of adults aged 25-64 years received higher education. Over the past decades, higher education has significantly expanded in the G7 countries due to increased access to it, as well as due to intensive digitalization (OECD, 2019a; Maksaev et al., 2020). The proportion of people aged 25-34 with higher education is 50% or more in Canada, Japan, and the Russian Federation. In Canada and the Russian Federation, this high proportion of adults with higher education has a correspondingly smaller proportion (less than 7%) of adults with lower secondary education. India and South Africa are the countries with the lowest proportion of young people with higher education (16% or lower). In India, the most common level of achievement among people aged 25-34 years is to have incomplete secondary education, while in South Africa, the most common level of education is higher secondary or post-secondary, which is not a higher education. In France, Italy, and the Russian Federation, persons with a master's degree or an equivalent degree make up the largest proportion of adults with higher education. On average in the G7

countries, about 1% of young people have a doctorate or equivalent qualification, although, in the United States, this proportion is about 2%.

To assess the personnel component of the scientific and educational potential, we will single out the teaching staff of universities that provide training of highly qualified personnel and carry out scientific activities, as well as personnel engaged in research and development in scientific organizations. Universities ensure the expansion of the scale of training of highly qualified scientific personnel. The number of teaching staff in Russia in the period 2013-2018 decreased by 26.1% due to a reduction in the number of students and a reduction in the number of educational organizations. In Brazil, by contrast, the state's education policy was aimed at improving the literacy rate of the population, and the number of university teachers increased from 349110 in 2014 to 362307 in 2017 (i.e. by 3.4%) (OECD, 2020b). Meanwhile, in the UK, USA, and Germany in 2014-2018, there was an increase in the number of university teachers from 6.8% (in Germany) to 12.1% (in the UK). The number of university teachers in the USA exceeds the number of university teachers in Russia by 2.2 times.

The number of personnel engaged in research and development per 1 million population in the BRICS countries is significantly lower than in developed European countries, the USA and Japan. According to official data, only Russia is approaching the required level in terms of the number of researchers. The current situation with personnel engaged in research activities in the BRICS countries raises serious concerns.

In general, the BRICS countries are engaged in the development of their universities and their material and technical base. This is especially true of China (Peking University, Tsinghua University, and Fudan University are leaders in all rankings) and Russia (Degtyareva, Chernysheva, 2018). In 2016, a plan was developed in India to form ten public and ten private universities of international level, however, the problem of its implementation was significant underfunding, so the only world-class higher education institutions are Indian Institutes of Technology (RIA, 2017).

The scientific and educational potential depends on the amount of funding for both university science and R&D in research organizations. Expenses for conducting research at universities of all types in 2019 amounted (at constant prices in 2015): to 3896 – in Russia, 21 125 – in Germany, 11 384 – in the UK, and 53 958 – in the USA. That is, these costs are 7.5 times higher on average in developed countries than, for example, in Russia (OECD, 2020a).

R&D financing further determines the state of scientific and educational potential, as well as its implementation. In this aspect, the countries of the BRICS group demonstrate different dynamics. For example, according to the available OECD (2020d) data, it is possible to compare the dynamics of R&D financing in Russia, South Africa, and some developed countries. In all the countries under consideration, the dynamics of R&D financing in the period 2010-2018 were positive (except Russia, where there was a decrease of 3.3% in 2016). The volume of financing in Germany exceeds the same indicator in Russia by 3 times, and in South Africa – by 30 times. In 2019, Brazil and China invested 2.3-2.4% of GDP in R&D development at the level of developed European countries, thereby strengthening their positions in the global R&D market (OECD, 2020d). Note that the analyzed countries have different R&D financing structures: in the USA, Japan, and most European countries, business structures are involved in R&D financing, which covers on average from 60 to 70%

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of all expenses, in developing countries most of the R&D costs are financed by the state or non-profit organizations (Unesco Institute for Statistic, 2020).

Table 4 also shows the results of calculating the integral indicators of the scientific and educational potential of the BRICS and G7 countries. In the individual ranking, the USA and Japan occupy the highest position (an integral indicator of 0.3 each), followed by Germany (0,26). Among the BRICS countries, Russia (0.19) and China (0.16) have the best indicators.

In general, when comparing the two groups of countries, the overall integral indicator of the scientific and educational potential of the BRICS (0.128) is 1.9 times lower than the similar indicator of the G7 (0.241).

The results of scientific activity, R&D expenditures, and the number of venture transactions in 2020 continued to grow, increasing the peak indicators of the pre-crisis period. In 2020, the number of scientific publications in the world increased by 7.6%. In 2020, the economies with the highest R&D expenditures continued to increase government budget allocations, and the leading global R&D spending companies increased total R&D spending by 10%. In 2020, there was an increase in venture transactions of 5.8%, which exceeded the average annual growth rate over the past 10 years (primarily due to high growth rates in Africa and Latin America) (WIPO, 2020, 2021).

Thus, we can conclude that the BRICS countries are lagging in the development of scientific and educational potential (primarily in terms of the education of the population and the training of scientific personnel), but the systematically increased funding of R&D, the involvement of specialists from abroad for research and the active expansion of venture activities are changing the landscape of global innovation: China and India consistently improve their performance, remaining the countries with the highest growth rates according to the Global Innovation Rating in time dynamics.

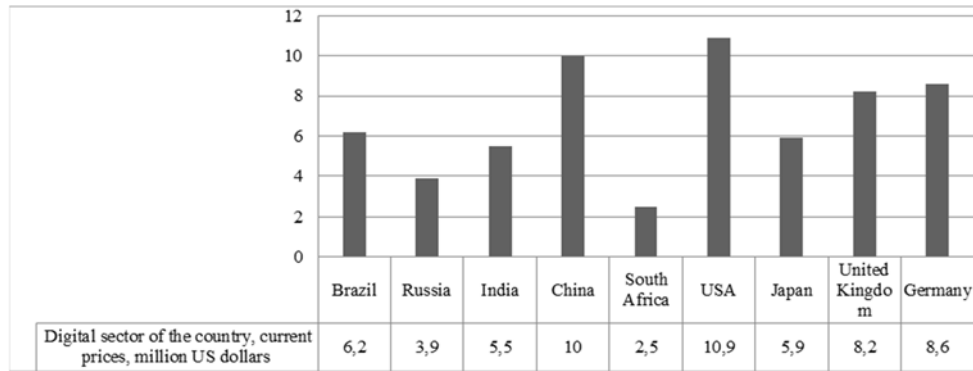
It is advisable to analyze the digital potential of the BRICS countries. The volume of the digital economy sector in 2021 in the BRICS countries was estimated as follows: in China – 1434.2 million US dollars (10% of GDP), in India – 158.13 million US dollars (5.5% of GDP), in Brazil – 114 million US dollars (6.2% of GDP), in Russia – 66.26 million dollars USA (3.9% of GDP), in South Africa – 8.78 million US dollars (2,5% of GDP) (Figure 4).

The figure data shows that most BRICS economies lag behind the economies of the G7 countries in terms of digital development, except China, which has the second largest digital segment in the world after the United States (10% of GDP).

The positions of the BRICS countries vary greatly in the level of exports of ICT goods. Thus, China is ahead of the developed G7 countries in terms of this indicator: the volume of exports of goods from China amounted to 549 954 million dollars in 2019, from the United States – 138 651 million dollars. For the rest of the BRICS alliance countries (Brazil, Russia, India, and South Africa), the value of this indicator is radically behind those in the G7 countries (Figure 5).

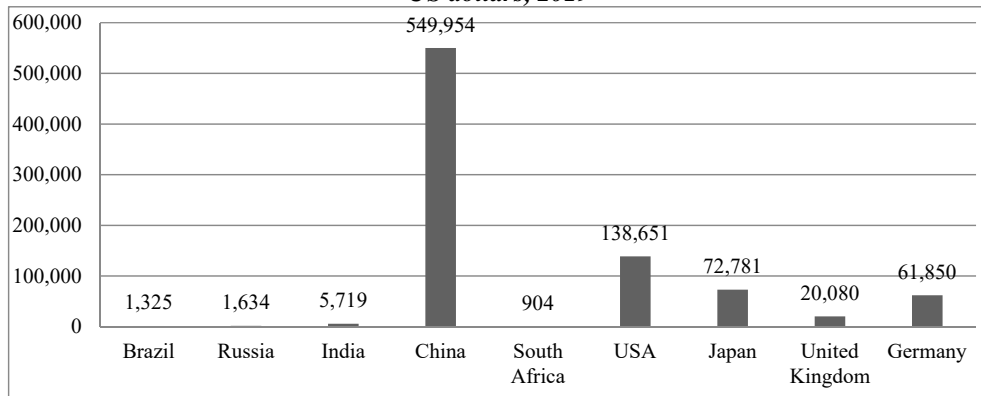


**Figure 4. The share of the digital sector in the GDP of the BRICS and G7 countries, 2020**



Source: compiled by the authors according to the OECD (2019b), IMF (2021).

**Figure 5. The volume of exports of ICT goods in the BRICS and G7 countries, million US dollars, 2019**



Source: compiled by the authors according to OECD (2020c).

The reason for the digital lag of the BRICS countries lies in the existence of the problem of access to digital infrastructure, in the digital literacy of the population. Data on the state of digital infrastructure as part of the digital potential of countries (estimated using the method of integral indicators) are presented in Table 5.

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**Table 5. Indicators of the digital potential of the BRICS and G7 countries, 2018-2020**

Country	Connection to fixed telephone networks	Bandwidth of the international Internet access channel (Kbit/s)	Households with a personal computer	Households with Internet access	Broadband Internet connections	Active users of mobile communication networks	The share of the digital sector in the country's GDP	The volume of exports of ICT goods in, million US dollars	Integral indicator of digital potential
<i>BRICS countries</i>									
Brazil	19.50	29.00	46.30	60.80	13.70	90.20	6.2	1325	0.046
Russia	21.70	68.80	74.40	76.30	21.40	80.80	3.9	1634	0.049
India	1.70	25.90	16.50	25.40	1.3	25.80	5.5	5719	0.02
China	13.70	27.90	55.00	59.60	28.0	83.60	10	549954	0.083
South Africa	6.40	17.40	21.90	60.70	3.0	70.00	2.5	904	0.026
<i>G7 countries</i>									
USA	37.0	125.4	88.8	87.0	33.9	132.9	10.9	138651	0.085
Japan	50.2	25.0	76.8	96.2	31.7	133.2	5.9	72781	0.072
United Kingdom	50.10	421.6	91.70	94.0	39.30	39.30	8.2	20080	0.079
Germany	54.1	54.1	92.9	87.9	40.5	79.8	8.6	61850	0.072
France	59.5	54.5	77.5	71.5	43.8	87.5	3.8	18429	0.064
Canada	40.1	73.6	88.2	91.2	38.0	72.5	3.9	7407	0.061
Italy	34.9	35.7	64.3	71.7	27.9	87.9	3.7	12070	0.051
World	13.0	76.6	47.1	54.7	13.6	61.9			

Source: compiled by the authors according to ITU (2018).

Indeed, the BRICS countries are characterized by a lower indicator of the development of digital infrastructure: they have lower Internet access speeds (among the BRICS countries, the highest is in Russia (68.8), but far from the average European (250)), the number of active users and households with Internet access. Nevertheless, they exceed the OECD average in terms of Internet connection costs (from 10,1 US dollars PPP in Russia to 29.9 US dollars PPP in Brazil) (Spartak, 2018; Shuyskiy, 2019; Ignatov, 2020). Thus, the number of households in India, South Africa, and Brazil with a personal computer is 2-4 times inferior to the same indicator of the leading countries; from 10 to 20% is the average lag of the BRICS countries in the number of broadband connections (ITU, 2018). At the same time, the digital infrastructure created in Russia is characterized not only by a comparable level of development in comparison with world leaders but also remains one of the most affordable in terms of financial costs (OECD, 2019b). The BRICS countries partially compensate for the insufficiency of the resource of the basic terrestrial digital infrastructure with a sufficiently high rate of use of mobile digital devices and services (ITU, 2018).

However, during the COVID-19 pandemic, activity in the digital sector of the BRICS economies increased amid a decline in the real sector (Analytical Center under the Government of the Russian Federation, 2020). For example, significant growth was recorded in the sectors of digital mobile telephony and the Internet, online education, e-commerce (by 10-30%), online entertainment, and telemedicine (RAEK, 2020). This suggests that during the pandemic there was an increase in the digital potential of the BRICS countries (Valdaiclub, 2020). In particular, the project of forming an independent ecosystem of the digital economy within the framework of the BRICS integration association will help

establish communication with the market and encourage private and institutional investors to participate in infrastructure projects, and allow national development institutions to find the most attractive objects for investment, received a new impetus to development in the conditions of the pandemic (TASS, 2020).

The results of the assessment of the digital potential of the BRICS countries in comparison with the G7 countries based on the method of calculating the integral indicator (Table 5) showed that the group of G7 countries (the value of the integral indicator is 0.069) in 2020 has 1.5 times higher digital potential than the BRICS countries (the value of the integral indicator is 0.045). The leaders in terms of the integral indicator of digital potential are the USA (0.085), China (0.083), Great Britain (0.079), Japan (0.072), and Germany (0.072).

Thus, the author's assumption about the existing lag of the BRICS countries in the level of digital potential development, the asymmetric level of development and accessibility of infrastructure components of the digital economy, as well as about their expansion during the period of uncertainty and turbulence caused by the pandemic, can be considered justified. In addition, building up and realizing the digital potential of the BRICS countries can become a tool for overcoming the uncertainty caused by geopolitical conflicts, since building communications and interaction, conducting trade operations, developing an ecosystem of online education, and so on, are in a specific area of the system of international regulation and law.

The final presentation of the comparative assessment of the capabilities of the BRICS and G7 countries in the context of the formation of a new configuration of the global economy and the corresponding rating of countries will be presented in Table 6.

**Table 6. Rating of BRICS and G7 countries depending on the level of development potential**

Country	Integral indicator of economic potential	Integral indicator of scientific and educational potential	Integral indicator of digital potential	Final assessment	Place among the BRICS and G7 groups
<i>BRICS countries</i>					
Brazil	0.036	0.15	0.046	0.077	9
Russia	0.028	0.19	0.049	0.089	8
India	0.065	0.07	0.02	0.052	11
China	0.315	0.16	0.083	0.186	2
South Africa	0.007	0.05	0.026	0.028	12
<b>Total</b>	<b>0.09</b>	<b>0.128</b>	<b>0.045</b>		
<i>G7 countries</i>					
USA	0.232	0.3	0.085	0.206	1
Japan	0.075	0.3	0.072	0.149	4
United Kingdom	0.048	0.22	0.079	0.116	5
Germany	0.126	0.26	0.072	0.153	3
Canada	0.034	0.23	0.061	0.108	7
France	0.04	0.24	0.064	0.115	6
Italy	0.025	0.14	0.051	0.072	10
<b>Total</b>	<b>0.08</b>	<b>0.241</b>	<b>0.069</b>		

Source: author's calculations.

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The assessment of the development potential of the BRICS countries and the G7 allows us to conclude:

- 1) The BRICS alliance exceeds the G7 countries in its economic potential by 0.01 p.p. (primarily due to the strong position of China).
- 2) The scientific and educational potential of the G7 countries is 1.9 times higher than that of the BRICS countries (due to the low educational indicators of the population and the small number of officially registered scientific personnel engaged in research).
- 3) Digital potential is 1.5 times higher in G7 countries (due to more developed digital infrastructure in developed countries).
- 4) The first place among the analyzed groups is occupied by the United States (integral index 0.206); China is in the second position (integral index 0.186); the third place is occupied by Germany (integral index 0.153).

The conclusions obtained allow us to form a matrix of government management efforts to strengthen the positions of the BRICS countries in the global economy (Table 7).

**Table 7. Matrix of government management efforts to strengthen the positions of the BRICS countries in the global economy**

Country	Changing public consciousness	Increase in foreign direct investment	Export expansion	Increasing the level of education of the population	Increased spending on R&D and development of the research sphere	Implementation of digital development programs
Brazil	+	+	+	+	+	+
Russia	+	+	+		+	+
India	+		+	+	+	+
China	+			+	+	+
South Africa	+	+	+	+	+	+

*Source: compiled by the authors.*

Determining the prospects of the BRICS in the new configuration of the global economy requires understanding that initially the alliance of developing countries was formed not just as an economic or trade bloc, but as an institutional association with its development bank to invest in sustainable infrastructure and renewable energy sources around the world.

Over the years of the alliance's existence, despite the very heterogeneous dynamics of the countries' development, many initiatives have not only strengthened the position of each member of the alliance on the world stage but also provided the BRICS integration association with much greater international influence (Statista, 2022a).

In conditions of socio-economic and geopolitical uncertainty and turbulence, countries can resort to the implementation of various strategies to strengthen their positions and increase stability:

- reduction/economy strategy (reduction of government spending, personnel optimization) (Gukasyan et al., 2022);
- an investment strategy focused on the development of new types of activities and new sectors of the economy, depending on changes in market conditions (Barton et al., 2002);
- ambivalent adaptation and development strategy. This strategy focuses on continuous monitoring of market signals (changes in the political, epidemiological, and economic situation) and ensuring maximum adaptability of the economic system to these changes.

Thus, the most appropriate strategy for the BRICS countries would be an ambivalent strategy of adaptation and development, assuming that any uncertainty can become a point of growth. This requires continuous monitoring of changes in the market and subsequent adaptation of the implemented public policy measures to the changing conditions.

According to the authors, the following points of growth should be identified for the BRICS group of countries:

- 1) Changing public consciousness as the basis for the implementation of further structural transformations of economic systems. The BRICS countries should develop a mechanism for motivating the population to change by the principles of social responsibility. The basis of this mechanism should be the transformation of the basic beliefs of individuals about themselves, their value as an adaptation resource, and a reference point for overcoming fear (Gukasyan et al., 2022). It is necessary to take into account the peculiarities of people's psychological perception of changes and to focus on social policy mechanisms that ensure the growth of income and increase the well-being of citizens.
- 2) Increased foreign direct investment. It is important for any economic system, but for Russia (especially in the context of sanctions restrictions), Brazil, and South Africa this tool can become a trigger for the launch of economic modernization processes. The implementation of additional measures to stimulate foreign investment as part of national projects is required: tools and methods of property insurance against political risks, special agreements, and special tax and customs regimes (Zhukov, Rasulova, 2020).
- 3) Expansion of exports. This measure is a key measure of strengthening the position of the state on the world stage. It encourages national companies to become more productive and competitive when entering the foreign market. China has a strong position on this indicator. Other BRICS countries require the implementation of measures aimed at increasing the interest of producers who are not present in foreign markets in the development of export activities; the formation of strategies and plans for exports; bringing the products produced in line with the quality of export demand; the development of tools to promote products in foreign markets (marketing promotion abroad, adapting products to the preferences of the importer country consumers, collecting the available information on foreign markets). (Bank of Russia, 2021). Governments can take control over the reduction of administrative and bureaucratic barriers for producers entering foreign markets.
- 4) Increasing the level of education of the population. This measure is recommended for all BRICS countries, except for Russia. The BRICS countries need to increase enrollment in

higher education, provide access to educational resources for all segments of the population, and use the potential of online education and digital educational platforms. An effective measure would be the exchange of positive experiences between the BRICS countries and the launch of cross-education and dual-degree programs within the alliance. Russia has a high-quality system for training highly qualified personnel, and its capabilities can be used to improve the level of education and qualifications of specialists from other BRICS countries, including in a distance format. In the context of the digitalization of society, it is also important to improve the digital literacy of the population.

- 5) Stimulation of R&D development in a period of uncertainty. This task can be solved by increasing government spending on education and the development of the scientific sphere, improving the personnel training system, and creating motivational mechanisms to attract private investment in scientific development (Frey, Osborne, 2013).
- 6) Implementation of digital development strategies. To ensure synergy, the BRICS countries should take the following actions in the field of digitalization: unlocking the potential of digital technologies and opportunities for the BRICS population; improving the accessibility and quality of goods and services produced by the BRICS countries using digital technologies; equalizing access to digital infrastructure for the BRICS population; increasing digital inclusion of people living in rural areas; providing Internet access to people with disabilities; developing The updated strategy will contribute to the development of joint measures to overcome the negative effects of the COVID-19 pandemic, and will also help to respond more effectively to new economic challenges in an uncertain and turbulent external environment.

## **5. Conclusion**

The article reveals the features of uncertainty and turbulence of the modern stage of socio-economic development as the basis for the formation of a new configuration of the global economy. The authors have identified the causes contributing to the increase in uncertainty and turbulence in the modern world: the growth of socio-economic tensions; digitalization and the corresponding transformation of the traditional way of life in society; the COVID-19 pandemic. The above reasons have caused an increase in global turbulence and triggered the processes of redistribution of global leadership. The authors have developed a model of the impact of uncertainty and turbulence on modern states.

The study assessed the economic, scientific, educational, and digital potential of the BRICS countries and compared it with the potential of the G7 countries.

It was determined that the value of the available economic potential of the BRICS alliance is almost identical to that of the G7 countries. An important contribution is made by China, which is the world leader in terms of GDP, foreign direct investment, and export development.

The authors substantiated that the scientific and educational potential of the G7 countries is higher than that of the BRICS countries. This is currently facilitated by the relatively low education levels of the population and the officially registered scientific personnel implementing research in most BRICS countries.

It has been proven that the BRICS countries' digital potential is lower than that of the G7 countries. Developed countries tend to have better digital infrastructure, while representatives of developing countries are more digitally active.

The authors conclude that the factors of uncertainty and turbulence open up new opportunities for countries to realize their potential. The study proves that the 2020-2021 pandemic has contributed to the BRICS countries' capacity-building and alignment with developed countries. This could usher in a new phase in the reconfiguration of the global economy.

The authors proposed tools and methods to strengthen the BRICS countries' position in the global economy by applying ambivalent development strategies and adapting to the changing environment.

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