Comparative Analysis of Technological Competition between the USA, China and the Russian Federation

Ablakulov Sherzod Kaxramonovich

The University of World Economy and Diplomacy, Master's student of the faculty (International relations and world politics)

ABSTRACT

The article provides a comparative analysis of technological competition between the United States, China and the Russian Federation. The study examines the main directions of technological competition between these countries, their technological capabilities, competitive advantages and weaknesses, as well as the impact of technological competition on the global economy and politics.

The study found that the U.S. retains its lead in technological competition, but China is rapidly closing that gap. The Russian Federation lags behind the United States and China in the development of some advanced technologies, but has significant advantages in other areas.

Technological competition between the United States, China, and Russia will have far-reaching consequences for the global economic and political order.

Keywords: Technological competition, USA, China, Russian Federation, Information technology, Artificial intelligence, Technological potential, Competitive advantages, Weaknesses, Global economy, Global politics, Tension in relations, Changing nature of war, Innovative systems, Social structure

***Materials* and methods:** Quantitative and qualitative methodology will be used in the study. Statistics will be used for quantitative analysis, including data on patents, investments in research and development, technology exports and imports. Data from official sources, analytical reports, and scientific articles will be used for qualitative analysis.

Research results: The results of the study revealed that the United States and China are increasing an aggravated attitude and significantly resorting to improving their technologies, an exorbitantly large amount of money in R&D, which in turn in a few years China will overtake the United States and become a top-1 actor in the international arena. Russia is also not lagging behind the adopted policy for 2030, it will also develop AI significantly and actively invest money in it.

Introduction.

While most developed and rapidly developing countries are characterized by a high proportion of business spending on research and development (hereinafter R&D). The scale and structure of competition between companies in advanced areas of scientific and technological progress are constantly growing, and the modern budget for research by business leaders is comparable to the total and scientific expenditures of individual states. The last few years have been a time of unprecedented opportunities and serious challenges for the three countries. In this case, the role of global cooperation in the field of science and technology has increased significantly and

words such as "intertwining cooperation and competition" are inherent in this. This interaction has a long history, a solid foundation and a common goal of integration in the field of economics and science. In addition, both China and the Russian Federation are facing similar problems – increasing pressure on technological competition and the suspension of cooperation from developed countries, primarily the United States.

According to Chinese experts, with the development of science and technology in China, especially in some regions, the advantages of Sino-Russian cooperation have begun to manifest themselves, supported by the proximity of scientific and technical capabilities.

As you know, the interaction of the Soviet Union with China and the United States played an important role in the formation of the industrial base of the People's Republic of China, the creation of domestic research institutes and the development of scientific and technical potential. [Lavrikova, Andreeva, Ratner, 2018; Isaev, 2021; Gao, 2021].

TECHNOLOGIES AS FACTORS OF ECONOMIC GROWTH

Was one of the first to draw attention to the special importance of organizing scientific research and development through the efforts of large companies. Schumpeter. Based on the results of observations of the technological breakthrough of large American concerns based on their own developments and patents at the beginning of the twentieth century, he came to the conclusion that in the capitalist economy, competition based on the inventions of new goods, discoveries of new technologies, new types of organizations, new sources of raw materials acquired special importance.

Textbook example: Using a light bulb instead of kerosene lamps - no matter how optimized the production of wicks or kerosene lamp housings will be, consumers will choose light bulbs, and their manufacturers will win the competition even at a high initial cost. "This competition provides decisive cost reductions or quality improvements, it threatens existing firms not with a slight reduction in profits and output, but with complete bankruptcy. According to its consequences, such competition belongs to the traditional one, like bombing to breaking down doors." This is the process of "creative destruction" — the deep essence of capitalism [1].

Consider the share of GDP spending in (R&D).

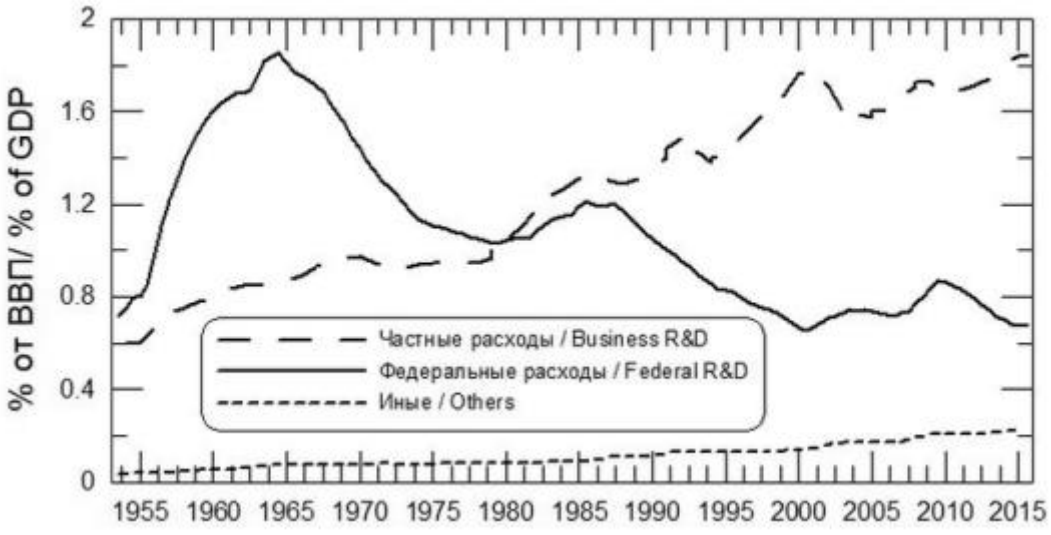

Fig. 1. **Dynamics of expenditure on research and development in the United States (share of GDP), by source of funding**

The national science Foundation of the United States. URL: https://nsf.gov/statistics/2018/nsb20181/data/sources (дата обращения: 10.12.2023).

For the richest states of the first cluster, the average value of R&D expenditures to GDP is 2.1%, and for all subsequent groups this value is monotonously decreasing: cluster 2 — -1.3%, cluster 3 — -0.7%, cluster 4 — -0.4%, cluster 5 — -0.3%, cluster 6 — -0.1%, cluster 7 — -0.3% [2]. Thus, the relative level of R&D spending is one of the critically important factors of economic growth, the level and dynamics of which make it possible to predict the technological development of a particular country).

In Russia, the share of R&D in GDP in 2017 reached 1.2%, which is almost the same as in Italy, but more than in Turkey, Mexico and Argentina. In these countries, companies invest little in research and development, and their financing is mainly provided by the state.

The largest companies in Russia - Gazprom, Rosneft, Norilsk Nickel, etc. - invest relatively little money in science, and according to these indicators they are included in the global assessment of private companies' R&D costs in second or third place.

R&D spending: international comparisons

Country	$ bln	As % to GDP	From Federal Budged	Federal spending as % to GDP
Russia	37,3	1,2	34,3	1,0
USA	502,9	2,8	138,5	0,4
China	408,8	2,1	84,0	0,4
Germany	114,8	2,9	34,3	0,9
Japan	170,0	3,3	33,9	0,7
France	60,8	2,2	17,7	0,6

Source: Science, technology and innovation of Russia 2017. Moscow: Institute of science development problems of the Russian Academy of science, pp. 83–85.

Let's add some information about China.

The first productive force

The Global Innovation Index of the World Intellectual Property Organization shows how China is annually approaching the top of the ranking of innovative economies in the world. If in 2009 the country was in 43rd place, then in 2022 it is already in 11th out of 132, leaving behind France, Japan and Canada and becoming the only middle-income economy in the top 30 of the ranking.

China's success is largely the result of systematic and long-term government policies. When, in the late 1970s, it became the leading force led by Deng Xiaoping, science and technology were declared the first productive force, the main engine of the economy. In terms of investment in research and development, China ranks 2nd in the world after the United States, with spending by both countries accounting for almost 50% of the worlds.

According to the Ministry of Science and Technology of the People's Republic of China, in 2021, China's research and development spending reached 2.8 trillion yuan (about 405 billion), which is 14.6% more than in 2020. According to available data for 2020, the United States spent 708 billion euros. The 14th five-year development plan of the People's Republic of China for 2021-2025 provides that R&D spending will increase by more than 7% per year. According to experts, by the middle of the

decade, China may overtake America in terms of R&D investments.

The scientific and technical development of the country is planned for the coming decades. According to the Chinese leader's goal, by 2035 China should become one of the leading innovative countries, and by 2050 it should become the leading scientific and technical power in the world.

The 14th Five-Year Plan has identified a number of important areas for the development of science and technology. The list includes artificial intelligence, quantum technologies, the semiconductor industry, medicine, brain science, genetics and biotechnology, aerospace and naval research.

Let's talk about (AI) Currently, the United States is a recognized leader in the field of AI. Numerous meetings and conferences are held, numerous documents are being developed, and developments are being actively implemented in all spheres of life, including military purposes and space. During the Trump presidency, the White House made U.S. leadership in the field of AI its top priority. Numerous documents on this subject are being published.

A draft federal law on AI has been developed and submitted. At the same time, funding for AI startups is growing rapidly. In 2018, venture capital investors in the United States invested $9.3 billion in research and development. About 5,000 patents have already been obtained in the field of AI. These facts indicate that the United States seeks to gain priority in this area both de facto and de jure.

Development and plans for the integration of AI in the Russian Federation

The federal Artificial Intelligence project is being implemented in Russia, developed in accordance with the AI Strategy until 2030. Sergey Nakvasin[1], he shared his thoughts at the IT conference "Key trends in the development of artificial intelligence: science and technology".

People's expectations of artificial intelligence are overheated.

- Investments in this area have decreased.
- Ethics and safety issues come to the fore.
- Artificial intelligence will merge with other technologies.
- It is necessary to develop quantum artificial intelligence.

The expert called the economic crisis the main engine of the introduction of AI. As the budgets of companies decrease against the background of international economic difficulties, cost optimization and efficiency improvement become a key motive.

Sergey Nakvasin notes that today it is important to solve the problem of obtaining specific economic effects. In Russia, they understand all the difficulties and contradictions associated with this technology, and they talk about 2-5%. This effect must be shown in order to continue the development of the technological direction with the support of the state.

Investments in AI are slowing down, as the necessary global infrastructure has already been created. Access to capacities is open, there are datasets, a large number of low-code solutions that allow any novice specialist to create applications. The cost of creating data sets has also decreased, as it has become possible to create synthetic data sets, Nakvasin noted.

Sber is one of the largest companies using AI. Boris Rabinovich, [2] He said that in 2022, the financial effect of using artificial intelligence in the collection will amount to $ 235 million.

In addition to large corporations, breakthroughs in the field of artificial intelligence will be achieved by scientific organizations, including the NTI Competence Center, which unites business clients and scientists, as well as the aforementioned teams of Deppavlov, BaseTracK, Starline and other companies with natural language processing technology from MIPT. Developer of driverless car technology. Companies can participate in technology competitions in order to make large profits, receive grants from the government and have

[1] Sergey Nakvasin, Director of the National Center for Artificial Intelligence under the Government of the Russian Federation.

[2] Boris Rabinovich. CDO Sbera, Senior Managing Director - Director of the Data Management Department (SberData).

the opportunity to monetize their own technologies.

Prospects for the development of AI in the USA, China and the Russian Federation.

In the future, technological competition between the United States, China and the Russian Federation in the field of AI will only intensify. This will lead to further development of technology and innovation, as well as changes in the global economy and politics.

The United States, China and the Russian Federation will strive to maintain and strengthen their positions in the field of AI. To do this, countries will increase investments in research and development, support domestic companies and develop cooperation with other countries.

As a result of technological competition between the United States, China and the Russian Federation, a redistribution of global economic and political influence may occur. In particular, China can become a world leader in the field of AI.

Conclusion

In conclusion, it can be said that technological competition between the United States, China and the Russian Federation is one of the most important and urgent problems of the modern world. This competition will have far-reaching consequences for the global economy and politics.

The United States retains leadership in technological competition, but China is rapidly closing this gap. China is implementing a large-scale technology development program, which includes investments in science and education, support for domestic companies and technology imports from abroad. As a result, China is already leading in some advanced fields such as robotics, quantum technologies and electric vehicles.

The Russian Federation has significant scientific and technological potential, but the country lags behind the United States and China in the development of some advanced technologies. The Russian Federation needs to strengthen its support for innovation in the private sector in order to reduce the technological gap with leading countries.

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