JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS

JRAIC.COM

JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS

Scientific and practical peer-reviewed journal

Journal of regional and international competitiveness — theoretical and practical journal dedicated to the issues of international and regional competitiveness.

The **mission** of the journal is to spread modern economic knowledge, publish the most interesting results of scientific research in the field of regional and international competitiveness, and to serve as a helpful forum for professional discussion of a broad spectrum of fundamental problems of socio-economic development, an important tool of communication among science, education, and business.

The Journal accepts for publication: original articles; translations of published articles from foreign journals (with the consent of the right holder for the translation and publication); reviews; essays; reports.

Contents

Theory and practice of preventive socio-economic policy: experience of the Republic of Tajikistan

Lutfullo K. Saidmurodzoda 🆔

Corresponding Member of National Academy of Science of Tajikistan, Doctor of Economics, Professor
Tajik State University of Finance and Economics, Dushanbe, Republic of Tajikistan
E-mail: lsaidmuradov@rambler.ru

ORIGINAL ARTICLE

Abstract This article examines the theoretical foundations and practical implementation of preventive socio-economic policy within the context of a transforming open economy, using the Republic of Tajikistan as a case study. The study argues that contemporary global economic instability necessitates a shift from reactive anti-crisis measures toward proactive, preventive approaches embedded in national development strategies. Drawing on evolutionary economic theory and the concept of transformational open economic systems, the paper conceptualizes preventive policy as a mechanism of managed evolution aimed at mitigating systemic risks, reducing transaction and fiduciary costs, and aligning the behavior of economic agents with long-term development goals. The analysis highlights the critical role of institutional compromise between the state and market actors in ensuring macroeconomic stability and competitiveness. Particular attention is given to Tajikistan's experience in overcoming post-Soviet transformation challenges, including civil conflict, economic collapse, and structural imbalances, followed by the successful implementation of strategic development programs. Empirical evidence demonstrates that preventive measures – such as macroeconomic monitoring, diversification, support for entrepreneurship, and social protection – have contributed to sustained economic growth and resilience to external shocks. The paper concludes that preventive socio-economic policy represents an essential paradigm for developing economies, enabling them to enhance adaptive capacity, ensure sustainable development, and effectively respond to global uncertainties.

Introduction

In recent years, the scientific community has been actively discussing how the modern globalizing world is exposed to serious economic risks that do not always fit into the general theory of evolutionary and cyclical development. Combating the symptoms of the global crisis is extremely important and deserves the attention of the scientific community. However, such a struggle and its methods depend primarily on a conceptual and theoretical approach to the essential characteristics of crisis phenomena and the readiness of national economic systems to confront them. Therefore, we can agree with the existing view in the economic literature that the main task of economic science today is to formalize a new logic and change the economic paradigm, which can help economic science itself to overcome its crisis. [1; 2]

The enormous social and economic losses, as well as the marginal transactional and fiduciary costs incurred by the national economic systems of the post-Soviet countries during the transformation process, are the result of a number of gaps not only in the theory of modern economic mainstream, evolutionary, and institutional economics, but also in the emerging and developing theory of transformational open economic systems. In our opinion, the main reason for the above-mentioned losses is that the economic scientific community and, to a large extent, decision-makers have not yet fully understood and accepted the place of the theory of transformational open economic systems in the methodology of the evolutionary approach. [3]

Thus, one of the tasks of the theory of the transformational economy, in the context of its projection onto the theory of the open economy, is to substantiate the principles and mechanism of implementing the so-called "preventive socioeconomic policy". In general, the importance of the principle of preventativeness

in the theory of an open economy consists, first of all, in studying the causes, factors and patterns of deviant behavior of economic agents from the market vector of development. [4; 5; 6; 7; 8;] Preventive socio-economic policy is, first of all, a policy of managed evolution, which consists in finding alternatives to institutional changes and corrections in the context of changing development conditions. [9]

From the perspective of evolutionary economic theory and the theory of an open economy, the goal of the public administration system should be to implement the principles of strategic development that are incorporated into national strategies and development programs. In this aspect, the historical experience of the Republic of Tajikistan during the transition to market relations shows that in a transforming open economy, it is necessary to find a compromise between the state and economic entities aimed at increasing the competitiveness of the national economy and reducing the level of transactional and fiduciary costs. Consequently, in our opinion, compromise is the initial economic relationship in the mechanism of implementing preventive socio-economic policy in a transforming and open economic system. [10] In this compromise, priority should always be given to the goal that, at any given time, may be in jeopardy and failure to achieve which poses a risk to the national economic system as it moves towards a market-oriented economy.

Therefore, the strategy of transformational changes in an open economy must, first of all, reflect the content of the real historical process, so as not to turn into a general declaration of intentions. The modern understanding of such a strategy cannot and should not be limited to purely economic issues at the level of methods and mechanisms typical of developed countries, but should be supplemented by issues of development in the broad sense of the word. [11]

Thus, based on the theoretical assumption that preventive socio-economic policies cannot be purely market-based, the most challenging theoretical and practical task is to identify the principles of future development that are incorporated into the strategies and development programs of various countries. The Republic of Tajikistan's limited historical experience demonstrates how the goals, objectives, and principles of the country's future development can be achieved under these conditions.

Main part

The Republic of Tajikistan is on the verge of a great historical holiday – the 35th anniversary of national independence. As emphasized by the Founder of Peace and National Unity, Leader of the Nation, President of the Republic of Tajikistan, His Excellency Emomali Rahmon, "the day of Tajikistan's independence is considered the greatest and most significant political and historical date for the ancient and noble Tajik people. For us, the Tajik people, this date represents the realization of the age-old cherished aspirations of our ancestors and stands as the result of the efforts and dedication of our ancient nation in attaining statehood and achieving freedom". [12]

The first years of independent development were extraordinarily difficult for the Republic, as the civil war imposed upon the Tajik people placed in jeopardy the very existence of Tajik statehood. Speaking at the solemn meeting dedicated to the sixth anniversary of the Republic's independence, His Excellency Emomali Rahmon noted at the time: "I fully understand that at present the majority of the Republic's residents are facing very difficult living conditions. However, I am firmly confident that soon all these hardships will be left behind, and better times and a peaceful life will prevail". [13]

In the mid-1990s, the country's GDP was 40% of its 1991 level, gross agricultural output decreased by 52.8%, industrial production declined by 65.8%, inflation reached four digit figures, and the national poverty rate exceeded 80%. The losses from the imposed civil war amounted to more than 10 billion USD. Only 42% of national roads and 20% of local roads were asphalt-paved, while 73% of roads were in poor condition, and the republic as a whole was in a transport and communications deadlock. It was only in the second half of the 1990s, owing to the foresight and wisdom of our people and the President of the Republic, that the civil war was brought to an end and the reconstruction of the devastated national economy could begin.

Accordingly, the peculiarities of the initial stage of economic transformation in independent Tajikistan should be assessed not only from the standpoint of the transition from a planned to a market-based system, but

above all from the perspective of overcoming the profound political and economic crisis that emerged in the early years of independence. During this period, priority was given to restoring fundamental constitutional rights of economic actors as protection of property, the right to own property, housing and work, choice of profession, etc. Only thereafter were conditions established for economic and entrepreneurial freedom, the effective use of state property in the interests of the people, guarantees for the social protection system, the formation of a national financial system, and the stability of the national currency.

In 1993, addressing the 48th United Nations General Assembly, the President of the country, His Excellency Emomali Rahmon, outlined the main priority for the future development of the national economy and noted that "while operating under extraordinary political and socio-economic pressure, within a relatively short period we succeeded in lifting the economic blockade from all regions of the republic, initiating the restoration of the destroyed national economy, and launching economic reforms aimed at the gradual introduction of market relations". [14]

In 1997, the economy of the republic recorded, for the first time since the crisis, showed positive growth rate of 1.2% and in the same year, at a meeting with representatives of the national intelligentsia, the President clearly outlined the directions for practical action in the economic sphere, emphasizing that, taking into account contemporary global realities and the specific features of the national mindset, it was necessary to concentrate on analyzing "the directions and advancement of the economic process and explaining the mechanisms for the introduction of a market economy". [13]

Despite considerable challenges at the initial stage of economic reforms, the country adopted the "Programme of Economic Reforms of the Republic of Tajikistan for 1995–2000" and the "Programme of Economic Development of the Republic of Tajikistan for the Period 2000–2015" which, taking into account the specifics of the current situation, were based on a phased approach and resolution of issues related to the establishment of market mechanisms. However, the gradual achievement of sustainable socio-economic development was not feasible in a context marked by the lingering effects of economic crisis - namely, acute energy shortages, high levels of food dependency, communications deadlock, and transport fragmentation of the regions. Strategic and priority decisions were required to enable the effective implementation of reforms. In this regard, in his 2005 Address to Parliament, His Excellency Emomali Rahmon, President of the Republic, emphasized that the strategic and vital tasks for the next five years would be to ensure energy independence, overcome transport and communications isolation, and ensure food security. Subsequently, in pursuit of the Millennium Development Goals (MDGs) for 2015, these priorities were transformed into strategic development goals for the country, and a number of strategic documents were developed and adopted to create favorable conditions for sustainable development, including the the National Development Strategy of the Republic of Tajikistan for the period up to 2015, as well as Poverty Reduction and Welfare Enhancement Strategies for the Tajikistan Population.

As a result of the implementation of national strategies and programs, by 2015, the state budget revenue increased from 300 million somoni to 18 billion somoni. Household income increased 25 times, and bank deposits increased more than 85 times. The poverty rate in the country decreased almost threefold, from 89% to 31%. The number of industrial enterprises increased from 358 in 1991 to 2,100 in 2015. To improve the living standards of the population and supply the consumer market with agricultural products, the President issued decrees allocating 75,000 hectares of land to the population, which made it possible to meet domestic demand for most essential food products. By 2015, within the framework of more than a thousand investment projects, more than 63 billion somoni (8.1 billion USD) of foreign investment had been attracted to the economy, including 27.5 billion somoni (3.5 billion USD) of direct investment, which was mainly directed to the energy, transport, healthcare, education, agriculture, irrigation, and other infrastructure.

As a result, by 2015, more than 2,000 km of roads, 190 km of railways, 240 bridges, and more than 30 km of road tunnels had been constructed and commissioned, at a total cost of more than 11.4 billion somoni. Tajikistan achieved one of its strategic goals - breaking out of the transport and communications deadlock. Also, by 2015, more than 36 billion somoni were attracted to ensure energy independence for the construction and commissioning of important small and large facilities for the generating and transmission of electricity.

A unified energy system was created for the country, and more than 1,300 MW of new generating capacity was commissioned.

Owing to the strong political will of the President of the country, His Excellency Emomali Rahmon, the country's economic development has taken on a completely new qualitative dimension. Following the adoption and implementation of the National Development Strategy of Tajikistan for the period up to 2015, the republic has achieved significant success in building a sovereign, democratic, legal, secular, unitary, and social state. During the implementation of this Strategy, stable economic growth averaging 7% was secured, macroeconomic stabilization was achieved, and inflation was reduced to single digits. Household incomes increased significantly and budgetary maneuvering opportunities expanded, allowing more resources to be directed toward the development of human potential as a fundamental resource for further socio-economic development.

In 2016, the Republic of Tajikistan entered a new stage of development.

With the view to further strengthening the foundations of steady economic development in the long term and improving the living standards of the country's population, Tajikistan developed and adopted the "National Development Strategy of the Republic of Tajikistan for the period up to 2030" in 2016. (with its phased implementation through five-year medium-term development programs), which defined three principles of sustainable development- preventiveness, industrialization, and innovation-which define the specific trajectory of the country's development amid an intensively changing geopolitical, geo-economic, and technological context of the modern world.

The need to develop systemic preventive measures to ensure the country's economic security first arose during the global financial and economic crisis of 2007-2009. In 2008, in his address to the Majlisi Oli (Parliament), the President set a very important objective: to incorporate into the system of state governance elements of continuous monitoring and assessment of the macroeconomic situation in crisis conditions. This represented a crucial management decision for an open economy that is constantly exposed to external shocks. The Republic of Tajikistan adopted an Action Plan to prevent the consequences of the financial crisis and established an Intergovernmental Anti-Crisis Commission.

An analysis of this Plan's implementation and the Commission's activities reveals that even at that time, the need to establish a flexible economic system in the Republic capable of adapting to changing global conditions and external shocks had already been raised. [15, p. 97] There was even an attempt to create a computer monitoring program - the "Early Warning System for Economic and Financial Crises," which was designed to enable real-time monitoring of economic processes; track the reaction of the environment in which they occur; identify their development trends at an early stage; determine various options for intervening in these processes; and, finally, respond in a timely manner to deviations and delays in the implementation of previously adopted decisions. [16, p. 167.]

In 2009, a Short-Term Additional Anti-Crisis Measures Plan was adopted, which set the important objective of implementing a range of preventive measures across socio-economic, monetary, and fiscal-policy spheres.

In the field of socio-economic policy, alongside short-term anti-crisis measures, preventive (fundamental) directions included ensuring the stability of the real sector, promoting the development of the private sector (particularly small and medium-sized enterprises), creating favorable conditions for investment, and ensuring stable employment. In monetary policy, preventive measures focused on monitoring and assessing the balance of payments and the national currency exchange rate. In fiscal policy, preventive measures were designed to ensure the efficient use of external public borrowings for the development of priority economic sectors, and to improve and monitor the system of tax incentives.

Since that time, the strategic management system of the Republic of Tajikistan has accumulated considerable experience in applying preventive measures aimed at ensuring economic security under external shocks.
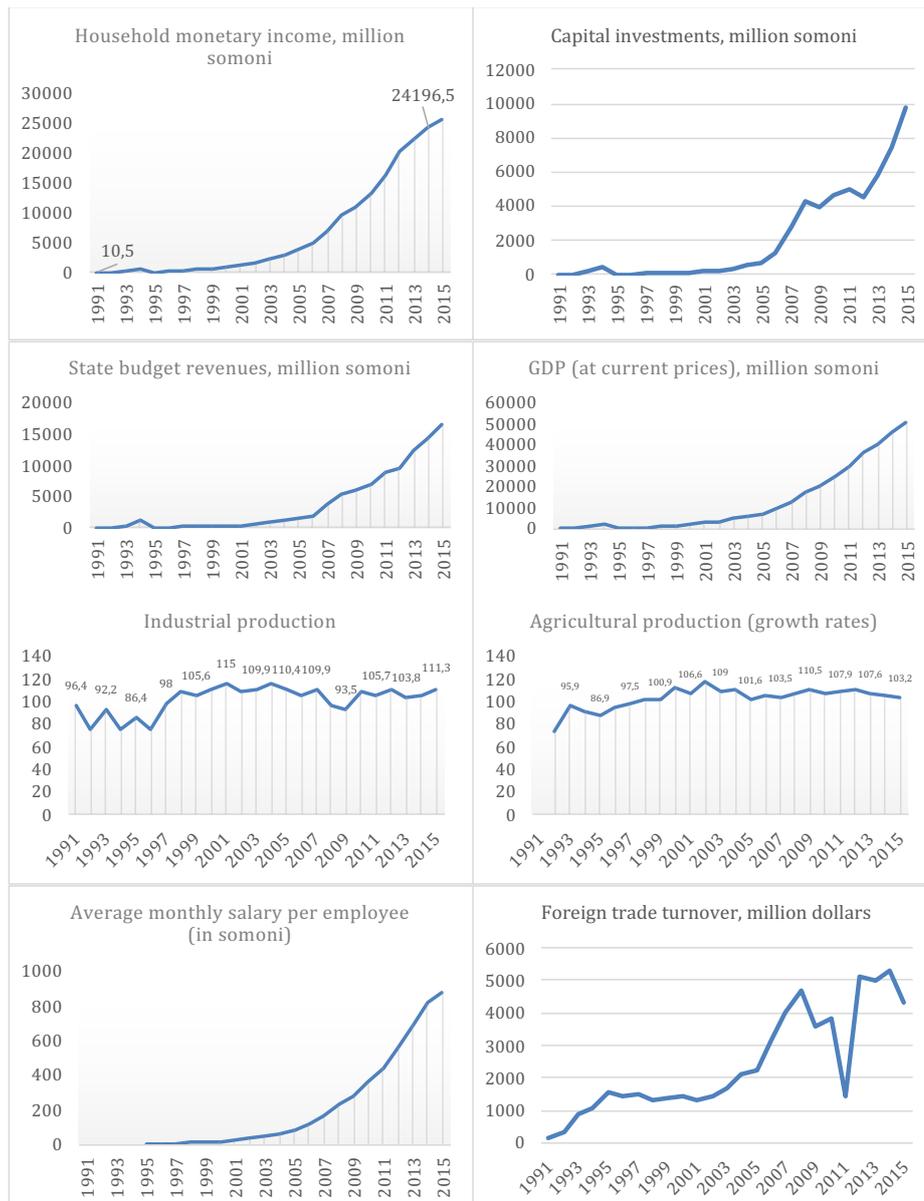
Figure 1. Economic Development Profile of the Republic of Tajikistan for the period up to 2015
Source: Author

The elements of preventive socio-economic policy in the country were most clearly implemented during the period of instability in global financial markets in 2014-2016. Thus, in early 2015, the Government of the Republic of Tajikistan developed and approved the "Action Plan to Prevent the Impact of Potential Risks on the National Economy," which covered five main areas of preventive action.

Given that the national economy is continuously exposed to external shocks, the primary objective - macroeconomic stabilization - was identified as being at significant risk. Accordingly, the Action Plan established measures aimed primarily at (1) ensuring the stability of macroeconomic indicators and (2) implementing a balanced monetary policy, which included steps to mitigate the risks of imported inflationary pressures. Recognizing the importance, within the preventive socio-economic policy framework, of reducing the "potential conflicts" of interest among economic agents, as well as the need to correct deviant behavior of actors within the national economic system relative to the predetermined development trajectory, the aforementioned Action Plan also included, alongside numerous anti-crisis measures, fundamental actions designed to (3) ensure the efficiency and transparency of the public sector; (4) strengthen social protection and employment; and (5) improve the investment climate and promote entrepreneurial development.

During the global financial market instability of 2016–2017, the Government of the Republic of Tajikistan implemented specific anti-crisis measures of a fundamentally preventive nature, including: (1) the rehabilitation of troubled banks; (2) exploring avenues for diversification of migration flows; (3) stabilizing the national currency; (4) improving the condition of arable land and ensuring food security; (5) revitalizing investment in the real sector of the economy; (6) diversifying exports; and (7) reducing informal employment.

To enhance the national forecasting system, amendments were introduced to the Law of the Republic of Tajikistan "On State Forecasts, Concepts, Strategies, and Programmes of Socio-Economic Development" in 2009, 2011, and 2017. Pursuant to this law, the Government of the Republic of Tajikistan, by Resolution No. 649 of 30 December 2007, approved the "Procedure for the Development of Short-Term, Medium-Term, and Long-Term State Forecasts of Socio-Economic Development of the Republic of Tajikistan." Since 2016, econometric models have been introduced into the national forecasting system based on the study of experiences from other countries.

Continuing the reform process, in 2018 the Law "On State Forecasts, Concepts, Strategies, and Programmes of Socio-Economic Development" was adopted in a new edition. This legislation clarified the short-term, medium-term, and long-term stages of socio-economic development and systematized the strategic documents of the country.

In 2018, in response to the negative impact of external shocks, the Government's preventive measures focused on strengthening coordination among ministries and agencies in ensuring economic security. A resolution was adopted on the "Action Plan for Coordinating the Implementation of Macroeconomic Policy and Preventing the Impact of Potential Risks on the National Economy," which specified the main directions of preventive socio-economic policy: (1) maintaining stability in key macroeconomic indicators; (2) ensuring the sustainable operation of state-owned enterprises and troubled banks; and (3) enhancing efforts to improve the investment climate and promote entrepreneurship. [17]

Finally, in the same year, in order to continuously monitor issues of financial stability, as well as to identify and overcome the negative impact of potential risks and global financial crises on the national economy, a permanent interdepartmental advisory body was established in the republic - the National Council for Financial Stability, which, based on monitoring of crisis situations or unforeseen destabilizing circumstances, including natural disasters, was authorized to submit to the Government of the Republic of Tajikistan an emergency plan to prevent possible consequences, with the aim of managing the situation and solving problems in conditions of instability.

In light of the negative impact of the COVID-19 pandemic, in March 2020, the government adopted the "Action Plan of the Government of the Republic of Tajikistan to Prevent the Impact of Potential Risks of the Coronavirus Pandemic on the National Economy," which comprised 23 provisions, including the following anti-crisis measures: actions to significantly increase import-substituting production and ensure consumer markets with essential products, including flour, oil, meat, sugar, eggs, vegetables, and other food products; increasing their production and stocks and preventing price increases; attracting foreign investment and financing from the International Monetary Fund and international donor organizations; measures to ensure the timely fulfillment of the state's social obligations, including support for vulnerable segments of the population; as well as measures aimed at supporting entrepreneurs, including tax breaks for small and medium-sized businesses and the postponement of non-tax audits. At the same time, the principle of prevention was used to protect the food market and ensure that the country's markets were supplied with domestically produced goods. By decision of the Republican Headquarters for the Prevention of the Spread of Coronavirus, Tajikistan introduced a temporary ban on the export of domestic agricultural products and the creation of opportunities for surplus production, which could be used to build up reserves. In particular, a temporary ban has been imposed on the export of all types of grains, legumes, flour and wheat, rice, eggs, potatoes, and all types of meat. Under the President's guidance, regional authorities were advised to expand the area of agricultural crops to provide the country's residents with domestically produced goods; specifically, the sowing area for potatoes was to be increased by 40–50%. VAT exemptions were introduced on imported staple foods such as sugar, vegetable oil, wheat, and rice in order to influence market prices. The National

Bank of Tajikistan temporarily reduced the reserve requirement ratio for credit institutions on savings and other similar liabilities from April 1 to December 31, 2020 - from 9% to 5% in dollars and from 3% to 1% in somoni, which contributed to an increase in the liquidity of the banking system, and also reduced the discount rate from 12.75% to 11.75% to support business.

During the pandemic, the President of the Republic of Tajikistan issued a decree "On Preventing the Impact of the COVID-19 Infectious Disease on the Socio-Economic Spheres of the Republic of Tajikistan" which, taking into account the current situation with the spread of the new infectious disease, set specific short- and medium-term tasks aimed at reducing the negative impact of COVID-19.

It should be noted that the high level of social and economic costs associated with combating COVID-19 makes this crisis comparable in impact to external shocks experienced during the global financial and economic crisis of 2007–2009. However, these costs significantly distinguish this situation from classic financial and economic crises, primarily in terms of the level of uncertainty and dependence on non-economic (medical, humanitarian, political) factors. At the same time, the main focus of the country's preventive socio-economic policy, namely ensuring macroeconomic stability, remained the center of attention for the government.

In the Address of the President of the Republic of Tajikistan, the Leader of the Nation, His Excellency Emomali Rahmon, to the Majlisi Oli of the Republic of Tajikistan "On the Main Directions of the Republic's Domestic and Foreign Policy" dated January 21, 2021, it is noted that "the consequences of the pandemic continue to have a negative impact on the economies of countries around the world, including the development of our national economy, the state budget, external trade, the national currency exchange rate, as well as the activities of industrial enterprises and service institutions... In 2020, we carried out our activities in the context of an acute global financial and economic situation, and despite the problems that arose, we took a number of operational measures to prevent the consequences of the crisis and protect the country's economic security. Despite the negative impact of these factors, the government's urgent measures ensured the stability of macroeconomic indicators and maintained positive tendencies in terms of improving the standard of living and quality of life". [18] As a result, economic growth remained positive at 4.5% at the end of 2020.

The experience of many countries around the world in combating the pandemic has shown that tough non-economic measures to contain the spread of COVID-19, such as widespread quarantine and social distancing, are certainly justified from the point of view of saving human lives and are linked to the fact that the capabilities of each country's healthcare system are significantly limited at a given moment in time. In such circumstances, "flattening the curve" and achieving a plateau of stability and certainty allows the country's healthcare system to cope with the burden. However, the downside of such measures is the social and economic costs associated with the reduction in economic activity. The interdependence between them is obvious and understandable: the more restrictive the measures to contain the spread of the virus, the higher the social and economic costs. Therefore, it can already be acknowledged today that the actions of the Government of the Republic of Tajikistan, under the existing restrictions, which were not aimed at declaring a total quarantine but focused on the introduction of more lenient self-isolation and social distancing measures, were generally justified, as they were based on the fundamental idea of the principle of prevention – ensuring long-term dynamic stability and sustainable development of the country in the face of external shocks.

In 2022, the Government of the Republic of Tajikistan adopted a new resolution on the "Action Plan to Prevent the Impact of Potential Risks on the National Economy". [19] The country's anti-crisis action plan under this resolution, along with previous measures (2018, No. 577), included issues of supplying consumer markets with raw materials, preventing unreasonable price increases, supporting vulnerable segments of the population, migrant workers and entrepreneurs, ensuring the timely fulfillment of the state's social obligations, preventing potential risks to the banking system, reducing exchange rate pressure, providing low-interest loans to industrial entrepreneurs, improving the investment climate, postponing non-tax audits, attracting additional financial assistance, and other measures.

An Interagency Headquarters was established to coordinate the implementation of macroeconomic policy and prevent the effects of potential risks on the national economy. At its sessions, issues are considered such as maintaining macroeconomic and banking system stability, increasing production of high value-added

export-oriented industrial products, ensuring the stable operation of state-owned enterprises, improving the investment climate, supporting entrepreneurship and internet access, providing the population with essential goods, preventing price increases, protecting vulnerable population groups, supporting labor migrants, and promoting tourism, with corresponding decisions adopted.

Modeling of economic processes in the economy of the Republic of Tajikistan has shown [20] that under conditions of significant external shocks, export diversification, rather than raw-material specialization, is most consistent with the country's economic model and creates conditions for developing higher value-added sectors. These measures are specifically outlined in the State Program for the Development of Exports of the Republic of Tajikistan for 2021-2025. [21] Therefore, one of the central objectives in the development of preventive measures in the National Development Strategy of the Republic of Tajikistan for the period up to 2030 is to increase the competitiveness of the national economy and create conditions for attracting productive capital to the country. In this case, the country's preventive policy is aimed at implementing measures to reduce the overall tax burden and the administrative burden on business; ensuring the low cost of doing business, including reducing the transaction costs of doing business; a policy of stable electricity prices; intensification of Research & Development carried out by small businesses; improving the efficiency of transport infrastructure; upgrading the skills of the workforce; and raising corporate governance standards.

Continuing the reforms in the country to improve the strategic planning system and the development of documents in this area, in 2022, a new Law of the Republic of Tajikistan "On Strategic Planning and State Forecasting" was adopted, [22] which defines the list of strategic documents and their interdependence at the national, sectoral, and regional levels, ensures the integration of strategic planning with the budget process, introduces a quality control system, develops results-oriented monitoring, reporting, and evaluation systems, and addresses other issues related to strategic planning and development forecasting.

The second principle of development outlined in the National Development Strategy of the Republic of Tajikistan for the period up to 2030 is is the principle of industrialization, which involves increasing the efficient use of national resources and aims to enhance the competitiveness of the national economy, primarily through the transition from an agrarian-industrial to an industrial-agrarian model of economic development. This principle is directly linked to the principle of prevention and reflects the characteristics of socio-economic policy, taking into account the specific features of the country's development. For example, in the initial period of independent development, more than 215,000 people, or 13% of the population employed in the economy, worked in industrial enterprises in Tajikistan, and the share of industry in the GDP structure was 25.4%. In the early stages of implementation of the National Development Strategy for the period up to 2030, about 85,500 people, or 3.5% of the population employed in the economy, were employed in industry, and the share of the industry in the GDP structure was about 16%. For this reason, the principle of industrialization specified in the Strategy was reinforced at the initiative of the President of the republic, His Excellency Emomali Rahmon, when he, along with three national goals—ensuring energy independence and the efficient use of electricity; ensuring food security and access to quality nutrition for the population; breaking the communication deadlock and transforming the country into a transit country—announced accelerated industrialization of the country as the fourth national goal. The task was set to bring the share of industry in the GDP structure to 30%.

"In the context of Tajikistan," notes President Emomali Rahmon, "without the establishment of a highly developed industry, the transition from an agrarian-industrial model of development to an industrial-agrarian one. , ensuring economic independence and social security is impossible". [18] Overall, achieving the fourth national goal-accelerated industrialization-is based on Tajikistan's favorable conditions for its implementation. The country experiences an annual 2% growth in its main productive force-its population-of which more than 58% are of working age. Despite its small territory, the country has significant potential in terms of water and hydropower resources and is rich in natural resources for the development of mining and processing industries, such as non-ferrous and ferrous metallurgy, the construction materials industry, and the pharmaceutical industry. Currently, more than 600 mineral deposits and 800 mineral manifestations have been explored and partially developed in Tajikistan, creating a solid resource base for the development

of the country's industry. The natural and climatic conditions of the valley regions are favorable for the production of agricultural products for traditional light and food processing industries, in particular, export-oriented products.

In this regard, the Leader of the Nation, President of the Republic of Tajikistan, His Excellency Emomali Rahmon, clearly identified the problem that "in order to achieve the fourth national goal, it is necessary to change the principle of development and the mechanism of implementation of the country's industrial policy". [18] It is now important to implement a new structural policy in industry by gradually shifting to the preferential development of sectors that produce end products. These objectives are reflected in the Program for the Accelerated Industrialization of the Republic of Tajikistan for 2020-2025, as well as in other sectoral strategic planning documents in the field of industry. The accelerated modernization of industry with new means of production involves both a focus on borrowing advanced technology from developed countries and the rapid development of traditional industrial production and enterprises for the complete processing of cotton fiber, leather, wool, cocoons, fruits, vegetables, and other domestic raw materials, that is, in essence, the expansion of the country's industrial space. And finally, the implementation of measures to stimulate export-oriented economic growth by increasing the production of finished goods at enterprises in the non-ferrous metallurgy, light, food, and pharmaceutical industries.

The accelerated development of the ferrous and non-ferrous metallurgy, machine building, and chemical industries will be crucial for reducing the country's dependence on imported products, providing various industries with the necessary equipment, increasing export potential, and diversifying industrial production. The new challenge facing the country, triggered by the COVID-19 pandemic, has once again highlighted the need to expand export-oriented and import-substituting development of the basic sectors of the national economy, where the accelerated industrialization of the country and its regions should play a central role. Special attention is given to the creation of agro-industrial and other sectoral clusters to improve industrial efficiency, enhance product competitiveness, and integrate into global value chains with foreign investment. Several strategic planning documents have been developed and adopted in this area, including the Concept for the Creation and Development of Agro-Industrial Clusters in the Republic of Tajikistan up to 2040. [23]

The implementation of the principle of industrialization in the country's development is becoming an important basis for the implementation of the third principle - the principle of innovation, which is specified in the National Development Strategy of the Republic of Tajikistan for the period up to 2030. At the same time, achieving the country's fourth national goal - accelerated industrialization – is not possible without science, information and communication technologies, and the fostering of technical thinking among young people. In this regard, the President of the country, His Excellency Emomali Rahmon, has declared 2020-2040 a period of intensive development of the exact and natural sciences, providing a powerful impetus for the formation of a modern scientific and technical worldview in society and the creation of a knowledge-based economy. The new technological cycle that we're seeing today in the global economy is a new global challenge that requires the advanced development of the education system and the large-scale introduction of international educational standards into the vocational education system.

As early as 2011, in order to improve the existing situation in the field of innovation, the Government of the Republic of Tajikistan adopted two fundamental documents: the Strategy of the Republic of Tajikistan in the Field of Science and Technology for 2011-2015 and the Program of Innovative Development of the Republic of Tajikistan for 2011-2020, which defined the main objectives of the state innovation policy such as creating favorable socio-economic, organizational, and legal conditions to increase production efficiency by utilizing innovative potential, and introducing energy-saving and environmentally friendly technologies that contribute to the production of competitive products.

Within the framework of the implementation of the innovation principle, the "Strategy for Innovative Development of the Republic of Tajikistan for the Period up to 2020" was adopted in 2015, with the aim of developing human resources in the fields of science, education, technology, innovation, and intellectual property; increasing the innovative activity of businesses and accelerating the emergence of new innovative companies; the broadest possible introduction of modern innovative technologies into the activities of state

authorities; the formation of a balanced and sustainably developing research and development sector; ensuring the openness of the national innovation system and economy, as well as the integration of the Republic of Tajikistan into global processes of creating and applying innovations. In 2023, following the instructions of the President of the Republic of Tajikistan, the State Program for Scientific and Innovative Development in the Republic of Tajikistan for 2023-2027 was adopted.

In 2012, Tajikistan became a full participant in the Agreement on the Creation of an Information Infrastructure for Innovative Activity among CIS Member States, establishing a distributed information system and CIS portal "Information for Innovative Activity of the CIS Member States." In 2013, Tajikistan joined the Agreement on Scientific and Technical Cooperation among the Governments of the Shanghai Cooperation Organization Member States.
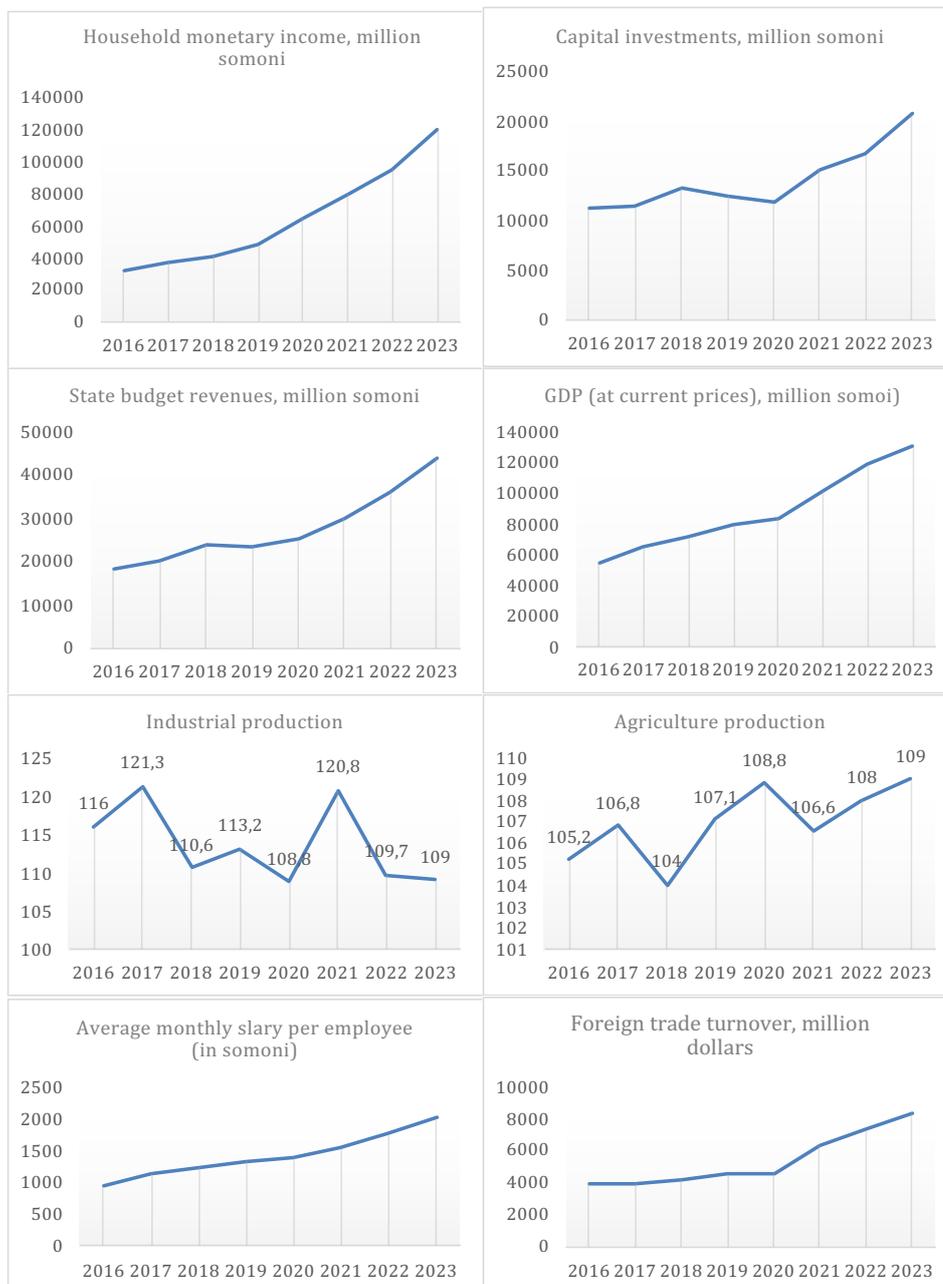
Figure 2. Economic Development Profile of the Republic of Tajikistan for the period 2016 to 2023
Source: Author

To further expand the principle of innovative development, in 2019, the Government of the Republic

of Tajikistan adopted the Concept of the Digital Economy in the Republic of Tajikistan, and in 2021, the Medium-Term Program for the Development of the Digital Economy in the Republic of Tajikistan for 2021 -2025, which define the main trend of innovation – transitioning the economy to digital rails, which will give impetus to the transformation of existing and development of new types of production, as well as obtain digital dividends in areas such as GDP growth, creation of new jobs, services, and improved living standards. In the medium term, the digital transformation process is planned to focus on the digitalization of the energy industry, the agro-industrial complex, and the telecommunications sector, in accordance with their strategic importance for the country's development. Given the current challenges in the field of digitalisation, the goal has been set to lay the foundations for non-digital (strengthening the regulatory and legislative framework and cyber security regulation) and digital (broadband Internet access throughout the country and optimisation of the entire process of service delivery using digital technologies) transformation in the country. In this regard, 2025-2030 have been declared the "Years of Development of the Digital Economy and Innovation" in the Republic of Tajikistan. [19]

Conclusion

The Republic of Tajikistan possesses tangible natural resources that provide a solid foundation for a transition to a "green" economy. Greenhouse gas emissions in Tajikistan amount to less than one ton per capita per year, while the country's share of total emissions within the Central Asian region is approximately 5%. This is primarily attributable to the extensive utilization of hydropower resources, which generate environmentally clean electricity and account for more than 98% of the energy balance. Accordingly, the concept of a "green" economy directly aligns with the national interests of the Republic of Tajikistan, and its broad implementation may create the necessary conditions for the country to secure its own niche within global innovation processes aimed at the efficient use of natural capital. These and other objectives of Tajikistan's green transformation are reflected in the Green Economy Development Strategy of the Republic of Tajikistan for 2023–2037 [20], which is currently being implemented at an accelerated pace. As noted by the President of the Republic of Tajikistan Emomali Rahmon, in his Address to the Parliament of the country on December 28, 2023, "Tajikistan, as a leading country in the world in the development of the green economy in 2037, will in fact become a green country". [24]

CONFLICT OF INTEREST
The author declares no conflict of interest.

References

1. Chernyaeva I.V., Chernyaev Yu.A. Harmony of the 21st Century Economy. Bulletin of the International Nobel Economic Forum. 2012, No. 1 (5). Vol. 1.

2. Rakhimov R.K. Transitional Economy in the Context of the Global Economic Crisis/Economic Development of Tajikistan in the Context of Anti-Crisis Measures. Materials of the Scientific and Practical Conference (20.04.2009). – Dushanbe. Irfon., 2009. Pp.43-55.

3. Origins. From the experience of studying economics as a structure and a process. Moscow. HSE Publishing House. 2006.

4. Economic Subjects of Russia (Institutional Analysis). Part 1-3. Moscow, 2010.

5. Nureev R.M. Russia: Features of Institutional Development. Moscow, 2009.

6. Rakhimov R.K. Features of Economic Policy in the Transition Period// Izvestiya of the Academy of Sciences of the Republic of Tatarstan. Department of Social Sciences. - 2004. - No. 4.

7. Turaeva M.O. On approaches to the study of the national economic system of Tajikistan//Economy of Tajikistan: development strategy. – 2009. -No. 3. Pp. 14-27.

8. Umarov Kh. Crisis in Tajikistan. Depth of Action. Form of Manifestation. Ways of Overcoming. Dushanbe. 2010.

9. Pogodin, Yu.A. The Influence of Institutional Changes on Economic Growth in Modern Russia. Abstract of PhD thesis. Volgograd, 2006.

10. Kuznetsov, V.N. Theory of Compromise. Moscow: Kniga i Biznes, 2010. 588 p.

11. E. de Soto. The Mystery of Capital. Why Capitalism Triumphs in the West and Fails Everywhere Else. Moscow: Olimp Business, 2004, p. 182.

12. Emomali Rahmon. Address at the Solemn Meeting on the Occasion of the 22nd Anniversary of the State Independence of the Republic of Tajikistan. 9 September 2013.

13. Emomali Rahmon. Speech at the Meeting with Representatives of the Intelligentsia. 19 March 1997.

14. Emomali Rahmon. Speech at the 48th Session of the United Nations General Assembly. 29 September 1993.

15. Bobozoda, G.J. The Contemporary Global Financial Crisis and Its Impact on the Economy of the Republic of Tajikistan. Dushanbe, 2009. 164 p.

16. Financial and Economic Mechanisms for Crisis Regulation: Proceedings of the Republican Scientific and Practical Conference of 5 June 2009. Dushanbe, 2009. 319 p.

17. Resolution of the Government of the Republic of Tajikistan "On the Action Plan for Coordinating the Implementation of Macroeconomic Policy and Preventing the Impact of Potential Risks on the National Economy." 30 November 2018, №557.

18. Address by the President of the Republic of Tajikistan, Leader of the Nation, His Excellency Emomali Rahmon, to the Majlisi Oli of the Republic of Tajikistan "On the Main Directions of the Republic's Domestic and Foreign Policy." January 26, 2021. www.prezident.tj

19. Resolution of the Government of the Republic of Tajikistan "On the Action Plan for Coordinating the Implementation of Macroeconomic Policy and Preventing the Impact of Potential Risks on the National Economy." 30 November 2018, №557.

20. The Republic of Tajikistan on the Path toward an Open Economy: Essays in Econometric Analysis. Edited by L.Kh. Saidmurodov, Corresponding Member of the Academy of Sciences of the Republic of Tajikistan. Dushanbe, 2018. 184 p.

21. Resolution of the Government of the Republic of Tajikistan "On the State Export Development Program of the Republic of Tajikistan for 2021–2025." 30 April 2021, №169.

22. Law of the Republic of Tajikistan "On Strategic Planning and State Forecasting." July 2022, №1894.

23. Resolution of the Government of the Republic of Tajikistan "Concept for the Creation and Development of Agro-Industrial Clusters in the Republic of Tajikistan up to 2040." 28 October 2020, №566.

24. Address by the President of the Republic of Tajikistan, His Excellency Emomali Rahmon, "On the Main Directions of the Republic's Domestic and Foreign Policy" (28 December 2023). / https://www.president.tj/event/missives/36374.

World-systems theory as a paradigm for explanation of uneven structure of global and national economic development

Dmitry V. Didenko ⬤ⁱᴰ

ORIGINAL ARTICLE

Doctor of Science in Economics, Candidate of Science in History, Professor
Russian Presidential Academy of National Economy and Public Administration, Moscow, Russian Federation
E-mail: didenko-dv@ranepa.ru

Abstract. In this essay the author attempts to revitalise ideas from various schools of world-systems theory (WST) to explain the roots of divergence and convergence between the West and the East in income per capita at various stages and phases of capitalist development of the world economy. The author argues that this theory provides with relevant concepts and approaches to reveal the role of empires in promoting long-distance trade, commodification of the global economy, as well as the factors behind secular change of world-economy centres and hegemonies. The author traces intellectual influences on the WST by interpreting the key concepts and discussing the lines of argument. The author compares the selected theoretical approaches by the WST, as well as by related theoretical paradigms, with empirical evidence found in economic history literature. This provides helpful insights for understanding changes in relative positions of Russia by bridging past and present and by placing the country's path of development into the global perspective. Thus, having claimed to be an alternative to the global capitalism during the Soviet period, Russia appeared to be a semi-periphery of the world capitalist economy. Surpassing development of China and India in the last decades promises shifts in the global economic landscape. The author's review of the literature demonstrates that most of the original schools of WST analysed factors behind the Great Divergence; yet their methodology is applicable to explain the convergence. To do so they borrowed the neoclassical concept of human capital and applied to a revised modernisation discourse.

Introduction

The phenomena of globalisation and deglobalisation of international economy and the role of the BRICS countries in these processes is widely discussed in academic literature and mass media. Among many streams of academic literature a prominent role belongs to the world-system theory (WST hereafter). It is relatively new, at least as regards Marxism, institutionalism, or even development economics. It is inherently historic as it places the global relationship among countries in a historical context by relying on empirical findings by economic and social historians and provides theoretical explanation of various phenomena of economic, social, and political history. The diversity of schools and discourses in which the complex of these processes and phenomena is understood and analysed makes it rather a multidisciplinary paradigm (Robinson, 2011), like modernisation theory, to which WST opposed when emerged. Both of these paradigms endeavour to investigate interactions of economic system with other ones, in which human activities are manifested.

The increasing weight of the BRICS countries poses a set of questions. The first is why China failed to expand overseas, beyond the traditional area, despite high level of technology relative to European countries

in the 15-18th centuries? The second question is how early modern development of the overseas commerce affected further capitalist development. The third is why the Great Divergence was succeeded by convergence in cross-country income per capita?

In trying to address them the author employs concepts and approaches developed by various schools of WST to arrive at the roots of divergence and convergence in income per capita at various stages and phases of capitalist development of the world economy.

The rest of the study is structured as follows. In the next Section 1 the author proposes his interpretation of the basic concepts and approaches employed by WST. In Section 2 he investigates the WST explanation and empirical findings by economic historians on the role of trade and rise of the new type of empires at the dawn of modern economic growth and the Great Divergence. Section 3 is focused on how different schools of WST explained and predicted the processes of divergence and convergence.

Main part

The WST paradigm: key concepts and approaches

The WST considers long-term[1] trends of capitalist society as a world-system unified by flows of commodities, labour and capital, divided into geographically defined structural subsystems: the core, semi-periphery and periphery. The key concepts of WST are "world-economy", "world-empires" and "capitalism".

In the WST perspective, world-economy is defined as the system in which powers and control are effected through a single division of labour but multiple polities and cultures. In contrast, in world-empires there is a single political system over the area under control. In this environment capitalism was from the beginning an affair of the world-economy and not of nation-states (Wallerstein, 2011 [1974], p. 63, 347-349). This idea can be traced back to the Communist Manifesto by K. Marx and F. Engels[2] despite it appeared not to be the consensus one among their followers. The WST relied on a broader concept of capitalism than Marxism did. The former can be summarised as a set of commodified economic activities aimed at profit maximisation and infinite capital accumulation (Wallerstein, 2004, p. 23-25; Arrighi, 2010, p. 8-11). Therefore, in socialist countries extreme form of state capitalism (not merely state-induced or state-led but state-owned economy) appeared to be the case. A narrower Marxist concept is based on such essential characteristics, as domination of private (versus public) property for the means of commodified production, aimed at maximum private extraction of surplus value[3] from wage-labour, which is realised through the respective distribution of political powers, ideological, cultural, and other means of social control.

State is conceptualised in Arrighi (2010, p. 28-37) based on territorialist versus capitalist approach on which enterprises, their networks and the whole world-system operate. Opposing to Marxism[4], in WST frame-work a state has its certain degree of autonomy and its own rational strategy aimed at territorial expansion and population under control. Arrighi (2010, p. 34) clearly distinguished political and economic logic: territorialist rulers identify power with the extent and populousness of their domains, and conceive of wealth/capital as a means or a by-product of the pursuit of territorial expansion; capitalist rulers, in contrast, identify power with the extent of their command over scarce resources and consider territorial acquisitions as a means and a by-product of the accumulation of capital. Thus, capitalism developed through ambivalent interaction between economic and political interests and rationality, as well as through competition of various economic and political institutions.

The concept of "world" is also related to empires as large supra-state units, which are conceptualised

---

1 *The concept of "Long durée" coined by Braudel (1973 [1967]; 1992 [1979]) became one of the key ones in economic history.*
2 *The basic idea was that a rapid development of modern industry had established the world market, for which the discovery and colonisation of America as well as trade with the colonies, paved the way. The concept of "world market" is frequently used already in the founding work of 1848 (Marx and Engels, 1977 [1848]).*
3 *In national accounting this may be operationalised as entrepreneurial income.*
4 *TAs the Communist Manifesto claimed, "The bourgeoisie has at last, since the establishment of Modern Industry and of the world market, conquered for itself, in the modern representative State, exclusive political sway… The executive of the modern State is but a committee for managing the common affairs of the whole bourgeoisie" (Marx and Engels, 1977 [1848], p. 37-38). This view does not presume any specific own interest on the part of a state.*

as a large power platform, derived from the strategy of control over expanded territories, with ethically and culturally diverse populations, resulting in coercive redistribution of resources (Derluguian, 2007). This ensures economic flows from the periphery to the centre by force (tribute and taxation) and by monopolistic advantages in trade. Yet, political empires are a primitive means of economic domination[5]. The world-economies that existed before capitalism, always transformed into empires: China, Persia, Rome. In contrast, capitalism is associated with development of the world-economy without the emergence of a unified political structure (Wallerstein, 2011 [1974], p. 15-16; 2004, p. 57-59).

Rising empires and economic growth

The shift from a traditional Malthusian system[6] to modern economic growth regime[7] was launched in England in the 18th century (e.g. Kuznets, 1966, p. 64, 462) having been prepared with the market integration in the previous centuries (e.g. Clark, 2015). During more than three latest centuries the regime spread around the world. The factors underlying the original shift of regime of economic growth away from the Malthusian mechanism are basically subdivided in Smithian (commercialisation) and Northian (institutional) growth. The former is based on division of labour for which exchange of goods by means of trade is a driver of growth, pre-modern, early modern, and modern. Trade follows from agricultural (and later industrial) specialisation via increasing population income.

The phenomena of globalising trade and the rise of empires in the early modern era, which went alongside each other, received an explanation within the frame-work of the WST.

It follows from the logic of WST that empires were not a necessary condition for the world capitalist economic system, even though they made their substantial contributions. Historically, the core of world-economy could be represented by city-states (like Venice[8], Genoa, Florence at the dawn of capitalism, Luxembourg or Singapore today), small- or medium-sized confederate states (like the United Provinces of the Netherlands in the 17 th – 18th centuries[9] or Switzerland), large nation-states with huge colonial appendages (Britain and France in the 18th – mid-20th centuries), federal states (primarily the US and the UK today). The polity was flexible, without clear trend to centralisation or decentralisation.

In WST perspective the traditional agrarian-coercive empires are separated from the later modern colonial empires whose governing logic was capitalist. Thus, Russia, like Turkey or Portugal, emerged as a pre-capitalist, agrarian-coercive empire. Subsequently they have long existed alongside capitalism while being increasingly penetrated and incorporated into the global capitalist networks. On the opposite, the Netherlands, England, or France were capitalist nation-states in Europe – while at the same time operating overseas as territorialist empires (Derluguian, 2007).

Indeed, it was the state which assisted "national" capitalists, absorbed their losses and thus promoted world capitalism. Among typical instruments of the state involvement into international commerce the main place belonged to monopolies, the protectionist system, and mercantilist policies. Among monopolies there were cases of joint-stock chartered companies which were part-governmental, part-business organisations which specialised territorially to the exclusion of other similar organisations. Also, in the process of capitalist development a large number of states created national economic barriers as a defensive mechanism of capitalists located in those which were one level below the high point of strength in the system (Arrighi, 2010, p. 250).

---

5 *In terms of new institutional economics, empires tend to have more transaction costs per capita than smaller states caused by larger expenditures for operation and contract enforcement. But empires tend to produce large-scale effects and have greater capacity for diversification.*

6 *Characterised with a negative relation between population size and GDP per capita and very slow long-term growth of income per capita.*

7 *Characterised with high rates of growth in income per capita based on rising productivity. S. Kuznets (1966) who coined the term did not support human capital theory although he acknowledged that spread of education and of the transnational stock of technological and social knowledge underlay the rise in productivity. Unified growth theory (Galor, 2011) revitalised the term stressing the role of human capital compound with the demographic transition in the movement from Malthusian to modern growth regime.*

8 *The state that at most met the standards of the capitalist logic (Arrighi, 2010, p. 38).*

9 *Braudel (1992 [1979], p. 193-195).*

The cases how the state assisted to merchants in their trade can be found in Russian history as well. In the second half of the 16th century the privileges issued by Ivan IV (the Terrible) to the Muscovy Company incorporated in England, a milestone in the history of Anglo-Russian relations, were of great importance for further development of Russia's commerce[10]. Another case, the Russian-American company for colonisation of Alaska was chartered by the emperor Paul I (in 1799) and sponsored by the Russian state[11].

As regards the role of trade in the Great Divergence, among the questions which arise, the first is what inspired the development of long-distance trade from the part of the European countries in the 15th – 17th centuries (and not from the part of China)[12]?

As Arrighi (2010, p. 35-37) suggested, by the mid-15th century Asia had been a purveyor of valued goods for the tribute-taking classes of Europe and had thereby exercised a powerful pull on Europe's precious metals. This structural imbalance of European trade with the East created strong incentives for European governments and businesses to seek ways and means, through trade or conquest, to retrieve the purchasing power that relentlessly drained from West to East.

Therefore, the expected benefits to Portugal and other European states of discovering and controlling a direct route to the East were incomparably greater than the expected benefits of discovering and controlling a direct route to the West were for the Chinese state whose agents weighed carefully the prospective benefits, costs, and risks.

Even in the 18th century the main economic and social indicators in Western Europe and in Eastern Asia were at comparable level, relative to their present relation. Considering England versus Yangtze delta, Pomeranz (2000) argued that technological stagnation of early modern and modern China and its failure to get on the path sustained growth were caused by the lack of both colonial expansion with long-distance trade and of more accessible fossil reserves, primarily coal. This in much contributed to the Great Divergence in the 18th – 19th centuries. By shifting the dating of the Great Divergence later than it was thought before this economic history research was seminal in revising the previous historiography and stimulating another wave of the debate on its roots. Pomeranz (2000) emphasized an occasional nature of outcomes of the world economic development, including the emergence of modern economic growth regime as a successful escape from the Malthusian bonds. The institutional structures both in China and in North-Western Europe were taking shape and developing by trial-and-error method. Thus, even though economic institutions in the late Ming (1368 to 1644) and early Qing China (1644 to 1911) were no less market oriented and the markets no less integrated than in Western Europe at the time to enable Smithian growth (Pomeranz, 2000, p. 69-86), Western Europe succeeded in the 18th-19th centuries while China fell behind reverting to semi-colonial economic position).

The second question is how early modern development of the overseas commerce affected further capitalist development. In Marxian literature early modern world trade is considered as a factor of primitive accumulation of capital, associated with slave capture, unequal exchange via cheating, fraud and outright robbery. In this perspective early capitalism is frequently defined as merchant (also commercial) one, the idea borrowed by other streams of literature (e.g. by the German Historical school of economics)[13].

The WST explains secular change of world-economy hegemons in the core of the system. Being associated with major fluctuations in international flows of trade (goods and services) and capital they are determined by the systemic cycles of capital accumulation and competition of historical institutions of capitalism. Each cycle consisted of a phase of material expansion followed by a phase of financial expansion. Financial expansions started at the moment when the leading business agencies of the preceding trade expansion switched their energies and resources from the commodity to the money trades (Arrighi, 2010, p. 88; Braudel, 1984, p. 242-248). Historically, these were a Genoese cycle, from the fifteenth to the early seventeenth centuries; a Dutch

---

10 *See, e.g., Kotilaine, 2005, p. 93-95.*
11 *See e.g. Lightfoot (2003).*
12 *As Arrighi (2010, p. 35-37) put it forward: why China did not discover Portugal and took control over the Inner Asian trade several decades before the latter started the same movement eastwards?*
13 *Wallerstein opposed the separation "merchant vs industrial" and argued "agricultural vs industrial" capitalism based on defining what type of commodity (largely agricultural) people produced for sale and profit in world market.*

cycle, from the late sixteenth century through most of the eighteenth century; a British cycle, from the latter half of the eighteenth century through the early twentieth century; and a US cycle, which began in the late nineteenth century. The crises of overaccumulation that marked the transition from one organisational structure to another also created the conditions for the emergence of ever more powerful governmental and business agencies capable of solving the crises through a reconstitution of the capitalist world-economy on larger and more comprehensive foundations (Arrighi, 2010, p. 6-7, 341).

Yet, the quantitative evidence we have on commodity structure of exports and imports over time starts from the 19th century, at best from the 18th century, i.e. covers the British and American cycles of accumulation, according to the timeline in Arrighi (2010, 5-7, 219-220).

Wallerstein (2011 [1974], p. 301-325) and Braudel (1992 [1979], p. 441-465) considered Russia as either a separate world-economy (16-17th centuries) or a periphery of the European capitalist world-economy (since the 18th century). Besides low commodification of the economy, one of the arguments was that Russia's trade with the East, where the colonization moved ahead, was of more importance than with the West before the 18th century. The quantitative and descriptive evidence[14] presented in Kotilaine (2005) strongly questions (and rather refutes) this argument, even without overall estimates on geographical composition of Russia's foreign trade. The whole view was challenged by the scholars within the same school who argued that Russia from the 16th century was as much part of the world-system, as were Poland or Turkey[15]. Remarkably, Kotilaine (2005, p. 2-5, 510-514) emphasised Russia's dependency in commerce with both directions. He pointed out predominance of foreign merchants, concentration of raw materials in exports and manufactured products in imports.

We should pay attention to an ambiguous role of trade for the development of the Russian Empire with borderland colonisation and open frontier (Khodarkovsky, 2002; Sunderland, 2004, p. 11-53)[16]. In the process of territorial expansion, the fertile black soil region was brought under cultivation in the 18th century (Broadberry and Korchmina, 2022, p. 7). But the vast areas of the Siberia and the Far East remained very low populated relative to the Russian European core and poorly explored. Trade links between European Russia and the peripheral provinces in the Caucasus and Central Asia[17] were of much less importance if compared to those of Britain and France with their overseas. Territorial expansion of the Russian Empire in Central Asia was driven primarily by geopolitical competition with the British Empire and much less by economic factors.

In WST perspective Russia could change it status from either an outsider or a periphery in the 16-17th centuries to a semi-periphery in the middle of the 18th century, and back to a periphery until the late 19th century. In the 18th century not only trade openness was on the rise but also positive trade balance. The production of Russian iron works was exported to the West besides agricultural commodities (Kahan, 1985, p. 163-266). Later, as the Industrial Revolution proceeded in the West, the composition of Russia's exports (more agricultural commodities) and imports (more machinery) more and more resembled those of a periphery. Despite the USSR became one of the two military superpowers in the second half of the 20th century and obtained some features to be included into the core, the commodity structure of Russian / Soviet foreign trade can hardly lend support to this notion. Before the 1950s the exports primarily consisted of agricultural commodities, woods, fishery, furs; while imports did of manufactured consumer and producer goods. Only within a short period of time (1950s – end 1960s), at the height of successes in catching up with the West, the exports of machinery expanded. But even in the best times[18] the structure could be characteristic for semi-periphery, not the core. In the 1970s-1990s agricultural exports was replaced by oil and gas on the side of

---

14 *The products obtained from the colonized East (furs first of all) if were exported then mainly to the West. Transportation networks westwards were much better developed than eastwards already in the 17th century.*
15 *Cited in Wallerstein (2011 [1974], p. XXV).*
16 *The concept was coined in the late 19th – early 20th centuries by F.J. Turner (1920, p. 11-38) with reference to Northern American type of colonization.*
17 *Many of these provinces were included into the Russian interior customs territory and the statistics reported trade flows with them as domestic. But some remained outside even being parts of the Russian Empire.*
18 *At the turn of 1960s-1970s when the share of manufactured products was largest, that of primary products was the least in exports, while the share of machinery was the least in imports.*

export; while imports of machinery were on the rise, as well as agricultural products (Uegaki, 2019, p. 306-309).

In the WST perspective, the USSR and the bloc of socialist countries, which emerged as an alternative to western capitalism and embarked on a path of their own economic integration, in fact remained a part of the capitalist world-economy. This thesis was primarily based on the broad concept of capitalism. It is confirmed by the data on foreign trade in the 1920s, first half of the 1940s, 1960s-1980s. In the 1920s almost all of the trade flows (low but comparable size with those of before the WWI) were those with capitalist countries, with Germany, the US and the UK being the main trading partners (MVT, 1967, p. 14). In the 1960s when trade openness returned to the level of 1920s, the main trading partners became the socialist countries from the COMECON[19] (MVT, 1967, p. 70-71). In the late 1980s when trade openness returned to the pre-Revolutionary levels of the early 20th century, the share of the capitalist core expanded and approached to 25% (TsSU, 1989, p. 645).

World System Theory on divergence and convergence

One of the basic ideas of the WST is that global market exchange is not equivalent[20]. As the capitalist world-economy is a highly hierarchical system the benefits of trade were distributed unequally not only within countries but also between them. This idea penetrates the literature from Marxism via dependency theorists to WST. For Karl Marx the main inequalities arising from international trade were basically intra-national. Prebisch (1950) applied the same logic by reverting it to international perspective. He introduced the concepts of centre and periphery within a world economic system with the specific international division of labour. In addition to the core and periphery, Wallerstein (2011 [1974]) proposed the intermediary layer, namely semi-periphery, necessary for the smooth functioning of the world-economy. As he claimed, unequal exchange is enforced by strong states on weak ones, by core states on peripheral areas. Thus, capitalism involved not only appropriation of the surplus-value by an owner from a labourer, but an appropriation of surplus of the whole world-economy by core areas (Wallerstein, 2011 [1974], p. 15-16; 2004, p. 28-29). Amin (1976, p. 133-145), who identified himself as Marxist, argued that the differences in wages between parts of the world greatly exceeded those in productivity.

The dependency theory was especially popular in the 1960s and 1970s when opposing to the modernisation theory. This theoretical shift contributed to the emergence of WST which basically relied on the former.

In the WST perspective, growth rates in underdeveloped economies are more likely to be lower than those in developed ones, within a historically long-term economic cycle. This is primarily due to the stylised fact that the latter are specialised in production of innovations while the former reproduce their copies through the following mechanism.

Various types of commodities constitute different value added, depending on their technological advancement and substitutability. The countries of the core specialise in physical- and human-capital intensive production, with low substitutability. Therefore, price competition in these segments is of relatively low intensity. Consequently, the price of such a product may contain a significant rental component. In this case a significant positive risk premium (or rent) goes to the successful innovator. However, if the innovation fails, the risk premium will be negative. This factor tends to be frequently overlooked. At the same time, peripheral areas of catch-up development, as a rule, specialise in the production of highly substitutable goods, the mass production of which has already been mastered in the core of the capitalist world system. Such production is characterised by increased intensity of price competition which depresses the prices and the level of entrepreneurial income.

---

19 *The Council for Mutual Economic Assistance established in 1949 by the key socialist countries of Eastern Europe. Among non-European socialist countries only Mongolia, Vietnam and Cuba subsequently joined as full members, while China participated as an observer in 1949-1961 (https://en.wikipedia.org/wiki/Comecon).*
20 *This presumption originates from Prebisch (1950, p. 8-14) who argued that from 1870s to 1940s primary commodities produced in a periphery had weaker price performance relative to manufactured goods produced in industrial centres, contrary to the respective costs.*

From unequal nature of international commodity exchange[21] it follows that divergence is a trend while convergence is just its temporary correction. Cases of catching-up then should be rather rare than frequent. Thus, most of the world-system theorists strongly predicted global divergence but hardly did the same for convergence. However, the empirical evidence of the recent decades contradicts this prediction. While during the 19th and 20th centuries there was a divergence between countries in the level of per capita income, then since the end of the 20th century there has been a convergence. Indeed, there are few rapidly developing countries. But this is primarily China, which has narrowed the gap several times since the 1980s. Also India showed rapid growth rates and a narrowing the gap in the 21st century. Both countries represent more than a third of the human race in terms of population.

An explanation of these stylised facts employing WST is proposed in Grinin and Korotayev (2015). They suggest that the Great Divergence and the Great Convergence constitute two phases of a single Global Modernisation process. They found that the roots of the turn to convergence lay in the late nineteenth and early twentieth centuries. Increasing import of capital by the world periphery appeared to be a starting point of the turn. This factor became even greater in the second half of the 20th century, with Transnational Corporations (TNCs) played the leading role to contribute to globalisation, technological transfer, and the development of infrastructure. Important reasons of the shift toward convergence were scientific and technological progress combined with ability of the periphery to adopt it. Human capital development in the World System periphery allowed really effective diffusion of capital and technologies from the World System core. The emergence of educated intellectuals (in particular, via student training in the West and in the USSR) was very important and could be the proponent of the ideas of modernisation. Some states on the periphery, even being suppliers of mineral resources, exposed sufficient propensity to collective actions through the OPEC in order to hike prices for fuel and sustain them for prolonged periods of time (Grinin and Korotayev, 2015, p. 116-134). These were basically the technological factors of convergence rather than institutions as environment of economic activities.

Not a single key cause but the combination of the factors have prepared the basis for the turn toward Convergence: the dramatically increased necessity both for the West and the USSR (each for various reasons) to seek alliances with developing countries; the need to put negative processes in the developing countries under control and elaborate proper strategies, scientific ideas, programs etc.; changes in the Western economies' structure, that required moving industrial production to developing countries; the awakening of the intellectuals and striving for modernisation; the role of developing countries as suppliers of raw materials (especially oil) and of cheap labour force which gradually gained more and more education and became more and more skilled (Grinin and Korotayev, 2015, p. 134).

Thus, the new wave of globalisation, which began in the late 1980s – early 1990s, has weakened the core and strengthened the periphery. Among the causes of the weakening of the relative might of the West an important place belongs to the dramatic slow-down of the population growth rates there (whereas in some developed countries those growth rates have even become negative) which is accompanied by its very significant ageing. In the meantime, the demand for the main resource of poor countries, namely their workforce, increased dramatically. Development of new technologies led to the situation when the technologies of older generations, which are subject to transfer to the periphery, became cheaper and cheaper (Grinin and Korotayev, 2015, p. 149-158).

What is important in the view of WST upon the Great Divergence that it was not just a process of growing differences in the levels of development of the West and the Rest, but also the process of the emergence of a new type of global economic system in which economies of various countries were incorporated into a single world economic system (but with very different roles) which shifted to the Great Convergence that happened in recent decades (Grinin and Korotayev 2015, p. 7).

The original modernisation theory of the 1950s-1960s basically stated that, when less developed countries come into contact with more developed countries, they start moving on the western path of development

---

21 *Combined with the idea that technological transfer is also unequal: periphery tends to borrow low-tech to improve the production of primary goods.*

(Eisenstadt, 1966; Black, 1966). This paradigm rested on the same historically optimistic progressist thinking as Liberalism and Marxism, with emphasis on active and proactive policies (developmental state) as well as on the elimination of destructive forms of class struggle. However, the wave of decolonisation in the 1960s did not lead to modern growth in most of the former colonised countries, contrary to predictions of modernisation theory. Therefore, this discourse of linear modernisation as westernisation was largely refuted. But a comeback occurred in the 1990s as state socialism collapsed and, the Cold War ended, global income convergence emerged somewhat earlier, and the prospects of liberal capitalism seemed to be bright again. Thus, the WST applied to a revised discourse of modernisation paradigm.

Unsurprisingly, the WST focuses on the division of labour (such as skilled and unskilled labour) based on the military power and capital intensity of core countries. Therefore, as it was shown above, there was need to borrow concept of human capital emerged and developed in the neoclassical mainstream of economics to explain the historical processes of divergence and convergence in productivity and income per capita.

Conclusion

The proximate source of pre-modern, early modern, and modern economic growth, advocated by Adam Smith, is the development of trade, associated with the formation and expansion of a new type of empires. These processes have been explained within the framework of world-systems theory, which considers long-term trends in the development of capitalist society as a world-system. This system is united by flows of goods, labour, and capital, but divided into geographically defined structural subsystems: the core, semi-periphery, and periphery.

Having been strongly influenced by Marxism, the WST emerged as a stream of leftist economic and sociological literature with emphasis on contradictory nature of the world economy subsystems as a driving force of the capitalist development. However, the WST relied on a broader concept of capitalism, than Marxism did, where free markets are rather an exception and where socialism becomes a kind of peripheral state capitalism. Also, WST opposed to linear version of modernisation theory and optimistic development thinking of the 1950s-1960s.

From this perspective, being technologically advanced in the early modern times, China remained an empire of the traditional agrarian-forced type, a world-economy in itself, and therefore was not so interested in promoting long-distance trade with the outer world, whether the East or the West. While the latter had a structural imbalance of European trade with the East and was much more interested in discovering and controlling a direct trade route to the East.

Contrary to China, Russia was highly open for foreign trade already in the 17th century, both with the East and the West. Russia could change it status from either an outsider or a periphery in the 16-17th centuries to a semi-periphery in the middle of the 18th century, and back to a periphery until the late 19th century. In the late 19th and early 20th centuries her elite had succeeded in transformation into a colonial empire whose management logic was basically capitalistic. The Soviet Union, once emerged as an alternative to global capitalism, in terms of trade flows appeared to be just a semi-periphery of the world capitalist economy.

Both trade and empire underpinned by military force could play a role in the rise of industrialisation, for example, by providing access to new markets and resources, and by supplying knowledge and resources. On the other hand, they could also have a negative effect, diverting resources from civilian investment to military spending and conspicuous consumption of elites. These processes of inter-country rivalry, more intensive in fragmented Western Europe, affected the dynamics of global divergence and convergence in income per capita, though in non-linear ways.

The WST theorises on a cyclical logic of capitalist accumulation (a phase of material expansion followed by a phase of financial expansion) and on competition of historical institutions of capitalism that both led to changes in centres of the world economy and their hegemonies. The crises were solved through a reconstitution of the capitalist world-economy on larger and more comprehensive foundations.

Dependency theory, especially popular in the 1960s and 1970s, argued that the global relationship

among countries is one in which developed countries force developing countries into the production of low value-added goods such as raw materials. Hence, no convergence in terms of per capita income occurs. Most of the world-system theorists, who strongly relied on the dependency theory, predicted global divergence but hardly did the same for convergence. However, the recent literature found the WST methodology applicable to explain the alternative empirical evidence of the latest decades by borrowing the neoclassical concept of human capital and revising modernisation discourse, originally refuted by the WST founders. Thus the WST appeared to be instrumental in explaining both the global divergence of the latest centuries and the convergence of the latest decades.

FUNDING

CONFLICT OF INTEREST
The author declares no conflict of interest.

References

1. Amin, S. (1976 [1973]). Unequal Development: An Essay on the Social Formations of·Peripheral Capitalism. Hassocks (England): Harvester Press.
2. Amin, S. (2016). Russia and the Long Transition from Capitalism to Socialism. New York: Monthly Review Press.
3. Arrighi, G. (2010). The Long Twentieth Century. Money, Power, and the Origins of Our Times. 2nd ed. London, New York: Verso Books.
4. Black, C. (1966). The Dynamics of Modernization: A Study in Comparative History. New York: Harper and Row.
5. Braudel, F. (1973 [1967]). Capitalism and Material Life, 1400–1800. New York: Harpercollins Publisher.
6. Braudel, F. (1992 [1979]). Civilization and capitalism. Vol. 3. The perspective of the world. Berkley: University of California Press.
7. Broadberry, S., & Korchmina, E. (2022). Catching-up and falling behind: Russian economic growth, 1690s-1880s. Oxford Economic and Social History Working Papers No. 192. University of Oxford. https://ora.ox.ac.uk/objects/uuid:8ddb009a-30d0-4100-9bcf-895b106481a2.
8. Clark G. (2015). Markets before economic growth: the grain market of medieval England. Cliometrica, 9(3), 265–287.
9. Derluguian, G.M. (2007). Some Ideas about Empires on Europe's Periphery (The Worlds the Portuguese, the Russians, and the Turks Created). Social Evolution & History, 6(1), 145–154.
10. Eisenstadt, S.N. (1966). Modernization: Protest and Change. Englewood Cliffs (N.J.): Prentice Hall.
11. Galor, O. (2011). Unified Growth Theory. Princeton (N.J.): Princeton University Press.
12. Grinin, L., & Korotayev, A. (2015). Great Divergence and Great Convergence: A Global Perspective. Heidelberg: Springer Cham.
13. Kahan, A. (1985). The Plow, the Hammer and the Knout: An Economic History of Eighteenth-Century Russia. Chicago: University of Chicago Press.
14. Khodarkovsky, M. (2002). Russia's Steppe Frontier: The Making of a Colonial Empire, 1500-1800. Bloomington – Indianapolis: Indiana University Press.
15. Kotilaine, J.T. (2005). Russia's foreign trade and economic expansion in the seventeenth century: Windows on the World. Leiden – Boston: Brill.
16. Kuznets, S. (1966). Modern Economic Growth: Rate, Structure, and Spread. New Haven; London: Yale University Press.
17. Lightfoot, K.G. (2003). Russian Colonization: The Implications of Mercantile Colonial Practices in the North Pacific. Historical Archaeology, 37(4), 14–28.

18. Marx K., & Engels F. (1977 [1848]). Manifesto of the Communist Party. Moscow: Progress Publishers.

19. MVT (1967). Ministerstvo vneshnei torgovli SSSR [Ministry of Foreign Trade of the USSR]. Vneshniaia torgovlia SSSR: Statisticheskii sbornik [Foreign trade of the USSR: Statistical Abstract]. 1918–1966. Moscow: Mezhdunarodnye otnosheniia [International relations].

20. Pomeranz, K. (2000). The Great Divergence. China, Europe, and the Making of the Modern World Economy. Princeton and Oxford: Princeton University Press.

21. Prebisch, R. (1950). The Economic Development of Latin America and its Principal Problems. Lake Success, NY: United Nations Department for Economic Affair.

22. Robinson, W.I. (2011). Globalization and the sociology of Immanuel Wallerstein: A critical appraisal. International Sociology, 26(6), 723–745.

23. Sunderland, W. (2004). Taming the Wild Field: Colonization and Empire on the Russian Steppe. Ithaca; London: Cornell University Press.

24. Tabata Sh., & Tabata T. (2019). Gross Domestic Products. In: Kuboniwa M. et al. (Eds). Russian Economic Development over Three Centuries: New Data and Inferences. Singapore: Palgrave Macmillan (pp. 251–289).

25. TsSU SSSR (1989). Tsentral'noe statisticheskoe upravlenie [Central Statistical Board of the USSR]. Narodnoe khoziaistvo SSSR [National Economy of the USSR]. Moscow: Finansy i Statistika.

26. Turner, F.J. (1920). The Frontier in American History. New York: Henry Halt and Company.

27. Uegaki, A. (2019). Foreign Trade. In: Kuboniwa M. et al. (Eds). Russian Economic Development over Three Centuries: New Data and Inferences. Singapore: Palgrave Macmillan (pp. 291–315).

28. Wallerstein, I. (2004). World-Systems Analysis: An Introduction. Durham, N.C.: Duke University Press.

29. Wallerstein, I. (2011 [1974]). The Modern World-System. Vol. I. Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century. Berkeley: University of California Press.

Econometric modelling of the impact of government support measures on investment activity and profitability of agriculture

Amir M. Edidzhi

ORIGINAL ARTICLE

Master Student
Kuban State Agrarian University named after I.T. Trublin, Krasnodar, Russian Federation
E-mail: edidzhi2001@gmail.com

Sergey N. Kosnikov [iD]

Candidate of Economic Sciences, Associate Professor
Kuban State Agrarian University named after I.T. Trublin, Krasnodar, Russian Federation
E-mail: kosnikov.s@edu.kubsau.ru

Abstract. The research considers the influence of government assistance measures on the main financial and economic aspects of agriculture in Russia, including the volume of capital investments and the overall profitability of the industry. The topic is particularly relevant due to the need for an accurate assessment of efficient budget money spending in limited funding and external problems such as economic constraints and weather risks. The research examines the effectiveness of subsidies, special payments, and tax breaks to promote investment and improve the financial performance of agricultural enterprises. Based on official Rosstat statistics and reports from the Ministry of Agriculture of Russia, we developed a special mathematical model based on aggregated data from ten Russian regions, 2010-2024. We also used the least squares approach adjusted for regional specifics. According to the results, there is a significant and statistically confirmed positive effect: the correlation coefficient for capital investment is 0.8029, for profitability – 0.0001. The model includes additional factors (local GDP and price growth) as effective ones in terms of this particular support. The research considers the territorial differences and time limits to suggest the practical guidance on improvement of existing approaches. The results are useful for effective development of the national agribusiness strategy, with an emphasis on targeted investments in new technologies. In general, the research helps to develop quantitative analysis tools in the agricultural sector and is prospective in terms of nonlinear dependencies and geography.

Keywords: government assistance; profitability of agricultural sector; mathematical modelling; regional amendments; Russian agro-industrial complex

Introduction

The agriculture in Russia plays a key role in ensuring food security and sustainable economic development. According to Rosstat, the volume of production of the agroindustrial complex in 2023 reached 8.3 tn RUB; in 2024 – 8.9 tn RUB (an increase of 6.9%)[1]. However, the industry is facing a lot of challenges: volatility in prices for resources (fertilizers, fuels), climate risks, and geopolitical constraints after 2022, including sanctions reduced technology imports by 25% [1]. The governmental support for agriculture in 2023 amounted to 540 bn RUB; in 2024 – 665 bn RUB including subsidies for loans, grants, and tax benefits (VAT exemption for exports)[2]. Exports of agricultural products in 2023 will amount to $ 43.5 bn USD; in 2024 – $ 43.1 bn USD. It indicates on potential growth but requires an assessment of the effectiveness of support measures [4].

[1] *The State Program of the Russian Federation "Development of agriculture and regulation of agricultural products, raw materials and food markets" for 2013-2030. Approved by Decree of the Government of the Russian Federation No. 717 dated July 14, 2012 (as amended in 2025). Source: https://mcx.gov.ru/activity/state-support/programs/ (accessed on 09.10.2025)*

[2] *The State Program of the Russian Federation "Development of agriculture and regulation of agricultural products, raw materials and food markets" for 2013-2030. Approved by Decree of the Government of the Russian Federation No. 717 dated July 14, 2012 (as amended in 2025). Source: https://mcx.gov.ru/activity/state-support/programs/ (accessed on 09.10.2025)*

Historically, the support has been always existing: anti-crisis measures in the 1990s, "Agricultural Development for 2008-2012" (investment growth by 30%) in the 2000s, etc. [1]; import substitution after 2014; digitalization and ecology (the budget for 2025 is 507 bn RUB for precision agriculture) in 2021, etc. Theoretically, such measures are justified by the theory of market failures: agriculture generates externalities (food security as a public good) and faces information asymmetry and high risks [2; 12].

Comparison with the foreign countries shows a lag: profitability in Russia is 15.4% (2023); in the EU and the USA – 20-25%[3]. According to the OECD, Russia is in the top 10 in terms of support (1.5% of GDP). However, the efficiency is lower (each ruble brings 0.8 rubles of investment versus 1.5 euros in the EU) due to bureaucracy and regional imbalances (South – 18%, Siberia – 12%) [3]. The BRICS (China, India) have similar problems. However, digitalisation increases returns by 5-7%[4].

The relevance of the research is provided by the requirement for quantitative assessment in conditions of a limited budget and climate change (droughts in 2023-2024 reduced yields by 10%) [15]. Scientific novelty of the research is in a panel model with fixed effects in 10 regions (2010-2024), accounting for indirect effects through investments, and a Hausman test for selecting a specification. The purpose of the research is to assess the impact of support on investments and profitability. The objectives of the research are to make a literature review, model development, empirical analysis, and recommendations.

Literature Review

Theoretically, the research is based on the neoclassical Solow model. According to it, the long term growth depends on capital accumulation and technological progress. Additionally, the research concerns with the Samuelson's theory of public goods. It emphasises the need for government intervention to compensate for externalities in agriculture, such as food security and environmental effects [2]. Market failures in agriculture are manifested in high transaction costs, weather uncertainty, and credit barriers for small farms. It justifies subsidies as a risk mitigation tool [9]. Within the framework of Romer's product variety model (1986, 1990), subsidies for R&D and innovation stimulate technological change and increase productivity by 10-15% due to the external effects of knowledge as a non-competing good [2; 12].

Foreign experience confirms the effectiveness of targeted measures: in the USA, PLC and ARC programs (2018-2025) increased investments in agriculture by 12% and increased risk tolerance through insurance subsidies[5]; in the EU the new CAP 2023-2027 (40% of the budget for green innovations) expects profitability to grow by 5-6% due to support for organic farming and digitalisation, although implementation faces challenges, such as reducing strict environmental requirements in 2022-2023[6]. In China, subsidies for seeds, machinery, and fertilizers (2020-2024) yielded a multiplier of 1.1-1.3. It accelerates the mechanisation of small farms and productivity by 8-10% [10]. In India, the PM-KISAN scheme (direct payments of Rs 6,000/ year) stimulated investments in small farms by 7-9%. it improves liquidity and access to seeds and fertilizers [14].

Russian literature focuses on assessing state support in terms of import substitution: Uzun and Shagaida (2019) calculated the effectiveness of subsidies at 0.75-0.85, emphasising the role in income stabilisation [2]; Shik (2018) identified GDP and prices with regional differences of up to 20% as key drivers of investment [3]; Altukhov (2015) emphasised the sustainability of the grain subcomplex through subsidies for seeds [4]. Recent studies take into account sanctions and post-pandemic shifts: Shelamova (2023) estimated a 3-5% drop in agricultural profitability in 2022-2023 due to rising costs [16]; through the applied panel models for the Volga region Gurnovich (2023) shows R2=0.80 and a support effect of 0.78 [17]; Saraikin (2023) identified nonlinear

effects of grants on innovation with a return threshold of >500 bn RUB [18]; Evstratova (2024) confirmed the disparities between the districts (South vs. Siberia: +15-18%) [19]. However, there is a gap in panel studies with fixed effects and indirect channels (investment → profitability) for 2020-2024, especially in the conditions of droughts and sanctions. This research is an attempt to integrate climate indicators (according to FAO[7]) and robust tests [13].

Methods

10 regions with the largest contribution to the Russian agro-industrial complex have been selected for empirical analysis: The Central, Volga, Southern, Northwestern, Ural, Siberian, and Far Eastern Federal Districts, the Krasnodar Territory, the Rostov region, and the Republic of Tatarstan. According to the papers on the regional differentiation of agriculture, this ensures the representativeness of the sample in terms of climatic, soil, and infrastructural differences [3; 19]. The panel is balanced and covers the years 2010-2024 (N=150 observations). It makes it possible to capture the periods before and after the sanctions of 2014 and 2022. The data is collected from official sources: Rosstat[8], the Ministry of Agriculture of the Russian Federation (reports on state programs[9]), and regional statistical collections [3; 4]. The support itself includes grants and incentives, investments in fixed assets, profitability in sales, control variables – regional GDP and inflation (according to the Central Bank of the Russian Federation).

The model specification follows the standard panel analysis approach in terms of the regional heterogeneity:

$$\ln(\text{Inv}_{it}) = \beta_0 + \beta_1 \ln(\text{Supp}_{it}) + \beta_2 \ln(\text{GDP}_{it}) + \beta_3 \text{Infl}_{it} + \alpha_i + \varepsilon_{it}$$
$$\text{Rent}_{it} = \gamma_0 + \gamma_1 \text{Supp}_{it} + \gamma_2 \ln(\text{Inv}_{it}) + \gamma_3 \ln(\text{GDP}_{it}) + \gamma_4 \text{Infl}_{it} + \delta_i + u_{it}$$

where:
Inv_{it} – investments in fixed assets (bn RUB);
Supp_{it} – volume of support (bn RUB);
GDP_{it} – gross regional product (tn RUB);
Infl_{it} – annual inflation (%);
a_i – fixed effects of regions;
e_{it} – residuals.

Logarithmisation of key variables (Inv, Supp, GDP) provides linearity and normality of residues (Shapiro-Wilk test: $p > 0.05$), as recommended for agricultural panels with high dispersion [6; 9].

The major method is OLS with fixed effects (FE), preferred by the Haussmann test ($\chi 2 = 18.4$; $p < 0.01$) over random effects. It ensures an isolation of constant regional factors such as climate or infrastructure [6; 7]. Tests for multicollinearity (VIF < 5), autocorrelation (Durbin-Watson = 1.98), and heteroscedasticity (Breusch-Pagan: $p > 0.05$) confirmed their adequacy. Robust Driscoll-Kraay standard errors were applied to account for spatial correlation in agricultural data [6]. The calculations were performed in Stata 17 (for panel analysis) and R 4.3 (visualisation), as in similar agribusiness studies [5; 8]. The variables are detailed below (Figure 1).

---

[7] *FAO. The Impact of Natural Hazards and Disasters on Agriculture, Food Security, and Nutrition. Rome: FAO, 2015. Source: https://www.fao.org/3/i5128e/i5128e.pdf (accessed on 10.10.2025)*

[8] *Rosstat. Regions of Russia: Socio-economic indicators. 2024. Moscow: Federal State Statistics Service, 2024. Source: https://rosstat.gov.ru/folder/210/document/13204 (accessed on 09.10.2025).*

[9] *The State Program of the Russian Federation "Development of agriculture and regulation of agricultural products, raw materials and food markets" for 2013-2030. Approved by Decree of the Government of the Russian Federation No. 717 dated July 14, 2012 (as amended in 2025). Source: https://mcx.gov.ru/activity/state-support/programs/ (accessed on 09.10.2025)*
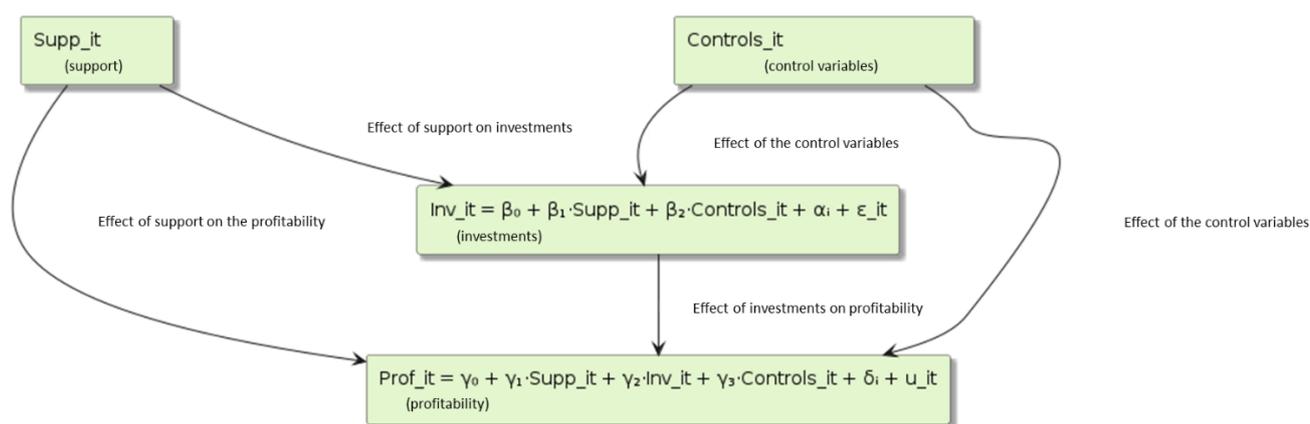
Figure 1. Economic model of investments and profits

Source: Authors

Results

In 2010-2024, the volume of state support for the agroindustrial complex in the analysed 10 regions of Russia increased from 600 to 1,450 bn RUB (an increase of 141%); investments in fixed assets – from 950 to 1,800 bn RUB (by 89%); the return on sales of agricultural enterprises increased from 9.8% to 21.0%. These trends show the general upturn in the industry, supported by government programs. However, it also reveals a slowdown in the multiplier effect: the average annual growth rate of support (6.1%) exceeds the investment rate (4.3%). It indicates an incomplete transformation of budget injections into long-term capital, especially after 2022 due to inflation and logistical disruptions [16]. According to the World Bank's reports on agricultural sustainability, these imbalances are typical for the post-sanctions period as subsidies partially cover current costs, rather than modernisation [1].

Table 1 shows the descriptive statistics of key indicators The sample (N=150) shows moderate variability: the standard deviation of support (180.25 bn RUB) is lower than that of investments (175.40 bn RUB). It indicates a standard distribution of subsidies by region compared to market investments. Profitability ranges from 9.8% (during the crisis years) to 21.0% (in 2024); an average level is 15.8%. It is lower than in its European counterparts (20-25% according to the OECD[10]).

Table 1 – Descriptive statistics of indicators

Indicator	Quantity	Average	Standard Deviation	Minimum	Maximum
Support (bn RUB)	150	1,050.50	180.25	600.0	1,450.0
Investments (bn RUB)	150	1,350.75	175.40	950.0	1,800.0
Profitability (%)	150	15.80	3.50	9.8	21.0
Regional GDP (trn RUB)	150	2.75	1.10	1.2	5.5
Inflation (%)	150	6.50	2.30	3.5	10.5

Source: Authors

Figure 1 shows the dynamics of support and investment, highlights structural shifts: until 2014, the ranks moved asynchronously due to the instability of the post-crisis recovery; from 2014 to 2020 – due to import substitution (export growth of $ 43.5 bn USD in 2023[11]); after 2020 the gap decreased by 15-20% due

---

[10] *OECD. Agricultural Policy Monitoring and Evaluation 2024. Paris: OECD Publishing, 2024. DOI: 10.1787/74da57ed-en. Source: https://www.oecd.org/en/publications/2024/11/agricultural-policy-monitoring-and-evaluation-2024_b4c72370.html (accessed on 10.10.2025)*

[11] *The State Program of the Russian Federation "Development of agriculture and regulation of agricultural products, raw materials*

to the acceleration of grants for digitalisation and technology [7]. This indirectly confirms the increase in the return on subsidies: in 2010-2015 1 bn RUB of support generated ~ 0.6 bn RUB investments. However, despite the sanctions restrictions in 2021-2024 it was ~0.85 bn RUB.
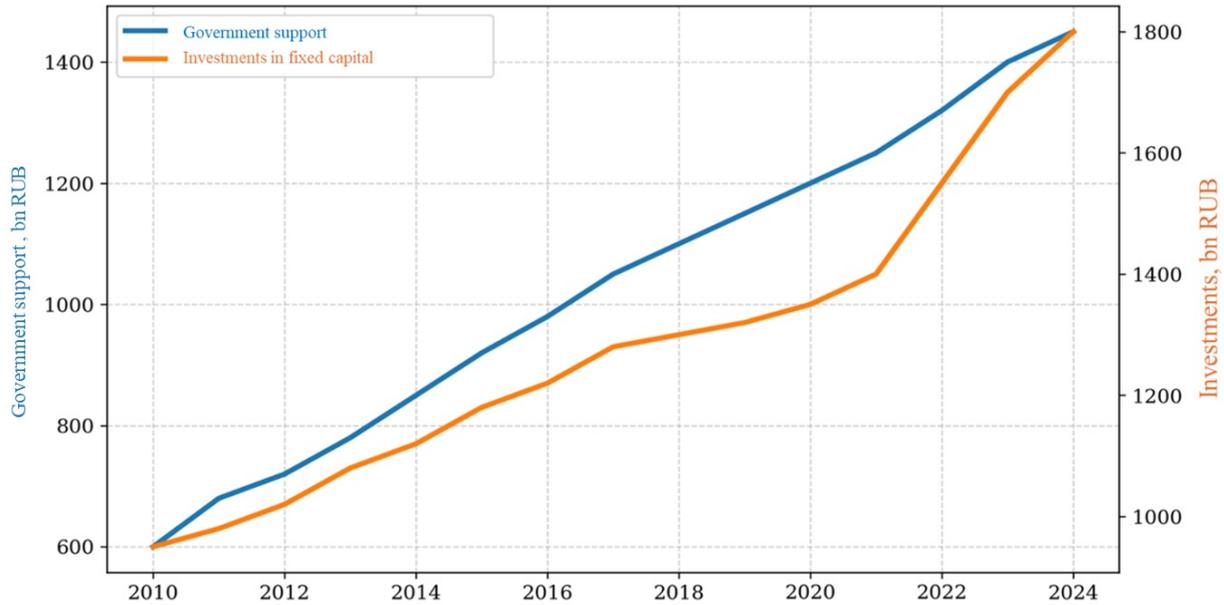
Figure 2. Dynamics of government support and investments (2010-2024)

Source: Authors

The correlation matrix (Table 2) records strong positive associations: between support and investment (r = 0.84; p < 0.01); investment and profitability (r = 0.80; p < 0.01); moderate with GDP (r = 0.55-0.60). The negative correlation with inflation (r = -0.30 to -0.40) highlights the vulnerability of the industry to the macroeconomic shocks of 2022-2023 (8-10% inflation). Those time the real impact of subsidies decreased by 4-6% [17]. These coefficients are consistent with panel estimates for the Volga region (r ≈ 0.78-0.82 [18]). However, they are higher than in early cross-sectional studies (r = 0.65-0.70 [3]) due to the longer period.

Table 2 – Matrix of correlations between indicators (2010-2024, p < 0.01)

	Support	Investment	Profitability	Regional GDP	Inflation
Support	1.00	0.84	0.67	0.55	-0.30
Investment	0.84	1.00	0.80	0.60	-0.35
Profitability	0.67	0.80	1.00	0.50	-0.40
Regional GDP	0.55	0.60	0.50	1.00	-0.20
Inflation	-0.30	-0.35	-0.40	-0.20	1.00

Source: Authors

Table 3 shows the results of the regression analysis The specification with fixed effects and robust Driscoll-Kraay standard errors (Hausman $\chi 2$ = 18.4; p < 0.01), isolating regional heterogeneities and spatial autocorrelation, is considered preferable. The coefficient of elasticity of investments for support is 0.8029 (t = 6.78; p < 0.001); 1% of the increase in subsidies stimulates investments by 0.8%. The direct effect for profitability is 0.00010 percentage points; the indirect (through investments) effect is 0.00030 percentage points; the total effect is 0.00040 percentage points per 1 bn RUB of support (both are significant at p < 0.001). The control variables confirm the role of GDP (β = 0.45; p < 0.01) and the negative one of inflation (β = -0.12; p < 0.05). F-statistics = 45.2 (p < 0.001) indicates the overall significance of the model; $R2$ = 0.667 for investment and 0.901 for profitability, higher than in most panel studies of agriculture ($R2$ ≈ 0.60-0.80 [16]).

Table 3 – Regression analysis results[12]

Model	Investment β (t; p)	R² (Inv.)	Profitability, direct β (t; p)	Profitability, indirect β (t; p)	R² (Rent)
Pooled OLS	0.7520 (5.23; 0.000)	0.612	0.00008 (3.45; 0.001)	0.00025 (4.78; 0.000)	0.856
Random Effects	0.7890 (6.12; 0.000)	0.645	0.00009 (4.12; 0.000)	0.00028 (5.23; 0.000)	0.878
Fixed Effects	0.8030 (6.78; 0.000)	0.667	0.00010 (4.56; 0.000)	0.00030 (5.89; 0.000)	0.901
FE with Robust SE	0.8029 (6.78; 0.000)	0.667	0.00010 (4.56; 0.000)	0.00030 (5.89; 0.000)	0.901

Source: Authors

The dot diagram (Figure 3) visualises the correlation (r = 0.84) and clusters: the points of the Southern Federal District and Krasnodar Territory are shifted upward (high returns); the Siberian and Far Eastern regions ones are closer to the axis (low due to climate and logistics [18]). The regression line (slope ≈ 0.80) illustrates subsidies positive effect on the outsiders, but do not eliminate the imbalances completely.

The analysis of Supp × Region interactions (Figure 4) reveal clear territorial heterogeneity. It persists even after taking into account fixed effects. In the Southern Federal District and the Krasnodar Territory the coefficient of elasticity of investments in support reaches 0.89-0.92; every additional billion rubles of subsidies turns into 890-920 million rubles of new investments. The high return is due to the favourable climate (more than 200 days of the growing season), the developed port infrastructure (Novorossiysk city, Rostov-on-Don city) and export orientation (the share of grain and oilseeds in exports is up to 60%). In the Central Federal District and Tatarstan the effect exceeds the national average (0.84-0.87). It is due to proximity to sales markets and a processing base.
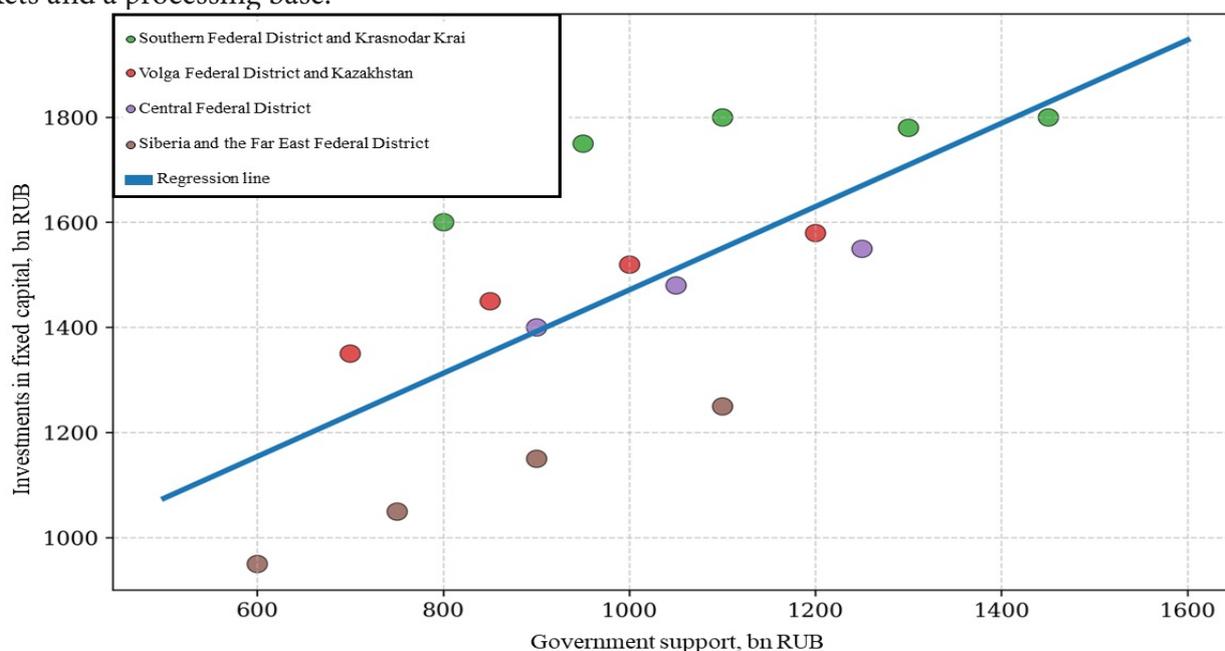
Figure 3. The impact of government support on investment activity

Source: Authors

On the contrary, in the Siberian and Far Eastern districts the coefficient drops to 0.65-0.68; 1 billion rubles of support generates only 650-680 mn RUB of investments. The main reasons are the short growing

[12] *Note: F-statistics=45.2 (p<0.001).*

season (120-140 days), high transport costs (delivery of machinery and fuel is 30-50% more expensive than in the South), and frequent droughts (according to the FAO, the climate risk index in these regions is 1.6-2.1 times higher than in the Southern Federal District[13]). The Ural and Northwestern Federal District occupy an intermediate position (0.74-0.78). The restrictions are mainly related to logistics and low density of processing facilities in these regions.

The difference between leaders and outsiders is 30-40%. It is statistically significant (the F-test for equality of coefficients is rejected at p < 0.01). This confirms the conclusions made by Evstratova (2024) about the continuing interregional imbalances [19] and the recommendations of the World Bank (2023) on the transition to differentiated subsidy rates for Russia: the higher the climatic and logistical risk, the higher the boost factor should be [1]. However, current unified support system actually subsidises the southern regions from the federal budget. Underfunding the development of problem territories slows down overall production growth and increases the country's dependence on imports from several agricultural regions.

The interpretation of the results is consistent with domestic estimates: the multiplier of 0.80 is close to the calculations made by Petrov (2015 [8]; 0.78) and Gurnovich (2023 [17]; 0.82). However, it exceeds the earlier work made by Ivanov (2017 [7]; 0.70-0.75) due to fixed effects and post-crisis data. Compared to the United States (1.2 according to the USDA[14]) and the EU (1.3-1.5 according to the OECD[15]), Russian returns are lower by 30-40% due to bureaucracy and inflation in 2022-2023 (reduction of the effect by 4-6% [16]). However, innovation grants (for technology and digitalisation) provide an increase in profitability of 3-5 percentage points above the base. Moreover, Altukhov (2015 [4]) and Gordeev (2019 [12]), emphasise the priority of budget redistribution: from the current 18-22% for innovation to 40% by 2030 to get closer to foreign practices[16]. Therefore, subsidies stabilise agriculture, accelerate growth, and require reducing administrative barriers and climate adaptation.
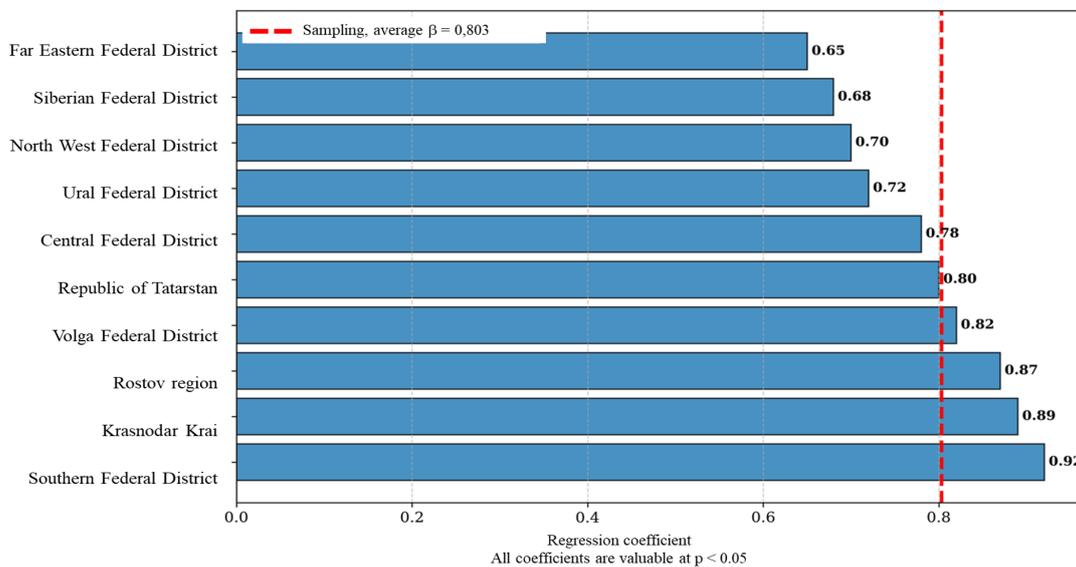
Figure 4. Regional coefficients of the impact of support on investments

Source: Authors

Conclusions

[13] FAO. *The Impact of Natural Hazards and Disasters on Agriculture, Food Security, and Nutrition. Rome: FAO, 2015.* Source: *https://www.fao.org/3/i5128e/i5128e.pdf (accessed on 10.10.2025)*

[14] USDA. *Farm Bill Analysis 2023. Washington: USDA, 2023.* Source: *https://www.ers.usda.gov/topics/farm-bill (accessed on 10.10.2025)*

[15] OECD. *Agricultural Policy Monitoring and Evaluation 2024. Paris: OECD Publishing, 2024. DOI: 10.1787/74da57ed-en.* Source: *https://www.oecd.org/en/publications/2024/11/agricultural-policy-monitoring-and-evaluation-2024_b4c72370.html (accessed on 10.10.2025)*

[16] European Commission. *CAP Strategic Plans 2023–2027. Brussels: EC, 2023.* Source: *https://agriculture.ec.europa.eu/cap-my-country/cap-strategic-plans_en. (accessed on 10.10.2025)*

An empirical analysis based on panel data for 10 regions of Russia for 2010-2024 (N=150) convincingly confirms the statistically significant positive impact of government support on investment activity and profitability of agricultural production. The coefficient of elasticity of investments in fixed assets in terms of support is 0.803 (t = 6.78; p < 0.001). Therefore, each additional billion rubles of subsidies generates an average of 803 mn RUB of new investments. The total effect on return on sales reaches 0.00040 percentage points per 1 bn RUB of support; the direct channel is 0.00010 percentage points; the indirect channel (through investment) is 0.00030 percentage points. The models have a high explanatory power (R^2 = 0.667 for investment; 0.901 for profitability) and are resistant to alternative specifications (Hausman χ^2 = 18.4; p < 0.01; VIF < 5; Driscoll-Kraay robust errors).

The obtained multiplier of 0.80 is located in the upper part of the range of domestic studies estimates in recent years: it exceeds the average values recorded by Uzun and Shagaida (2019) – 0,75-0,85 [2], Petrov (2015) – 0.78 [8] and Gurnovich (2023) – 0.82 [17]. We can explain it by the longer observation period, indirect account, and fixed regional effects. However, the return on each ruble of support remains significantly below the level of the United States (approximately 1.2[17]) and EU countries (1.3–1.5[18]). It is consistent with Shelamova's conclusions (2023) on the negative impact of the sanctions regime in 2022-2024 and rising costs [16]. The revealed territorial heterogeneity (a coefficient of 0.89-0.92 in the Southern Federal District and Krasnodar Territory versus 0.65-0.68 in the Siberian and Far Eastern regions) confirms the conclusions made by Shik (2018) [3] and Evstratova (2024) [19] on transition to a differentiated agrarian policy.

According to the results, we formulate specific proposals for improving government support for 2026-2030. However, it is advisable to differentiate geographically a subsidy system with the introduction of increasing coefficients from 1.15 to 1.40 for regions with difficult climatic conditions and high transport remoteness. At the same time, the share of innovative and "green" grants should be increased to 40-45% of total support by 2028-2030. According to calculations, it will provide an additional increase in profitability by 3.5-4.5 percentage points. It is necessary to legislate the annual automatic indexation of all types of subsidies to the agricultural producer price index. Moreover, there is a need to form a single federal digital platform for transparent monitoring of efficiency with mandatory publication of key indicators for recipients of funds over 30 mln RUB per year. The implementation of these measures can raise the multiplier of state support from the current 0.80 to 1.10-1.20 by 2030 and significantly reduce regional disparities.

The limitations of the study are due to the aggregated nature of the data and the linear specification of the model. They make it impossible to identify intraregional heterogeneity and possible threshold effects. It is prospective to use the generalised method of moments to eliminate endogeneity, implement spatial econometric models, and transit to micro-level data of enterprises.

The results obtained and the recommendations developed can be used by the Ministry of Agriculture of the Russian Federation and regional agribusiness management bodies in preparing a new version of the State Program for the Development of Agriculture for 2026-2030 and contribute to the formation of a more effective, innovation-oriented and geographically differentiated system of state support for the Russian agro-industrial complex.

FUNDING

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTION

---

[17] *USDA. Farm Bill Analysis 2023. Washington: USDA, 2023. Source: https://www.ers.usda.gov/topics/farm-bill (accessed on 10.10.2025)*

[18] *OECD. Agricultural Policy Monitoring and Evaluation 2024. Paris: OECD Publishing, 2024. DOI: 10.1787/74da57ed-en. Source: https://www.oecd.org/en/publications/2024/11/agricultural-policy-monitoring-and-evaluation-2024_b4c72370.html (accessed on 10.10.2025)*

Amir M. Edidzhi – formal analysis; data collection and processing.
Sergey N. Kosnikov – conceptualisation; writing the original text.

References

1. Aksyutina, S. V., & Mironenko, N. V. (2020). Current issues of the agricultural sector state regulation. *Journal of International Economic Affairs, 10*(4), 1469-1490. https://doi.org/10.18334/eo.10.4.111047 (in Russian).

2. Shagaida N., & Uzun V. (2015). Food security: Problems of assessing. *Voprosy Ekonomiki,* (5), 63-78. https://doi.org/10.32609/0042-8736-2015-5-63-78 (in Russian).

3. Shik, O. V., & Iynbykh, R. G. (2023). Assessment of the level of state support for the agro-industrial complex and proposals for increase its efficiency. APK i predlozheniya po povy`sheniyu eyo effektivnosti, (4), 3-16. DOI: 10.33305/234-3. EDN GYGUPW (in Russian).

4. Altuxov, A. I. (2015). The Grain and Food Subcomplex of the Country's Agro-Industrial Complex: Problems of Formation and Development. *Ekonomika sel`skoxozyajstvennyh i pererabatyvayushhih predpriyatij,* (6), 2–7 (in Russian).

5. Tuskov, A., & Goldueva, D. (2022). Econometric modeling of the International Happiness Index. *Siberian Journal of Economic and Business Studies, 11*(4), 77-95. https://doi.org/10.12731/2070-7568-2022-11-4-77-95 (in Russian).

6. Ledneva, O. V., & Tindova, M. G. (2025). Panel data in the analysis of the regional agro-industrial complex. *Food Policy and Security, 12*(2), 343-356. https://doi.org/10.18334/ppib.12.2.123105 (in Russian).

7. Aliyeva, Z. B. (2017). Preferential crediting as urgent instrument of the state financial support of agrarian and industrial complex. *Finance: Theory and Practice,* 21(4), 66–77. https://doi.org/10.26794/2587-5671-2017-21-4-66-77 (in Russian).

8. Dedeeva, S. A. (2014). Инвестиции в сельское хозяйство: перспективы развития и риски. In *Ekonomika, upravlenie, finansy: materialy III Mezhdunar. nauch. konf. (g. Perm', fevral' 2014 g.).* (pp. 4-6). Perm': Merkurij. Retrieved from https://moluch.ru/conf/econ/archive/93/4867 (in Russian).

9. D'yachenko, V. N. & Lazareva, V. V. (2020). The impact of agricultural transformations on the region's rural settlement system. *Regional'naya ekonomika: teoriya i praktika, 18*(12), 2256–2275. DOI: 10.24891/re.18.12.2256. EDN UFWDVF. https://moluch.ru/conf/econ/archive/93/4867 (in Russian).

10. Valiev, A. P., Nizamov, R. M., Safin R. I., Mukhametgaliev, F. N., & Nezhmetdinova, F. T. (2022). Priorities for the development of the agro-industrial complex and the tasks of agricultural science and education. *Vestnik Kazanskogo gosudarstvennogo agrarnogo universiteta*, 17(1), 97-107. DOI: 10.12737/2073-0462-2022-97-107. EDN BFQMKB (in Russian).

11. Ruban-Lazareva, N. (2025). Assessing the efficiency of budget expenditures on agro-industrial complex. *APK: ekonomika, upravlenie*, (2), 10-18. DOI: 10.33305/252-10. EDN HFSSQC (in Russian).

12. Gordeev, A. V. (2006). On measures to implement the priority national project "Development of the Agro-Industrial Complex". *Ekonomika sel`skoxozyajstvennyh i pererabatyvayushhih predpriyatij,* (1), 4-6. EDN KUGAAD (in Russian).

13. Zvereva, A. P., Nosova, O. E., & Skorobogatyh, E. Yu. (2022). Econometric Analysis of the Effectiveness of the State Support Program for Agriculture in the Kaliningrad Region // *Vestnik molodezhnoj nauki,* (4), 8 p. Retrieved from https://cyberleninka.ru/article/n/ekonometricheskiy-analiz-effektivnosti-programmy-gosudarstvennoy-podderzhki-selskogo-hozyaystva-v-kaliningradskoy-oblasti (accessed: 17.02.2026) (in Russian).

14. Meng, M., Yu, L., & Yu, X. (2024). Machinery structure, machinerysubsidies, and agricultural productivity: Evidence from China. *Agricultural Economics, 55*, 223–246. https://doi.org/10.1111/agec.12820

15. Kumari, P., & Dahiya, S. (2022). Determinants of Adoption of PM-KISAN Scheme: Empirical Evidence from Jhajjar District in Haryana. *Journal of Rural Development*, 41(4), 510–522. https://doi.org/10.25175/jrd/2022/v41/i4/166259

16. Shelamova, N. A. (2023). The impact of sanctions on the development of agriculture and the agro-food market in Russia. *Ekonomika, trud, upravlenie v sel'skom hozyajstve,* (9), 45-53. DOI: 10.33938/239-45 (in Russian).

17. Gurnovich, T. G., Grigoryan, M. A., & Kurdakova, E. G. (2023). Strategic Planning in the Activities of Agricultural Organizations. *Estestvenno-gumanitarnye issledovaniya,* (4), 493-496. EDN LOYOGE (in Russian).

18. Samygin, D. Yu., & Kudryavcev, A. A. (2018). Strategic tools for distributing state support to the agricultural sector. *Ekonomicheskaya politika*, (5), 156-175. Retrieved from https://cyberleninka.ru/article/n/strategicheskie-instrumenty-raspredeleniya-gospodderzhki-agrarnogo-sektora (accessed: 11.10.2025) (in Russian).

19. Anopchenro, T. Yu., & Vetrova, E. V. (2024). Main trends and factors in the development of the Russian agro-industrial complex at the present stage. *Ekonomicheskie nauki*, (231), 41-46. DOI: 10.14451/1.231.41. EDN HITQKX (in Russian).

Special economic zones as a catalyst for global digital transformation

Igor A. Karachev ⓘD

Candidate of Economics, Associate Professor
P.G. Demidov Yaroslavl State University, Yaroslavl, Russian Federation
E-mail: karachev2011@yandex.ru

ORIGINAL ARTICLE

Abstract. The article concerns with the global trends of high geographical concentration and uneven cross-sectoral growth of digital investment flows. The research considers the methodological features of the processes of technological development assessing and forecasting. They form the basis for policy-making in digitalisation. The differentiation concerns with time horizon, target orientation, areas of scientific knowledge, methods, data and technological forecasting models, results, etc. The article reveals different digitalisation policy components. According to the research, investment incentive component includes mechanisms of national economies digital openness, facilitation of the inflow, and promotion of digital foreign direct investment. Indeed, investment impact enhancement component deals with the measures to develop digital content regulation, relevant tax instruments, environmental issues, digital competencies, and linkages. According to the research, there are two keys approaches to develop digital strategies. Indeed, geographically oriented approach involves the development of macro-regional, sub-regional, and national strategies; sector-oriented approach involves the development of technological and industry-specific strategies. The analysis highlights the investment context for the implementation of digital strategies in key macro-regions and sectors of the digital economy. Moreover, the research considers special economic zones in terms of foreign direct investment in the areas of data processing and e-commerce. Based on expert data, the article highlights best practices for regulating and supporting digital foreign direct investment within special economic zones globally and in various macro-regions. As a result, the research formulates the principles to strength the investment potential of digital strategies, taking into account the growing role of special economic zones.

Introduction

Rapid expanding and widening of opportunities for faster growth and structural shifts of the digital economy ensure national productivity growth, innovation, and sustainable development. Indeed, digital investment flows are highly concentrated in a relatively small number of economies. For example, in 2024, 80% of new digital projects of foreign direct investment (hereinafter – FDI) accounted for only 10 developing economies, mainly Asian. At the same time, they show uneven intersectoral growth. For example, in 2024 in developing countries the digital services and basic information and communication infrastructure sectors accounted for $ 37 USD bn and $ 9 USD bn in global FDI, respectively[1].

To correct these negative trends, it is necessary to develop the tools for theoretical basis, comprehensively stimulating investments, integrate support measures into geographically oriented (macro-regional, sub-regional, and national), and sector-oriented (technological and sectoral) digital strategies.

Digitalisation policy: theoretical and methodological base

The formation of digitalisation policy and implementation of digital strategies and the development of measures to support digital investments are based on two interrelated and complementary processes: assessment of technological development (hereinafter – TA). TA is the process of studying the economic, social, environmental, ethical, legal, and cultural consequences of digital technologies implementation [10;

---

[1] *World Investment Report 2025: International Investment in the Digital Economy. UNCTAD. Source: https://unctad.org/system/files/official-document/wir2025_en.pdf. (accessed on 17.11.2025)*

12; 14; 19]. Moreover, it includes technological forecasting (hereinafter – TF). TF is the process of studying longterm trends in innovation, sociotechnical context, and scenarios of economic and political conditions corresponding to technological changes [9; 15-17].

The features of TA methodology are as follows:

- TA time horizon covers the short /medium term period;
- TA aimed at specific technologies implementation;
- TA is interdisciplinary and includes technical, economic, and socio-political research;
- TA methods are design research, public opinion polls, interviews with stakeholders, analysis of technological trends and factors, design and visualisation tools;
- TA focuses on the spread and consequences of technologies adoption, usage of new products;
- TA results in the development of scientific and technological policy on the introduction of new technologies.

The features of TF methodology are as follows:

- TF covers a long-term time period;
- TF explores science-technology-innovation sector relevant to the national innovation system;
- TF uses an interdisciplinary approach based on innovation, design, and management research;
- TF methods are scenario analysis, expert assessment method, SWOT analysis;
- TF focuses on the development of new technological solutions, their commercialisation, and the life cycle of new products;
- TF results in the development of strategic directions of scientific and technological policy.

The policy of digitalisation based on TA and TF should include a component of investment incentives and a component of strengthening investment influence [4].

In term of digital policy, the investment incentive component is the adaptation of best practices of digital openness of national economies, the use of mechanisms to promote digital FDI [1-2].

However, digital openness has two approaches to regulate the admission of digital FDI. Developed countries impose minor restrictions on the share of foreign participation in the equity of national companies. Moreover, they introduce mechanisms for verifying investments for threats to national economic security and technological sovereignty [5]. Indeed, within the scope of inspections are investments aimed at the introduction of AI and other advanced technologies. Developing countries regulate the admission of digital FDI by imposing bans or thresholds on the participation of foreign capital, requirements for the creation of joint ventures, applying general licensing, and permitting rules for the investors. In terms of FDI in digital economy, development requires a balance between restrictive and liberal practices and their transparent implementation.

Nevertheless, digital FDI promotion includes stimulating investment flows by simplifying procedures for starting and running a business. It also involves licenses for the construction of digital infrastructure, visas for foreign IT specialists, reducing the administrative burden for digital start-ups, expanding support measures for specific sectors, such as data centres and semiconductors. The technological parks are extra initiatives of digital FDI promotion. They form an advanced innovation ecosystem within their borders. It allows companies to test new products in a controlled environment, minimising the associated risks [20].

Moreover, digital FDI promotion covers the activities of national development institutions in terms of investments [8]. It stimulates the reinvestment process, expands access to public-private partnership projects, promotes the country's competitive advantages through effective international information and marketing campaigns. Additionally, the key role of development institutions is to improve approaches to regulate and support digital investments, ensure consistency of these processes with national and sectoral strategies.

The component of strengthening investment influence implies the development of digital content regulation, specialised tax instruments, environmental issues, digital competencies, etc. [3; 6-7].

Digital content regulation provides safer on-line environment by establishing content moderation mechanisms. They includes liability for digital platforms, cyber crime prevention, digital advertising control, AI usage transparency, etc. They also include establishing of regulatory authorities to control digital content

producers, and attracting FDI in the localisation of content produced by companies in the digital economy, requirements on investments a share of local revenues in the national sector, quotas for local content, licensing of broadcasters in terms of their content localisation indicators, etc. To ensure availability of digital content, fulfillment of international obligations under World Trade Organisation agreements, and the strengthening of investment influence, countries should be guided by flexible requirements for digital content, consistent with digital strategies, adapted to national conditions, market size, and production capabilities [13]. Large markets can use quotas and reinvestment commitments; small ones can offer incentives related to tax breaks and support for co-production.

The development of specialised tax instruments concerns with the search for the optimal combination of regulatory and supportive mechanisms in digital economy. This regulation is caused by the intangible nature of digital services. However, it is difficult to forecast value added and operations control. The absence of specific rules regarding revenue from the provision of digital services leads to a distortion of competition between digital and non-digital companies. Indeed, it causes the widespread use of transfer pricing mechanisms by multinational corporations. The goal of increasing tax collection determines the need to introduce taxes on digital services, establish special rules for digital companies, including those related to calculating the tax base for income tax purposes. Moreover, it provides the tax registration of foreign digital companies for calculating value added tax. The supporting mechanism is the main one in attracting of digital FDI, and includes tax deductions, loans and exemptions, accelerated depreciation, targeted benefits for business angels investors financing digital start-ups. The relative simplicity of implementing a supportive mechanism, the effectiveness of its implementation depend on the elaboration of benefits and their consequences [11]. In this regard, the strengthening of investment influence in the digital economy sector is possible in terms of concept of a balance between tax regulation and tax support. The concept is targeted, limited in time and volume, and subjected to regular effectiveness assessment.

The environmental issue of digital policy is concerns with an idea that digital devices become an electronic waste accelerating every year. FDI in digital and green transformation can be complementary tools to form synergies for sustainable development. Achieving this effect will be facilitated by a regular assessment of the environmental risks of digital FDI, including analysis of energy consumption, water consumption, emissions, and environmental footprint [14]. Investment criteria should include industry-specific benchmarks (i.e. energy efficiency targets, water consumption limits, and emission thresholds). Moreover, support measures should apply the following sustainable practices: renewable energy, efficient cooling technologies, and integration of circular economy principles.

Digital competencies ensure the growth of national digital potential through knowledge transfer. Moreover, communications contribute to increasing the competitiveness of national digital service providers. They both play an important role in attracting digital FDI. Digital competencies are formed through simplification of the visa regime, partnerships with foreign educational institutions, internship and training programs in AI, etc. [18]. The strengthening of production tides is provided through the development of cooperative platforms, access to industry databases of suppliers, attracting investment agencies, implementing digital projects at the sites of techno parks and SEZ.

Main part

Geographically-oriented digital strategies: key features and investment context

Macro-regional and sub-regional digital strategies are crucial tools for promoting cross-border coherence of national digital policies and developing cooperation in terms of digital infrastructure (Table 1). By facilitating the unification of standards, harmonisation of regulation, and stimulating the development and joint implementation of national policies, digital strategies can enhance the attractiveness of the macro/sub-region in terms of FDI. However, national digital strategies are key instruments of state policy in digital transformation management. Moreover, they form favourable conditions for the development of digitalisation and attracting investments in digital infrastructure and services (Table 2). The strategies outline general priorities and specific mechanisms for implementing the directions of digital economy development: public

administration, infrastructure provision, digitalisation of the private sector, expansion of the scope of digital technologies, etc.

Table 1 – Macro-regional and sub-regional digital strategies

Macroregion	Key features	Investment context
Africa	- focus on the establishment of digital infrastructure, development of digital competencies, the harmonisation of sub-regional and national policies, formation of a single digital market (DTSA); - focus on digital connectivity and inclusivity (sub-regional digital strategies of EAC, ECOWAS, and SADC).	- targeted support tools for innovation-oriented investment projects (DTSA)[2]; - attracting investments into infrastructure mapping (digital modelling of infrastructure facilities) (DTSA; EAC, ECOWAS, and SADC strategies); - development of innovative (high-risk) and mixed public-private financing tools involving foreign capital (DTSA; EAC, ECOWAS, and SADC strategies); - formation a single payment zone and the Digital Sovereignty Fund (DTSA); - investment incentives for integration into the global e-commerce sector (EAC, ECOWAS, and SADC strategies).
Asia	- formation of a common digital space considering the resolution of problems of cross-country compatibility (CAREC DS; DEFA); - focus on digital development management, cybersecurity, accumulation of knowledge and competencies in terms of digital solutions, e-commerce, digital payments, and innovative entrepreneurship (CAREC DS; ADM; DEFA).	- development of the public-private partnership tools (CAREC DS); - formation of a portfolio of priority investment projects supporting digital development in various fields and industries (CAREC DS); - harmonisation of investment regulatory tools (ADM); - establishing rules for investors in the field of digital commerce, payments, working with data flows, privacy, Artificial Intelligence (hereinafter – AI), and cybersecurity (DEFA).
Latin America and the Caribbean (ELAC)	- recommendations on the formation and access to advanced digital infrastructure, innovation management, AI, etc.	- development of tools for mixed financing of investment projects and joint use of new infrastructure facilities; - formation of a set of measures to improve the quality of the investment climate.
Western Europe (DC)	- focus on the development of digital competencies and infrastructure in the private and public sectors.	- planning of large-scale public/private investment programs; - implementation of cross-border investment and infrastructural projects.

Source: Author

---

[2] *DTSA – Digital Transformation Strategy for Africa (2020-2030); EAC – East African Community; ECOWAS – Economic Community of West African States; SADC – Southern African Development Community; CAREC DS – Digital Strategy for Central Asian Regional Economic Cooperation until 2030; ADM – Digital Master Plan Association of Southeast Asian Nations on the period up to 2025; DEFA – the ACEAN Framework Agreement on the Digital Economy; ELAC – The Digital Agenda for Latin America and the Caribbean for the period up to 2026; DC – Digital Compass-2030.*

Table 2 – Certain aspects of national digital strategies

Aspect	Characteristic
Digital inclusion	- provision on digital inclusivity exists in 97% of developed countries strategies, and in 88 % of developing countries strategies; - directions of digital inclusivity cover: the expansion of digital infrastructure (especially in peripheral areas) and the improvement of digital skills (especially among socially vulnerable groups of the population); - expansion of the digital infrastructure includes both the provision of basic access and construction of data centres and computing centres; - improving digital skills consists in the distribution of basic digital competencies among population groups and the development of advanced digital competencies to maintain the efficiency of innovative ecosystems.
Investment context: the focus on digital inclusion in strategies requires increased investment in high-tech sectors (AI, cybersecurity, and data science). However, it contributes to occurrence of a skilled and digitally literate workforce, and increases the overall national investment attractiveness	
Environmental sustainability	- provision on environmental sustainability exists in 86% of developed countries strategies and in 55% of developing countries strategies; - environmental problems related to the development of the digital economy involve depletion of natural resources due to digital devices production, infrastructure development, high energy consumption, water consumption for cooling data centre servers and electronics production, electronic waste; - problem of energy consumption becomes a key one in the formation of digital infrastructure (data centres). Indeed, those energy issues have been developed in the digital strategies of China, Chile, Finland, Qatar, Singapore); - absence of specific indicators and industry-specific measures related to the environmental aspects of the digital economy in most digital strategies.
Investment context: focus on environmental sustainability determines synchronisation of investments in the digital economy with investments in renewable energy. Therefore, the digital transition plays a catalytic role in the energy transition	
Favourable investment environment	- provisions on regulation of investments in the digital economy in 2024 exist in 88% of national digital strategies. Moreover, there is 20% increase compared to 2017; - provisions on standards of attracting investments in the digital economy in 2024 exist in 77% of national digital strategies. Indeed, there is 61 % increase compared to 2017. These provisions are widespread in developed (89%) rather than in developing (71%) countries; - cybersecurity and data privacy are of the greatest importance in digital strategies.
Investment context: provisions on regulation and standards of investments in the digital economy are usually supplemented by provisions on the investments in specific industries and technologies	
Financial support	– national digital strategies contain parameters for using the following sources of financing: programs focused exclusively on the high-tech sector (2017 – 3%; 2024 – 37%), budgetary funds (2017 – 69%; 2024 – 92%), private funds (2017 – 55%; 2024 – 85%), public-private partnership (2017 – 35%; 2024 – 58 %), FDI (2017 – 44 %; 2024 – 48%); – absence of structured approach to stimulate investments in the digital economy due to the insufficient focus in digital strategies on investment promotion agencies (hereinafter – IPAs). However, IPAs are mentioned in 20% of strategies of developing countries and in 11% of strategies of developed countries;

Aspect	Characteristic
	– special attention in digital strategies is devoted to investment promotion measures (electronic company registration services; visa facilitation for highly qualified specialists; acceleration and training programs) (2017 – 37%; 2024 – 87%) infrastructural and cooperative measures (formation of clusters, parks, and special economic zones) (2017 – 32%; 2024 – 7%), and investment incentives (tax and non-tax benefits) (2017 – 56%; 2024 – 72%).
Investment context: digital strategies should define specific investment goals and include a calculation of financing required for their implementation	

Source: Author

Sectoral-oriented digital strategies: key features and investment context

The rapid development of advanced technologies determines the development of targeted strategies and policies in terms of AI, data processing, and semiconductors (Table 3). These strategies play a key role in the process of attracting investments, highlighting national priorities, ensuring regulatory certainty, and demonstrating a long-term commitment to the development of the digital economy sector.

Table 3 – Key areas of sector- and technology-oriented digital strategies

Aspect	Characteristic
Artificial intelligence	- areas of AI's influence on economic development include: catalytic (positive – in the presence of a strategy and regulation) – stimulating innovation, increasing productivity and competitiveness of sectors; restrictive (negative – in the absence of a strategy and regulation) – digital inequality, concentration of market power, ethical and data privacy issues; - acceleration of adopting AI strategies. In 2024, 38% of states have adopted the strategy. There is 36% increase compared to 2017. However, according the geographical distribution, the strategy has been adopted in 76% of developed countries, 34% of developing countries in the Asia-Pacific region, 24% Latin American and Caribbean countries, 17% of African countries; - countries' approaches to AI in terms of digital strategies include: an approach with an emphasis on economic competitiveness and technological leadership; an approach with an emphasis on public service provision, social inclusion and ethical safeguards; a balanced approach with an emphasis on sustainable development and international innovation cooperation.
Investment context: digital strategies in terms of AI define investment, research, and infrastructure priorities, establish ethical and regulatory frameworks to ensure responsible and transparent use of AI. It ensures public trust and provides favourable conditions for attracting targeted investments	
Data processing	- areas of data centres influence on the digital economy include: catalytic (positive – in the presence of placement planning) – stimulating digital connectivity, industrial transformation, and increasing national technological and innovative potential; restrictive (negative – in the absence of placement planning) – excessive load on the energy grid, negative environmental impact, slowing down the digitalisation; - data centre strategies are primarily involved into cloud computing development policies covering the entire value chain from data management, standards, and digital interoperability to interconnections, process management, business practices, and cybersecurity. For example, in 2024 about 50 countries have adopted similar policies;

Aspect	Characteristic
	- examples of successful implementation of data centre strategies include: a) transformation of Guizhou Province (China) into a national data hub, 2016-2024; b) implementation of national and regional strategies to attract sustainable investments in data centres in Canada (Alberta AI-Based Data Centre Development Strategy, 2024), Chile (National Data Centre Plan, 2024-2030) and Singapore (Green Data Centre Roadmap, 2024); an example of problematic implementation of data centre strategies is the situation in Ireland in 2021-2025 – the growth of the sector outstripped the capacity of the energy grid in Dublin.
Investment context: digital data processing strategies should integrate investment incentives in data centre construction (simplification of licensing procedures, tax incentives and targeted marketing) with the competitive advantages of the territory, energy, and climate policy (availability of renewable energy sources, favourable climate), industrial strategy (reliable industrial infrastructure, level of development of industrial cooperation), and regulatory readiness (transparency of relevant norms and standards); data centre construction projects should consider investments in energy infrastructure modernisation at the planning stage	
Semiconductors	- specialised strategies for semiconductor industry development combine financial incentives with investments in infrastructure, training programs, and targeted support for specific segments of the value chain; - focus on individual segments of the value chain – manufacturing, assembly, testing, design or materials. It helps to consolidate the country in a segment corresponding to its capabilities in the digital economy.
Investment context: strategies for the development of the semiconductor industry should ensure national technological sovereignty, increase competitiveness, and diversify national industry in terms of the requirements of sustainable development	

Source: Author

Special economic zones are the cores of digital infrastructure development

An increase of geo-economic and geopolitical tensions, trade, and investment relations transformed under the influence of digitalisation made special economic zones (hereinafter – FEZs) a kind of investors regulator. Worldwide, the numbers of FEZ exceeds 6,300 units[3]. FEZs provide a structured, predictable, and preferential business environment to facilitate the implementation and maintenance of the most effective international business practices.

However, both positive and negative results of zonal functioning within an ecosystem including thousands of FEZs, zonal policy is being transformed. One part of the FEZ follows a model focused on new forms of growing investments, such as digital infrastructure. The other part is a model aligns infrastructural development with the quality of life, offers investors conditions including residential and social infrastructure facilities for employees[4].

Since 2022, the number of greenfield FDI projects in the FEZ in business services has exceeded the number of production projects. It reveals a trend towards the servicification of investments in the FEZ, especially the large–scale transition to intellectual, high-tech, digital investments (Table 4).

---

[3] *Irwin-Hunt, A. (2025). Global Free Zones Evolve for Rerouted Globalisation. Source: https://www.fdiintelligence.com/content/1e3968cf-4e1e-4be5-87f9-f1a10747ee16. (accessed on 17.11.2025)*
[4] *Global Free Zones of the Year 2025. fDi Intelligence. Source: https://www.fdiintelligence.com/special-report/523230cd-5d1e-46bd-9162-60594cbfdf97. (accessed on 17.11.2025)*

Table 4 – Number of "greenfield" FDI projects in the FEZ by scope

Project scope	2004	2006	2008	2010	2012	2014	2016	2018	2020	2022	2024
Business services	3	21	32	20	21	26	45	41	65	209	245
Production	44	76	79	48	66	127	238	228	122	130	179

Source: Author

Traditional sectors such as renewable energy, chemical industry, and metallurgy still attract the largest amounts of FDI into the FEZ. However, the communications sector includes data centres. It becomes the one of the top ten sectors in terms of announced FDI in 2023 and attracting record investments in 2024 (Table 5). In 2022, the information technology software and services sector also was ranked high.

Table 5 – Top 10 sectors accepting FDI in FEZs

Sector	2022	Sector	2024
	$ USD, bn The USA		$ USD, bn The USA
Renewable energy	64.33	Renewable energy	19.58
Electronic components	8.84	Chemistry	6.74
Metals	2.47	Metals	5.34
Chemistry	1.74	Electronic components	3.89
Transportation and warehousing	1.59	Semiconductors	2.92
Automotive industry	1.38	Transportation and warehousing	2.64
Software and information technology services	1.32	Communications	2.48
Financial services	0.86	Industrial machinery	2.14
Ceramics and glass	0.74	Pharmaceuticals	1.35
Semiconductors	0.60	Food and drinks	1.17

Source: Author

FEZs have the most significant advantages of localising investments in data processing (Saudi Arabia – a virtual FEZ for cloud computing; Great Britain – specialised territories for data centres near free ports; Singapore – the cross-border Johor FEZ), and electronic commerce (the US Foreign Trade Zones program)[5]. Indeed, they are as follows:

- revocation of custom obligations and import duties on expensive data centre equipment reduce the cost of investment projects related to training and application of AI models;

- existing energy infrastructure provides capacity redundancy and allows energy and water-intensive data centres to support operation;

- FEZs are logistics and infrastructure hubs. They help the companies to achieve the required level of efficiency, scalability, and customer orientation in the e-commerce.

Based on the Global Free Zones of the Year 2025 rating, we will[6] highlight the best practices for regulating and supporting digital FDI within the FEZ at the global and at the macro-regional levels.

Global level (Dubai Multi Commodities Centre (DMCC), UAE; Cayman Enterprise City (CEC), UK (Cayman Islands)). The DMCC operates an artificial intelligence center, a sustainable development hub, a

[5] *The Investment Dimension of Digital Strategies. (2025). UNCTAD. Source: https://unctad.org/system/files/official-document/diaepcbinf2025d3_en.pdf (accessed on 17.11.2025)*

[6] *Global Free Zones of the Year 2025. fDi Intelligence. Source: https://www.fdiintelligence.com/special-report/523230cd-5d1e-46bd-9162-60594cbfdf97. (accessed on 17.11.2025)*

cryptocenter, and a corporate dispute resolution center. DMCC develops initiatives to strengthen corporate governance, transparency, and investment incentives. They include income tax benefits, subsidised support packages for company registration, leasing for start-ups and small and medium-sized businesses in technology, AI, game industry, and blockchain. In CEC, investors are guaranteed complete neutrality with respect to taxes on profits, income, and capital gains. CEC offers resident companies consulting and marketing support, internship programs, and advanced digital infrastructure.

The macro-regional level.

Middle East Macroregion (DMCC; Dubai Commerce (DCC), UAE). Nowadays DCC automated and digitalised its business processes to simplify and accelerate logistics for residents. DCC provides the investors with flexible work and warehouse spaces, information technology infrastructure, and digital marketing services, including real-time analytical data on residents' products.

European Macroregion (Zona Especial Canaria (ZEC), Spain; Consorcio de la Zona Franca de Cádiz (CZFC), Spain). A special feature of ZEC strategy is cooperation with scientific and educational institutions. It allows FEZ to form and develop a talent pool adapted to the needs of residents. The rating experts also highlight credit programs and tax incentives specifically designed for digital industries. They include reduced corporate tax rate and tax deductions to cover part of companies' variable costs and R&D expenses. CZFC is the centre of the "blue economy" – the concept of sustainable use of oceans, seas, and coastal zones. CZFC develops technology start-ups in the shipbuilding and aerospace sectors in cooperation with the University of Cadiz and the institutes of the National Maritime Cluster.

African Macroregion (Eko Atlantic City (EAC), Nigeria). EAC implements the smart city concept, a range of special investor support measures, registration and protection of intellectual property rights, simplified processing of visas, and work permits for qualified professionals. According to the experts, EAC improves corporate governance and transparency standards through regular independent audits of the zone's impact on the environment and social sphere.

Asia-Pacific Macro Region (Port City Colombo (PCC), Sri Lanka; Tanjung Lesung SEZ (TLSEZ), Indonesia). A special feature of the PCC is a combination of incentives, including the following: a zero personal income tax rate for foreign resident employees, tax incentives for developers and investment companies, centre's services for resolving corporate disputes. TLSEZ actively collaborates with universities and research institutes to support talent development and R&D. TLSEZ operates an advanced digital permit and license system.

Macroregion of the Americas (CEC; Zonamerica (ZA), Uruguay). ZA operates as a technology park to form an ecosystem of companies by stimulating cooperation. ZA successfully implements strict sustainability standards in its business processes.

Conclusions

Therefore, we develop the principles to ensure the investment potential of digital strategies. They are as follows::

– firstly, the formation of a clear investment concept to identify the priority sectors, investor profiles, and strategic infrastructure needs for various purposes.

– secondly, the alignment of digital strategies with the goals of sustainable, investment, and industrial development to ensure the development of human capital, necessary regulatory reforms, and infrastructure planning.

– thirdly, integration of sustainability criteria into digital strategies to address the problem of the environmental footprint of investments into digital infrastructure.

– fourth, investment planning, including assessment of the infrastructure gap, forecasting demand, and determining the strategic location of data and innovation centres, etc.

– fifth, targeted implementation of measures to promote digital transformation and structural modernisation.

– sixth, strengthening the coordination of digital strategies at different levels to achieve economies of

scale, promote cross-border integration, and ensure regulatory consistency.

– seventh, integration of digital development into the special economic zones to build a comprehensive preferential policy in the digital sector.

FUNDING

CONFLICT OF INTEREST

The author declares no conflict of interest.

References

1. Adner, R., & Kapoor, R. (2009). Value Creation in Innovation Ecosystems: How the Structure of Technological Interdependence Affects Firm Performance in New Technology Generations. *Strategic Management Journal, 31*(3), 306–333. https://doi.org/10.1002/smj.821

2. Crescenzi, R., Dyèvre, A., & Neffke, F. (2022). Innovation Catalysts: How Multinationals Reshape the Global Geography of Innovation. *Economic Geography, 98*(3), 199–227. https://doi.org/10.1080/00130095.2022.2026766

3. Cuervo-Cazurra, A., Silva-Rêgo, B., & Figueira, A. (2022). Financial and Fiscal Incentives and Inward Foreign Direct Investment: When Quality Institutions Substitute Incentives. *Journal of International Business Policy, 5*, 417–443. https://doi.org/10.1057/s42214-021-00130-9

4. Diercks, G., Larsen, H., & Steward, F. (2019). Transformative Innovation Policy: Addressing Variety in an Emerging Policy Paradigm. *Research Policy, 48*(4), 880–894. https://doi.org/10.1016/j.respol.2018.10.028

5. Edler, J., Blind, K., Kroll, H., & Schubert, T. (2023). Technology Sovereignty as an Emerging Frame for Innovation Policy. Defining Rationales, Ends and Means. *Research Policy, 52*(6), 104765. https://doi.org/10.1016/j.respol.2023.104765

6. Fergnani, A. (2022). Corporate Foresight: A New Frontier for Strategy and Management. *Academy of Management Perspectives, 36*(2). https://doi.org/10.5465/amp.2018.0178

7. Frick, S., & Rodríguez-Pose, A. (2022). Special Economic Zones and Sourcing Linkages with the Local Economy: Reality or Pipedream? *The European Journal of Development Research*, *34*, 655–676. https://doi.org/10.1057/s41287-021-00374-4

8. Frick, S., & Rodríguez-Pose, A. (2023). What Draws Investment to Special Economic Zones? Lessons from Developing Countries. *Regional Studies, 57*(11), 2136–2147. https://doi.org/10.1080/00343404.2023.2185218

9. Georghiou, L. (2008). *The Handbook of Technology Foresight: Concepts and Practice.* Edward Elgar Publishing.

10. Grunwald, A. (2018). Technology Assessment in Practice and Theory. London: Routledge. https://doi.org/10.4324/9780429442643

11. Guceri, I., & Albinowski, M. (2021). Investment Responses to Tax Policy under Uncertainty. *Journal of Financial Economics, 141*(3), 1147–1170. https://doi.org/10.1016/j.jfineco.2021.04.032

12. Hennen, L., Hahn, J., Ladikas, M., Lindner, R., Peissl, W., & van Est, R. (2023). *Technology Assessment in a Globalized World: Facing the Challenges of Transnational Technology Governance.* Cham: Springer Nature. https://doi.org/10.1007/978-3-031-10617-0

13. Magro, E., & Wilson, J. R. (2019). Policy-Mix Evaluation: Governance Challenges from New Place-Based Innovation Policies. *Research Policy*, *48*(10), 103612. https://doi.org/10.1016/j.respol.2018.06.010

14. Musango, J. K., & Ouma-Mugabe, J. (2024). A Generic Technology Assessment Framework for Sustainable Energy Transitions in African Contexts. *Technological Forecasting and Social Change*, *204*, 123441. https://doi.org/10.1016/j.techfore.2024.123441

15. Nicoletti, G., von Rueden, C., & Andrews, D. (2020). Digital Technology Diffusion: A Matter of Capabilities, Incentives or Both? *European Economic Review,* 128, 103513. https://doi.org/10.1016/j.euroecorev.2020.103513

16. Plekhanov, D., Franke, H., & Netland, T. H. (2023). Digital Transformation: A Review and Research Agenda. *European Management Journal, 41*(6), 821–844. https://doi.org/10.1016/j.emj.2022.09.007

17. Schneider, C., Rosmann, M., Lösch, A., & Grunwald, A. (2023). Transformative Vision Assessment and 3-D Printing Futures: A New Approach of Technology Assessment to Address Grand Societal Challenges. *Ieee Transactions on Engineering Management, 70*(3), 1089–1098. https://doi.org/10.1109/tem.2021.3129834

18. Schot, J., & Steinmueller, W. E. (2018). Three Frames for Innovation Policy: R&D, Systems of Innovation and Transformative Change. *Research Policy, 47*(9), 1554–1567. https://doi.org/10.1016/j.respol.2018.08.011

19. Srinivas, K. R., & van Est, R. (2023). Technology Assessment in Developing Countries: The Case of India – Examples of Governmental and Informal TA. In *Technology Assessment in a Globalized World: Facing the Challenges of Transnational Technology Governance* (pp. 101–123). Cham: Springer International Publishing https://doi.org/10.1007/978-3-031-10617-0_6

20. Taebi, B., Correljé, A., Cuppen, E., Dignum, M., & Pesch, U. (2014). Responsible Innovation as an Endorsement of Public Values: The Need for Interdisciplinary Research. *Journal of Responsible Innovation, 1*(1), 118–124. https://doi.org/10.1080/23 299460.2014.882072

The features of the development of the local healthcare services market: analysis of demand for paid service

Irina V. Popova [iD]

Doctor of Sociology, Associate Professor
Yaroslavl State Technical University, Yaroslavl, Russian Federation
E-mail: pivik@list.ru

Anna N. Zhilina [iD]

Candidate of Medical Sciences
Yaroslavl State Medical University, Yaroslavl, Russian Federation
E-mail: zhilina-1979@mail.ru

Alexey V. Zorin [iD]

Candidate of Economic Sciences, Associate Professor
Kostroma State Agricultural Academy, Kostroma, Russian Federation
E-mail: zav104@yandex.ru

ORIGINAL ARTICLE

Abstract. Healthcare sector is a key indicator of socio-economic development and the population quality of life. Healthcare organisations traditionally play a significant role, providing both access to the healthcare services and improving public health. The sector is a special area of economic relations. Indeed, on this market, the healthcare services is a good. An analysis of the healthcare services market dynamics shows a steady increase in the volume of paid services. Recently, there is an increase in the share of paid healthcare services in the total volume. It indicates a growing demand for high-quality medical services. The formation and development of the healthcare services market in Russia is a complex and multifaceted process. It requires an integrated approach. The successful development of this sector depends on addressing existing problems and implementing management decisions. However, the market of paid healthcare services is currently developing in Russia. Its further development includes improving the quality of care, increasing the availability of modern medical technologies, and ensuring the competitiveness of Russian medical institutions. Meanwhile, the share of commercial medical organisations is growing with every passing year. Nevertheless, the development of paid healthcare services market is quite slow due to a reduction in effective demand and a shortage of qualified specialists. The purpose of the research is to define the ratio of supply and demand in this market: the need for health ensures demand for medical services. The major method of an empirical study is a sociological survey. According to the research results, demographic changes, technological innovations, and the level of government support determine the development of the private healthcare services market. The trends identified indicate a natural transition towards the use of paid healthcare services.

Keywords: healthcare; paid services market; quality of life; health capital; effective demand; need for health

Introduction

Nowadays, healthcare is the basis of social vital activity and one of the leading sectors of the national economy. Healthcare sector is a key indicator of socio-economic development and the population quality of life. Healthcare organisations traditionally play a significant role, providing both access to the healthcare services and improving public health. Therefore, it is crucial in the conditions of pandemics, climate change, chronic diseases, etc. First, healthcare organisations are responsible for the development and implementation of healthcare policies aimed at improvement of the population quality of life. It includes disease prevention, vaccination, anti-addiction programs, healthy lifestyle promotion, etc. Healthcare

organisations develop strategies to overcome the challenges, such as the increasing number of infectious or chronic diseases. Secondly, healthcare organisations actively participate in research and scientific activities. They often provide effective solutions and new technologies in the field of medicine and healthcare. It allows one to respond to emerging threats and improve methods for diagnosing and treating diseases. Thirdly, an important aspect is the coordination of actions of various sectors of society. Healthcare organisations work in the cooperation with various government agencies, non-governmental organisations, the business sector, etc. Such collaboration helps to address not only medical issues, but the issues of poverty, education, and access to clean water. Fourth, education and training of personnel is an essential task. Modern healthcare organisations train medical personnel, providing them with the necessary knowledge and skills to work in a rapidly changing environment. In addition, they disseminate information about health and disease prevention. It could significantly improve public health in the long term. Therefore, healthcare organisations play multifunctional and vital role in modern society. Society's ability to adapt to changes, manage emerging threats, and ensure an improved quality of life for all citizens depends on them. It requires constant attention, resources, and innovative approaches to cope with new diseases and challenges facing humanity in the 21st century [1, p. 224].

The existing market of private medical services in the Russian Federation can be assessed as developing one. Therefore, it is exposed to various factors of macro- and meso-economic levels. In this market, there is quite fierce competition. It regulates supply and demand. An important condition for balancing demand is the expansion of economic opportunities for potential consumers, an increase in their incomes, etc. It leads to increased activity in the specified market, the volume of paid healthcare services, and the average service fee.

In the healthcare services market, as in any economic activity, one of the main factors determining the successful development of relationships is the preservation and maintenance of a competitive environment. Competition is a marker of market relations development. It is an independence in the choice of healthcare services providers, the ability to make contracts between buyers and service providers. Competition is one of the most important economic laws of the development of society, a stimulator of production activity, and improvement of the quality of products and services. It promotes the development of the economy, search for effective solutions, development of advanced technologies, and provides consumers free choice. The role of the state as a moderator and supervisor of antimonopoly legislation is important for the development of competition in the healthcare services market. In accordance with Article 4 of the Federal Law "On Protection of Competition", competition is the rivalry of economic entities; their independent actions exclude or limit their ability to unilaterally influence the general conditions of circulation of goods in the relevant commodity market[1]. Consequently, in terms of competition in the provision of healthcare services, medical organisations should not unilaterally influence the general conditions for the provision of services. This mechanism ensures the containment of rising prices for healthcare services, introduction of innovative technologies, provision of high-quality medical services by attracting qualified specialists to a medical organisation, customer-oriented approach, etc. Also, it stimulates a cost reduction.

Methods

The most important characteristic of competition is the rivalry between business entities. It is the behaviour characterised by the desire to gain an advantage over other subjects in a particular area of the economy in conditions of material goods shortage [2, p.18]. Indeed, these norms of law regulate the behaviour of competing entities, rules of competition, and guarantee the competition within certain limits. The establishment of such rules and guarantees is necessary for the existence of competition itself. In conditions of limited resources and growing needs, without legal regulation and control of competition, the process of competition between subjects will result in monopolisation or widespread violation of consumer rights, primarily in the field of quality of goods and services. The most important issue for consumers in the field of paid medical care is the quality and cost. Competition ensures the most significant interests and needs of patients against the background of public healthcare financing problems through the mechanisms of a

---

[1] *Federal Law No. 135-FZ on Protection of Competition. (2006, July 26). ConsultantPlus. (as amended on 08.08.2024)*

market economy. Therefore, such competition optimises the cost of healthcare services, improves social well-being, and reduces mortality [3, p. 67].

However, in the scientific literature there is another view on competition in the provision of healthcare services. According to it, healthcare is an industry of health protection. Moreover, there is also non-price competition in the healthcare services market, as the competitiveness of a medical organisation increases due to its development (acquisition of new equipment, attraction of highly qualified specialists), improvement of the quality of medical care, and accessibility of medical services (opening new branches, departments of a medical organisation, increasing types of care, and reducing waiting times). Meanwhile, researchers often attribute the paid healthcare services market to markets with imperfect competition, since it is dominated by a small number of individuals; entry of new organisations into the industry is limited by high barriers and significant financial investments. As a result, the features of an oligopoly appear. Imperfect competition is a rivalry in terms of control the prices of the products fabricated by the individual manufacturers. Indeed, imperfect competition causes difficult market interactions and limited access to information. Perfect competition is an idealised state of the commodity market. It characterised by a large number of independent entrepreneurs (sellers and buyers), opportunity to free market interactions, equal access to information and a homogeneous product. Therefore, market participants should have an appropriate high-tech base, ensure licensing of activities, professional growth of employees, and successfully pass the accreditation. Otherwise, private medical organisations cannot expect high profits. According to the research on the competition in the healthcare services market, it has seasonal demand for medical services, insufficient development of commercial services in severe cases of diseases, expensive high-tech equipment, asymmetry in the provision of services, high barriers to entry for new manufacturers, and a multi-level consumer system. Therefore, the concept of competition in the healthcare services market is a process of interaction between consumers of medical services (patients), suppliers (medical institutions), and intermediaries (insurance companies), aimed at achieving the common and personal needs. The purpose of competition in the healthcare services market is to increase the value of receiving a service for the consumer. Value refers to the quality of medical care and the amount of money spent for the service received. Indeed, a constant or slight increase in the price of services for consumers, and the quality of services and should be improved. It stimulates and expands the market [4, p. 33].

An analysis of the healthcare services market dynamics shows a steady increase in the volume of paid services. Recently, there has been an increase in the share of paid healthcare services in the total volume. It indicates a growing demand for high-quality medical services (Figure 1).
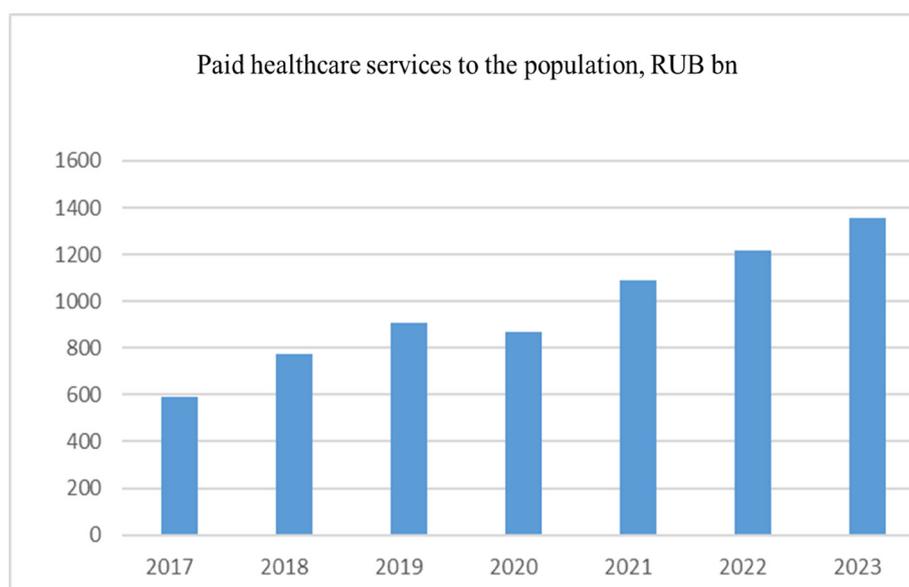
Figure 1. Dynamics of volume of paid healthcare services, 2017-2023

Source: Rosstat

The main factors of healthcare services market development are as follows:
- expanding the range of healthcare services;
- integration of small clinics into the large medical networks;
- opening of multidisciplinary medical centres;
- introduction of digital technologies into medical practice;
- development of the VHI (Voluntary Health Insurance) system [5-8].

The main competitive advantages of private medical institutions include the following:
- high reputation of the healthcare organisation;
- high quality of healthcare products and services provided, effective treatment of diseases (the structure of completed cases according to the purpose of the visit);
- qualification of medical personnel (% of doctors with the highest category);
- sufficient material and technical base, availability of modern diagnostic medical equipment (% of the equipment under 5 years);
- the uniqueness of the healthcare products and services;
- reasonable prices do not exceed the similar ones for healthcare products and services from other market participants.

New medical equipment significantly affects the treatment process. The need for a constant increase in investments of commercial medical institutions in equipment determines the specifics of the demand for healthcare services [9-13].

The identified main limitations of the market development are as follows:
- lack of qualified medical personnel;
- uneven development of regions;
- high costs of equipment and technology;
- the need for constant updating of the material and technical base [13-15].

Therefore, we conditionally identify the main types of medical institutions corresponding to the sectors of the modern economy; each has its own specific management: a) state and municipal medical institutions; b) commercial medical institutions. Public medical organisations include subordinated to the bodies of the state health system, medical, preventive, and scientific research institutions, pharmaceutical organisations, pharmacy institutions, etc. Municipal medical institutions include medical, pharmaceutical, and pharmacy organisations subordinated to the municipality. The private healthcare system includes medical institutions and pharmacies subordinated to the individuals engaged in private medical practice and pharmaceutical activities.

Therefore, the main aspect of the market mechanism is competition. Studying competitors and highlighting their strengths and weaknesses is extremely important for gaining a certain share of the healthcare services market. By comparing services with those of competitors, there could be determined the competitive advantages and market positions. They are unique, special features of medical organisations distinguishing them from others. They make higher profits. When determining competitive advantages, it is important to focus on patients and their needs, and to be sure these advantages are perceived by them. Competitive advantages are the basis of the strategy of participants' behaviour in the market of healthcare products and services [16].

Results

The formation of a post-industrial economy requires increased attention to the factors determining the quality of human capital. It includes the level or capital of health available to individuals. At the micro level, increased interest in health capital is evident in new trends such as telemedicine, healthcare digitalisation, medical tourism, or MedTech (a fusion of advanced medical and information technologies). At the macro level, healthcare services is the area with a high proportion of government intervention due to the social importance of public health, and market failures in the relevant markets.

The healthcare services market has specific features. Its main goal is to provide high-quality medical

care to the population and the patient's health.

However, in the literature, there is a different interpretation of healthcare services in terms of the specifics of payment. It depends on the provision of the service: for a fee, expense of compulsory insurance, or the state budget. Also, it depends on demand because assistance, unlike services, is provided for objective reasons; it is not advertised and offered a choice. This classification is not operational in the framework of this research. For instance, a person has objective indications for a planned medical operation; he or she can study information about providers offering this service and choose the best one; it is quite possible within the framework of the Russian compulsory medical insurance system. In details, the specifics of the healthcare services market are described in the economic literature [17-19]. Synthesising the available approaches, the following characteristics can be distinguished:

1. The uncertainty of demand. Despite a number of medical procedures, such as regular medical checkups or vaccinations, are planned, most of them are surprising for the consumer. It results in consumers being unable to plan their medical expenses. Moreover, these costs may be disproportionately high compared to income.

2. Information asymmetry. The healthcare services are one of the traditional examples of trust-based goods (the quality of these goods is often impossible to assess after their consumption). Consumers are not sufficiently informed to make a rational choice of the healthcare services they require. As a result, they cannot assess the quality of the service provided and rely on subjective impressions. For instance, they believe a certain manipulation with less discomfort for the patient provides a better service [20, p. 17].

The empirical base is the data of a standardised sociological survey conducted based on the program and the author's methods. The starting point of our research was quantitative indicators of improvement of the population quality of life in the Yaroslavl region, Russia. To assess satisfaction with the quality of life, a survey was conducted through a Google form for various categories of citizens of Yaroslavl, Russia. The sampling included: 77.3% of women and 22.7% of men. Age: 51.7% of respondents are under 30 years old; 23.4% – 31-40 years old; 15.4% – 41-50 years old; 7.0% – 51-60 years old; 2.5% over 60 years old. Education: 70.1% of respondents have higher education; 22.4% – secondary vocational education; 7.5% – secondary general education. Marital status: 42.3% of respondents are married for the first time; 28.9% – not married; 8.5% – divorced; 8.0% – remarried after divorce; 10.4% – in a civil union; 2.0% – widowed. Living conditions: 56.4% of respondents live in their own flats; 13.5% – private house; 19.0% – rent apartments; 6.5% – state apartments; 4.5% – communal apartments. Employment: 64.5% of respondents are working; 19.0% – working and studying; 5.0% – studying; 4.0% – retired and working; 7.5% – not working or studying. Sector of employment: 23.9% are government, administrative authorities; 19.8% – trade, services; 14.2% – education, medicine, culture; 11.2% – production; 5.1% – private enterprise; 6.1% – transportation; 19.7% – other. All these socio-demographic characteristics are related to the assessment of people's quality of life.

In accordance with the purpose of this research, we use the results to test some particular hypotheses related to health capital and consumer behaviour in the paid medical sciences market.

The ratio of supply and demand in this market is as follows: the need for health ensures a demand for medical services. To describe the health capital of the population, the research contains the question: "How would you rate your health?". The following results were obtained:

I have good health; I suffer only from seasonal colds – 54.0%;

Generally good, I have one chronic disease – 36.5%;

I have poor health; I have several chronic diseases – 9.5%.

The object of our research is the population distributed by age groups: 51.7% of respondents are under 30 years old; 23.4% – 31-40 years old; 15.4% – 41-50 years old; 7.0% – 51-60 years old; 2.5% over 60 years old.

In recent years, the privatisation of enterprises has formed a steady trend towards ignoring such a problem as occupational morbidity. Confirmation of this hypothesis is the answers to the question: "Do you have an occupational disease?" according to the option "I do not know what occupational disease is" – 13.0% and 11.5% answered they have. The results obtained allow us to conclude low quality of health capital. However, it is factor of increasing demand for paid healthcare services.
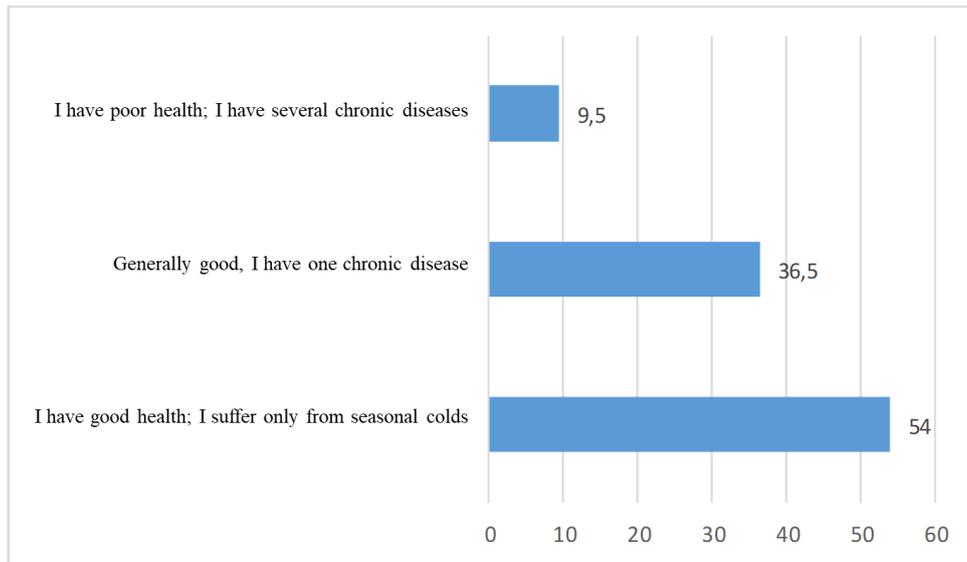
Figure 2. Health capital (% of respondents)

Source: Authors

To determine the proportion of users of paid healthcare services, the question was asked: "Do you use paid healthcare services?"

The results are as follows (Fig. 3):

Yes, sometimes – 47.8%

Yes, more often than free of charge – 45.8%

Free of charge only – 6.4%
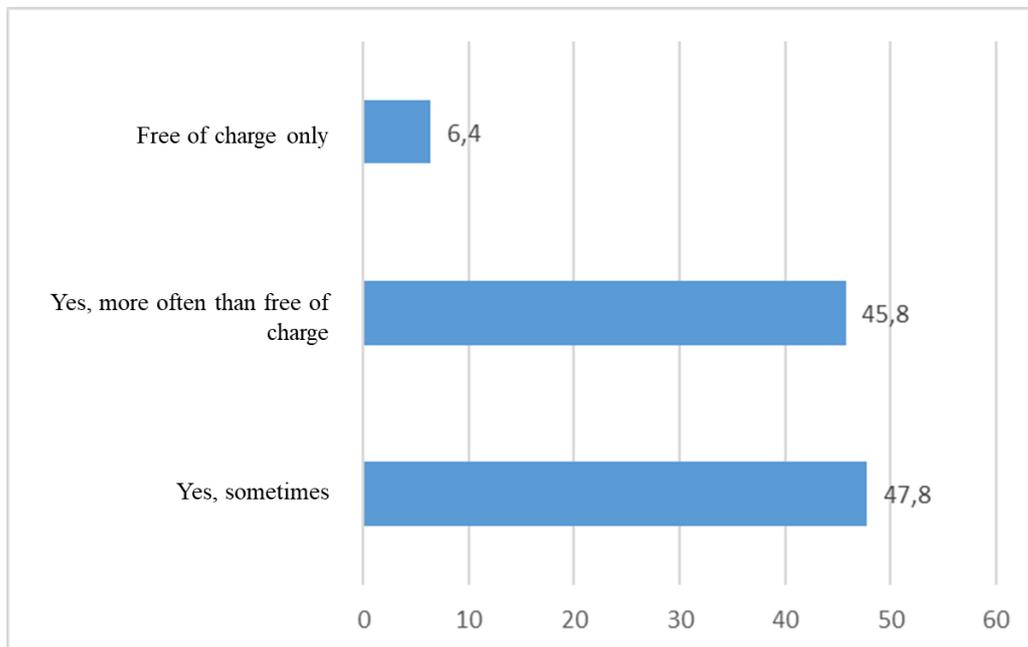
Figure 3. Proportion of healthcare services users

Source: Authors

The main part of the sampling consists of the working people; they can use paid services. But the result itself allows us to extrapolate it to the unemployed population. They are forced to use free medicine, which has serious disadvantages.

The motivation of patients is formed by the quality of service, pricing policy, recommendations, and convenience of receiving services. Understanding these factors allows medical organisations to effectively build a development strategy and improve the quality of services provided. Identifying the reasons for

accessing paid healthcare services was the purpose of the study. It helps to develop recommendations for improving public administration and the population quality of life. Question: "What are your reasons for paying the medical centres?" There were several possible answers; amount is more than 100%; result is arranged in descending order:

62.2% – due to time savings, it is not possible to spend much time on free medicine;

47.8% – due to the lack of opportunity to receive this service for free;

46.8% – due to the higher quality of service;

22.4% – due to the opportunity to choose a doctor by my own.

To overall assessment of the organisation of medical care in Yaroslavl, Russian Federation respondents were asked the following question: "How would you rate the medical care for Yaroslavl residents?" Mark all the options that suit you; amount is more than 100%; result is arranged in descending order:

- negatively, there is always a problem of getting an appointment with a specialist – 55.0%;
- negatively, there is always a problem getting an appointment with a local therapist – 44.0%;
- poorly organised appointment at the local clinics – 39.0%;
- it is difficult to get free dental care – 31.0%;
- poorly organised ambulance service – 27.5%;
- positively, we have no problems receiving medical care – 23.5%;
- it is difficult to get to the hospital for treatment – 10.5%;
- poorly organised child care – 9.5%.

According the research results, public reorganisation of the healthcare system has a negative effect on its condition. People are forced to use paid healthcare services. It reduces the ability to meet people's needs to maintain their health, life expectancy, increases morbidity. Indeed, it negatively affects all indicators of quality of life and capital of health related to the public administration of the health system.

Conclusion

As a result, demographic changes, technological innovations, and the level of government support determine the development of the private healthcare services market. The trends identified indicate a natural transition towards the use of paid healthcare services in healthcare. The entrepreneurs adapted to these changes can expect to thrive in this fast-growing sector of the economy. At the same time, small and medium-sized businesses play a significant role in the healthcare sector. They ensure the availability and quality of healthcare services, introduce innovations, and contribute to economic development. Their active involvement in the health of society highlights the need to form an enabling environment for further growth and development of this sector. It ultimately benefits society as a whole. However, economic activity, tax preferences, and public support measures are necessary for healthy development of the private healthcare services market and the segment of small and medium-sized businesses. Indeed, paid healthcare services market is currently undeveloped in Russia. Meanwhile, the share of commercial medical organisations is growing with every passing year. An effective combination of market mechanisms and government participation will have a positive effect on this sector development. Nevertheless, the development of paid healthcare services market is quite slow due to a reduction in effective demand and a shortage of qualified specialists.

Therefore, modern economics has well-developed terminological basis for describing the major categories of the healthcare services market. The economists define the goal of the healthcare system as an increase of health capital. As a set of healthcare services, those are investments both through non-medical expenses, for example, the purchase of a gym membership or water filtration equipment, and through medical care.

CONFLICT OF INTEREST
The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION
Irina V. Popova – writing – original draft.
Anna N. Zhilina – data curation, formal analysis, validation.
Alexey V. Zorin – conceptualization, project administration, writing – review & editing.

References

1. Makovetskaya, E. N., & Gorokhovsky, S. P. (2025). Private medical organizations as subjects of the medical services market. *Ekonomika i biznes: Teoriya i praktika, 4*(122), 224-228 (in Russian).

2. Puzyrevsky, S. A. (2021). *Russian competition law.* Moscow: Izd-vo Prospekt (in Russian).

3. Shamalova, E. V., Kostromina, E. A., & Laufer, K. M. (2022). A study of competition in the Russian medical services market. *Russkiy ekonomicheskiy byulleten, 5*, 331 (in Russian).

4. Belousova, V. I. (2024). The concept and essence of competition in the medical services market. *Studencheskaya nauka i XXI vek, 21*(1), 30-32 (in Russian).

5. Petrov, A. S. (2023). Features of pricing in the market of paid medical services in the context of import substitution. *Finansi i kredit, 12*, 2667-2675 (in Russian).

6. Baigulova, A. A., & Dovletov, A. B. (2023). Effectiveness of private medical organizations in the Russian healthcare system. *Theoreticheskaya i prikladnaya ekonomika, 1*, 36-45. https://doi.org/10.25136/2409-8647 (in Russian).

7. Krasova, E. V., & Sverchkova, A. D. (2022). Commercial medicine in Russia: Development trends and demand factors. *Social'nye aspekty zdorov'ya naseleniya, 68*(4). https://doi.org/10.21045/2071-5021-2022-68-4-8 (in Russian).

8. Tsvetova, G. V., & Polonnikova, E. K. (2021). The market of medical services in the regional dimension. *Vlast' i upravlenie na Vostoke Rossii, 1*(94), 93-100 (in Russian).

9. Ablyaeva, V. I., & Nikolaeva, N. A. (2016). The market of medical services in modern Russia. *Byulleten' medicinskih Internet-konferencij, 6*(1), 187 (in Russian).

10. Kostanyan, A. A., & Smbatyan, S. M. (2023). The theory of consumer behavior and demand in the new paradigm of digital healthcare. *Vestnik Moskovskogo universiteta. Seriya 6: Ekonomika, 58*(5), 66-89. https://doi.org/10.55959/MSU0130 (in Russian).

11. Kalyagin, G. V. (2021). The lighthouse after Coase: Alternative ways to provide public goods and functions of the state. *Vestnik Moskovskogo universiteta. Seriya 6: Ekonomika, 2*, 247-264 (in Russian).

12. Manukyants, S. V., & Furin, A. G. (2021). Markets of trust goods and digital economy. *Vestnik Povolzhskogo gosudarstvennogo tekhnologicheskogo universiteta. Seriya: Ekonomika i upravlenie, 2*(50), 44-53. https://doi.org/10.25686/2306-2800.2021.2.44 (in Russian).

13. Tsvetova, G. V., & Polonnikova, E. K. (2020). Trends in the development of the Russian market of medical services. *Vlast' i upravlenie na Vostoke Rossii, 3*(92), 120-125 (in Russian).

14. Subbotina, T. N. (2022). Improving the logistics activities of an enterprise to maintain competitiveness in the face of severe sanctions restrictions: Digitalization of logistics chains. *Uspekh sovremennoy ekonomiki, 3*, 103-110 (in Russian).

15. Davydovich, A. R., Grinenko, S. V., Karamova, A. S., & Fesenko, O. P. (2022). The medical services market: Current state and development prospects under sanctions. *Problemy social'noj gigieny, zdravoohraneniya i istorii mediciny, 30*(5), 740-745 (in Russian).

16. Kozlova, E. I., & Novak, M. A. (2018). The market of paid medical services in Russia: Dynamics, factors of development. *Innovacionnaya ekonomika: perspektivy razvitiya i sovershenstvovaniya, 5*(31), 50-57 (in Russian).

17. Belaya, R. V. (2018). Availability of medical services as a factor of human capital increase: Sociological research data. *Rossijskoe predprinimatel'stvo, 10*, 3163-3176. https://doi.org/10.18334/rp.19.10.39489 (in Russian).

18. Elokhina, L. N. (2022). Transformation of the national medical services market: A review of the works of modern Russian authors. *Ekonomika i upravlenie, 7*, 331-376. https://doi.org/10.35854/1998-1627-

2022-7-731-736 (in Russian).

19. Soklakova, I. V., Santalova, M. S., Kuzmina, E. Yu., & Pliev, H. I. (2021). Features of the formation and development of the medical services market in the context of a pandemic. *Ekonomicheskie sistemy, 3*, 88-94 (in Russian).

20. Manukyants, S. V. (2023). Features of the medical services market: Theoretical and economic analysis. *Vestnik Povolzhskogo gosudarstvennogo tekhnologeskogo universiteta. Seriya: Ekonomika i menegment, 4*(59), 15-24 (in Russian).

EU automotive production chains: country-specific features in terms of regional integration development

Elena V. Sapir iD

Doctor of Economics, Professor
P.G. Demidov Yaroslavl State University, Yaroslavl, Russian Federation
E-mail: sapir@uniyar.ac.ru

Ilya A. Gorshkov iD

Student
P.G. Demidov Yaroslavl State University, Yaroslavl, Russian Federation
E-mail: gorshkov1424@yandex.ru

ORIGINAL ARTICLE

Abstract. The article considers the specifics of the current production chains of the automotive industry, the degree of specialisation, assessment of changes in geographical disparities in the production of goods by levels of commodity movement in the European Union. The hypothesis of the research concerns with the proportional and equitable participation of individual countries and regions in the European automotive industry in terms of deep regional integration. The methodology presented for modelling the production chains of the automotive industry confirms the general hypothesis of the research. Indeed, the production of simple nodes has become more evenly distributed across Europe. The research reveals a decrease in geographical disparities in the production of complex integrated modules. Finally, it resulted in the increased concentration of the main assembly facilities in a limited number of locations. The results obtained indicate a more even development of Europe's knowledge-intensive production base against the background of deepening integration processes. Those are useful in the development of measures to support the automotive industry in the BRICS and EAEU. It is important to support the expansion of the geography of integrated modules production to contribute the strengthening of the technological base of the regional association member countries.

Keywords: automotive industry; European Union; uneven spatial development; export specialisation; production chains

JEL codes: F18, F63, L62

Introduction

At the present stage, the automotive industry of the European Union is facing a number of challenges on the leadership in the global automotive industry. The automotive industry and industries directly or indirectly related to it account for about 7% of Europe's GDP and employ about 13.8 mln people[1]. In 2019, the European Union (consisting of 27 countries) (hereinafter – the EU) dominated the global automotive market. It has 10 of the world's 20 largest suppliers of automotive components and 4 of the 10 largest manufacturers of finished vehicles by revenue[2]. During the same period, Europe's share in the total global production of passenger cars was 21.6%. However, by 2024, the share of finished car production in the EU countries had decreased to 17.4%[3]. It is justified by the technological lag in the region's automotive industry and the slow response to changes in market conditions.

---

[1] *Automotive industry. European Commission. Source: https://single-market-economy.ec.europa.eu/sectors/automotive-industry/policy-and-strategy_en (accessed on 06.05.2025)*
[2] *Deubener H. et al. European automotive industry: What it takes to regain competitiveness. McKinsey. 2025. Source: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/european-automotive-industry-what-it-takes-to-regain-competitiveness# / (accessed on 06.05.2025)*
[3] *Production statistics 2024. International Organization of Motor Vehicle Manufacturers. 2024. Source: https://www.oica.`net/category/production-statistics/2024-statistics/ (accessed on 06.05.2025)*

At the current stage, European automakers are facing the challenges of radical changes in engine technology, growing consumer demand for unique cars, an accelerated transition from hardware-defined vehicles to software-defined ones, etc.[4]. Previously, European automakers, especially German companies, were provided with skilled labour, automated production, etc. Therefore, the companies themselves received significant economies of scale. Combined with low energy prices, this allowed companies to produce local products competitive on the global market. However, these advantages are currently under threat due to the active use of industrial robots and the general automation of production in the United States and China. Companies in these countries have flexible cost structure. Moreover, the trade unions have limited influence on company management.

China has an increasingly important role in the global automotive industry. It has currently established the production of internationally competitive electric vehicles [1, p.67]. In opposition to the rapidly advancing Chinese automotive industry, the EU states reduce the dependence of regional production chains on supplies abroad, especially from China[5]. There is a gradual process of reindustrialisation and regionalisation of value chains within the framework of the association. Indeed, the transfer of the most complex and capital-intensive passenger car production processes to the EU countries. Nowadays, the automotive industry production network of the EU has developed a stable system of relationships between suppliers, automotive companies and countries. Therefore, the majority of car assembly plants and factories for the production of parts and components are located in the Western European countries (hereinafter – WE). At the same time, there are several countries forming a core of this system. They accumulate the most knowledge-intensive and profitable stages of the car manufacturing process [2]. Meanwhile, the one of European integration tasks is levelling of the cross-country differences in the technical and production base [3, p. 51].

Therefore, there is an issue of a decrease in the unevenness in the geographical structure of countries' specialisation at the EU certain stages of passenger car production in terms of the economic internationalisation and the development of a Single Market. Indeed, the countries with the peripheral economy should correlate with the central European economies and in terms of the level of production development and technical base of the automotive industry.

Review of literature and research

The problem of uneven development of production chains in the European automotive sector has become the subject of research by a lot of domestic and foreign scientists, consulting agencies and international organisations.

The Russian researchers consider the issues of self-sufficiency of the European automotive industry, export specialisation, and export structure of European economies. They also deal with the specifics of the institutional regulation and the trends towards reducing asymmetry in the development of Eastern European and Western European countries[6] (hereinafter – EE and WE) [4, p. 124; 5, p. 96; 6, p. 562]. The EE countries are actively attracting foreign investment due to cheap labour. However, they risk to lose their advantage in terms of automation [7]. There is a gradual reduction in the technological gap in the levels of development of the countries of the Eastern and Western macroregions [8, p. 50]. The advantages of cooperation are considered as a driver of technological development: the formation of a model of open innovation, joint work in terms of non-competitive research [9]. Mechanisms of state support and administrative regulation play a special role in the European automotive industry [10]. The segment of electric vehicles (EV) and hybrids is actively gaining a foothold in the European automotive market, and EV production volumes are increasing [11, p. 236]. There is a change in the sectoral structure of the WE countries towards an increase in the share of high-tech information services in the cost of products [12].

The works by foreign scientists are devoted to two central groups of problems: the first is the sustainability

---

[4] *Waas A. et al. European Auto Industry is at a Crossroad. Boston Consulting Group. 2023. Source: https://www.bcg.com/ publications/2023/european-auto-industry-is-under-pressure (accessed on 06.05.2025)*

[5] *Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery. European Commission. Brussels. 2021. COM (2021) 350 Final. P. 11.*

[6] *Western Europe: Germany, Austria, Belgium, Sweden. Eastern Europe: Poland, Hungary, Slovakia, Czech Republic, Romania*

and self-sufficiency of production chains; the second one is the uneven participation of countries in certain stages of European automotive chains [14-17; 18, p. 177]. Special attention is paid to the growing dependence of European battery production on the supply of Chinese raw materials [13]. It also concerns with the gradual increase in the degree of integration of production processes within the region [25]. There is a loss of global market share by European automakers due to competition with Asian companies. Moreover, there is a shift in production focus to sustainable development and digital services [19; 20, p. 25]. In the automotive industry of the EU there are imbalances in the distribution of countries by stages of the value chain [21]. The relocation of factories to Eastern European countries allows automakers with the strong economies to supply themselves with cheaper components and increase their competitiveness [22]. Pavlinek [23] notes an increase in the degree of involvement of peripheral EU states in the regional automotive industry. At the same time, it is expected to strengthen the territorial specialisation of production, change in the geographical distribution of automotive enterprises in the EU. Moreover, the author identified a key advantage and time of significant vulnerability of the automotive industry in the integrated periphery of Eastern Europe. They are as follows: attracting foreign direct investment due to low production costs, especially cheap labour [24].

Reports from international organisations and consulting agencies examine the current state of the EU automotive industry and its risks. The agencies note the instability of the current situation in the automotive industry, the technological lag in the production of electric vehicles, and dependence on imports of critical raw materials for the production of batteries of the EU[7,8]. The report of the European Automobile Manufacturers Association[9] (ACEA) for 2023 and 2022 identifies the leaders in car assembly among European countries: Germany, Spain, the Czech Republic, and Slovakia. Countries are experiencing an increase in production volumes caused by a gradual decrease in the impact of supply chain disruptions.

Therefore, the following issues have been widely studied in the scientific literature: the increasing dependence of the EU automotive industry on foreign investors and their products; decline in competitiveness relative to the US and Chinese automakers in the electric vehicle segment; increase in imbalances in the level of development of the automotive industry of the European automotive industry. At the same time, the issue of country-specific aspects of export specialisation at certain stages of the production chain is understudied. This research examines the extent of the discrepancy in the nature of specialisation of individual countries and regions, the course of the development of European integration.

Methods

During the research the following hypotheses were put forward:
H1: a decrease in geographical (cross-country) imbalances in the production of simple nodes.
H2: a reduction in the disparity in the production of integrated modules.
H3: the imbalances in the localisation of assembly plants increasing.

To test the hypotheses, an analysis of the European automotive industry production chain was conducted. It corresponds to the following categories of goods: the product movement; intermediate goods used in car assembly (simple components); enlarged modules: (1) curb chassis and (2) body for passenger cars); ready-made cars of various types. This specification of the levels of product movement is necessary to further determine the specialisation of countries at certain stages of the car creation chain (Table 1).

Table 1 – Classification of goods by levels of movement in the automotive industry in Europe

The level of product movement	Customs Tariff Number (CTN)	Product Name
Simple components	870840	Transmission box

[7] *Deubener H. et al. European automotive industry: What it takes to regain competitiveness. McKinsey. 2025. Source: https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/european-automotive-industry-what-it-takes-to-regain-competitiveness# / (accessed on 06.05.2025)*

[8] *Waas A. et al. European Auto Industry is at a Crossroad. Boston Consulting Group. 2023. Source: https://www.bcg.com/publications/2023/european-auto-industry-is-under-pressure (accessed on 06.05.2025)*

[9] *Economic and market Report Global and EU auto industry: full year 2023. ACEA. 2024. Source: https://www.acea.auto/files/Economic_and_Market_Report-Full_year_2023.pdf (accessed on 10.05.2025)*

The level of product movement	Customs Tariff Number (CTN)	Product Name
	870880	Amortisation System
	8507	Battery accumulators
	840820	Diesel engines
	840734	Engines with a cylinder capacity exceeding 1 litre
	8501	Electric motors and generators
Enlarged modules	8706	Chassis equipped with an engine
	870710	Bodywork for passenger cars
Ready-made cars	870323	Cars with gasoline engine capacity from 1.5-3 litres
	870332	Cars with diesel engine capacity from 1.5-2.5 litres
	870340	Diesel cars with electric motor
	870380	Electric vehicles

Source: composed by the authors based on T. Sturgeon et al., 2016[10]

Stage 1. Determination of the specifics of commodity movement at the level of individual goods

The empirical verification of the research hypothesis was conducted in several stages. At the first stage, the coefficients of the export specialisation of the European Union countries for the main components, integrated modules, and finished cars (Formula 1) were calculated.

$$RCA_{ip} = \frac{(X(M)_{ipw}/X(M)_{itw})}{(X(M)_{prw}/X(M)_{tw})} \qquad (1)$$

where RCA is the coefficient of export specialisation (according to the method of B. Balash),
X (M) is the export (import) flow,
p is the product of interest according to the CTN code,
i is the country under study, w is the worlds' flow,
r is intercountry flows in the European Union (27 countries),
t is the total volume of exports (import).

The numerator is the share of exports or imports of goods in the total exports or imports of the country under study. The denominator is the share of exports or imports of the studied product in the total exports or imports of EU countries.

The RCA coefficients were calculated for the EU. According to the results, two countries with the highest RCA scores for each of the products were selected. To assess the specialisation of individual economies at a particular stage of the production chain, 9 countries most involved in international trade in automotive products were considered and divided into two macroregions: Western Europe – Belgium, Germany, Austria, Sweden; Eastern Europe – Romania, Slovakia, Czech Republic, Poland, Hungary.

Stage 2. Determining the location of individual economies at the stages of the production chain

The assessment of the location of individual countries at specific stages of the passenger car production chain was conducted by calculating the weighted average coefficient of export specialisation for a group of goods proposed by the authors (Formula 2).

---

[10] *Sturgeon T. et al. (2016). The Philippines in the Automotive Global Value Chain. The Duke Centre on Globalization. Governance & Competitiveness Centre on Globalization. Source: https://gvcc.duke.edu/wp-content/ uploads/2016_Philippines_Automotive_ Global_Value_Chain.pdf (accessed on 10.05.2025)*

$$ARCA_{ik} = \sum_{p=1}^{Pk}(RCA_{ip}*d_{ipk}) \tag{2}$$

where ARCA is the RCA indicator weighted by the share of exports of goods in the commodity movement group, RCA is the coefficient of specialisation for a particular commodity item within the commodity movement group, p is the product of interest according to the CTN code,

i is the country under study,

k is the level of commodity movement (according to Table 1),

pk is the number of product items in group k (for simple components – 6 items, for enlarged modules – 2 items, for ready made vehicles – 4 items),

d is the share of exports of goods by a country within the commodity distribution group.

The higher the weighted average coefficient of export specialisation of countries for a certain group of goods, the more significant the country's role in the production of group k goods. The coefficient provides the country's strategic role in the automotive production chains of the EU. The indicator is calculated for nine countries for three groups.

To detail analysis of the distribution of European countries by individual stages of the production chain, a graphical method based on the construction of bell curve has been applied. Traditionally, the concept of a bell curve shows the relationship between a stage of the production chain and its added value. Their initial stages are represented by research and development with high added value. However, in our work the bell curve has been modified: three stages have been postponed on the abscissa (X) axis according to the distribution scheme: components, assemblies, and readymade cars. The values of the ARCA coefficients are on the ordinate (Y) axis. The resulting graph allows us to assess the degree of participation of countries in a specific part of the production chain and draw conclusions about the role of the economy in the automotive industry of the region.

Stage 3. Assessment of the uniformity of the distribution of production capacities in the EU

At the final stage of the study, to determine the degree of uniformity of capacities distribution in the EU automotive sector, the indicators of the standard deviation of the export specialisation coefficients of the countries for 2010 and 2023 were calculated. The choice of the initial period is due to the restructuring of production chain and recovery of the global economy in 2010 to the level preceding the global financial crisis. The standard deviation indicator (Formula 3) shows the imbalances in the production and technological potential of the EU countries in the automotive industry in the post-crisis period.

$$\sigma_{gk} = \sqrt{\frac{\sum\left(ARCA_{ik} - (\overline{ARCA})_k\right)^2}{(n-1)}} \tag{3}$$

where σ_{gk} is the standard deviation for the group of countries,

g at the level of commodity movement k,

g is the group of countries,

$\overline{ARCA}$ is the arithmetic mean of the weighted average coefficients of countries at the level of commodity movement k, n is the number of analysed countries.

To assess changes in the degree of participation of EU macro-regions in the production process, the value of the average standard deviation for the enlarged regions of the European Union (Western Europe and Eastern Europe) is used (Formula 4).

$$\overline{\sigma}_{gks} = \frac{\sigma_{gk1s} + \sigma_{gk2s} + \sigma_{gk3s}}{ns} \tag{4}$$

where $\overline{\sigma}_{gksis}$ the average value of the standard deviation for the countries of Western / Eastern Europe,

s is the macroregion (Western / Eastern Europe),

σ_{gkis} the standard deviation of the weighted average coefficient of export specialisation of goods for the group of countries g at the level of commodity movement k (1, 2, 3).

The obtained indicator estimates the overall change in the imbalances in the distribution of production chain stages in the geographical regions of the EU. Based on a comparison of the average standard deviation at the beginning and end of the period, the structure of the distribution of production capacities of the automotive industry in WE and EE has changed.

Results

1 The level (state) of specialisation of EU countries in the automotive industry

According to the results of the calculations in the first stage, the countries with the highest value of the coefficient of export specialisation for individual goods were identified (Table 2). Two countries with the highest specialisation rates in terms of selected product line and product group were included in the Table 2.

Table 2 – Values of the highest indicators of export specialisation (RCA) of the EU-27 countries for selected goods

| Product Name	Country	RCA	Product Name	Country	RCA
Transmission box	Romania	5.16	Electric motors and generators	Hungary	3.54
Amortisation System	Slovakia	4.72	Battery accumulators	Hungary	9.99
Diesel engines	Slovakia	5.81	Engines, V[11] > 1L	Hungary	9.11
Bodywork	Czech Republic	5.64	Chassis	Sweden	11.59
Cars with petrol engine, V 1.5-3L	Slovakia	5.81	Cars with diesel engine, V 1.5-2.5 litres	Czech Republic	3.02
Diesel cars with electric motor	Slovakia	8.57	Electric vehicles	Belgium	2.21

Source: developed by the authors according to UN Comtrade data

According to research results, the following positions of EU countries in the automotive industry were determined: centres for (1) the production of highly processed components (Hungary); (2) the assembly of components into integrated modules (Czech Republic); (3) the integration of imported goods into a single unit and the production of a finished car (Slovakia, Czech Republic, Germany); (4) the role of manufacture and export of curb chassis (Sweden) in the segment of intermediate and consumer goods of the international automotive market.

We have compiled a general scheme for the distribution of automotive components in production chains in the EU (Fig.1).

Eastern European countries specialise in internal combustion engines. The production of enlarged modules is concentrated to a greater extent in Germany, Sweden, the Czech Republic, and Poland. The main assembly plants of the European automotive industry are located in the countries of Central Eastern Europe; individual capacities are localised in Germany; electric vehicles are also assembled in Belgium.

---

[11] *Note: V – engine cylinder capacity*
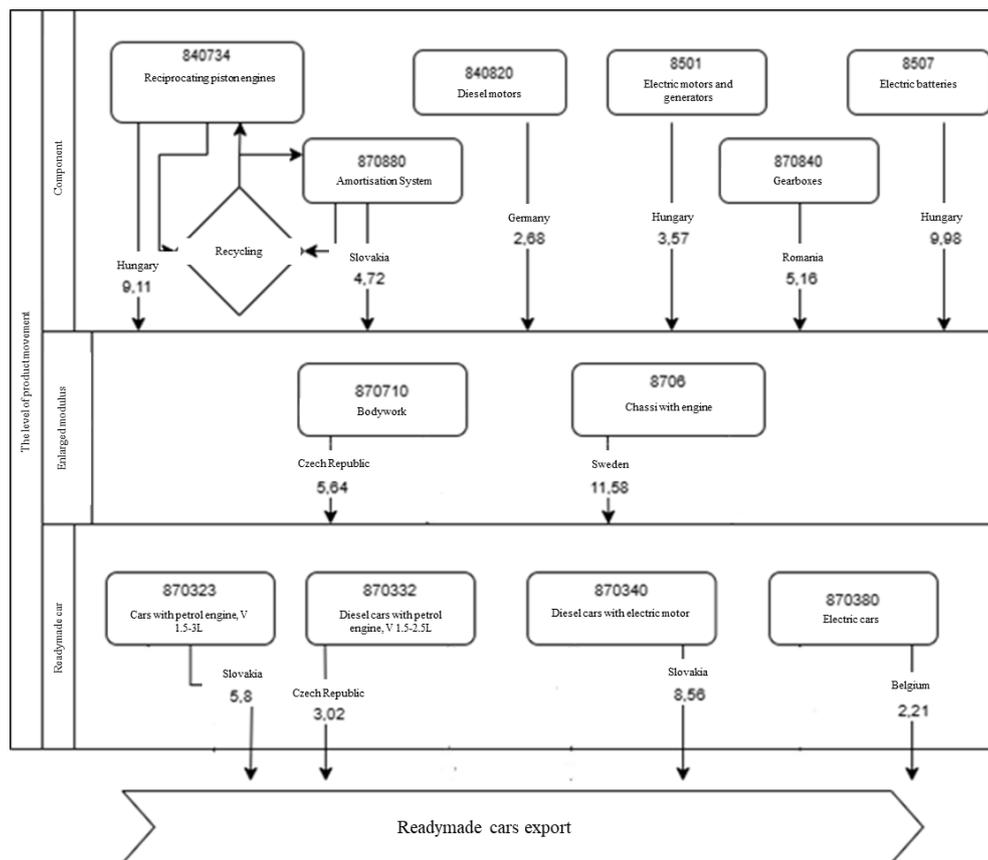
Figure 1. A product distribution scheme focused on the EU's leading countries in terms of RCA[12]
Source: developed by the authors according to UN Comtrade data

2 Modern configuration of production chains in the EU automotive industry

At the second stage, the weighted average indicators of export specialisation (ARCA) by levels of commodity movement for the selected countries were calculated (Table 3).

Table 3 – Matrix of ARCA indicators by levels of product movement

Country	Simple components	Enlarged modules	Readymade car
Austria	3.313	0.330	0.524
Belgium	0.369	0.141	1.758
Czech Republic	2.039	4.911	2.387
Finland	1.951	0.150	0.265
Germany	1.523	2.213	1.951
Hungary	8.157	1.132	1.834
Poland	3.610	3.377	0.567
Romania	3.956	0.923	0.224
Slovakia	2.247	1.023	5.992
Sweden	2.787	11.041	1.761

Source: developed by the authors according to UN Comtrade data

Based on the weighted average coefficients of specialisation, we constructed graphs to show the degree of participation of the countries of the eastern and western parts of the EU at certain stages of the value chain (Fig. 2). The results of the second stage clarify and expand the provisions obtained in the first one.

---

[12] *Note: The value under the country name is the coefficient of export specialisation*

Western European countries   *Eastern European countries*
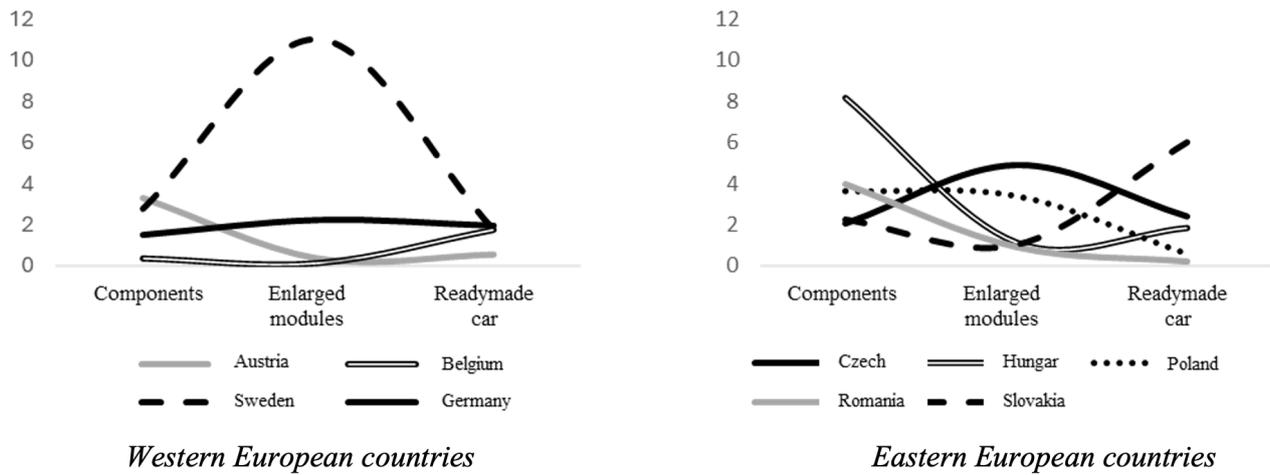
Figure 2. The values of the ARCA coefficient of the EU countries for individual stages of the automotive production chain

Source: developed by the authors according to UN Comtrade data

According to Figure 2, there are imbalances in the specialisation of individual countries of Eastern and Western Europe at the stages of the production chain. Indeed, the countries of Eastern Europe mostly are focused on simple stages of the production chain do not require high qualification skills. Slovakia, the Czech Republic, and Hungary are actively involved in the final assembly of cars. At the same time, Hungary also has a high degree of specialisation in the components trade. Poland and Romania do not specialise in exporting of the readymade cars. However, they are one of the main suppliers of shock absorption systems and gearboxes. In addition, Poland produces and exports of equipped automobile chassis.

The countries of Western Europe (Austria, Germany, Sweden) are focused on the production of components and assemblies. Nevertheless, they are also specialising on the assembly of cars. Some Western European countries (Germany, Belgium, Sweden) mainly assemble the electric cars are, actively promote a "green" policy, and stimulate demand for environmentally friendly vehicles.

3 Imbalances in the geographical distribution of automotive capacity in the EU

The changes in the structure of countries' specialisation in the production of goods at different levels of the production chain across the enlarged regions of the European Union and the union as a whole were analysed. Table 4 estimates the deviations of country specialisation levels from the average values for individual stages, macro-regions across the EU and automotive industry chain.

Table 4 – Indicators of the standard deviation of ARCA coefficients by levels of product movement and country groups, 2010 and 2023

The level of product movement	Simple components		Enlarged nodes and modules		Ready-made cars		The whole chain		Ready-made cars		The whole chain	
Region	2010	2023	2010	2023	2010	2023	2010	2023				
EU	2.65	2.10	10.90	3.37	0.60	1.70	1.89	1.39				
EE	3.61	2.71	15.11	1.82	0.57	2.36	1.58	1.50				
WE	1.67	1.60	6.26	4.71	0.69	0.95	2.12	1.25				

Source: developed by the authors according to UN Comtrade data

In the EU there is a tendency to reduce the imbalances in the distribution of production capacities of the automotive industry by country. At the same time, there is a gap in the component manufacturing segment; the largest change is in the disproportion in the location of assembly plants. There is also an increase in imbalances in the assembly of readymade cars.

In the analysed Eastern European countries, the imbalances in the component manufacturing segment decreased during the study period. The production processes to design complex nodes have acquired a more uniform geographical distribution across the world countries. There is a decrease in differences in the distribution of the final assembly of readymade cars in the macroregion.

The Western European countries under study have a reduction in the asymmetry in the level of specialisation of countries by stages of the production chain. There is a decrease in imbalances in the production and trade of components and enlarged assemblies against the background of a reduction in the number of assembly plants in Western European countries.

Therefore, the results of the third stage show a reduction in the overall disparities in the geographical location of individual stages of passenger car production across the EU regions. At the same time, in the Western, Central, and Eastern parts of Europe there is an increase in imbalances in the distribution of carmaker assembly plants. For both regions and the Union as a whole, there is a tendency to move towards a more even distribution of the production links of components and assemblies.

Conclusions

Hence, all three formulated hypotheses were confirmed during the research. Firstly, the geographical imbalances in the production of simple components and components of the automotive industry have decreased over the period under study. Secondly, the production of enlarged technologically complex modules has become more evenly distributed across the Europe. A number of countries have managed to strengthen their own technological base of the industry and integrate into the production chain in its more knowledge-intensive segments. Thirdly, the geography of localisation of assembly plants in Europe has become more limited. There is a formation of a limited pool of countries that control the main capacities of the final assembly of readymade cars.

The study revealed the country-specific features of the automotive industry production networks of the European Union. Among the countries of Western Europe, Germany is of particular interest. The country has an identified export specialisation at each of the levels of commodity movement. Moreover, despite ARCA's low performance in comparison with other countries in absolute terms, Germany is the leader in exporting components, integrated modules and readymade vehicles, surpassing the production scale of other economies in the region by several times. Assembly and manufacturing plants of both European and non-regional automakers are concentrated in Germany. Its automotive industry is characterised by technological leadership among the EU countries in the development of diesel, gasoline engines, hybrid systems, and electric vehicles. The main importing countries of German components are the USA, Poland, China, Turkey, the Czech Republic, Austria, and Slovakia. Some of the products produced are aimed at non-regional exports. However, the significant volumes of components are still supplied to enterprises in the EU member states. Most European automakers depend on the supply of German-made components. The German automotive sector features underline the country's status as a leading one in regional value chains and a major player in the international automotive market.

Sweden's atypically high level of specialisation at the assembly production stage in 2023 can be recognised as a natural consequence of the active expansion of national automakers into foreign markets. Swedish companies supply equipped chassis for vehicle assembly in other countries. This method significantly reduces the costs associated with customs formalities. The main markets for the enlarged modules of Swedish manufacturers are Mexico, Egypt, Spain, Israel, Australia, and Brazil. Indeed, the largest flow of loaded chassis belongs to the segment of commercial vehicles, represented among others by trucks of the Scania and Volvo brands, Sweden.

The automotive industry in Slovakia is focused on assembling of ready-made cars of different brands, design of ready-to-install automotive components, commissioning work, etc. [26]. Moreover, the assembly plants of the Korea company KIA and its first-order suppliers – Mobis – are located in the country. More than 35% of gasoline car shipments are to Germany; about 30% of hybrid car exports are to the United States; a third of diesel cars are exported to Italy. The main volume of deliveries of finished Slovak-made cars concerns

with the countries of Europe and North America.

Among the Eastern European countries, Hungary is the most actively produces the components. For instance, Continental's Hungarian plants in Vaca, Debrecen and Gyor produce braking and electronics systems; ZF Friedrichshafen provides assembly plants with transmission elements, suspension, and control systems. A significant share of Hungarian components is imported by European countries specialising in the final assembly of cars (Germany, Belgium, Slovakia, Czech Republic). About 7% of the country's battery exports is to the United States, about 51% to Germany, and 10% to Belgium[13].

According to the results of the analysis of the dynamics of the imbalances in the export specialisation of countries at the stage of production of simple components, minimal change was revealed among Western European countries. However, the geographical distribution structure of automotive component manufacturing enterprises in Eastern Europe became more homogeneous. The distribution of component production capacities in Eastern European countries was achieved due to an increase in the volume of exports of components by Romania and Slovakia. It increased by 6.4 and 2.9 times, respectively. The largest share of the supplied products of the countries is accounted for by the European leaders of the automotive industry: Germany, the Czech Republic, Hungary, Sweden, and Poland.

At the stage of production of enlarged modules, there is a high level of concentration of production within individual countries. The high deviation rate in 2010 for Eastern European countries is explained by Slovakia's particularly large annual exports of passenger car bodies, which amounted to about $ 1.1 bn USD. However, the country's total exports in 2010 were $ 65.3 bn USD. The share of exports of body parts accounted for 1.8% of total exports; the main supplies of these goods were to Germany (~59%) and the Russian Federation (~41%). In 2023, exports of the commodity item under study decreased by 99.5%. It was caused by the cessation of body supplies to the Russian Federation and the relocation of German assembly plants to Slovakia.

Finally, at the stage of final assembly, there is a slight change in the localisation of car assembly plants in the countries of the western macroregion of the Union and a concentration of assembly facilities in a limited number of Eastern European countries. Slovakia is the most involved in the assembly stage today. It has significantly strengthened its position in the export of passenger cars: its share in the country's total exports increased from 8.0% in 2010 to 16.2% in 2023 due to increased trade in gasoline, hybrid, and electric vehicles. A significant part of the deliveries of passenger cars abroad in the reporting period were made to Germany – 21.3%, the USA – 11.7%, Great Britain – 9.1%. Hungary and the Czech Republic have significantly strengthened their specialisation in the final assembly stage. Since 2010, their car exports have increased by 318% and 215%, respectively. Germany, Sweden, and Belgium specialise in the level of ready-made cars. At the same time, Germany has the largest exports of passenger cars of all types. Germany and Belgium are focused on the production of electric vehicles. Swedish enterprises at this stage are mainly focused on the production of gasoline and diesel cars. However, the production of hybrids and electric cars is not well established.

Therefore, there is a reduction in the imbalances in the distribution of production capacity across regions at the level of simple components. There is also a decrease in asymmetry in the localisation of plants for the production of complex components. However, the concentration of assembly plants in individual countries of the macro-regions is increasing with an emphasis on the economies of Eastern Europe.

In the future, the structure of the geographical distribution of production capacities among the EU countries will result in the homogeneous participation of the countries of the macro-regions in certain stages. At the same time, the concentration of manufacturing enterprises focused on the production of simple and less profitable products in Eastern European countries is expected to increase.

The practical significance of the research is in the possibility of use of the European Union experience in the development of the EAEU automotive industry. With certain assumptions, the most developed members of the Union (the Russian Federation and the Republic of Belarus) can become centres for the concentration of complex and knowledge-intensive stages of the production chain. However, the production of components

---

[13] *The estimates given here and further in the section are obtained by the authors based on Trade Map data. Source: https://www. trademap.org / (accessed on 07.06.2025)*

and assembly of readymade cars can be localised in Kyrgyzstan, Armenia, and Kazakhstan. However, one of the serious limitations of the automotive network development in the Eurasian Union is the insufficient volume of production and sale of domestically produced passenger cars to establish an international production system within the Union.

FUNDING

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORS' CONTRIBUTION

Elena V. Sapir – conceptualization, project administration, writing – original draft.
Ilya A. Gorshkov – investigation, formal analysis.

References

1. Smirnov, S. V. (2021). Building cars with electric motors abroad: From the beginning to the present day. *Nauchnoye naslediye*, (80-1), 63-68 (in Russian).

2. Domański, B., & Lung, Y. (2009). The changing face of the European periphery in the automotive industry. *European Urban and Regional Studies, 16*(1), 5-10. https://doi.org/10.1177/0969776408098928

3. Yeremchenko, O. A., & Kurakova, N. G. (2023). Measuring the level of technological sovereignty in foreign countries: The experience of the European Union. *Ekonomika nauki, 9*(3), 47-60. https://doi.org/10.22394/2410-132X-2023-9-3-47-60 68 (in Russian).

4. Sidorova, E., & Sidorov, A. (2023). The strategic autonomy of the European Union in the economy: Concept and challenges of implementation. *International Trends, 21*(3), 119-142. https://doi.org/10.17994/IT.2023.21.3.74.7

5. Belov, V. B. (2019). The economic and political role of Germany in the European Union. *Actualnye Problemi Evropi*, (4), 93-113. Retrieved from https://elibrary.ru/waymnt (in Russian).

6. Vasilchenko, A. D. (2024). On the interdependence between specialization and structure of machinery exports: Case of European economies. *Zhurnal ekonomicheskikh issledovaniy Sankt-Peterburgskogo universiteta, 40*(4), 551-569. https://doi.org/10.21638/spbu05.2024.402 (in Russian).

7. Vozmilova, S. S., & Volgina, N. A. (2016). Automotive industry in the countries of Central Eastern Europe: Current development trends. *Vestnik RUDN. Seriya: Ekonomika*, (1), 7-21. Retrived from https://cyberleninka.ru/article/n/avtomobilestroenie-v-stranah-tsentralnoy-vostochnoy-evropy-sovremennyetendentsii-razvitiya (in Russian).

8. Shishelina, L. (2019). Some results of three decades of transformation in Central Europe. *Sovremennaya Evropa, 6*(92), 48-56. http://dx.doi.org/10.15211/soveurope620194856 (in Russian).

9. Podstrakova, M. I. (2021). European automotive industry under great transformation in the industry. *Rossijskij Vneshnee`konomicheskij Vestnik*, (5), 116-123. https://doi.org/10.24412.2072-8042-2021-5-116-123 (in Russian).

10. Messaudi, M. A., & Gorlova, O. S. (2022). State regulationof the development of the automotive industry in the European Union. *Humanitarian Scientific Journal*, (2), 98-102. Retrieved from https://elibrary.ru/ivsamb (in Russian).

11. Zakrevskaya, Y. A. (2023). The global and Russian automotive industry: The period of adaptation. *Obrazovanie i zakon*, (12), 228-237. Retrieved from https://elibrary.ru/ceuext (in Russian).

12. Rodionova, I., & Madry, Ts. (2021). Production of knowledge-intensive goods and services: The positions of the countries of Central and Eastern Europe. *Socialnoe ekonomicheskie problemy yrazvitiya regionov v usloviyax globalnoj nestabil`nosti*, 99-114. Retrieved from https://elibrary.ru/dqqofn (in Russian).

13. Britsche, A., & Fekete, M. (2024). Supply chain resilience in the European automotive industry. *Management Systems in Production Engineering, 32*(3), 380-400. Retrieved from https://doi.org/10.2478/mspe-

2024-0036

14. Gerőcs, T., Meszmann, T. T., & Pinkasz, A. (2021). Uneven development in the European automotive industry: Labor fragmentation and value-added production in the Hungarian semi-periphery. In *Global Commodity Chains and Labor Relations* (pp. 274–296). https://doi.org/10.1163/9789004448049_012

15. Jipa-Muşat, I., Campling, L., & Prevezer, M. (2025). Business politics as a causal mechanism shaping uneven regional development across Romania's automotive industry. *Journal of Economic Geography, 25*(3), 447-467.

16. Domański, B., Micek, G., Guzik, R., Gwosdz, K., & Kocaj, A. (2024). *The evolution of European manufacturing industries: The dynamics of core-periphery relationships*. https://doi.org/10.4324/9781003430117

17. Vošta, M., & Kocourek, A. (2017). Competitiveness of the European automobile industry in the global context. *Politics in Central Europe, 13*(1), 69-86. https://doi.org/10.1515/pce-2016-0023

18. Gáspár, T., & Sass, M. (2023). 'Space-time dents' in global value chains: The Hungarian case. *Society and Economy, 45*(3), 173-185. Retrived from http://dx.doi.org/10.1556/204.2023.00020

19. Čižinská, R., Hrtúsová, T., & others. (2021). *Position and perspectives of the European automotive industry*. ŠKODA: AUTO University. Retrieved from https://www.researchgate.net/publication/355144184_Position_and_Perspectives_of_the_European_Automotive_Industry

20. Tocci, N. (2021). *European strategic autonomy: What it is, why we need it, how to achieve it*. Istituto Affari Internazionali (IAI). Retrieved from https://www.iai.it/sites/default/files/9788893681780.pdf

21. Megyeri, E., Pelle, A., & Tabajdi, G. (2023). The realities of EU industrial policies analysed through automotive value chain dynamics. *Society and Economy, 45*(3), 250-269. http://dx.doi.org/10.1556/204.2023.00005

22. Jürgens, U., & Krzywdzinski, M. (2009). Changing East–West division of labor in the European automotive industry. *European Urban and Regional Studies, 16*(1), 27-42. https://doi.org/10.1177/0969776408098931

23. Pavlínek, P. (2020). Restructuring and internationalization of the European automotive industry. *Journal of Economic Geography, 20*(2), 509-541. https://doi.org/10.1093/jeg/lby070

24. Pavlínek, P. (2020). Restructuring and internationalization of the European automotive industry. *Journal of Economic Geography, 20*(2), 509-541. https://doi.org/10.1007/s10663-022-09554-9

25. Fana, M., & Villani, D. (2021). The automotive supply chain in Europe: An input-output analysis of value added and employment composition. *JRC Working Papers Series on Labour, Education, and Technology,* (1), 4-31. Retrieved from https://publications.jrc.ec.europa.eu/repository/handle/JRC123473

26. Saxunova, D., Novackova, D., & Bajzikova, L. (2018). Focus on the automotive industry in the context of a globalization process in Slovakia. *Journal of Eastern Europe Research in Business and Economics*. https://doi.org/10.5171/2018.435685.