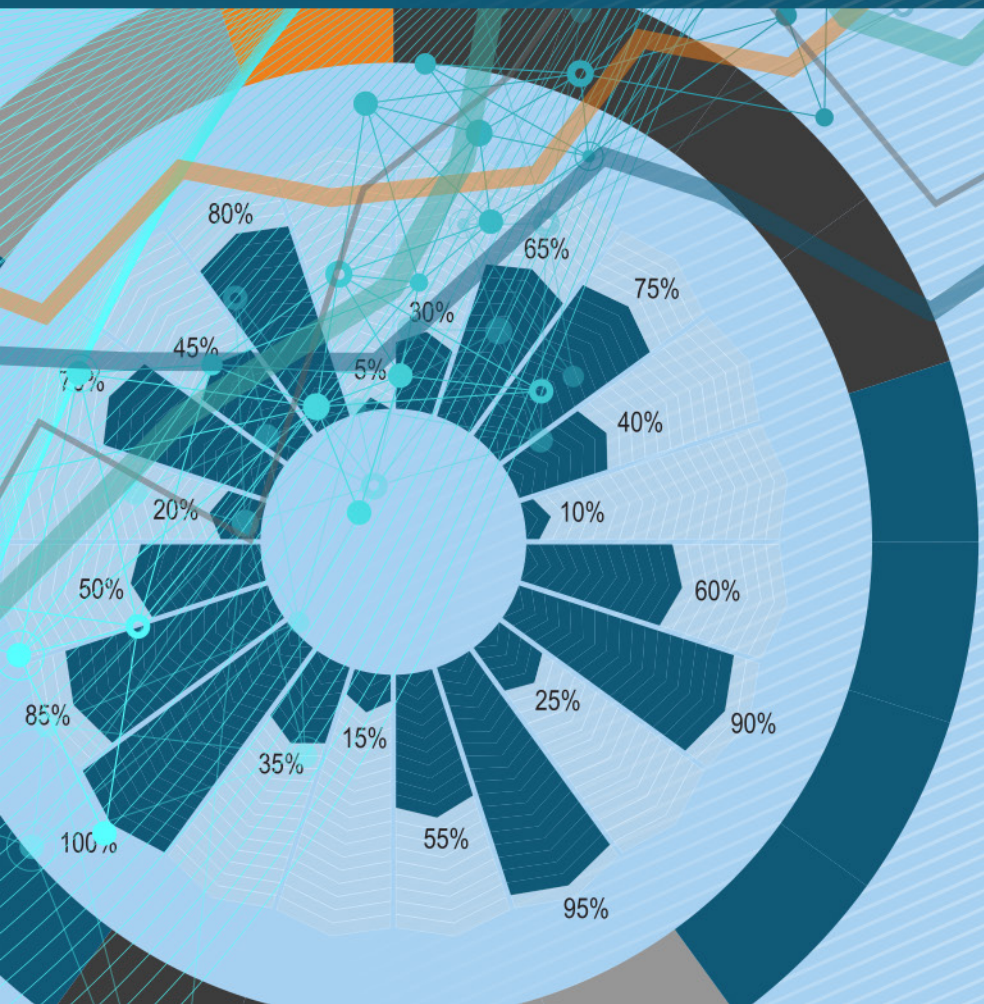
ISSN 2782-1927

JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS

JRAIC.COM



Vol. 7 (01) 2026

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.

ISSN	2782-1927
Regulator:	Registered by the Federal Service for Supervision in the Sphere of Telecom, Information Technologies and Mass Communication (ROSKOMNADZOR). Date of registration: 31.12.2020. Registration certificate ЭЛ № ФС 77 - 80072
Publication Frequency:	4 issues per year
Language:	English
Founder and Publisher:	Yaroslavl State Technical University, 150023, Russia, Yaroslavl, Moskovsky prospect, 88
Website:	http://www.jraic.com
Postal address:	150023, Russia, Yaroslavl, Moskovsky prospect, 88
E-mail:	jraic.ystu@gmail.com
Phone:	+7 (4852) 44-02-11
Date of issue:	28.03.2026

The journal is included in the list of leading Russian peer-reviewed scientific journals of the Higher Attestation Commission (VAK) and in the «White List» of academic journals

Contents

DEFINING COMPETITIVENESS

World-systems theory as a paradigm for explanation of uneven structure of global and national economic development 4
Dmitry V. Didenko

The comprehensive analysis of digitalisation indices and cross-cutting digital technologies metrics for assessing the digitalisation of the economy 14
Elena E. Irodova, Alexey M. Sokolov

NATIONAL COMPETITIVENESS

Theory and practice of preventive socio-economic policy: experience of the Republic of Tajikistan 29
Lutfullo K. Saidmurodzoda

Tax security in the economic resilience system of the Republic of Tajikistan: theory, methodology, and practice 41
Olimjon M. Alizoda

Factors of industrial growth in the Republic of Kazakhstan: investments, innovations, and modernisation 49
Zhanna R. Ashimova, Zhanay Z. Abitov, Diana Z. Abitova, Amina M. Uristembek

'Besides' view on the strategic plans for the socio-economic development of the Russian Federation in terms of the international competitiveness 65
Alexey V. Tebekin

REGIONS COMPETITIVENESS

The development of creative clusters in the Russian regions 79
Alla B. Berendeeva, Maria A. Sukhanova

OPEN DISCUSSION

The unmanned aerial vehicle technologies and artificial intelligence as the most important factors in ensuring the Russian economy competitiveness and implementing a strategy of technological leadership 93
Alexander A. Kiselev, Roman V. Kolesov

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

Dmitry V. Didenko

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.

Keywords: world trade; national states; empires and periphery; the Great Divergence; Marxism; dependency theory; modernisation theory

JEL codes: B24, B25, F20, F10, N40, P10

DOI: 10.52957/2782-1927-2025-7-1-4-13

For citation: Dmitry V. Didenko (2026). World-systems theory as a paradigm for explanation of uneven structure of global and national economic development. *Journal of regional and international competitiveness*, 7(1), 4.

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 [22], 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 [29, 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 [8, p. 23-25; 3, 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 [3, 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 [3, 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 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 [9]. 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

1 The concept of "Long durée" coined by Braudel (1973 [5]; 1992 [6]) 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 [18].

3 In national accounting this may be operationalised as entrepreneurial income.

4 As 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" [18, p. 37-38]. This view does not presume any specific own interest on the part of a state.

5 In terms of new institutional economics, empires tend to have more transaction costs per capita than smaller states caused by larger

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 [29, p. 15-16; 28, 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 [16, p. 64, 462] having been prepared with the market integration in the previous centuries [8]. 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 [9].

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 [3, p. 250].

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

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 [3, p. 38].

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

10 See, e.g., Kotilaine, 2005 [15, p. 93-95].

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 [3, 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 [20] 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 [20] 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 [20, 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 [3, p. 88; 6, p. 242-248]. Historically, these were a Genoese cycle, from the fifteenth to the early seventeenth centuries; a Dutch 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 [3, p. 6-7, 341].

11 See e.g. Lightfoot, 2003 [17].

12 As Arrighi [3, 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.

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 [3, 5-7, 219-220].

Wallerstein [29, p. 301-325] and Braudel [6, 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 [15] 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 [15, 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 [14; 23, p. 11-53][16]. In the process of territorial expansion, the fertile black soil region was brought under cultivation in the 18th century [7, 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 [13, 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 export; while imports of machinery were on the rise, as well as agricultural products [27, 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 [19, p. 14]. In the 1960s when

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) [29, p. XXV].

16 The concept was coined in the late 19th – early 20th centuries by F.J. Turner [26, 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.

trade openness returned to the level of 1920s, the main trading partners became the socialist countries from the COMECON[19] [19, 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% [25, 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 [21] 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 [29] 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 [29, p. 15-16; 28, p. 28-29]. Amin [1, 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.

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.

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.

20 This presumption originates from Prebisch [21, 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.

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

An explanation of these stylised facts employing WST is proposed in Grinin and Korotayev [12]. 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 [12, 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 [12, 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 [12, 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 [12, 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 [(10; 4]. 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

The article was written on the basis of the RANEPA state assignment research programme.

The author of the article borrows his material from the collective monograph: Van Leeuwen B., Didenko D., Calabrese M., Wang M. Innovation and Economic Development in Eurasia, 500 BCE–Present: The Roots of Divergence. Cham: Springer, 2025. Ch. 4 The Change towards Modern Growth: Proximate Causes. The author thanks Bas van Leeuwen, Matteo Calabrese, Meimei Wang for the original ideas and productive discussions. The author of the article bears fully responsible for the final research decisions and their possible shortcomings.

CONFLICT OF INTEREST

The author declares no conflict of interest.

References

1. Amin, S. (1976). *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). T*he Long Twentieth Century. Money, Power, and the Origins of Our Times*. 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). Capitalism and Material Life, 1400–1800*. New York: Harpercollins Publisher.

6. *Braudel, F. (1992). Civilization and capitalism. 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. *Journal of Economic History*, 84(4), 1-32. Retrieved from 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). *Manifesto of the Communist Party*. Moscow: Izdatelstvo "Progress".

19. MVT (1967). Ministry of Foreign Trade of the USSR. *Vneshniaia torgovlia SSSR: Statisticheskii sbornik, 1918–1966*. Moscow: Mezhdunarodnye otnosheniia (in Russian).

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. Russian Economic Development over Three Centuries: New Data and Inferences*. Singapore: Palgrave Macmillan.

25. *TsSU SSSR*. (1989). Moscow: Finansy i Statistika (in Russian).

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

27. Uegaki, A. (2019). *Foreign Trade. Russian Economic Development over Three Centuries: New Data and Inferences*. Singapore: Palgrave Macmillan.

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

29. Wallerstein, I. (2011). *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.

Received 09.09.2025
Revised 01.10.2025
Accepted 11.01.2026

The comprehensive analysis of digitalisation indices and cross-cutting digital technologies metrics for assessing the digitalisation of the economy

Elena E. Irodova

Doctor of Economics, Professor
Ivanovo State University, Ivanovo, Russian Federation
E-mail: irodovaee@ivanovo.ac.ru

Alexey M. Sokolov

Postgraduate student
Ivanovo State University, Ivanovo, Russian Federation
E-mail: hi-sokol-on@mail.ru

ORIGINAL ARTICLE

Abstract. The article examines the comparative analytical validity of two approaches to assess the digitalisation of the economy in terms of the international composite indices of digital development and metrics based on the level of dissemination of cross-cutting digital technologies. Nowadays, index systems, including DESI, NRI, EGDI, and IDI mainly consider the infrastructural, institutional, and social conditions of digital transformation. However, there are some limitations of their implementation in the real sector of the economy. It ensures the relevance of the research. Therefore, the purpose of the research is to compare the effectiveness of index- and technology-based approaches to digitalisation of the economy. The methodological basis of the research includes systematic, comparative, criterion, and index analysis. To unify international index systems, we used the author's method of unified composite digitalisation index (UCDI) based on the aggregation of DESI, NRI, EGDI, and IDI indicators. To assess the technological issue of digitalisation, we use the comprehensive analysis of cross-cutting digital technologies. It resulted in the comparable analytical model including artificial intelligence, quantum technologies, robotics, additive manufacturing, DLT, 5G/6G, and AR/VR. According to the research, unified composite digitalisation index (UCDI) reflects institutional and infrastructural maturity more efficiently. Indeed, cross-cutting digital technologies-based approach identifies differences in technological specialisation and digital transformation of the economies. For instance, China demonstrates a higher position in terms of cross-cutting digital technologies parameters compared to a number of countries leading in traditional digital indexes. At the same time, there is a gap between the level of the digital environment and the level of technological implementation in Russia. Hence, cross-cutting digital technologies metrics have a higher analytical sensitivity in assessing the technological component of digitalisation of the economy. Therefore, those promising in terms of the scientific research and strategic planning.

Keywords: digitalisation of the economy; cross-cutting digital technologies; composite indexes; unified composite index of digitalisation; digital transformation

JEL codes: O33, C43

DOI: 10.52957/2782-1927-2026-7-1-14-28

For citation: Elena E. Irodova & Alexey M. Sokolov. (2026). The comprehensive analysis of digitalisation indices and cross-cutting digital technologies metrics for assessing the digitalisation of the economy. *Journal of regional and international competitiveness*, 7(1), 14.

Introduction

The digital platforms, artificial intelligence, big data, the industrial Internet of Things, robotics, and other cross-cutting digital technologies (CCDT) form qualitatively new architecture of economic development. It includes traditional factors complemented by technological intensity, information processing speed, and economic systems ability to adapt rapidly.

Therefore, importance of methodically correct assessment of digitalisation of the economy is increasing. However, international digital development indexes, including DESI, NRI, EGDI, and IDI are primarily focused on measuring the infrastructural, institutional, and social prerequisites for digital transformation.

Despite their high analytical value, they reflect to a limited extent the depth of implementation of advanced digital solutions in the real sector and the actual level of technological transformation of the economy.

It forms a methodological gap between assessing the conditions of digitalisation and estimating the results. In this regard, there is a need to develop a comprehensive analytical approach that combines the advantages of composite indexes and a system of metrics based on the level of CCDT distribution. This approach allows us to assess both digital and technological maturity of the economy and intensity the introduction of digital solutions.

The scientific problem of the research is an insufficient ability of existing digitalisation indices to identify real differences between countries in terms of the level of technological implementation, the structure of digital transformation, and the degree of economic involvement in the new technological order. In this regard, comparative analysis of traditional digitalisation indices by CCDT was implemented to form a valid model for economy digitalisation assessment.

The object of the research is approaches to economy digitalisation assessment based on composite indices of digital development and CCDT. The subject of the study is the effectiveness of composite digitalisation indexes and CCDT metrics.

The purpose of the study is to consider the analytical effectiveness of index-based and CCDT-based approaches to assess economy digitalisation based on CCDT combined analysis and the author's method of a single composite index of digitalisation.

Within the framework of achieving the research goal, the following tasks were considered:

- to analyse CCDT as a relevant basis for assessing the technological aspect of digitalisation of the economy;
- to develop and apply a method of CCDT combined analysis to introduce CCDT metrics into a comparable analytical model;
- to study the structure, methodological features, and analytical capabilities of current international composite digitalisation indexes;
- to develop and apply the author's method of unified composite digitalisation index (UCDI) for the unification and comparison of global index systems;
- to conduct a comprehensive comparative analysis of CCDT and UCDI;
- to identify the comparative advantages, limitations, and analytical effectiveness of the studied approaches to assess the digitalisation of the economy.

The application of systematic, comparative, structural-functional, criterion, correlation, and index approaches ensure the methodological basis of the research. It allows us to compare the analytical viability of various methodologies for economy digitalisation assessment in terms of infrastructural, institutional, and technological parameters of digital transformation.

The key element of the research is comprehensive CCDT metrics analysis included heterogeneous indicators of analytical framework. Its methodological structure is based on three levels of assessment: conditions, implementation, and results. It consistently records the presence of a basic digital environment, the degree of actual technological implementation, and its final economic impact. This approach provides an opportunity to assess economy digital readiness and its technological transformation.

The second methodological research tool is the author's method of the Unified Composite Digitalisation Index (UCDI) to unify and compare international index systems. It allows us to unify heterogeneous composite indexes of digital development to a single measurement scale through normalisation, subsequent aggregation, and calculation of the average integral indicator. It provides a comparable basis for analysing the digitalisation of the economy in infrastructural, institutional, and social conditions.

To verify an analytical validity of the studied approaches, comparative and correlation analysis were used. They compare CCDT and UCDI, assess their relationship with the key macroeconomic results of digital transformation. All named above identify differences in the structure of data obtained and determine the methods to assess the aspects of technological and economic digitalisation.

Main part

Analysis of CCDT effectiveness

CCDT includes neurotechnology and artificial intelligence (AI) systems, quantum technologies, advanced manufacturing technologies (3D printing, additive technologies), robotics and sensor systems, distributed ledger technologies (DLT, blockchain), new generation wireless communication technologies (5G/6G), augmented and virtual reality (AR/VR). Their effectiveness analysis requires a comparable framework of indicators to assess the technological base, institutional, and social conditions.

The methodological structure of CCDT approach involves the three levels of analysis:

Level 1 (assessment of conditions): the fundamental conditions of digital development are fixed, including the communication infrastructure, the availability of digital services, the level of digital competencies, the maturity of government regulation, and the overall degree of network readiness. The level correlates with existing international indexes such as DESI, NRI, EGDI, or IDI, and largely reproduces their logic. However, it is a basic factor of CCDT in the economy impossible[1] [1].

Level 2 (implementation assessment): the technological core of digital transformation includes an assessment and implementation of CCDT in key industries. Mainly, it focuses on assessment of technological solutions integration degree: industrial implementation of AI, robotisation of production processes, industrial Internet of Things penetration, digital twins use, the intensity of big data use, the prevalence of cloud-based infrastructure and other components of CCDT. This level of methodology allows ones to assess real implementation of technologies in the new technological order [7; 13].

Level 3 (assessment of results): reflects the overall effectiveness of digital transformation and focuses on evaluation of economic, structural, and social effects of CCDT. It provides an assessment of real changes in the economy and society. The key indicators are the growth of labour productivity, the contribution of the digital sector to GDP, the expansion of high-tech exports, increased innovation activity, the transformation of employment structure and quality of life. This level determines the actual impact of digitalisation, including its impact on economic growth, competitiveness, and structural modernisation. However, the effect of digital transformation is non-linear and depends on the institutional environment, the industry structure, and the level of human capital development. The third level verifies the effectiveness of digitalisation, assesses technological implementations transformed into measurable socio-economic results[2] [5; 11].

The proposed structure forms a methodologically holistic approach to assess the digitalisation of the economy. It also combines a traditional macroeconomic and institutional framework with technologies. Its main advantage is ability to reflect the real processes of digital transformation. Unlike classical indexes focused on the availability of technology and the maturity of government digital policy, the presented methodology for CCDT metrics analysis captures technological practices in the economy, measures the degree of their industrial and sectoral penetration, and provides more accurate technological forecasts. Moreover, the methodology has a high analytical sensitivity to identify technological gaps in specific industries. It makes it particularly relevant in research on technological development and in the strategic planning system. The presented framework is a CCDT combined analysis: first – to verify the availability of basic conditions; second – the actual use of technologies; third – contribution to economic development. The scientific literature emphasizes the value of multi-level assessments. For instance, the National Research Centre of Russia considers indices of 'readiness', 'use' and 'impact' of technologies. Indeed, it similar to the presented research model[3] [8; 12].

However, this approach has significant limitations. Firstly, CCDI monitoring requires industry statistics [7; 11]. Moreover, CCDT indicators are not standardised and are not included in international databases.

[1] *Skolkovo Institute of Science and Technology. (2019). Methodology for calculating the "Digital Russia" index of the subjects of the Russian Federation. 2018. Source: https://finance.skolkovo.ru/downloads/documents/FinChair/Research_Reports/SKOLKOVO_Digital_Russia_Methodology_2019-04_ru.pdf (accessed on 04.03.2026).*

[2] *OECD. (2019). Measuring the Digital Transformation: A Roadmap for the Future. Paris: OECD Publishing. DOI: 10.1787/9789264311992-en*

[3] *Institute of Information Society Development. (2023). The index of readiness of priority sectors of the economy of the Russian Federation for the introduction of artificial intelligence Analiticheskiy otchet. Source: https://iis.ru/2024/03/28/aireadinessindex2023 (accessed on 01.03.2026).*

Therefore, it difficult to compare countries. CCDT development has a high dynamic, and technological cycles of updating occur faster than official statistics occurs. It ensures a discrepancy between the actual changes and the available data, forming time lags and distorting current estimates. A significant methodological challenge is the separation of technological maturity from the fundamental conditions of digitalisation. As in some cases, infrastructural security can show a low depth of technological implementation, and relatively weak institutional conditions. On the contrary, it can correlate with individual technological breakthroughs. The high heterogeneity of CCDT is an equally significant limitation in various economic sectors. The introduction of AI, robotics, and quantum technologies in industry, transportation, the financial sector, or the public administration system requires special nonstandard indicators. This limits a formation of aggregated unified international digitalisation CCDT based index and implies the combination of macroeconomic, industry and technological metrics [2; 4; 9; 14].

Table 1 shows a comparison of the level of leading countries' economies and China and Russia economies in terms of 7 basic CCDT, 2022-2024. Indeed, this demonstrates fundamentally different technological profiles that are not revealed existing composite digital development indices.

Indeed, the leading countries of the EU and the USA have higher degree of AI and big data analysis implementations in the business sector: the share of organisations using AI is on average 35-50%. China demonstrates higher values of 40-55% in a number of industries. It correlates with large-scale government and corporate investments in algorithmic solutions, industrial AI, and intelligent platforms. In Russia, this indicator does not exceed 10-15%. It indicates an early stage of AI technologies in the real sector of the economy[4,5,6].

Quantum technologies are of special interest. According to the cumulative index, including patent activity, government funding, and research centres, the leading countries are estimated at 80-90%, and China – 90-100%. Russia, despite the general technological lag in most CCDT, demonstrates a comparatively higher position in this area of 60-65 points. It indicates the preservation of scientific groundwork with limited commercialisation of results[7].

Additive manufacturing technologies are also differentiated. In the leading countries, the share of enterprises using 3D printing in production reaches 20-25%; in China 25-30%, primarily in the mechanical engineering, aerospace, and defence-industrial complexes. In Russia, additive technologies are used in 3-5% of enterprises. It shows a low degree of their technological integration into industry[8].

The most contrasting differences are in robotics and sensor systems. The density of industrial robots in the leading countries of the EU and the USA is 280-350 units per 10,000 people employed in the manufacturing industry; in China – 320-400 units. In Russia, the density of robotics is 20-30 units. These differences are hard to be reflected by aggregated digital indexes. Indeed, they are of key importance for assessing industrial digitalisation[9,10].

The leading countries and China demonstrate moderate growth in the distributed registries and blockchain technologies. The share of organisations using DLT solutions is 10-15% and 15-20%, respectively,

[4] *OECD. (2026). AI use by individuals surges across the OECD as adoption by firms continues to expand. Retrieved from https://www.oecd.org/en/about/news/announcements/2026/01/ai-use-by-individuals-surges-across-the-oecd-as-adoption-by-firms-continues-to-expand.html (accessed: 15.02.2026).*

[5] *OECD. (2025). The Adoption of Artificial Intelligence in Firms. Paris: OECD Publishing. Source: https://www.oecd.org/en/publications/the-adoption-of-artificial-intelligence-in-firms_f9ef33c3-en.html (accessed on 04.02.2026).*

[6] *Stanford Institute for Human-Centered Artificial Intelligence. (2025). AI Index Report 2025. Source: https://hai.stanford.edu/ai-index/2025-ai-index-report (accessed on 12.03.2026).*

[7] *World Economic Forum. (2022). Quantum Technologies: Transforming the Future of Science and Industry. Geneva: Press Release. Source: https://www.weforum.org/reports/quantum-technologies/ (accessed on 17.03.2026).*

[8] *Wohlers Associates. (2024). Wohlers Report 2024: Additive Manufacturing and 3D Printing State of the Industry. Fort Collins. Source: https://wohlersassociates.com/product/wr2024/ (accessed on 02.03.2026).*

[9] *International Federation of Robotics. (2024). World Robotics Report 2024. Source: https://ifr.org/worldrobotics (accessed on 03.09.2026).*

[10] *Reuters. (2024). China overtakes Germany in industrial use of robots, says report. Source: https://www.reuters.com/technology/china-overtakes-germany-industrial-use-robots-says-report-2024-11-20/ (accessed on 22.02.2026).*

with a concentration in the financial sector, logistics, and cross-border operations. In Russia, this indicator is 5-7%. It reflects both institutional constraints and the limited scale of corporate implementations[11].

Next-generation wireless communication technologies (5G/6G) are one of the key points of divergence between CCDT approach and composite indexes. In the leading countries, the industrial use of 5G covers 20-30% of large enterprises; in China – 30-40%, including the use of private networks on industrial sites. In Russia, the industrial use of 5G remains is below 10%. However, there is a relatively high level of telecommunications infrastructure development in the consumer segment[12].

The same is for virtual and augmented reality technologies. In the leading countries, AR/VR is actively used in industry, engineering design, and education, covering 15-20% of organizations; in China – 20-25%. In Russia, these technologies are used by 3-5%. It reflects their fragmented implementation[13].

Table 1 – The leading countries, China and Russia in terms of digitalisation of the economy and 7 main cross-cutting digital technologies

Country / Group of countries	AI share in business, %	Quantum Technologies (index)	Additive technologies, %	Robot density (units/10 thousand)	DLT / blockchain, %	5G/6G industrial use, %	AR/VR, %
Leading countries Asia/EU/USA	35-50	80-90	20-25	280-350	10-15	20-30	15-20
China	40-55	90-100	25-30	320-400	15-20	30-40	20-25
Russia	10-15	60-65	3-5	20-30	5-7	<10	3-5

Source: Authors

Analysis of economic digitalisation effectiveness indices

To compare CCDT metrics and digitalisation indices and assess the level of economy digitalisation, we used the author's method of unified composite digitalisation index (UCDI). It as an aggregated indicator integrating the calculation results of the four most widespread and methodologically recognised international digital development indices: The Digital Economy and Society Index (DESI), the Network Readiness Index (NRI), the E-Government Development Index (EGDI), and the Information and Communication Technology Development Index (IDI). The choice of the presented indices is determined by their methodological features, assessment of consistency, orientation of indicators, high prevalence in scientific research, stability of methodology, regularity of updating the statistical base and coverage of key aspects of digitalisation of the economy and society[14] [3; 7; 10].

The Digital Economy and Society Index (DESI). The index annually assesses the digital productivity and dynamics of the European Union countries in key areas of digital transformation. In 2025, DESI is a dashboard aligned with the Digital Decade KPIs targets and covers five basic dimensions: Connectivity (infrastructure), Human capital (digital skills and personnel), Use of the Internet (broadband Internet access), Business digital integration (digital technology integration in business), and Digital public services. DESI 2025 is presented in Table 2 and uses more than 30 indicators, including the KPIs of the digital decade. It serves as a tool for comparing and monitoring the progress of EU member states. The index assesses both the infrastructural and institutional aspects of digitalisation[15].

[11] *Deloitte. (2023). Global Blockchain Survey 2023. Source: https://www2.deloitte.com (accessed on 05.02.2026).*
[12] *GSMA. (2024). The Mobile Economy 2024. Source: https://www.gsma.com/mobileeconomy (accessed on 10.03.2026).*
[13] *PwC. (2019). Seeing is believing: How VR and AR will transform business and the economy. London: Press Release. Source: https://www.pwc.com/gx/en/industries/technology/publications/economic-impact-of-vr-ar.html (accessed on 02.04.2026).*
[14] *European Commission. (2025). Digital Decade 2025: DESI methodological note. – Brussels: European Commission. Source: https://digital-strategy.ec.europa.eu/en/library/digital-decade-2025-desi-methodological-note (accessed on 07.03.2026).*
[15] *European Commission. (2025). Digital Decade 2025: DESI methodological note. – Brussels: European Commission. Source: https://digital-strategy.ec.europa.eu/en/library/digital-decade-2025-desi-methodological-note (accessed on 07.03.2026).*

Table 2 – Weighted average coefficient of the leading countries, DESI 2025

Rank	Country	Total DESI Score
1	Finland	77.6
2	Denmark	76.5
3	Netherlands	74.0
4	Malta	74.0
5	Sweden	71.9

Source: European Commission, 2025[16]

According to the analysis of leading countries component profiles shows, the main drivers of the overall result in Finland, Denmark, the Netherlands, Malta, and Sweden are as follows:

- high coverage of high-bandwidth fixed and mobile broadband networks (almost total coverage of FTTH/5G-capable networks);
- high level of basic and advanced digital skills;
- widespread adoption of digital business processes (e-commerce, cloud services, automation);
- advanced digital government services (e-ID, online registration, data exchange between departments).

These are confirmed by the DESI sectional breakdown and national reports. More than 77% of Finnish citizens believe that digitalisation makes their lives easier. It increases the willingness of the population to accept electronic services and contributes to the growth of digital public services (socio-behavioural effect).

DESI covers only EU member states (in the expanded version, some neighbouring partners through adapted methods). Therefore, there is no the Russian Federation DESI rating. For comparable international positioning, is necessary to use the ITU ICT Development Index (IDI) and other global indexes (World Bank, OECD, Eurostat, etc.).

Methodological features of DESI:

Limited geography: DESI is focused on the EU; non-EU countries are either not included or can be represented through adapted 'international' versions (I-DESI). It complicates direct interpretation.

Incompleteness and variance of data: there are no recent national data for a number of 2025 indicators; in DESI, those are considered and estimated/extrapolated. It reduces the accuracy of interannual comparisons for individual sub-components.

Consistency with Digital Decade KPIs: In 2025, DESI was revised and aligned with the KPIs of the digital decade; it shows the inclusion of indicators directly related to the EU goals for 2030 (gigabit networks availability, IT specialists share, and the digital intensity of business). The synchronisation enhances the political relevance of the index. However, it complicates direct comparability with previous issues without retrospective normalisation.

The composition of the indicators: DESI focuses on institutional and political institutions of digitalisation (e-government, EU digital goals). Indeed, global indexes consider an access and infrastructure (connectivity, affordability). Consequently, DESI includes 'political and institutional' component of digitalisation.

Relevance and frequency of updates: individual DESI components are reviewed and updated irregularly (some KPIs have publication delays). It is relevant in terms of the index for operational evaluation.

Assessment of DESI's viability. DESI is a methodologically valid tool for screening the level of digital transformation within institutional aspects the EU (digital public services, digital policy, business practices). However, inter-regional and global DESI comparisons require complementarity with methodologically compatible global indicators (ITU IDI) for network access and quality parameters, industry-specific SST indicators (e-health, e-education, digital industry) to assess the sector transformation. To include DESI in CCDT we implement an institutional component of the composite index and the weighting coefficients of EU countries and other economies).

[16] *European Commission. (2025). Digital Decade 2025: DESI methodological note. – Brussels: European Commission. Source: https://digital-strategy.ec.europa.eu/en/library/digital-decade-2025-desi-methodological-note (accessed on 07.03.2026).*

Network Readiness Index (NRI). The index assesses countries 'network readiness' for the use of digital technologies and covers four basic criteria: Technology (the level of digital and technological infrastructure), People (human capital, digital skills and the willingness of the population and businesses to use technology), Governance (quality of regulation, institutional environment, trust and cyber-security) and Impact (economic and social effects of digitalisation). The model includes a multi-level hierarchy of 58 indicators; individual indicators are systematically updated between releases. The NRI is presented in Table 3 and covers about 133 economies. It is a global comparison tool, additionally focusing on the role of digital public-private partnerships (DPPPs)[17].

Table 3 – Weighted average coefficient of the leading countries, NRI 2024

Rank	Country	Total EGDI Score
1	USA	78.96
2	Singapore	76.94
3	Finland	75.76
4	Sweden	74.99
5	South Korea	74.85
…	…	…
17	China	68.70
…	…	…
41	Russia	55.74

Source: Portulans Institute, 2024[18]

The analysis of leading countries component profiles shows the following:

- the high level of technological base development, the quality of the digital infrastructure, the scale of investments in software and cloud solutions, the intensity of scientific activity in AI and robotics;
- advanced digital literacy and an effective education and training system ensuring sustainable reproduction of human capital for the digital economy;
- mature institutional practices, including quality regulation, high level of trust, and advanced digital government services;
- a pronounced economic effect of digitalisation, development of domestic digital services market, and the competitiveness of ICT services exports.

The report highlights the United States, Singapore, and a group of European countries as the most representative profiles. The United States occupies a leading position primarily due to the Technology component. It shows the sustainable advantage in the development of digital infrastructure, software solutions, and technological entrepreneurship. Singapore demonstrates one of the most balanced profiles. Its high result is ensured by a close link between digital business, public administration, and institutional coordination. The stability of the final positions is typical for European countries, due to consistent digitalisation policies, high predictability of regulation, and consistency of infrastructural and social components.

China has a high technological advantage with less strong institutional parameters. The country strongest positions are in the Access area. It is estimated as 91.77. Moreover, it shows the extremely high level of digital infrastructure coverage, including FTTH development, network bandwidth, and international Internet traffic. Additionally, China ranks 1st in the AI scientific publications indicator, and 3rd in the Robot density indicator. It shows high intensity of scientific and technological development and industrial implementation of advanced solutions. At the same time, according to the second-order Governance indicator, China ranks 88th with a score of 62.11. It shows a relatively weaker position in ICT regulation, data protection, and institutional

[17] *Portulans Institute. (2024). Network Readiness Index 2024. Washington: Press Release. Source: https://networkreadinessindex.org/nri-2024-edition-press-release/ (accessed on 17.02.2026).*

[18] *Portulans Institute. (2024). Network Readiness Index 2024. Washington: Press Release. Source: https://networkreadinessindex.org/nri-2024-edition-press-release/ (accessed on 17.02.2026).*

trust. Therefore, the Chinese profile of NRI reflects the advanced development of the technological circuit in the presence of restrictions from the regulatory environment.

The Russian Federation NRI profile 2024 is a combination of relatively strong infrastructural parameters and weaker positions in technologically promising areas. The highest results are Access (30th place; 76.47) and Inclusion (40th place; 73.47). It shows a high level of digital accessibility and engagement. According to the People index, Russia has a relatively stable position (22nd place; 54.58). It shows an acceptable level of human capital in terms of country network readiness. However, there is a lag in Future technologies – Russia ranks only 104th with an estimate of 24.23. It shows a weak investment and technological base in terms of promising digital solutions. There is an internal imbalance in the Governance component: at relatively high values of digital trust, Regulatory indicators are low (112th place; 52.66). It limits the institutional effectiveness of digital transformation. Methodological features of NRI:

Variability of indicators: Indicator replacements/corrections occur between NRI releases (several replacements and adjustments were recorded in 2024). It complicates long-term dynamics without initial structural post-calibration.

Aggregation of different types of measurements: NRI combines technological, institutional, and socio-economic indicators; direct aggregation eliminates important industry signals. For instance, breakthrough CCDT in certain sectors are not presented in the overall index).

Different relevance of indicators for countries with different economic structures: the weight of individual subgroups (for example, Future technologies versus Access) correlate differently with the national economic structure. It requires adaptive weighting.

Sensitivity to institutional policies and shocks: the index shows political and institutional decisions (regulation, trust). Therefore, it can respond quickly to regulatory changes, but slowly to real technological shifts in industries.

Assessment of NRI viability. NRI is a global network readiness indicator with the advantage of a wide geographic sample and a multidimensional model. To assess CCDT effectiveness, we should: apply NRI as a macro-institutional, systemic component of a composite metric (reflecting the ecosystem's readiness to implement DDCT); combine it with sectoral indicators (industry level: e-health, e-education, level of industrial digitalisation, etc.); compensate the loss of detail in the aggregate index; retrospectively monitor changes in the composition of NRI indicators; normalise/post-calibrate time series; consider JRC methodology audit (external verification) to interpret the results and make policy conclusions.

The e-Government Development Index (EGDI). The index assesses development of e-government and the ability of government institutions to use digital technologies to provide public services to citizens and businesses. The EGDI is developed by the United Nations Department of Economic and Social Affairs (UN DESA) and is a part of the regular UN E-Government Survey report. In 2024, the EGDI considers 193 UN member states and is used as a global tool for comparing the maturity of digital governance. In the current methodological version, the index aggregates three basic components: the Online Service Index (the level of development and maturity of electronic public services), the Telecommunication Infrastructure Index (the state and accessibility of telecommunications infrastructure), and the Human Capital Index (human capital, including the level of education and digital literacy). The EGDI assesses institutional and infrastructural aspects of public administration digitalisation.

According to the E-Government Survey 2024 (Table 4) the global average EGDI value is 0.64; China ranks 35th place with a score of 0.8718; the Russian Federation ranks 43rd with a score of 0.8533[19].

Table 4 – Weighted average coefficient of the leading countries, EGDI 2024

Rank	Country	Total EGDI Score
1	Denmark	0.9847
2	Estonia	0.9727
3	Singapore	0.9691

[19] *United Nations Department of Economic and Social Affairs. (2024). United Nations E-Government Survey 2024: Accelerating*

Rank	Country	Total EGDI Score
4	South Korea	0.9679
5	Iceland	0.9671
…	…	…
35	China	0.8718
…	…	…
43	Russia	0.8533

Source: United Nations Department of Economic and Social Affairs, 2024[20]

The analysis of component profiles shows the key factors of EGDI overall result for the leading countries. They are as follows:

- high level of maturity of digital government services, including CCDT (birth-to-business, life events), active services and interagency data exchange (OSI);
- fixed and mobile broadband, high network bandwidth, and availability of next-generation mobile Internet (TII);
- a high level of digital and general skills of the population, provided by a well-developed education and continuous training (HCI) system.

The leading countries have well-developed infrastructure and human capital. They enhance the benefits of digital public services directly reflected in the values of OSI. For example, in Denmark and Finland, the share of users of electronic government services exceeds 90%; the digital channels are dominant in the interaction of citizens and businesses with the government. It ensures their stable position in the top of the EGDI rating.

China has a high component asymmetry. The country is demonstrating high TII values due to the large-scale deployment of fiber-optic networks and mobile infrastructure, significant progress in the digitalisation of basic public services. At the same time, the relative lag in HCI and institutional aspects of digital governance limits the final position in the ranking. It indicates structural imbalances between technological access and the quality of electronic services.

The Russian Federation has high EGDI values, formed due to the developed segment of public services (Gosuslugi portal, digital registries, electronic payments. It shows the growth of OSI's competitive performance in recent years (2022 – 0,8319; 2024 – 0,8533). However, the limitations are the heterogeneity of the telecommunications infrastructure by region and restrained dynamics of HCI. It reduces the scaling effect of digital services. Therefore, the Russian EGDI profile indicates the advanced development of the applied level of the digital state in the presence of structural constraints from the infrastructural and personnel components [3].

Methodological limitations of EGDI:

Institutional focus: EGDI has the institutional level of digital government (services, policy, infrastructure), but does not fully cover the depth of the digital transformation of the economy (sectoral aspects, private sector ICT).

Data time lags: the methodology is revised every few editions. It complicates comparison of cycles (changes in OSI sub-components, revision of HCI and TII).

Aggregation of components: the EGDI indicator is aggregated; countries with the same EGDI may have very different quality of one of the components (for example, strong infrastructure, but weak 'electronic engagement' of citizens).

Digital Transformation for Sustainable Development. New York: United Nations. Source: https://desapublications.un.org/publications/united-nations-e-government-survey-2024 (accessed on 12.02.2026).

[20] *United Nations Department of Economic and Social Affairs. (2024). United Nations E-Government Survey 2024: Accelerating Digital Transformation for Sustainable Development. New York: United Nations. Source: https://desapublications.un.org/publications/united-nations-e-government-survey-2024 (accessed on 12.02.2026).*

Assessment of EGDI viability. EGDI can serve as an institutional and infrastructural foundation for analysing digitalisation in terms of CCDT. Therefore, combining EGDI with indicators shows innovation maturity (for example, AI, digitalisation of industries) as part of CCDT metrics. The use of EGDI in terms of the component values (OSI, TII, HCI) and the updated methodology of 2024, allows ones to adjust the index weight in the composite ranking of CCDI assessments depending on the region and country profile. The EGDI is a reliable tool for assessing the progress of digitalisation of the public sector and can be used as a component of IT infrastructure assessment within the framework of integrated indices of economy digitalisation. For a comprehensive assessment, we integrate EGDI with DESI and ITU IDI to cover both institutional, infrastructural, and industry-specific aspects of digitalisation.

Information and Communication Technology Development Index (IDI). The index provides a comprehensive assessment of the level of development and dissemination of information and communication technologies in national economies. It is developed by the International Telecommunication Union (ITU) as a tool for international comparison of countries digital development. The structure of the index includes three basic dimensions: Access (access to ICT infrastructure and communication services), Use (intensity and scale of ICT use by the population and organisations), and Skills (human capital and educational prerequisites for digitalisation). The index covers more than 170 countries and is used to monitor the digital divide, assess the dynamics of ICT development, and compare infrastructural and socio-human aspects of economy digitalisation. A sample of statistical data from the ITU 2025 study is presented in Table 5[21].

Table 5 – Weighted average coefficient of the leading countries, ITU 2025

Rank	Country	Total DESI Score
1	Saudi Arabia	99.2
2	Finland	98.7
3	Estonia	98.5
4	Kuwait	98.4
5	Qatar	98.4
…	…	…
37	Russia	92.3
…	…	…
43	Russia	0.8533

Source: International Telecommunication Union, 2025[22]

According to the analysis of leading countries component profiles, the main drivers of the overall result are as follows:

- a total coverage of fixed and mobile broadband networks (FTTH, LTE/5G), high bandwidth and availability of international Internet traffic;
- intensive use of ICT by the population and businesses, high levels of Internet activity, mobile broadband traffic, and digital services;
- a high level of human capital, secondary and higher education enrolment, digital and cognitive skills.

The leading countries access ICT infrastructure and communication services is 40-45%. It confirms the critical role of telecommunications infrastructure as the foundation of digitalisation.

China demonstrates high Access rates; the country is the world leader in the number of mobile broadband Internet connections and the scale of fiber-optic infrastructure (90%). It shows the extensive nature of ICT infrastructure and economies the development. At the same time, China's position is weaker in terms of Use and especially Skills. It shows a structural imbalance between technological coverage and the

[21] *International Telecommunication Union. (2025). Measuring Digital Development: ICT Development Index 2025. Source: https://www.itu.int/itu-d/reports/statistics/idi2025 (accessed on 12.03.2026).*

[22] *International Telecommunication Union. (2025). Measuring Digital Development: ICT Development Index 2025. Source: https://www.itu.int/itu-d/reports/statistics/idi2025 (accessed on 12.03.2026).*

quality of human capital.

According to ITU IDI 2025, Russia shows strong performance in the Access component (mobile and fixed-line coverage exceeds 95% for the urban population), moderate performance in Use (about 70% of the adult population actively uses the Internet and online services), and the Skills component is limited by the low prevalence of advanced digital competencies and insufficient population digital training. Therefore, Russia has a high level of ICT development, but is inferior to the leading countries in terms of usage and skills.

Methodological features

Focus on the basic digital infrastructure: the IDI, being developed by ITU, is focused on measuring the level of ICT development and captures primarily access, use, and skills. It ensures high comparability, but limits institutional and sectoral aspects of economy digital transformation.

Structure and aggregation of indicators: the index aggregates three blocks (access, use, skills); they consider the proxy indicators (educational coverage, literacy). It reduces the accuracy of assessing real digital competencies and their compliance with the requirements of the digital economy.

Limited relevance for leading countries: the index loses its discriminating ability between economies with advanced digital ecosystems. It requires its use in combination with more institutionally and technologically sensitive indexes.

Assessment of IDI viability. IDI is a reliable tool for global assessment of economy digitalisation in terms of comparing infrastructure, digital usage, and skills of the population. To integrate IDI with CCDI it is necessary to use IDI as a basic component of the global digitalisation index, complementing DESI for the analysis of institutional and managerial aspects. The combined use of IDI and DESI provides a complete understanding of the digital development of countries with different economic, political, and institutional characteristics.

Table 6 shows the results of the comprehensive analysis.

Table 6 – A brief description of the indices for economy digitalisation assessment

Index	Structure	Direction	Limitations
DESI EU	Connectivity; Human Capital; Use of Internet; Business Digital Integration; Digital Public Services	Infrastructural, Institutional, Social	Focus only on EU countries; low sensitivity to breakthrough technologies (quantum technologies, AR/VR, DLT); Relevance and frequency of updates
NRI Global (134 countries)	Technology; People; Governance; Impact	Technological, Institutional, Socio-economic	Variability of the set of indicators, Aggregation of different types of measurements, Sensitivity to institutional policies and shocks
EGDI Global (UN)	Online Services; Telecom Infrastructure; Human Capital	Service, Infrastructural, Institutional and managerial	Institutional direction, Time lags of data, Aggregation of components

Index	Structure	Direction	Limitations
IDI Global (ITU)	Access; Use; Skills	Technological, Infrastructural	Focus on basic digital infrastructure; structure and aggregation of indicators; limited relevance for leading countries

Source: Authors

A method for comparing the consistency of approaches to assess economy digitalisation

A comparison of the consistency of approaches to assess economy digitalisation is shown in Figure 1. Methodically, UCDI was formed by normalising the final values of each of the four indices to a single scale from 0 to 100, followed by averaging. To ensure comparability, linear normalisation was used for the maximum and minimum of the sample of countries included in the analysis. The final ECIC value was calculated as an unweighted average of the normalised DESI, NRI, EGDI, and IDI indicators. It allows us to avoid subjectively overestimating the significance of individual components and maintain the neutral aggregating nature of the index.

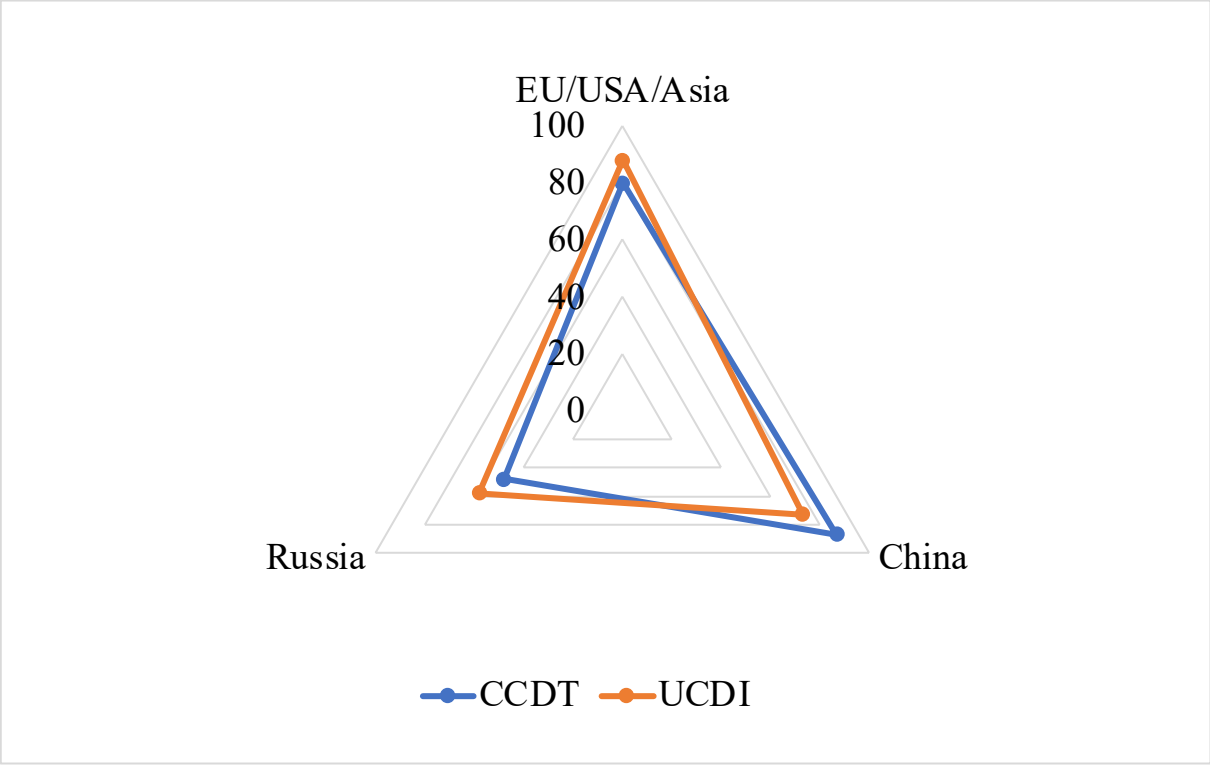


Figure 1. A method for comparing the consistency of approaches to assess economy digitalisation
Source: Authors

UCDI data shows a neutralised condition of digitalisation. The gap between the leading countries and China in terms of UCDI is 15-20 percentage points, despite fundamental differences in technological specialisation. Russia ranks relatively low. It is interpreted as a general low level of digital development.

CCDT index forms a differentiated picture. In terms of CCDT, China is 5-10 percentage points ahead of most of the leading countries in the EU and the USA due to the high density of robotics, the scale of AI adoption, and the industrial use of 5G. At the same time, the lower positions of UCDI are due to technological rather than institutional and social components dominant in CCDT approach.

Russia demonstrates a structural gap between the digital environment and technological digitalisation. The single composite index records a lag of 25-30 percentage points; CCDT assessment shows a qualitative difference: the values of indicators are 5-10 times lower than those of the leading countries; for robotics

and 5G – 10-15 times lower. Therefore, Russia's digitalisation is primarily service-infrastructural rather than technologically-productive.

The second method of comparing the consistency of approaches to assess economy digitalisation is to analyse the correlation of the obtained indicators with key macroeconomic results. The correlation analysis allows us to assess the degree of connection with digital transformation economic effects. Within the framework of the research, labour productivity, measured by GDP per employee, the share of high-tech and knowledge-intensive industries in gross value added, the volume of exports of high-tech products, the growth rate of the manufacturing industry was used as effective indicators. For comparability of calculations, averaged data for 2024 were used. It which made it possible to minimise cyclical fluctuations and identify stable dependencies.

According to the results of the correlation analysis, UCDI has a moderate relationship with economic results. The correlation coefficients between the values of the UCDI and labour productivity indicators for a sample of countries, including technological leaders, China and Russia, are in the range of 0.40-0.55. Similar values were obtained when comparing the share of high-tech value added and exports of high-tech products. Therefore, traditional indexes are more appropriate in terms of assessment the digital environment and institutional conditions.

CCDT aggregated significantly higher correlate with economic results. The correlation coefficient between CCDT the CT index and labour productivity exceeds 0.70; in some samples it is 0.75-0.78. A comparison with the share of high-tech industries in gross value added shows a correlation at the level of 0.72-0.76. It shows a close relationship between the intensity of CCDT introduction and the structural modernisation of the economy. A similar relationship was found for exports of high-tech product – the correlation coefficients exceed 0.65; composite indices does not exceed 0.50.

Correlation analysis is of particular importance when considering some countries. In China, high values of CCDT indicators are combined with steady growth in labour productivity in the manufacturing industry and an increase in the share of high-tech exports. It confirms the role of robotics, AI, and 5G industrial networks as key drivers of economic growth. In Russia, the moderate values of UCDI are accompanied by a weak correlation with the dynamics of productivity and high-tech value added; low CCDT indicators show the limited economic effect of digitalisation.

Conclusion

The existing composite digitalisation indices and metrics of CCDT show different levels and aspects of economy digital transformation. As a result, they have different analytical consistency. To ensure the correct comparison of these approaches, two complementary methodological tools were used in this research. As a result, a comprehensive CCDT metrics analysis combines the heterogeneous indicators to a single analytical framework. The author's UCDI ensures the unification of international index systems.

The proposed UCDI is a generalised indicator of the institutional and infrastructural maturity of the digital economy. It allows ones to compare the level of digital readiness and digital inclusion of countries. However, when analysing the technological structure of digitalisation and the factors of long-term economic growth, UCDI demonstrates limited analytical sensitivity. It requires to supplement it with CCDT indexes and indicators.

According to the comparative and correlation analysis, CCDI reflects the actual scale of key technologies introduction, the degree of their integration into industry, and countries scientific and technological potential. However, UCDI mainly considers countries institutional and infrastructural characteristics. This confirms the analytical advantage of using CCDT in assessing of economy digitalisation, scientific research, and strategic planning. It is especially evident when comparing the leading countries, China and Russia in terms of technological differences in AI, robotics, high-speed Internet, additive and other technologies.

According to the statistical calculations, CCDT in assessing of economy digitalisation has a fundamental analytical advantage over existing composite indexes:

- it provides a higher discriminating ability between countries with different technological specialisations;

- identifies real technology leaders;
- captures the structural depth of digitalisation and its contribution to productivity and industrial development;
- moreover, it is especially effective for analysing developing countries, where the digital infrastructure may be relatively developed with weak implementation of key technologies.

Therefore, UCDI is an effective tool for assessing the institutional and infrastructural maturity of the digital environment. However, CCDT is more effective to assess the technological depth of economy digitalisation. The scientific significance of the research concerns with substantiating of analyses integration. The practical significance includes the implementation of proposed approach for strategic diagnostics of digital development, identifying technological gaps and digital policy priorities.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Elena E. Irodova – conceptualization; supervision.
Alexey M. Sokolov – writing – original draft.

References

1. Abramov, V. I., & Andreev, V. D. (2023). Improving the methodology for assessing the digital maturity index of Russian regions, taking into account aspects of the second and third stages of digital transformation of PMA based on foreign experience. *Management Sciences*, 13(1), 32-46. https://doi.org/10.26794/2304-022X-2023-13-1-32-46 (accessed: 02.03.2023).

2. Aslanova, I. V., & Kulichkina, A. I. (2020). *Research and assessment of the digital maturity of an organization*. St. Petersburg: Izdatelstvo "Politekh". DOI: 10.18720/IEP/2020.6/24 (in Russian).

3. Bobylev, S. N., Solovyeva, S. V., Palt M. V., & Khovavko, I. Yu. (2019). The digital economy indicators in the sustainable development goals for Russia. *Ekonomicheskiy vestnik Moskovskogo universiteta*. (4), 24-41. https://doi.org/10.38050/01300105201943 (in Russian).

4. Vylgina, Yu. V., Karjakin, A. M., & Velikorossov, V. V. (2023). A study of approaches to assessing the level of digitalisation of small business organizations. *Innovacionnaya ekonomika: informaciya, analitika, prognozy*, (2), 107-115 (in Russian).

5. Irodova, E. E. (2021). Assessment of the effectiveness of various approaches in the framework of research on the level of development of the digital economy using the example of the European Union countries. *Sbornik nauchnykh trudov Ivanovskogo gosudarstvennogo universiteta*, 21(37) (in Russian).

6. Irodova, E. E., & Sokolov, A. M. (2025). Systematic process analysis: digitalisation of the economy in terms of the political economy approach. *Journal of Regional and International Competitiveness*, (1). https://doi.org/10.52957/2782-1927-2025-6-1-4-20

7. Makarov, I. A. (2024). Composite indexes for governing digitalization: methods for construction. *Voprosy gosudarstvennogo i municipal'nogo upravleniya*, (3), 81-105 (in Russian).

8. Melmont, D. D. (2024). The impact of digitalization on the economic and social development of Russia's regions. *Voprosy innovacionnoj ekonomiki*, 4(14), 1215-1228 (in Russian).

9. Mirzoeva, M. U. (2024). Organizational changes in the context of digital transformation: management methodology and evaluation of effectiveness. *Vestnik evrazijskoj nauki*, (6), 1-16 (in Russian).

10. Prokhorova, M. P., Lebedeva, T. E., Tsapina, T. N., & Sedykh, D. V. (2022). Business Ecosystems: organizational and managerial aspects. *Moskovskij ekonomicheskij zhurnal*, (10), 617-627 (in Russian).

11. Sintyaev, S. A. (2025). Methodology for assessing the efficiency of digital platforms in the context

of the sustainable development of regional economic systems. *Ekonomika: vchera, segodnya, zavtr*a, 15(3A), 141-153 (in Russian).

12. Simchenko N. A., Blagih I. A., Malyushin I. I. (2024). Methodological problems of domestic economic science. *Theoretical economics*. (8), 25-33. DOI: https://doi.org/10.52957/2221-3260-2024-8-25-33 (in Russian).

13. Abasheva, O. Yu., Amirova, E. F., Belyaeva, S. V., Bondarenko, I. A., & Poletaikina, A. N. (2020). *Digital economy and cross-cutting digital technologies: modern challenges and prospects for economic, social and cultural development*. Samara: NIC PNK OOO (in Russian).

14. Shabaltina, L.V. (2023). Classification of methods for assessing digital maturity. *EPP*, (10), 4257-4279.

Received 12.01.2026
Revised 20.02.2026
Accepted 21.03.2026

Jraic.com
JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS 2026; 7(1):29-40

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

Lutfullo K. Saidmurodzoda

ORIGINAL ARTICLE

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

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.

Keywords: preventive socio-economic policy; transformational economy; open economy; economic security; macroeconomic stability; institutional development; crisis management; Tajikistan; sustainable development; economic reforms

JEL codes: E61; O11; P27

DOI: 10.52957/2782-1927-2026-7-1-29-40

For citation: Lutfullo K. Saidmurodzoda (2026). Theory and practice of preventive socio-economic policy: experience of the Republic of Tajikistan. *Journal of regional and international competitiveness*, 7(1)

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 [4-8]. 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"[14].

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"[15].

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.

[14] *Emomali Rahmon. (2013). Address at the Solemn Meeting on the Occasion of the 22nd Anniversary of the State Independence of the Republic of Tajikistan. 9 September 2013 (in Tajik)*

[15] *Emomali Rahmon. (1997). Speech at the Meeting with Representatives of the Intelligentsia. 19 March 1997 (in Tajik).*

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"[16].

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"[17].

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

[16] *Emomali Rahmon. (1993). Speech at the 48th Session of the United Nations General Assembly. 29 September 1993 (in Tajik).*
[17] *Emomali Rahmon. (1997). Speech at the Meeting with Representatives of the Intelligentsia. 19 March 1997 (in Tajik).*

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.

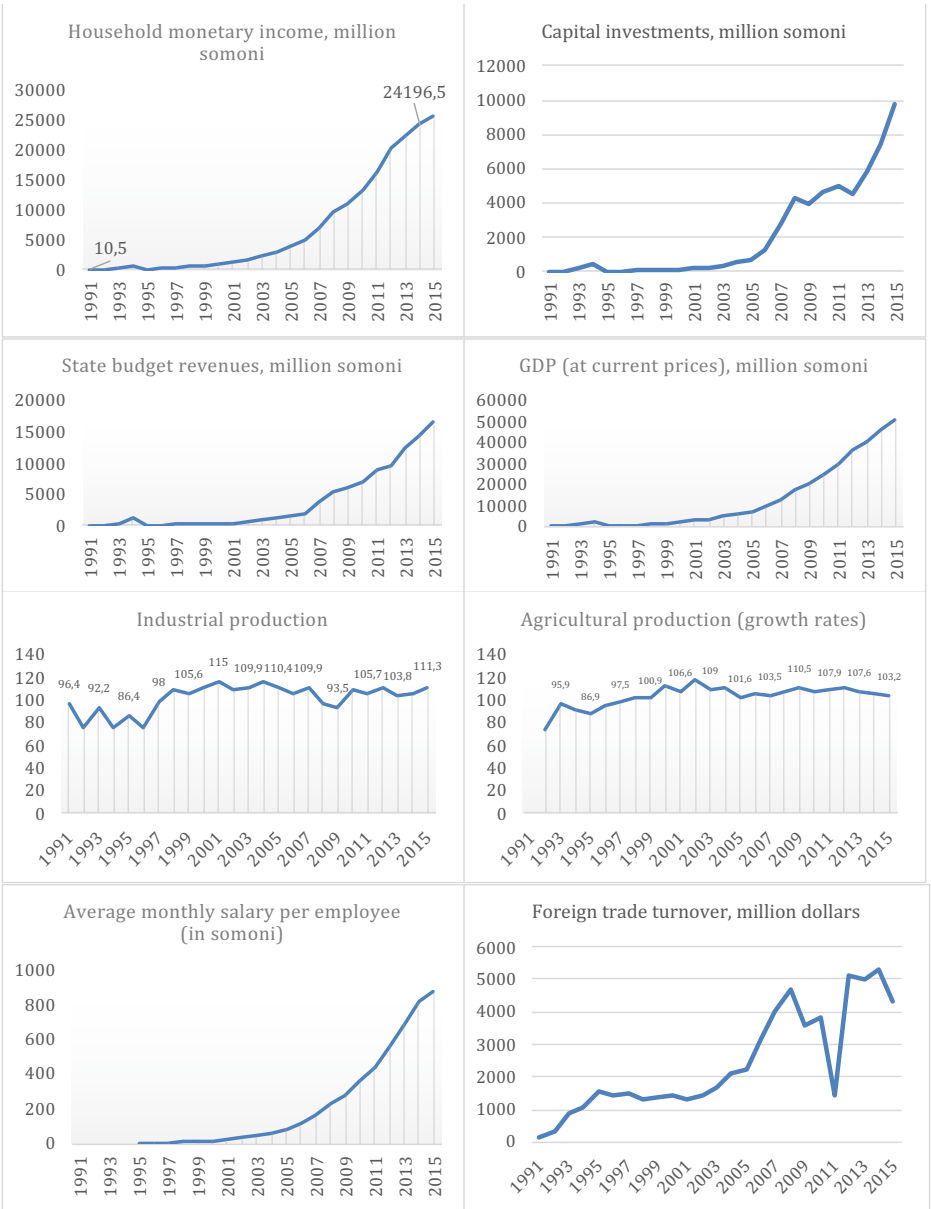


Figure 1. Economic Development Profile of the Republic of Tajikistan for the period up to 2015
Source: Author

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 [12, 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 [13, 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.

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[18].

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,

[18] *President of the Republic of Tajikistan. (2018). 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.*

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"[19]. 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"[20]. The country's anti-crisis action plan under this resolution, along with previous measures (2018, No. 577), included issues of supplying consumer

[19] President of the Republic of Tajikistan. (2021). 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. Retrieved from www.prezident.tj (in Tajik).

[20] President of the Republic of Tajikistan. (2022). Law of the Republic of Tajikistan "On Strategic Planning and State Forecasting" July 2022, № 1894.

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 [14] 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"[22] was adopted, 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

[21] President of the Republic of Tajikistan. (2021). 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] President of the Republic of Tajikistan. (2022). Law of the Republic of Tajikistan "On Strategic Planning and State Forecasting" July 2022, № 1894.

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"[23]. 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"[24]. 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[25].

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

---

[23] President of the Republic of Tajikistan. (2018). 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.

[24] President of the Republic of Tajikistan. (2018). 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.

[25] President of the Republic of Tajikistan. (2020). 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.

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.

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[26].

[26] *President of the Republic of Tajikistan. (2018). 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.*

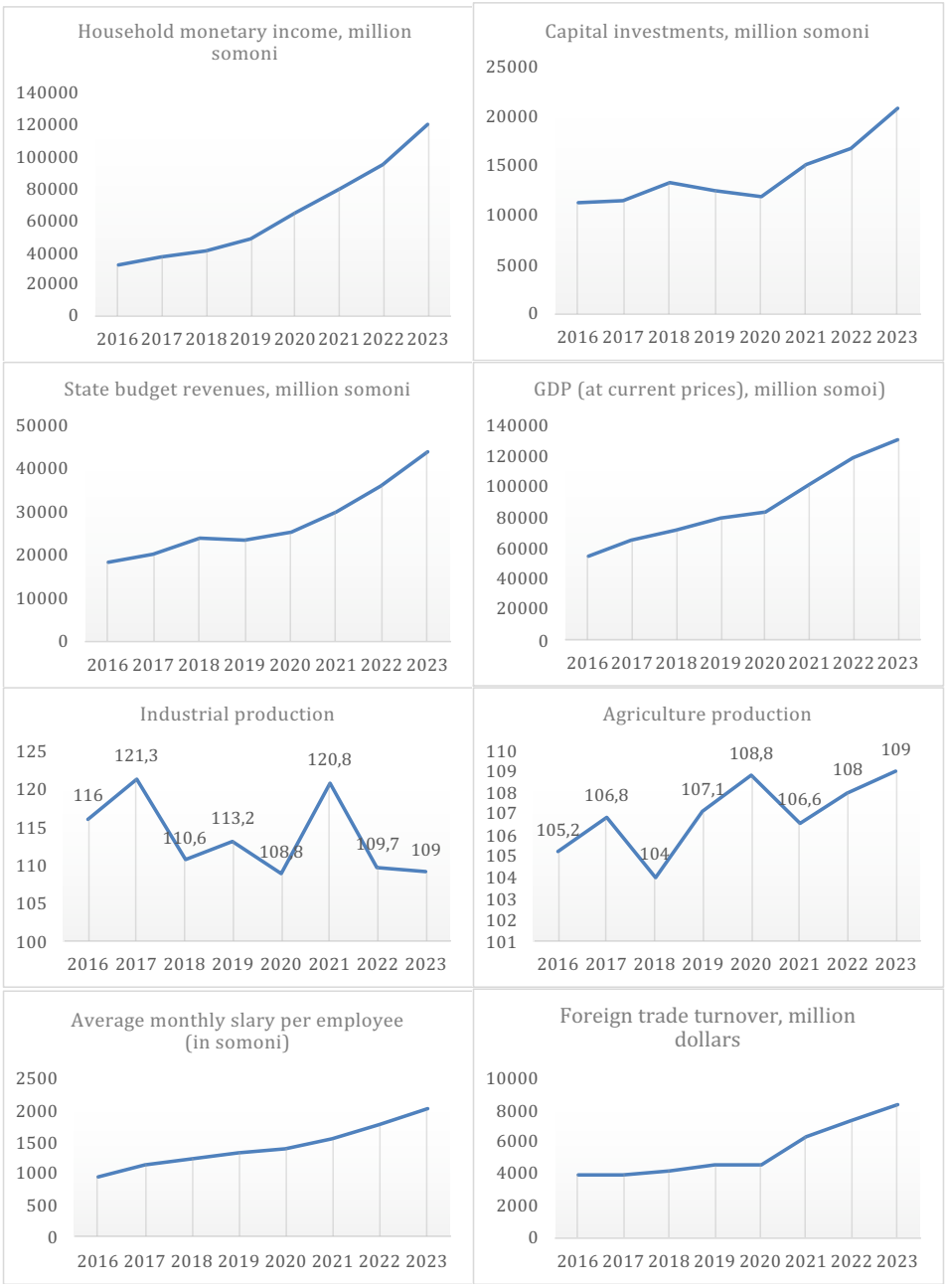


Figure 2. Economic Development Profile of the Republic of Tajikistan for the period 2016 to 2023
Source: Author

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, 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"[14].

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The author declares no conflict of interest.

References

1. Chernyaeva, I. V., & Chernyaev, Yu. A. (2012). Harmony of the 21st Century Economy. *Byulleten` mezhdunarodnogo nobelevskogo E`konomicheskogo foruma*, (1-1), 446-452 (in Russian).

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

3. Kuz`minov Ya. I. (Ed.) (2007). *Origins. From the experience of studying economics as a structure and a process*. Moscow: HSE Publishing House (in Russian).

4. Nureev, R. M. (Ed.). *Economic Subjects of Russia (Institutional Analysis). (Part 1-3)*. Moscow, 2010.

5. Nureev, R. M. (2009). *Russia: Features of Institutional Development*. Moscow: Norma (in Russian).

6. Rakhimov, R. K. (2024). Features of Economic Policy in the Transition Period. *Izvestiya of the Academy of Sciences of the Republic of Tatarstan*. Department of Social Sciences, (4).

7. Turaeva, M. O. (2009). On approaches to the study of the national economic system of Tajikistan. *Economy of Tajikistan: development strategy*, (3), 14-27 (in Russian).

8. Umarov, Kh. (2010). *Crisis in Tajikistan. Depth of Action. Form of Manifestation. Ways of Overcoming*. Dushanbe: Irfon (in Russian).

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

10. Kuznetsov, V. N. (2010). *Theory of Compromise*. Moscow: Kniga i Biznes (in Russian).

11. De Soto, H. (2004). *The Mystery of Capital. Why Capitalism Triumphs in the West and Fails Everywhere Else.* Moscow: Olimp Business (in Russian).

12. Bobozoda, G. J. (2009). *The Contemporary Global Financial Crisis and Its Impact on the Economy of the Republic of Tajikistan*. Dushanbe.

13. *Financial and Economic Mechanisms for Crisis Regulation. (2009)*. In: Proceedings of the Republican Scientific and Practical Conference of 5 June 2009. Dushanbe.

14. Saidmurodov, L. Kh. (Ed.) (2018). The Republic of Tajikistan on the Path toward an Open Economy: Essays in Econometric Analysis. Dushanbe (in Russian).

Received 11.01.2026
Revised 11.02.2026
Accepted 15.02.2026

[14] *President of the Republic of Tajikistan. (2023). 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). Retrieved from https://www.president.tj/event/missives/36374*

Jraic.com
JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS 2026; 7(1):41-48

Tax security in the economic resilience system of the Republic of Tajikistan: theory, methodology, and practice

Olimjon M. Alizoda SPIN-code: 5552-5179

ORIGINAL ARTICLE

Doctor of Economics, Associate Professor
Tajik National University, Dushanbe, Republic of Tajikistan
E-mail: olim.23@mail.ru

Abstract. The article examines the role of tax security in the state's economic resilience system on the example of the Republic of Tajikistan. The relevance of the research is due to the increasing external and internal economic challenges, the digital transformation of the fiscal system, and the need to ensure the sustainability of budget revenues in terms of global economic instability. The purpose of the research is a comprehensive scientific substantiation of tax security and development of methodological and practical approaches it in the context of modern institutional and economic transformations. Statistical data from government agencies of the Republic of Tajikistan and from international financial organisations is the empirical basis of the research. Tax security is a dynamic state of the tax system. It ensures the stability of budget revenues, the effectiveness of tax administration, and the protection of the economy from fiscal risks. The research identifies key threats to tax security, including a high level of the shadow economy, a significant amount of tax benefits, and the dependence of domestic consumption on external factors such as remittances from migrant workers. Despite the positive dynamics of macroeconomic indicators and the growth of tax revenues, these factors significantly limit the fiscal potential of the state. Moreover, digitalisation of tax administration is an important tool for increasing transparency and efficiency of tax control. As a result, an intensive budget filling model expands the tax base and reduces inefficient tax benefits and institutional integration of the shadow sector into the legal economy. It will increase the stability of the tax system and strengthen state economic security.

Keywords: economic resilience; financial security; tax security; shadow economy of the Republic of Tajikistan; fiscal policy of the Republic of Tajikistan

JEL codes: H21, H26, H20, O23, E62

DOI: 10.52957/2782-1927-2025-7-1-41-48

For citation: Olimjon M. Alizoda. (2026). Tax security in the economic resilience system of the Republic of Tajikistan: theory, methodology, and practice. *Journal of regional and international competitiveness*, 7(1), 41.

Introduction

In the modern structure of the national security, the financial component occupies a dominant position. The Republic of Tajikistan is at the stage of active institutional transformation and integration into global economic processes. Therefore, issues of financial stability are of existential importance. The core of the financial security system is tax security. It prevents the tax system security from internal and external threats, ensures budget sufficiency, performs government functions, and maintains socio-economic stability in a volatile environment.

The concept of tax security combines economic, legal, and geopolitical determinants in terms of a common national security system. The founder of a systematic approach to this problem is D.N. Tikhonov. He proposed to consider security in terms of strategic tax planning and minimising fiscal risks [10]. To develop the approach, K.V. Maslov substantiated the concept of tax security as a legal institution, focusing on legal mechanisms for protecting the interests of the state and society [6]. E.A. Zakharova identifies specific indicators of the system's sustainability, such as the tax burden and the share of revenue in GDP [5]. I.K. Shishkina considers fiscal security as the foundation of financial stability, ensuring the protection of state interests via effective management of income and expenses [11]. A number of modern scientists consider tax security as a dynamic management system. E.I. Minakova defines it as a modern institutional mechanism aimed at preventing tax evasion [8]. According to E.L. Gulkova et al., security is a protecting an organisation

from unjustified additional charges and preserving its business reputation in an aggressive fiscal environment [4]. A comprehensive view of the problem is presented in the research of A.A. Bazhenova and S.Z. Mehdiyev. They consider tax system protection as a prerequisite for the existence of a sovereign state [2]. M.V. Galazov studies industry specifics in detail (using the example of small business). Moreover, he offers a legitimate optimisation tools for business [3]. The concept of A.I. Ponomareva defines tax security as an 'institutional filter'. According to the author, the system is designed to block destructive phenomena (corruption, shadow capital) at the stage of forming budget flows [9]. However, A.V. Minakov considers fiscal sustainability as a basis of country economics [7]. The foreign scientists study its in terms of the human factor. Indeed, according to the classical model by M. Allingham and A. Sandmo, taxpayers behaviour is of great attention [12]. J. Alma and B. Torgler introduced the concept of 'tax morality'. They proved that the security level of the system is directly dependent on the degree of trust between the government and society: the smaller the social distance, the higher the voluntary discipline of taxpayers [13].

Therefore, tax security has transformed from a highly technical fundraising task into a complex interdisciplinary system. It combines strict control, institutional design, and strengthening of the social contract.

Nowadays, tax security development theory is the transition to digital control paradigms. Preliminary, our research focused on the transformation of digital economy and tax security into a system of predictive analysis and technological monitoring. Indeed, the key factor is the cyber stability of fiscal institutions and electronic transactions [1].

The relevance of this research is provided by a need to develop tax mechanisms ensuring the sovereignty of the Republic of Tajikistan, 2026-2030. This time period had unprecedented overlap of factors: post-pandemic recovery, geopolitical turbulence in the region, changes in logistics chains, and internal reform of fiscal legislation, including the introduction of a new Tax Code in 2022, and a strategic reduction in the VAT rate to 14% in 2024.

The purpose of the research is to provide a comprehensive justification of tax security role in state economic resilience (on the example of the Republic of Tajikistan). Moreover, the research develops scientific and methodological approaches to improve the integration of theoretical concepts, methodological tools, and practical digital solutions.

Methods

The methodological basis of the research includes the main principles of economic resilience. The research methods used are analysis and synthesis, induction and deduction, abstraction and generalisation, and logical-structural and comparative analysis. Above provide a holistic understanding of the processes of tax security ensuring. We analyse the impact of formal and informal institutions on ensuring tax security via an institutional analysis.

The research based on the latest empirical data from the Tax Committee under the Government of the Republic of Tajikistan, reports from international financial institutions (IMF, World Bank), and macroeconomic statistics, 2023-2025.

Results

Tax security is an integral subsystem of the financial and economic resilience of the state. In theory, the tax security of the Republic of Tajikistan has dynamic state of the fiscal system. It ensures the guaranteed receipt of tax revenues in sufficient amounts to cover legally established budget expenditures, while maintaining incentives for the development of entrepreneurial activity.

The Tajik economic model has a high proportion of external factors (remittances, energy imports, and exports of raw materials). It provides an expanded interpretation of tax security. Moreover, it includes fiscal efficiency, institutional resilience – the ability of the tax administration to withstand corruption risks and adapt to digital challenges.

The Republic of Tajikistan economy is at the stage of active modernisation and integration into the global economy. Therefore, tax security is of critical importance. On the one hand, the state strives to ensure

the stability of budget revenues needed to finance social programs, the construction of strategic facilities, and infrastructure projects. On the other hand, the business community is in conditions of a high tax burden historically been assessed by international experts as one of the most significant in the region.

Tax security in the context of the digitalisation of the economy is as an indicator of the balance of interests between the state and business: the ability of the state to collect taxes and the ability of businesses to pay them while maintaining the potential for development.

A fundamental element of ensuring tax security is the continuous assessment of tax risks and cyber attacks from external and internal threats. In the modern economic theory of Tajikistan, tax risk includes financial losses caused by adverse changes in tax legislation, errors in tax planning, and misinterpretation of regulations by both the taxpayer and the fiscal authorities. In 2025 the dynamics of legislative changes has reached a peak. Therefore, the management of these risks becomes an integral part of the economic security system of any organisation.

The Law of the Republic of Tajikistan 'On Security' contains the following concept: economic security is the state of protection of the national economy from internal and external conditions, processes, and factors that endanger its sustainable development and economic independence; security is the implementation of a unified state policy in terms of security via a system of economic, political, organisational measures threaten to the vital interests of citizen, society, and the state[1].

According to Article 82 of the Tax Code of the Republic of Tajikistan, tax risk is interpreted as 'a risk management system is a set of rules, documents, and measures to identify, assess, respond to risks, monitor, and control their level. It is implemented in accordance with this Code by tax authorities to identify and prevent the risk of violations, tax legislation, and encouragement of responsible taxpayers. Based on the results of the risk assessment, the tax authorities apply the appropriate form of tax control'[2].

The key criteria for tax security in terms of theoretical discourse are:

1. Fiscal self-sufficiency is the ability of the tax system to finance current and capital expenditures without a critical increase of public debt. On World Bank's forecast of maintaining a high risk of a debt crisis until the repayment of Eurobonds on the Rogun HPP in 2025-2027, this criterion is dominant one[3].

2. Social justice is an equal distribution of the tax burden to prevent a social tension. The high level of poverty (although decreasing from 83% in 2000 to 19% in 2025)[4] requires a cautious approach to indirect taxation.

3. The competitiveness of a jurisdiction provides the conditions preventing an outflow of capital and labour resources.

The theory of fiscal and public finance emphasises the direct correlation between tax potential and debt sustainability. In Tajikistan the public debt is an important instrument for financing strategic projects (energy, infrastructure). Indeed, a tax security acts as a guarantor of solvency.

However, 'ensuring tax security is a new concept in the system of financial and national security to increase the process of the digital economy globalisation. In this process, tax systems are increasingly relying on information technology. It leads to the emergence of new threats and external and internal attacks. Therefore, the tax system should be protected from all types of threats and cyber attacks' [2].

In the Republic of Tajikistan, the quantitative and qualitative indicators objectively assess the level of tax security. The methodological framework of the research is based on the standards of public finance

---

[1] The Law of the Republic of Tajikistan «On Security» No. 721 of 28.06. 2011. Akhbori Majlisi Oli of the Republic of Tajikistan, 2011, No. 6, Article 434; 2014, No. 11, Article 646; Law of the Republic of Tajikistan on 03.03.2016, No. 1283; on 08/03/2018, No. 1540. President of the Republic of Tajikistan Emomali Rahmon. Dushanbe.

[2] The Tax Code of the Republic of Tajikistan. (2022). Dushanbe: Nashrietimuosir.

[3] International Monetary Fund. (2025). Republic of Tajikistan: First Review Under the Policy Coordination Instrument and Request for Modification of a Quantitative Target and a Reform Target. Source: https://www.imf.org/-/media/files/publications/cr/2025/english/1tjkea2025001-print-pdf (accessed on 11.02.2026).

[4] President of the Republic of Tajikistan. (2025). The message of the President of the Republic of Tajikistan Emomali Rahmon, on the main directions of the Republic's domestic and foreign policy on 16.12.2025, Dushanbe. Source: https://president.tj/event/news/54185 (accessed on 10.02.2026).

statistics. Its implementation is apart of the country's obligations to the IMF[5].

Table 1 – Key assessment indicators

A group of indicators	Indicator	Economic sense
Macroeconomic	The share of tax revenues in GDP	Reflects the level of redistribution of national income through the budget. In Tajikistan, this indicator has historically fluctuated between 18-20%. It is typical for emerging markets.
Administrative	Collection rate	The ratio of the taxes actually received to the planned indicators.
Structural	Tax expenses	The amount of lost income due to benefits and preferences. In 2022, this indicator reached a critical level of 11% of GDP.
Risks	The level of tax debt	The ratio of accumulated arrears to annual receipts.

Source: Author

A special place in the methodology is occupied by the assessment of the tax gap – the difference between theoretically possible tax revenues (with full compliance with legislation) and actual fees.

Tax security plays an important role in the economic security system. Therefore, the main threats and attacks affecting the level of economic security come are fiscal and financial in nature.

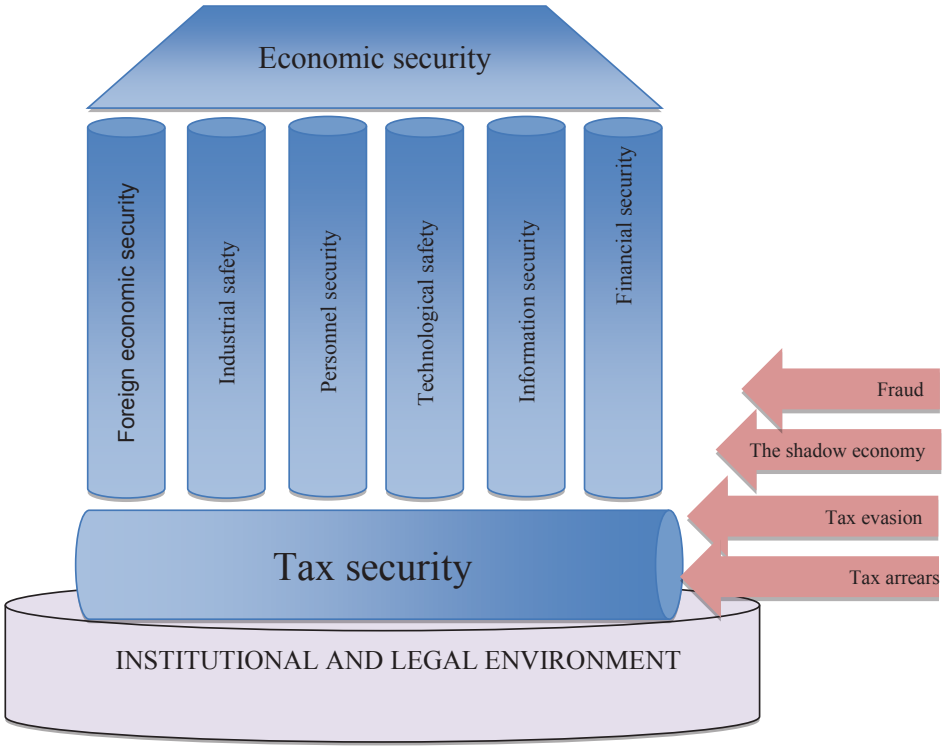


Figure 1. The role of tax security in the economic security system

Source: Author

In Tajikistan, the tax gap is formed under the influence of two main factors: The first is the shadow economy – a sector is completely hidden from taxation. The share of the shadow economy range from 30%

[5] *President of the Republic of Tajikistan. (2025). The message of the President of the Republic of Tajikistan Emomali Rahmon, on the main directions of the Republic's domestic and foreign policy on 16.12.2025, Dushanbe. Source: https://president.tj/event/news/54185 (accessed on 10.02.2026). President of the Republic of Tajikistan. (2025). The message of the President of the Republic of Tajikistan Emomali Rahmon, on the main directions of the Republic's domestic and foreign policy on 16.12.2025, Dushanbe. Source: https://president.tj/event/news/54185 (accessed on 10.02.2026).*

to 50% of GDP. It significantly distorts the basis for calculating tax potential. The second is political benefits: the legal narrowing of the tax base through the provision of individual preferences. According to the IMF methodology, is also a form of loss of budgetary resources.

Discussion

Tax security is derived from the state of the real economy. An analysis of the macroeconomic environment in 2023-2025 demonstrates that Tajikistan's economy, despite external shocks, has shown high adaptability, forming a basis for fiscal withdrawals.

Tajikistan's economy showed high growth rates. It directly influenced the expansion of the tax base. In 2023, real GDP growth was 8.3%. The main drivers were gold exports, an increase in private consumption supported by an influx of remittances, and large-scale government investments in infrastructure. This indicator remained at 8.4% in the first quarter of 2024. The World Bank forecast for 2024 suggested a slowdown to 6.5-7.2% due to regional uncertainty. However, the actual dynamics turned out to be higher than expected[6]. According to preliminary data, in 2025, GDP grew by 8.4%, reaching 176.9 billion somoni (over $19 bn USD) in nominal terms[7].

Over the past 25 years, Tajikistan's economy has demonstrated impressive growth in monetary terms, increasing 15-fold (see Figure 2).

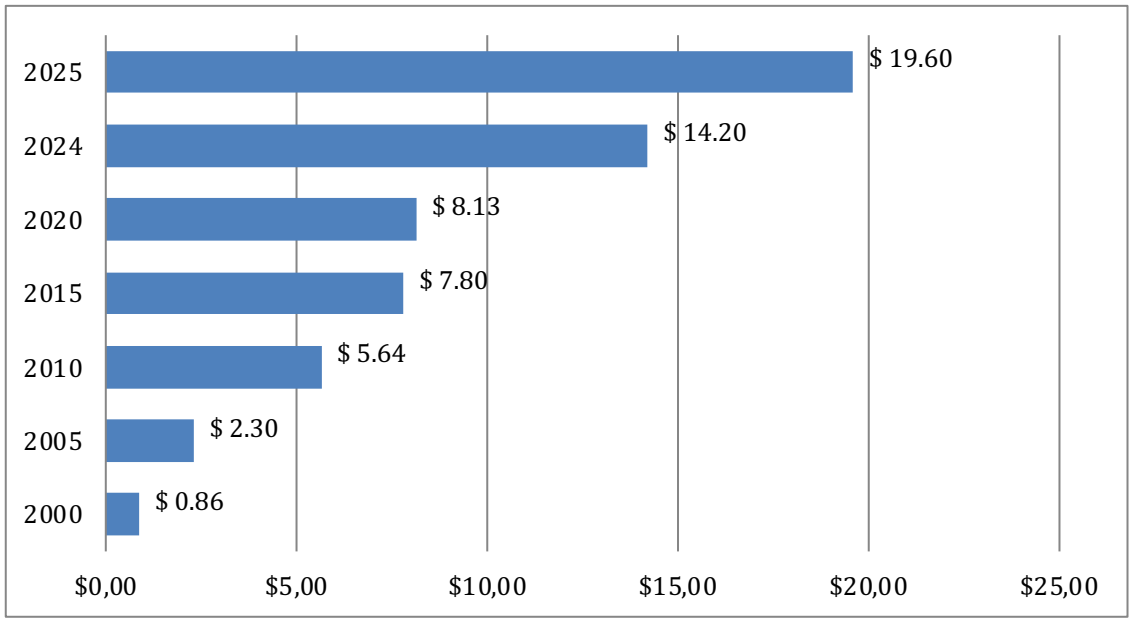


Figure 2. Dynamics of the GDP of the Republic of Tajikistan, 2000-2025 (bn USD)

Source: Agency for Statistics under the President of the Republic of Tajikistan, 2026[8]

Steady GDP growth ensured favourable conditions for the implementation of tax collection plans, since an increase in trade and production turnover automatically generates an increase in VAT and income tax receipts.

Despite the positive dynamics of GDP, the macroeconomic environment has tax security risks. Firstly, the economy's dependence on migrant remittances – a key source of financing for domestic consumption. Fluctuations in the Russian economy and migration policy (stricter entry rules, devaluation of the ruble, etc.) decrease the purchasing power of Tajikistan population. It also affects VAT collections – the main source of tax revenues for the state budget. Secondly, inflation is projected at the level of the average inflation rate in Tajikistan in different periods (see Fig. 3) has a twofold effect. On the one hand, it nominally increases the tax base. On the other hand, it devalues real budget revenues and increases the cost of public procurement.

[6] *World Bank. (2025). Report on the economy of Tajikistan 2025. Source: https://www.vsemirnyjbank.org/ext/ru/home (accessed on 10.02.2026).*
[7] *Agency for Statistics under the President of the Republic of Tajikistan. (2026). Source: https://www.stat.tj (accessed on 10.02.2026).*
[8] *Agency for Statistics under the President of the Republic of Tajikistan. (2026). Source: https://www.stat.tj (accessed on 10.02.2026).*

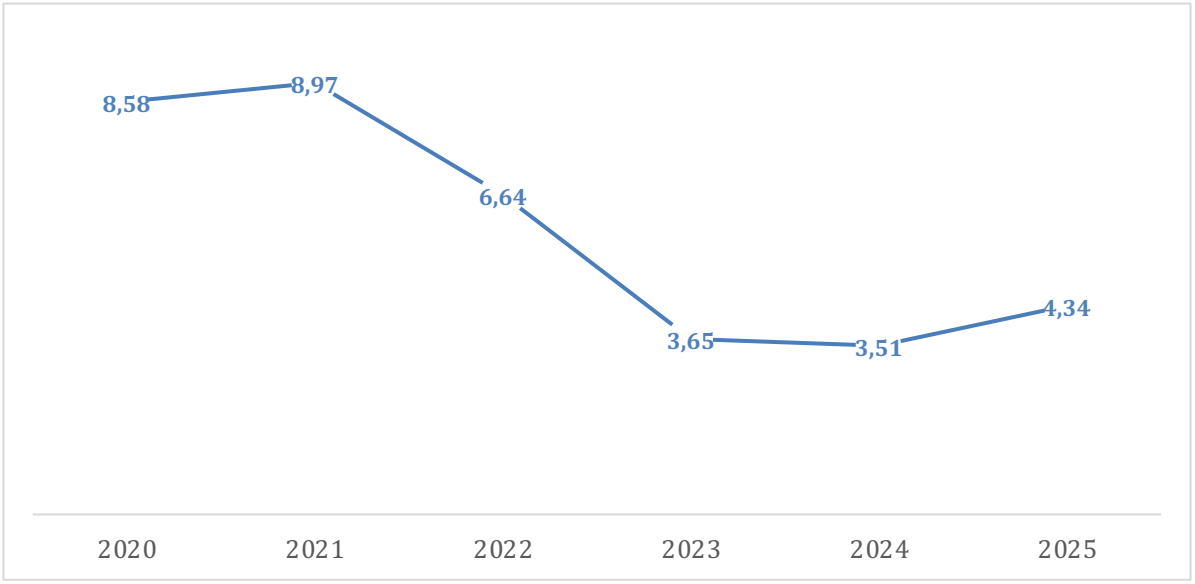


Figure 3. The average inflation rate in Tajikistan, 2020-2025

Source: National Bank of the Republic of Tatarstan, 2026[9]

The practical implementation of tax policy in the period under review is characterised by a combination of fiscal liberalisation (reduction of rates) and administrative tightening (digitalisation, enforcement, etc.). The balanced budget system requires the uniform fulfilment of obligations by all regions. The central element of the tax strategy was to reduce the tax burden to bring the economy out of the shadows.

Theoretically, a reduction in the rate leads to a temporary drop in budget revenues. However, the 2024 data (revenue growth) confirms the effect of the Laffer curve: the reduction in the rate is compensated by an expansion of the base and an improvement in collection (see Figure 4). Reducing VAT to 14% makes evasion less cost-effective compared to the risks of fines. It strengthens tax security.

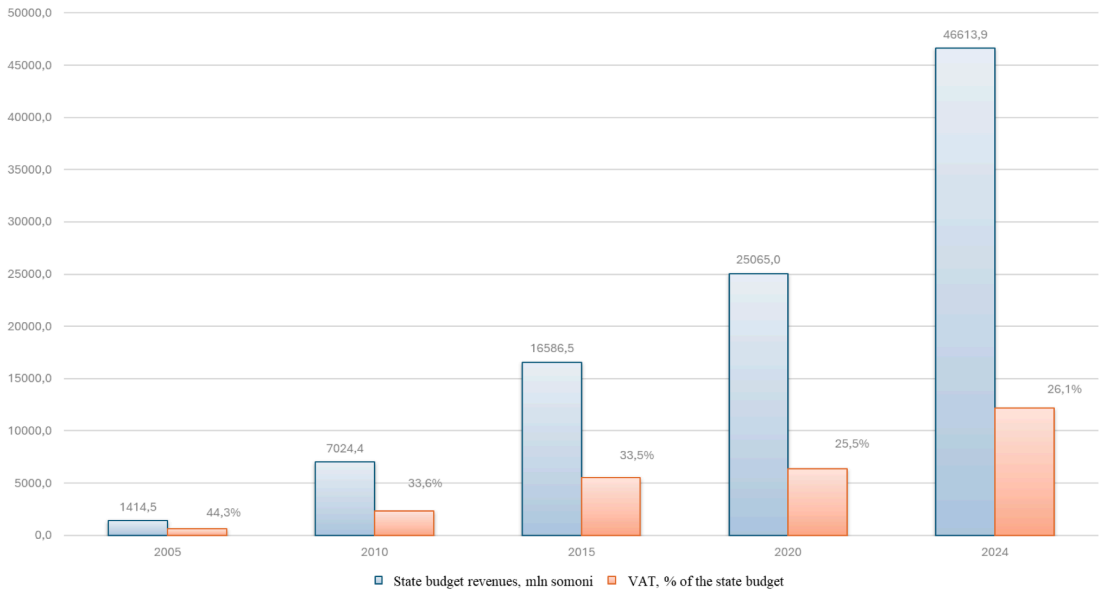


Figure 4. Comparison of VAT receipts to state budget revenue, 2000-2024

Source: Agency for Statistics under the President of the Republic of Tajikistan, 2026[10]

[9] *National Bank of the Republic of Tatarstan. The inflation rate in Tajikistan. (2026). Source: https://nbt.tj/ru/monetary_policy/inflation.php (accessed on 10.02.2026).*

[10] *Agency for Statistics under the President of the Republic of Tajikistan. (2026). Source: https://www.stat.tj (accessed on 10.02.2026).*

The most critical aspect in Tajikistan's economy is the developing of shadow economy – the antagonist of tax security. According to expert assessment, the share of shadow economy in Tajikistan ranges from 30% to 50% of GDP. In 2022, the country's official GDP was about $ 11.4 bn USD. However, according analisys by the Eurasian Development Bank, the real volume of the economy could be larger twice due to unaccounted incomes. Therefore, $ 5-6 bn USD are in the shadows[11].

Moreover, the shadow sector forms unfair competition. Legal businesses bear the full tax burden, while 'gray' enterprises dump due to non-payment of VAT and social contributions and benefits.

Indeed, the one of the most serious threats is the enormous amount of tax benefits. According to the IMF report (2025), tax expenditures in 2022 were estimated at 11% of GDP [13]. hence, the state voluntarily renounces revenues equivalent to almost half of the taxes actually collected. Benefits are often individual in nature, provided to large industrial enterprises or investors without a transparent performance analysis. The IMF strongly recommends to rationalise a benefits system, as its reduction is the most efficient way to raise income without raising rates for the population.

According to our research, Tajikistan's tax system has transformed from a fiscal instrument of withdrawal to a modern mechanism for regulating the economy. The adoption of the 2022 Tax Code and the consistent reduction of the VAT rate to 14% indicate a paradigm shift towards partnerships with businesses. However, strategic security remains under threat due to the huge volume of the shadow economy (up to 50% of GDP) and excessive tax benefits (11% of GDP). These two factors significantly decrease the fiscal space and make the budget dependent on large taxpayers and the external economic environment.

Conclusion

On the example of the Republic of Tajikistan, the research provides a comprehensive scientific substantiation of the role of tax security in the general system of state economic security. During the conceptual and institutional analysis, a wide range of determinants was comprehensively studied.

Therefore, there is an efficient development of tax security of the Republic of Tajikistan. The analysis shows critical and systemic vulnerabilities that, in the medium term, could completely eliminate all the tactical successes achieved and jeopardize the country's financial sovereignty. The fundamental focus of government policy should immediately shift from futile increased administrative pressure on the remaining legal businesses to ensuring insurmountable economic and technological barriers to the shadow sector.

Nowadays, transfer of the business into the legal field becomes unprofitable activity with unacceptably high risk. Therefore, via the formation of digital controls, the total institutionalisation of the shadow economy is necessary. Indeed, the state should focus on strengthening the concept of 'tax literacy' based on 'tax morality.' It will contribute to the steady growth of voluntary tax discipline in civil society.

During the implementation, ensuring the long-term tax security of the Republic of Tajikistan requires a transition from extensive to intensive budget filling. It is an expansion of the tax base due to the systemic integration of the shadow sector into the legal field and a strict revision of inefficient tax expenditures. This approach establishes a financial foundation that is resilient to global challenges and capable of ensuring the sovereign development of the national economy.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The author declares no conflict of interest.

[11] *President of the Republic of Tajikistan. (2025). The message of the President of the Republic of Tajikistan Emomali Rahmon, on the main directions of the Republic's domestic and foreign policy on 16.12.2025, Dushanbe. Source: https://president.tj/event/news/54185 (accessed on 10.02.2026)..*

References

1. Alizoda, O. M., & Ibroimov, T. A. (2025). Ensuring tax security in the digital. *Bulletin of Bokhtar state university named after Nosiri Khusrav (Scientific journal). Series of economic sciences and the humanities*, (1-2), 417-422 (in Tajik).

2. Bazhenov, A. A., & Mehdiyev, S. Z. (2012). Tax security as an element of the national security of the state. *National security / nota bene*, (5), 85-89. Retrieved from https://nbpublish.com/library_read_article.php?id=61552 (in Russian).

3. Galazova, M. V. (2020). Tax security as an integral part of the economic security of small businesses. *Problemy rossijskoj ekonomiki na sovremennom etape: Materialy vserossijskoj nauchno-prakticheskoj konferencii, Moskva, 12 aprelya 2019 goda.* (pp. 310-320). Moscow: Rossijskij gosudarstvenny`j universitet pravosudiya imeni V.M. Lebedeva (in Russian).

4. Gulkova, E. L., Karp, M. V., & Tipalina, M. V. (2023). Role of tax security in organization economic security system. *Vestnik universiteta*, (6), 153–161. https://doi.org/10.26425/1816-4277-2023-6-153-161 (in Russian).

5. Zakharova, E. A. (2011). Tax security. Criteria for its assessment. *Vestnik Belorusskogo gosudarstvennogo ekonomicheskogo universiteta*, (6), 63-68. Retrieved from http/e:/doc.bseu.by:8080/handle/edoc/3309 (accessed: 16.02.2026) (in Russian).

6. Maslov, K.V. (2021). *Tax security of the state as an object of legal support*. Moscow: Infotropik Media (in Russian).

7. Minakov, A. V. (2004). Fiscal security as the main condition of economic security in Russia. *Ekonomicheskij analiz: teoriya i praktika*, (7), 49-56 (in Russian).

8. Minakova, E. I. (2017), Analysis of the activities of tax authorities in ensuring tax security as an integral part of ensuring economic security. *Obrazovanie i nauka bez granic: fundamental'nye i prikladnye issledovaniya*, (6), 115-120 (in Russian).

9. Ponomarev, A. I., Ponomarev M. A., & Toporov, I. V. (2015). Tax security as a component of economic security. *Gosudarstvennoe i municipal'noe upravlenie. Uchenye zapiski SKAGS*, (3), 230-234 (in Russian).

10. Tikhonov, D. N. (2002). *Fundamentals of tax security*. Moscow: Analitika-Presse (in Russian).

11. Shishkina, I. K. (2018). Fiscal security as a component of the country's financial security. In: *Aktual'nye voprosy ekonomiki i upravleniya: Sbornik statej I Mezhdunarodnoj studencheskoj nauchno-prakticheskoj konferencii, Orel, 26 aprelya 2018 goda* (pp. 184-186). Orel: Orlovskij gosudarstvenny`j agrarny` universitet imeni N.V. Paraxinaj (in Russian).

12. Allingham, M. & Sandmo, A. (1972). Income tax evasion: a theoretical analysis. *Journal of Public Economics*, 1(3-4), 323-338.

13. Alm, J., & Torgler, B. (2004). Culture Differences and Tax Morale in the United States and in Europe. *CREMA*, Working Paper, No. 2004-14. Retrieved from https://www.econstor.eu/bitstream/10419/214300/1/2004-14.pdf (accessed: 01.023.2026).

Received 10.01.2026
Revised 12.02.2026
Accepted 15.03.2026

Jraic.com
JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS 2026; 7(1):49-64

Factors of industrial growth in the Republic of Kazakhstan: investments, innovations, and modernisation

Zhanna R. Ashimova

Candidate of Economics, Senior lecturer
Almaty Technological University, Almaty, Kazakhstan
E-mail: ashimovazanna2022@gmail.com

Zhanay J. Abitov

Master Student, Software Engineer, Kcell, Almaty, Kazakhstan
E-mail: abitovpro@gmail.com

Diana Z. Abitova

Software Engineer, Amazon, Berlin, Germany
E-mail: abitov.zh.77@gmail.com

Amina M. Uristembek

Head of the Export Sales Department of Dolce LLP, Almaty, Kazakhstan
E-mail: a86310818@gmail.com

ORIGINAL ARTICLE

Abstract. The modern conditions of structural transformations of the Republic of Kazakhstan economy accompanied by the transition from a raw material model to an innovation-oriented development. Therefore, the identification of factors determining the dynamics of industrial growth is becoming a key area of scientific research. This analysis concerns with the strategic objectives of increasing the effectiveness of state investment and industrial policy, the practical challenges associated with reducing inter-regional disparities, and accelerating the modernisation of production facilities. Increasing the effectiveness of state investment and industrial policy, reducing interregional imbalances, and accelerating the modernisation of the national economy in terms of the transition to an innovation-oriented growth model provide the relevance of the research. The purpose of the research is to identify and quantify the relationships between the main drivers of industrial development, including investments in fixed assets, commissioning of new fixed assets, and the production of innovative products. The objectives of the research are as follows: correlation and regression analysis of these factors, the analysis of their impact on industrial production, verifying of the statistical significance of the obtained dependencies, identification of the institutional constraints, and ways to overcome them. The methodological base of the study implements the official statistical data from the Bureau of National Statistics of the Republic of Kazakhstan, 2017-2024. To comprehensive assessment of the impact of these factors on industrial production, the research uses the methods of paired correlation analysis, multiple linear regression, and regional comparison. To determine the statistical significance of the dependencies, we consider the p-levels, the institutional and structural features of the industrial sector. An analysis shows a strong positive relationship between investments in fixed assets and industrial production ($r = 0.8738$), a moderate relationship between the introduction of new fixed assets and production growth ($r = 0.3991$), and a significant role of innovative products in shaping industrial growth ($r = 0.7976$). The scientific novelty of the research consists in the integration of the innovation factor into a single quantitative model of industrial growth, and identification the specifics of the temporary distribution of the effect of capital investments. This approach clarifies the structure of the determinants of industrial development, and identifies institutional constraints to prevent their implementation. The practical significance of the results includes their applicability for improving the mechanisms of industrial and investment policy, developing effective modernisation strategies, and stimulating research and development activities. The findings help to establish long term regional development programs, government support tools, and conditions for strengthening the competitiveness of Kazakhstan's industrial sector.

Keywords: correlation analysis; investments in the economy of Kazakhstan; factors of economic growth; institutional environment; economic policy of Kazakhstan

JEL codes: G31, H21, H25, H54, H81

DOI: 10.52957/2782-1927-2025-7-1-49-64

For citation: Zhanna R. Ashimova, Zhanay J. Abitov, Diana Z. Abitova, Amina M. Uristembek. (2026). Factors of industrial growth in the Republic of Kazakhstan: investments, innovations, and modernisation. *Journal of regional and international competitiveness*, 7(1), 50.

Introduction

The Kazakhstan economy is undergoing a transition from resource dependence to a model of sustainable, innovation-oriented growth. Therefore, the quality of capital investments, the production facilities renewal, and the involvement of innovations in technological chains play a key role. To assess the effectiveness of economic policy, it is necessary to compare the dynamics of indicators, identify well-established relationships between investments in fixed assets, industrial production, the introduction of new fixed assets, and the release of innovative products.

However, there are limitations in descriptive statistics and pair dependencies, institutional factors, inter-regional heterogeneity, and time lags in the investment effect. Moreover, there is no complex analysis of investment activity and industrial production in the national literature. Therefore, the impact of fund modernisation and innovation is underestimated. This particular research provides the comprehensive analysis through integration the innovation factor into a single quantitative scheme and comparing of national and regional trajectories.

An analysis of scientific and analytical literature allows us to identify five main areas of economic growth:

1. Macroeconomic determinants of growth.
2. Investments and innovations as sources of development.
3. Digitalization and industrial transformation.
4. Regional growth and sustainable development.
5. Institutional and cluster conditions.

1. Macroeconomic factors of economic growth

The system macroeconomic determinants of growth are considered in the papers by Sukharev O.S. [1], Tenkovskaya L.I. [20], Alpatova E.S. [21], Melyantsev V.A. & Adrova I.S. [27], Sharokhina S. [23], Dubovik M., Dmitriev S. & Aitkazina M. [12]. The authors examine the impact of government strategies, GRP, macroeconomic cycles, and household incomes on growth processes. They reveal a tendency to increase the influence of regional imbalances, the need for a transition to an innovative development model, and the role of macroeconomic stability.

2. Investments and innovations as sources of development

The special attention is paid to the investment process, its relationship to innovation, and impact on economic security in the papers by Tinkova E.V. & Dikareva V.A. [2], Sinitsyn A.V. & Kopein V.V. [3], Shadchenko N.Yu. & Belmesov M.A. [4], Chebotarev S.S. & Gimadeev A.D. [5], Birzhanova A., Nurgalieva A. & Nurmagambetova A. [10], Nivorozhkina L.I. [29]. The scientific works substantiate the role of «green» investments and digital assets.

3. Digitalization, industry, and technological transformation.

Serebrennikova A.G. et al. [15], Rodionova D.G. & Alferyeva D.A. [8], Chuprova S.V. [7], Aleshkova A.V., Burika M.V. & Ivashkina M.V. [9], Tolstykh T.O. & Shatsky A.A. [25], Isaeva N.S. [26], Salimova T.A. et al. [18] focus on the digital transformation of the manufacturing sector and the innovation industry. The authors explore the industrial Internet of Things, the mechanisms of innovative production sustainability, the value of food, the dynamics of industrial growth, and the sustainable development of cluster structures. The scientific works highlight the role of digital platforms and AI in industrial policy.

4. Regional development and sustainability of territories.

The papers by Mirsaidov A.B. & Murtazoev O.K. [19], Kuanyshbaev S. et al. [11], Baitursunova A. et al. [10], Yurenkov I.N. [16], Cherevko V.E. [14], Kulikov M.V. [28], Kupriyanov A.N. [30] consider regional specifics and sustainable development. The regions are active drivers of growth at presence of infrastructure, institutions, and human capital.

5. Institutional and theoretical-methodological approaches.

The theoretical and methodological base of the research is presented by Bulina A.O., Mozgovaya K.A. & Pakhnin M.A. [17], Lubkova E.M. et al. [22], Afanasyeva E.V. & Tregub I.V. [25], etc. These papers present models of economic growth, classification of development factors, and institutional mechanisms to support innovation. The system of clusters, the interaction of government and business, the impact of human capital on growth rates are described.

According to the literature review, modern scientific knowledge on the problems of economic growth is based on the investment activity, innovative production, regional sustainability, and institutional design. The common element is the transition to the digital economy and the use of knowledge and data management technologies.

These works [1-30] form a reliable theoretical and empirical basis for selection the direction of research and developing a methodological approach to analyse the sources of economic growth in terms of modernisation and digitalization.

The object is the research is the macroeconomic system of the Republic of Kazakhstan; the subject is the statistically observed relationships between the volume of industrial production, investments in fixed assets, the introduction of new fixed assets, and innovative production. The purpose of the research is to identify and quantify the stable relationships between the drivers of industrial growth and production in terms of institutional and regional specifics.

The research defines and address the following tasks: to form a system of correlation estimates and a multiple regression model, determine the strength and direction of the relationships, verify the statistical significance and stability of the results, conduct inter-regional comparisons, interpret the identified patterns in the logic of institutional economics, propose applied recommendations for investment, industrial, and innovation policy.

Research hypotheses:

H1 – the increase in real investments in fixed assets is positively related to the volume of industrial production;

H2 – the effect of commissioning new fixed assets is manifested with a time lag and increases production;

H3 – an increase in the output of innovative products is associated with an increase in industrial production and the competitiveness of industries;

H4 – regions with high values in investment, fund input, and innovative products demonstrate steadily higher industrial production volumes; low values for a combination of factors are associated with lagging.

The empirical base is the official ranks of the Bureau of National Statistics, 2017-2024 (national and regional levels); a comparable 2019-2024 subarray is used for multiple regression. The following methods are used: pair correlation (Pearson), multiple linear regression, visual analytics, possible multicollinearity of investment and introductory indicators, the influence of lags in terms of the regional structure. We correct and correlate the indicators if necessary.

To improve the accuracy of the results, the initial series were analysed for outliers and abnormal values. The research includes inter-regional comparisons to identify differences in the dynamics of industrial development in the regions of Kazakhstan.

The novelty of the research consists in a quantitative assessment of the role of investment, fund renewal, innovation in a single model of industrial growth, institutional interpretation of the relationships obtained in terms of the time lags and regional specifics. The contribution of the research is a structured empirical hypothesis test to correction policy instruments.

The results clarify the priorities of modernisation and R&D, improve the mechanisms for synchronising investment and innovation policies, and provide targeted support to regions with institutional bottlenecks.

The article contains theoretical and methodological prerequisites, description of data and methods, results of correlation, regression analysis and visual analytics, institutional interpretation and discussion, conclusions and recommendations for economic policy development.

To quantify the interrelationships of industrial growth key factors in the Republic of Kazakhstan, a correlation and regression analysis was conducted based on data for 2017-2024, presented in Tables 1-4 and

Figures 1-4.

The following predictors are selected:

X_1 – investments in fixed assets (Table 2);

X_2 – commissioning of new fixed assets (Table 3);

X_3 – the volume of innovative product production (Table 4);

as a dependent variable, Y is the volume of industrial production (Table 1).

The choice of predictors is provided by their theoretical significance in the industrial growth model and confirmed by a preliminary analysis of the data.

Table 1 – Volume of industrial production (goods, services), by value (million, KZT)[1]

Region	2017	2018	2019	2020	2021	2022	2023	2024
The Republic of Kazakhstan	22 790 208	27 218 063	29 380 341	27 028 505	37 606 242	48 777 088	46 991 786	51 469 083
Akmola region	561 289	659 726	791 161	1 040 510	1 138 936	1 515 044	1 793 149	1 977 240
Aktobe region	1 597 085	1 865 976	1 856 761	1 595 499	2 247 442	2 827 312	2 544 949	2 833 892
Almaty region	795 683	892 772	1 009 815	1 246 533	1 500 789	1 651 713	1 753 148	1 930 456
Atyrau region	5 508 219	7 077 539	7 888 133	5 174 828	8 557 591	13 341 731	10 815 028	11 104 713
West Kazakhstan region	1 914 501	2 480 524	2 392 109	1 822 866	2 843 130	3 924 946	3 527 138	3 731 562
Zhambyl region	374 029	421 146	476 971	518 243	639 110	881 373	856 257	939 524
Karaganda region	2 318 440	2 519 789	2 620 992	2 965 669	4 353 606	3 865 349	3 531 680	4 113 712
Kostanay region	764 326	883 375	1 206 982	1 541 948	2 333 110	2 470 019	2 670 333	2 913 343
Kyzylorda region	731 408	941 395	852 146	653 270	808 579	977 984	1 043 543	1 100 284
Mangystau region	2 316 201	2 892 269	2 908 789	2 156 452	2 726 723	3 182 644	3 065 797	3 095 385
South Kazakhstan region	832 113							
Pavlodar region	1 778 385	1 984 949	1 988 957	2 117 002	2 783 335	3 230 473	3 157 697	3 513 708
North Kazakhstan region	240 530	243 039	263 575	315 516	394 666	519 686	674 861	714 237
East Kazakhstan region	1 581 530	1 860 098	2 153 903	2 400 350	2 763 416	2 217 698	2 319 999	2 657 831
Astana	573 927	646 674	884 345	1 184 455	1 543 914	1 972 354	1 933 017	2 569 685
Almaty	902 536	917 883	1 001 187	1 081 642	1 420 750	1 763 727	2 096 033	2 153 410
Shymkent		492 259	579 554	670 531	812 873	967 251	1 090 720	1 198 530

[1] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

Region	2017	2018	2019	2020	2021	2022	2023	2024
Turkestan region		438 643	504 953	543 184	738 264	907 944	1 054 754	1 278 283
Zhetisu region						297 397	325 226	358 892
Ulytau region						1 036 540	1 141 372	1 267 162
Abai region						1 225 894	1 597 075	2 017 223

Table 2 – Investments in fixed assets, fields of implementation (thousand, KZT)[2]

Region	2019	2020	2021	2022	2023	2024
The Republic of Kazakhstan	12.576.793.455	12.270.144.010	13.242.233.420	15.251.104.090	17.649.312.955	19.461.332.759
Akmola region	333.722.774	436.632.714	514.683.093	579.972.904	613.526.016	585.508.552
Aktobe region	598.864.111	648.036.184	817.135.802	960.038.538	1.025.761.687	910.842.275
Almaty region	647.330.718	682.407.156	733.425.671	613.940.487	737.743.410	1.017.661.274
Atyrau region	4.328.235.889	3.178.960.005	2.910.114.254	3.003.503.184	2.934.834.321	2.059.586.083
West Kazakhstan region	586.265.454	481.485.200	428.741.908	537.886.227	675.202.835	749.911.167
Zhambyl region	296.397.932	350.068.077	398.609.176	428.501.575	536.595.421	533.862.418
Karaganda region	811.432.734	692.347.518	796.866.367	724.917.845	876.522.542	1.456.700.866
Kostanay region	288.736.884	336.598.703	431.178.669	492.069.660	561.627.131	640.216.190
Kyzylorda region	400.208.745	292.344.162	308.941.474	413.284.091	513.730.912	673.703.713
Mangystau region	556.558.080	582.278.874	629.137.706	785.759.298	1.102.171.850	1.085.676.613
Pavlodar region	494.619.730	487.154.305	571.926.837	742.793.468	797.474.875	839.747.433
North Kazakhstan region	234.490.082	286.251.507	333.149.434	368.460.383	443.683.769	565.406.729
East Kazakhstan region	621.913.489	729.115.274	834.080.468	555.270.644	648.603.766	773.934.927
Astana	919.106.767	1.125.210.530	1.225.027.055	1.462.523.930	1.655.031.985	1.992.816.598
Almaty	820.448.723	976.794.888	1.187.619.882	1.407.989.996	1.803.183.330	2.069.933.449
Shymkent	194.958.322	278.737.026	462.481.709	549.617.823	661.740.269	768.155.483
Turkestan region	443.503.021	705.721.887	659.113.915	742.587.923	948.809.712	1.396.142.169
Zhetisu region				291.989.301	356.716.595	537.347.629
Ulytau region				175.499.451	228.961.647	244.438.815
Abai region				414.497.362	527.390.882	559.740.376

[2] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

Table 3 – Commissioning of new fixed assets (thousand, KZT)[3]

Region	2019	2020	2021	2022	2023	2024
The Republic of Kazakhstan	7.710.033.342	7.966.175.357	9.895.405.868	9.171.647.893	20.855.397.418	23.542.941.118
Akmola region	317.272.761	357.829.377	375.440.328	524.412.801	504.125.826	360.110.412
Aktobe region	430.689.725	329.919.543	482.254.648	516.824.713	553.943.368	488.541.675
Almaty region	488.397.432	377.988.429	392.055.089	321.635.548	576.514.621	512.072.628
Atyrau region	1.453.603.470	1.271.061.565	1.965.932.288	828.413.999	10.285.907.842	11.779.704.973
West Kazakhstan region	375.703.027	226.443.282	198.492.287	582.107.746	319.938.311	434.656.927
Zhambyl region	164.446.509	229.233.687	278.895.555	276.251.450	433.653.085	426.844.808
Karaganda region	653.623.850	489.209.863	575.832.399	393.832.191	409.967.579	742.751.567
Kostanay region	203.891.419	224.402.773	279.039.019	320.288.304	458.635.471	399.367.627
Kyzylorda region	298.941.395	283.196.262	179.679.129	221.409.482	274.757.049	372.853.954
Mangystau region	387.136.749	563.584.892	682.385.252	437.098.334	450.850.490	768.563.279
Pavlodar region	338.568.171	439.028.009	400.620.586	490.144.898	433.158.466	656.034.147
North Kazakhstan region	182.054.044	265.882.292	267.213.006	270.697.013	331.798.509	376.937.761
East Kazakhstan region	393.427.403	448.143.308	872.865.491	338.823.328	380.440.382	451.110.105
Astana	806.887.233	945.887.612	1.120.870.678	1.206.250.675	1.749.891.997	2.221.357.463
Almaty	711.084.205	733.504.129	948.818.868	991.065.775	1.575.434.158	1.551.530.030
Shymkent	150.890.346	224.041.487	306.605.832	383.287.833	582.896.625	574.270.337
Turkestan region	353.415.603	556.818.847	568.405.413	484.681.760	903.128.323	800.482.342
Zhetisu region				151.424.498	191.679.856	194.602.112
Ulytau region				72.316.894	111.605.522	106.645.033
Abai region				360.680.651	327.069.938	324.503.938

Table 4 – Total volume of innovative products (goods and services) (thousand, KZT)[4]

Region	2017	2018	2019	2020	2021	2022	2023	2024
The Republic of Kazakhstan	844.734,9	1.064.067,4	1.113.566,5	1.715.500,1	1.438.708,5	1.879.123,1	2.399.758,1	1.838.998,4
Akmola region	15.721,9	25.644,6	17.793,0	56.366,5	112.279,2	252.818,1	235.024,4	113.133,9
Aktobe region	39.442,0	44.299,9	51.421,7	59.026,1	86.445,2	85.005,2	90.889,2	77.278,1
Almaty region	12.624,2	18.351,2	20.443,6	59.571,0	66.339,0	54.262,5	43.905,6	94.553,5
Atyrau region	5.768,0	8.819,8	7.536,3	402.420,3	40.422,1	18.036,5	70.439,7	107.209,5
West Kazakhstan region	18.122,1	23.398,7	24.713,4	21.671,3	19.774,1	19.753,0	26.068,0	29.384,0

[3] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

[4] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

Region	2017	2018	2019	2020	2021	2022	2023	2024
Zhambyl region	50.854,7	66.782,3	77.092,5	67.430,7	77.650,2	60.765,9	36.212,4	37.971,8
Karaganda region	32.048,0	54.778,0	74.007,0	145.720,6	246.050,8	224.972,6	271.601,2	124.392,5
Kostanay region	91.502,6	124.014,9	211.088,3	349.012,4	378.988,5	528.652,6	898.777,3	580.272,8
Kyzylorda region	5.505,8	6.401,7	16.425,2	19.925,7	33.111,2	42.355,7	54.795,7	95.247,0
Mangystau region	294.9	651.0	7.971,3	5.317,2	4.233,2	8.522,9	12.668,3	9.426,1
South Kazakhstan region	125.231,6							
Pavlodar region	177.881,5	250.032,0	44.503,7	96.984,4	97.164,0	115.194,9	122.689,6	124.419,3
North Kazakhstan region	13.804,9	9.396,5	8.652,1	26.066,0	25.196,4	82.386,6	117.152,3	131.662,9
East Kazakhstan region	80.472,0	174.068,8	223.618,8	116.747,0	37.549,2	58.127,5	18.385,7	24.840,3
Astana	149.277,5	112.146,2	129.468,7	67.314,0	41.456,4	33.090,5	38.433,3	57.755,2
Almaty	26.183,3	30.228,4	48.948,4	56.491,2	62.846,8	118.191,7	146.822,9	165.007,7
Shymkent		101.678,0	136.084,8	150.588,3	95.024,9	28.116,6	27.718,6	42.243,8
Turkestan region		13.375,7	13.797,5	14.847,6	14.177,3	27.421,6	17.720,0	14.448,7
Zhetisu region						27.662,4	25.968,4	3.200,1
Ulytau region						983.8	71.060,7	x
Abai region						92.802,7	73.424,7	6.044,3

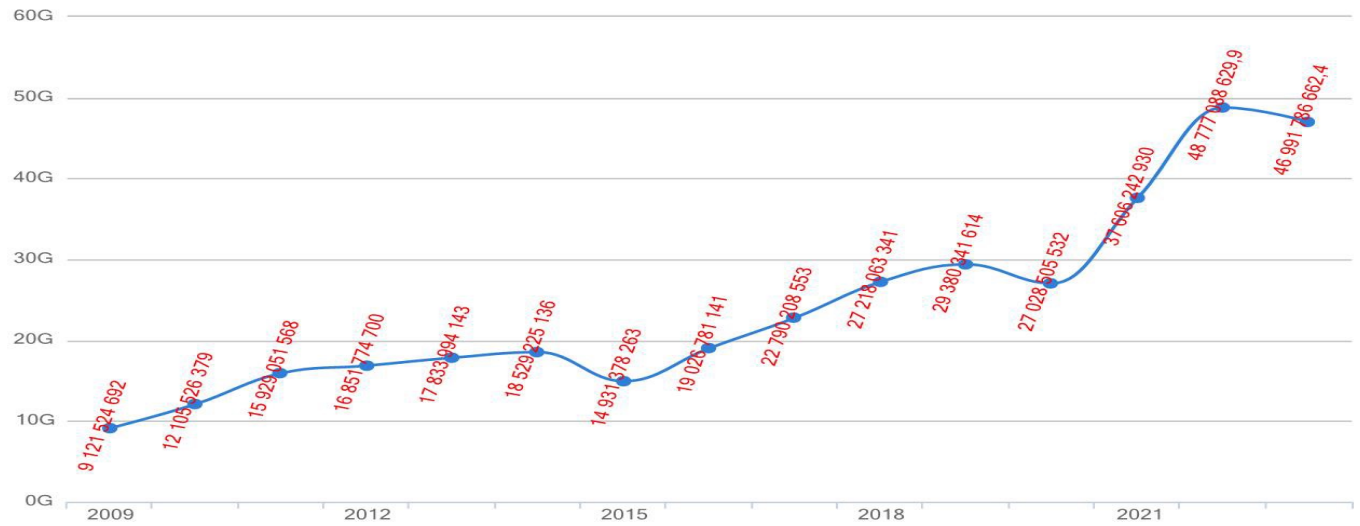


Figure 1. The volume of industrial products (goods, services) production, in value terms

Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[5]

[5] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru /*

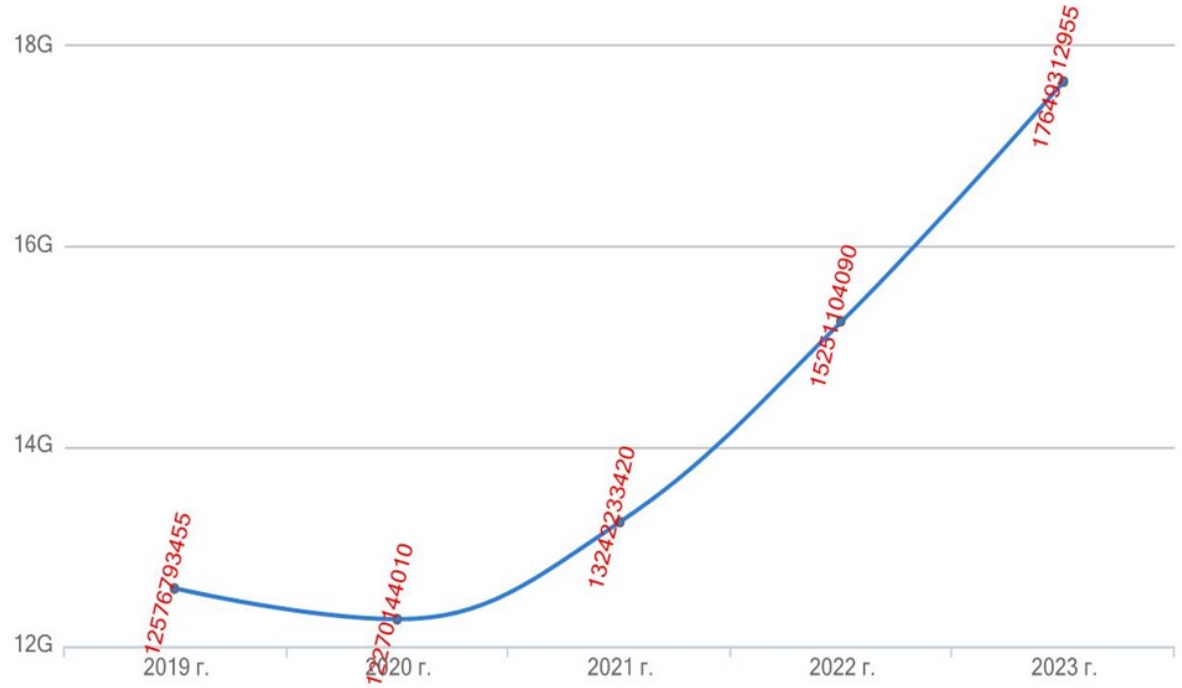


Figure 2. Indicator: Investments in fixed assets by the fields of implementation
Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[6]

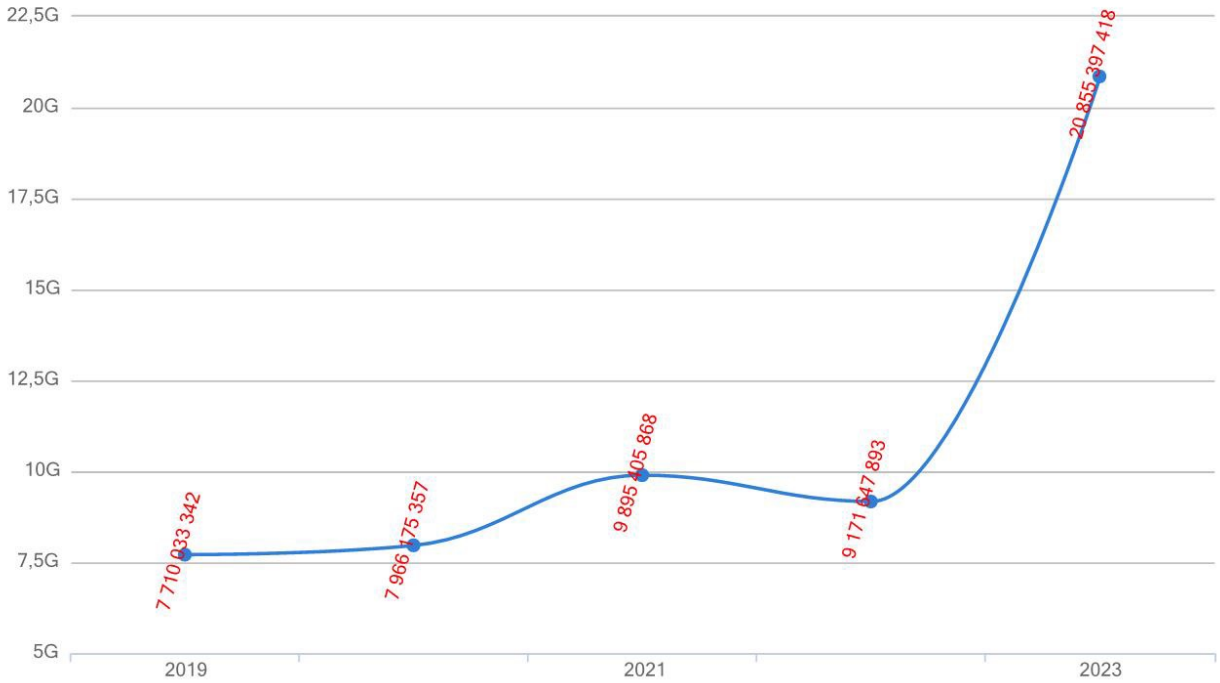


Figure 3. Commissioning of new fixed assets
Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[7]

(accessed on 02.02.2026).

[6] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

[7] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

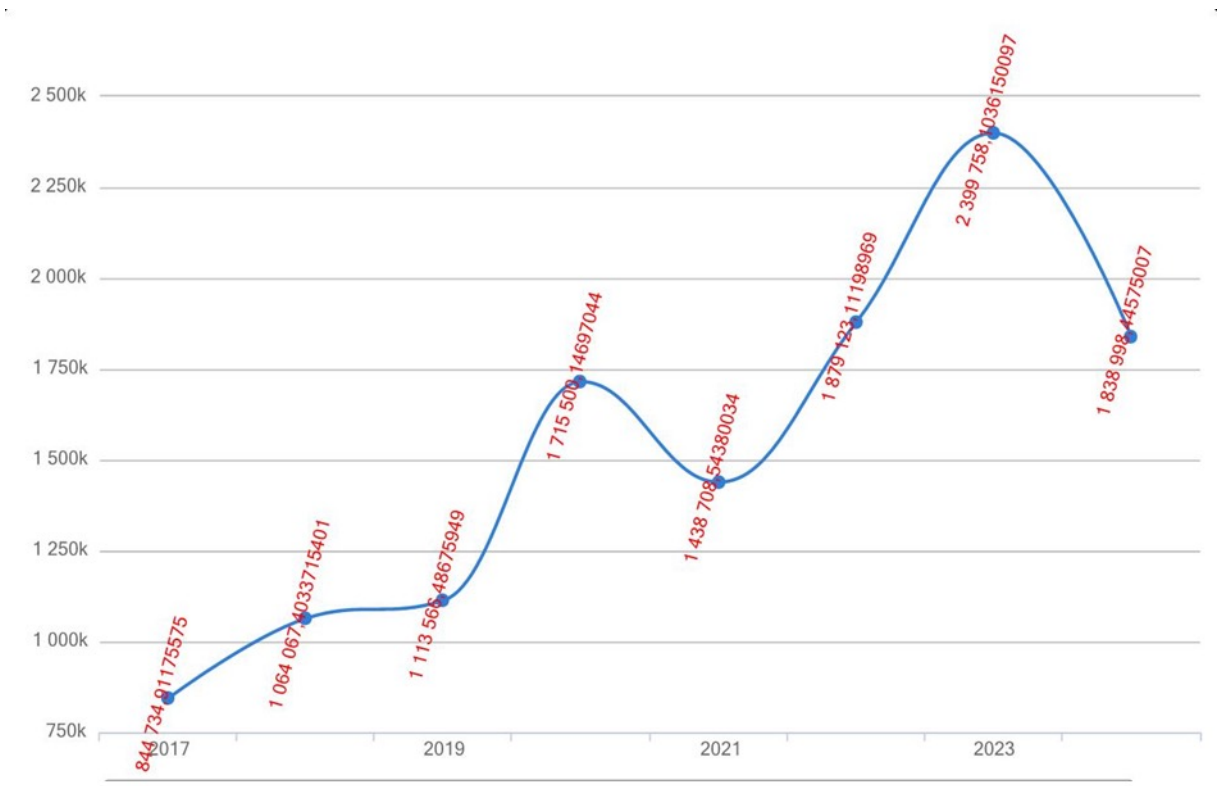


Figure 4. Total volume of innovative products (goods and services)
Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[8]

Main part

The study of the interrelationships between macroeconomic indicators – investments, industrial production, the introduction of new fixed assets, and innovative products – ensures a descriptive analysis to a structural understanding of economic growth. The data obtained provide a basis for diagnosing the current state of the industrial sector and identifying points of institutional tension. The correlation analysis is complemented by visual analytics and strategic interpretation for multidimensional interpretation of statistical dependencies. The section presents the results of correlation coefficients calculations, their interpretation, and identification of the economic logic of their relationships. It agrees with previously published studies [1-30]. However, it generalises the methodological base.

The authors proposed the following models of correlation analysis (Models 1,2,3) and model of multiple linear regression (Model 4). The results are shown in in Tables 5 and 6.

Model 1. Paired linear correlation (Pearson)

Variables: Y – the volume of industrial production (Table 1, Figure 1); X_1 – investments in fixed assets (Table 2, Figure 2).

Objective: to assess the degree of linear dependence of industrial production on the level of investment.

Hypothesis: H_1 – an increase in investment is statistically significantly associated with an increase in industrial production (the expected sign is positive).

Estimate: r = 0.8738; p-value < 0.01; the relationship is strong and significant (Figure 3, Table 5).

Model 2. Paired linear correlation (Pearson)

Variables: Y – volume of industrial production (Table 1, Figure 1); X_2 – commissioning of new fixed assets (Table 3, Figure 4).

[8] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

Objective: to identify the relationship between the renewal of production facilities and industrial production.

Hypothesis: H_2 – modernisation of funds positively correlates with industrial production.

Estimate: r = 0.3991; p-value > 0.05; the relationship is moderate, requires clarification with lags (Figure 5, Table 5).

Model 3. Paired linear correlation (Pearson)

Variables: Y – the volume of industrial production (Table 1, Figure 1); X_3 – the volume of innovative products (Table 4, Figure 6).

Objective: to assess the impact of innovation activity on industrial production.

Hypothesis: H_3 – the growth of innovative products is accompanied by an increase in industrial production.

Estimate: r = 0.7976; p-value < 0.01; the relationship is strong, but requires regression testing with a small number of observations (Figure 7, Table 5).

Hypothesis: H4 – The combined impact of investments in fixed assets, the commissioning of new fixed assets, and the volume of innovative products significantly affects the volume of industrial production in Kazakhstan. The regions with high indicators in three factors demonstrate steady growth in industrial production. It is confirmed by an increase in production volumes by value. On the contrary, regions with low indicators of these factors have lower industrial development and production volumes (Figure 8).

We calculate the correlation models based on the data in Tables 1-4 and summarise the results in Table 5.

Table 5 – Correlation analysis of industrial production volume (goods, services), investments in fixed assets, commissioning of new fixed assets, and the volume of innovative products of the Republic of Kazakhstan

Indicator 1	Indicator 2	Correlation coefficient, r	Interpretation
Investments in fixed assets by the fields of implementation (2019-2024)	Volume of industrial production (goods, services), by value	0.8738	Strong positive correlation; investment growth is accompanied by an increase in industrial production
Volume of industrial production (goods, services), by value (2019-2024)	Commissioning of new fixed assets	0.3991	Moderate positive correlation; the increase in production is partly due to the modernisation of production assets
The total volume of innovative products (goods and services) (2017-2024)	The volume of production of industrial products (goods, services)	0.7976	Strong positive correlation; innovative products have a stable impact on the industrial sector

Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[9]

Table 5 shows the results of three correlation analyses:

1. The difference between investment and industrial production: r = 0.8738 indicates a strong direct relationship. Each increase in investment is accompanied by a proportional increase in output. The investments are the main drivers of industrial development.

[9] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

2. Between the volume of production and the introduction of new fixed assets: r = 0.3991. It is a moderate connection. The growth of industrial production stimulates indirect modernisation of funds. There is a structural lag between production activity and equipment upgrades.

3. Between the volume of innovative products and industrial output: r = 0.7976. The correlation is high. Innovation activity has a steady impact on production growth. The effect is particularly high in the high-tech and manufacturing sectors. The innovations enhance the multiplicative effect of investments.

These dependencies are consistent with the provisions of the theory of endogenous growth. According to the theory, the internal factors are investment and technological renewal. Moreover, innovations provide the economic development. Additionally, the research results agree with the Cobb-Douglas production function. According to it, industrial production depends on a combination of capital and technological factors. The gap between high investment and the limited effect of fund renewal and R&D requires institutional incentives aimed at increasing returns on investment.

Figure 5. Correlation of the volume of industrial products (goods, services) of production, by value, and investments in fixed assets by the fields of implementation

Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[10]

Figure 6. The volume of industrial products (goods, services) production by value, and the commissioning of new fixed assets

Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[11]

[10] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).*

[11] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and*

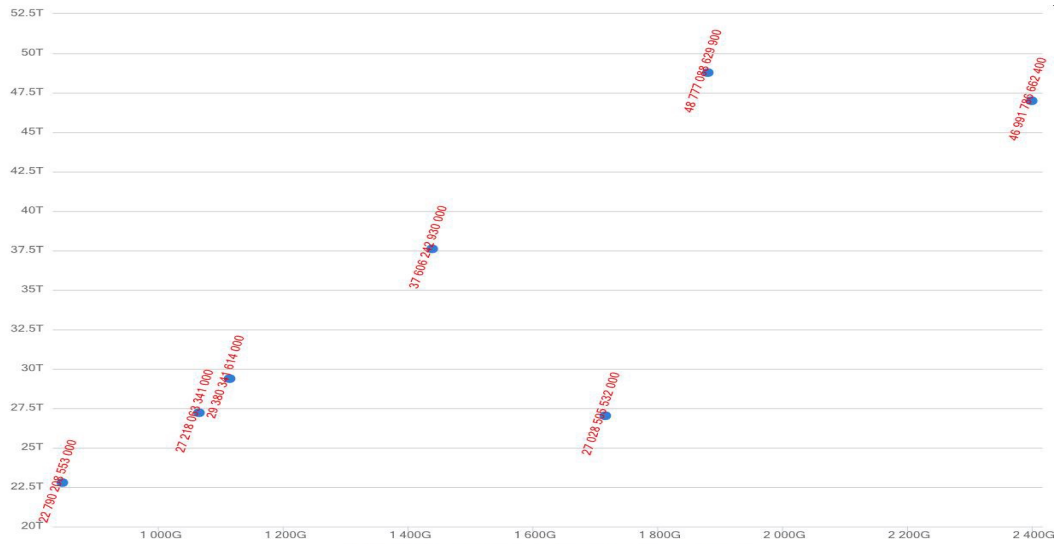


Figure 7. The total volume of innovative products and the volume of industrial production (goods, services)
Source: Indicators of industrial and innovative development of the Republic of Kazakhstan, 2000-2024[12]

Table 6 – Identified internal and external problems and recommendations for their elimination

Identified internal problems	Recommendations
Low level of investment growth in fixed assets	Increasing the financing of infrastructure projects, attracting private investment through public-private partnerships
Weak correlation between investment and industrial production	Strength the project effectiveness of investments, implementation of a post-investment control system, monitoring and analysis of costs
Inconsistent commissioning of new fixed assets	Development of a clear schedule for equipment modernisation, set of the priorities for investments in the renovation of fixed assets
Shortage of institutional incentives for industrialisation	The optimisation of fiscal policy, increasing the role of public and private programs to support small and medium-sized businesses, providing tax and customs preferences for manufacturers
Insufficient contribution of innovative products to the growth of industrial production	The promotion of R&D, stimulation of innovation in enterprises, integration of science and business, and start of industrial startups
Low level of technological renewal in regional industries	Digitalization and automation programs, establishing the industrial zones to attract investments and modern technologies
Weak correlation between funding and industrial growth rates	The mechanisms for coordinating investment and production planning, implementation of technologies for tracking investment flows
Absence of a systematic approach to estimating the effectiveness of capital investments	Development of a unified methodology for assessing the return on investment in fixed assets, establishment of systems for real-time investment analysis and monitoring

Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026).

[12] *Indicators of industrial and innovative development of the Republic of Kazakhstan (2000-2024). Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. Bureau of National Statistics. Source: https://stat.gov.kz/api/iblock/element/113866/file/ru / (accessed on 02.02.2026)*

Identified internal problems	Recommendations
Low international competitiveness of individual regions	Implementation of a strategic planning system based on the analysis of international experience, activation of foreign trade, and promotion of domestic goods to foreign markets
Low diversification of sources of foreign investment	Expanding the geography of foreign investment, developing trade with key partners, and attracting foreign investors to high-tech industries
Instability of external economic conditions	Development of anti-crisis measures, establishing the reserve funds to protect against economic fluctuations, strengthening trade and investment relations with key partners
Inefficient use of export potential	Improving the quality and competitiveness of products, establishing export clusters, and increasing government support for exporters
Excessive dependence on foreign technologies and equipment	Development of own production facilities for the production of high-tech products, support for domestic developments and start-ups in the field of high technologies
Insufficient integration into global supply chains	The development of logistics infrastructure, establishing the partnerships with international companies, implementation of standards are the international requirements

Source: Authors

Therefore, improvement of the investment climate, quality and competitiveness of products on the foreign market, optimisation of investment and production processes within the country are relevant.

Conclusion

The research involves a comprehensive analysis of the interrelationships between investments in fixed assets, the introduction of new fixed assets, the volume of innovative products, and industrial production in Kazakhstan, 2017-2024. The results showed a strong correlation between investment and industrial production ($r = 0.8738$), a moderate relationship between the introduction of new funds and production ($r = 0.3991$), and a high importance of the innovation component ($r = 0.7976$). The multiple regression model shows the positive impact of a combination of factors; a lag effect of investments within 1-2 years.

The results confirmed the existence of a close positive relationship between investments in fixed assets and the volume of industrial production in Kazakhstan ($r = 0.8738$, $p < 0.01$). It agrees with the results by E.V. Tinkova and V.A. Dikareva [2] on the growth of investment activity is a key indicator of industrial development. The established relationship between the commissioning of new fixed assets and industrial production ($r = 0.3991$, $p < 0.05$) demonstrates a moderate influence. It agrees with the results by of N.Yu. Shadchenko and M.A. Belmesov [4] on increasing the efficiency of long-term capital investments growth.

The significant role of innovative products ($r = 0.7976$, $p < 0.01$) confirms the thesis that innovations are an independent factor in industrial development. It agrees with the research results by A.V. Sinitsyn & V.V. Kopein [3], D.G. Rodionov & D.A. Alferyev [8] on the interdependence of the investment process and the innovative activity of enterprises. Moreover, the identified asynchronous effect of investments with a time lag of 1-2 years correlates with the concept by M.V. Kulikov [28] on the role of the institutional environment in slowing down the implementation of capital investments.

The novelty of the analysis is in the integration of the innovation factor into a single model of industrial growth. The scientists O.S. Sukhareva [1] and L.I. Tenkovskaya [20] focus on macroeconomic trends and the general investment environment. However, this particular research offers quantitative evidence of the complex impact of investments, renovation of fixed assets, and innovations.

The practical significance of the results is their implementation as a basis for state industrial policy formation. Moreover, the conclusions confirm the expediency of synchronising investment programs with

measures to stimulate R&D. It correlates with the proposals of T.A. Salimova et al. [18] on consideration of the innovation clusters as a strategic factor in industrial development.

The limitation of the research is the use of aggregated macroeconomic data. It prevent us to assess the industry specifics and differences in dynamics of large and small enterprises. Moreover, a time lag of 1-2 years requires more in-depth modelling, including the use of panel data and distributed lag estimation methods, similar to L.I. Nivorozhkina et al. [29].

Promising areas for further research are as follows: expanding an analysis time horizon to confirm identified relationships sustainability; industrial and regional samples to identify differences in the dynamics of industrial development; additional factors, i.e. human capital (A.O. Bulina et al. [17]) and digitalization of production processes (A.G. Serebrennikov et al. [15]); the development of scenario models for predicting industrial growth under the influence of external economic factors.

Hence, research results serve to the development of economic analysis of industrial growth theory and practice, confirm the importance of integrated accounting of investments, innovations and renewal of production assets, and provide new trends for interdisciplinary research in terms of institutional economics and industrial policy.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTION

Zhanna R. Ashimova – conceptualization, project administration, writing – original draft.
Amina M. Uristembek – writing – review & editing.
Zhanay Z. Abitov – investigation.
Diana Z. Abitova – formal analysis.

References

1. Sukharev, O. S. (2019). Macroeconomic problems of Russia's growth and national projects. *Problemy teorii i praktiki upravleniya*, (7), 17-33 (in Russian).
2. Tinkova, E. V., & Dikareva, V. A. (2020). Investments in fixed assets as an indicator of investment activity in industry. *Ekonomika i predprinimatel'stvo*, 1(114), 755-760 (in Russian).
3. Sinitsyn, A. V., & Kopein, V. V. (2019). The relationship between the investment process and innovation as an aspect of investment attractiveness and financial security of the region. *Ekonomika i predprinimatel'stvo*, 1(102), 310-315 (in Russian).
4. Shadchenko, N. Yu., & Belmesov, M. A. (2024). Investments as a source of economic growth and their socio-economic efficiency. In: *Sbornik materialov Vserossijskoj nauchno-prakticheskoj konferencii. Saratov*. (pp. 119-121). Saratov (in Russian).
5. Chebotarev, S. S., & Gimadeev, A. D. (2021). Taking into account the influence of economic factors on the cost of capital-intensive products. *Industrial'naya ekonomika*, 4(2), 121-133 (in Russian).
6. Khairov, B. G., & Zotina, P. S. (2020). Barriers to export of Russian high-tech, innovative and other. *Ekonomika i upravlenie: problemy, resheniya*, 12(108), 104-109 (in Russian).
7. Chuprov, S. V. (2023). Analytical design of the regulator for ensuring the optimality and stability of the reserve of innovative industrial products. *Sistemnyy analiz i matematicheskoye modelirovaniye*, 5(1), 45-56 (in Russian).
8. Rodionov, D. G., & Alfer'yev, A. D. (2020) Sustainability of the optimal plan of innovative production of an industrial enterprise. *Zhurnal Sankt-Peterburgskogo gosudarstvennogo politekhnicheskogo universiteta. Ekonomika*, 13(5) 106–119. DOI: 10.18721/JE.13508 (in Russian).

9. Aleshkov, A. V., Burik, M. V., & Ivashkin, M. V. (2022). Formation of value proposition of innovative food products based on perceived value. *Vestnik Tihookeanskogo gosudarstvennogo universiteta*, 3(66), 111-122 (in Russian).

10. Birzhanova, A., Nurgalieva, A., Nurmagambetova A., Dincher N., & Yuksel S. A. (2024). Neuroquantic approach to decision-making for investors' perception of investments in "green" and traditional bonds. *Investicionnyj menedzhment i finansovye innovacii*, 21(1), 168-184.

11. Kuanyshbayeva, S. (2025). Integration of spatial planning and land-use management in the interests of sustainable development. *International Journal of Sustainable Development and Planning*, 20(3), 1337-1343. Retrieved from http://iieta.org/journals/ijsdphttps://iieta.org/journals/ijsdp/paper/10.18280/ijsdp.200339

12. Dubovik, M., Dmitriev, S., & Aitkazina, M. (2025). The impact of the gross regional product per capita on the processes of convergence between different regions of the country. *Kubakhan Academic Journal*, 4(4), 1237-1243. https://doi.org/10.48161/qaj.v4n4a931.https://iieta.org/journals/ijsdp/paper/10.18280/ijsdp.200339

13. Baitursunov, A. (2025). Key factors influencing the growth of small and medium-sized businesses in emerging economies: the example of entrepreneurship in Kazakhstan and the challenges of sustainable development. *Entrepreneurship and Sustainability Issues*,12(4). Retrieved from http://jssidoi.org/jesi

14. Cherevko, V. E. (2024). The military-industrial complex as a factor in the growth of the national economy. *Ekonomika i biznes: teoriya i praktika*, 7(113), 222-225 (in Russian).

15. Serebrennikov, A. G., Rusakov, D. S., Tonyavina, E. V., Matveeva, O. G., & Stepanishcheva, M. V. (2024). Industrial Internet of Things in technologies of digital transformation of sources of economic growth. Molodaya mysl': nauka, tekhnologii, innovacii. In: *Materialy XVI(XXII) Vserossijskoj nauchno-tekhnicheskoj konferencii studentov, magistrantov, aspirantov i molodyh uchenyh. Bratsk*. (pp. 225-227). Bratsk. (in Russian).

16. Yurenkov, H. (2024). The military-industrial complex as a factor of socio-economic growth. Izvestiya Saratovskogo universiteta. *Novaya seriya. Seriya: Sociologiya. Politologiya*, 24(4), 404-409 (in Russian).

17. Bulina, A. O., Mozgovaya, K. A., & Pakhnin, M. A. (2020). Human capital in economic growth theory: Classical models and new approaches. *Vestnik Sankt-Peterburgskogo universiteta. Ekonomika*, 36(2), 163-188 (in Russian).

18. Salimova, T. A., Guskova, N. D., Krakovskaya, I. N., Biryukova, L. I., Ivanova, I. A., & Bazarnova, E. S. (2023). *The concept of ensuring sustainable competitiveness of innovative cluster formations in the industry of the Russian Federation in the context of societal challenges 5.0.* Saransk: Individualnyy predprinimatel Afanasyev Vyacheslav Sergeyevich (in Russian).

19. Mirsaidov, A. B., & Murtazoev, O. K. (2020). Mechanisms of formation and development of innovative regional industrial systems in the Republic of Tajikistan. *Internet zhurnal "Naukovedeniye"*, (8). Retrieved from https://naukovedenie.ru/issues.php (in Russian).

20. Tenkovskaya, L. I. (2022). Macroeconomic trends in Russia shap- ing the investment and business environment. *Vestnik Omskogo universiteta. Seriya "Ekonomika"*, 20(3), 48-64. DOI: 10.24147/1812-3988.2022.20(3) (in Russian).

21. Alpatova, E. S. (2021). Stages of economic growth in Russia and its prospects. In the collection: Current socio-economic problems of the development of society in Russia and abroad. In: *Sbornik materialov III Vserossijskoj nauchno-prakticheskoj konferencii s mezhdunarodnym uchastiem. Volgograd*. (pp. 625-629). Volgograd (in Russian).

22. Lubkova, E. M., Kosinsky, P. D., Ganieva, I. A., Osokina, N. V., Kleshchevsky, Yu. N., Merkuryev, V. V., Shelkovnikov S. A., Zhernov, E. E., Mikhailov, V. G., Kumaneeva, M. K., Ermolaeva, G. S., Zubova, A. V., Duletbaev, A. A., & Myagkov, E. V. (2023). *Industria leconomics: theoretical and methodological foundations of development.* Kemerovo: Kuzbasskiy gosudarstvennyy tekhnicheskiy universitet imeni T.F. Gorbacheva (in Russian).

23. Sharokhina, S. (2021). Economic growth and economic development: a conceptual framework. In: *Nauchnye issledovaniya v sovremennom mire. Teoriya i praktika. sbornik izbrannyh statej Vserossijskoj (nacional'noj) nauchno-prakticheskoj konferencii. St. Petersburg*. (pp. 167-169). St. Petersburg (in Russian).

24. Afanasyeva, E. V., & Tregub, I. V. (2023). Qatar's economic development and the factors of its growth. *Vestnik RMAT*, (2), 27-30 (in Russian).

25. Tolstykh, T. O., & Shatsky, A. A. (2022). Model for assessing and forecasting the dynamics of the industrial development of the region. *Region: sistemy, ekonomika, upravlenie*, 4(59), 191-196 (in Russian).

26. Isaeva, N. S. (2021). Influencing factors and tools on the sustainable development mechanism of industrial enterprises. *Nauka i praktika Rossijskogo ekonomicheskogo universiteta im. G.V. Plekhanova*, 13(2-42), 92-104 (in Russian).

27. Melyantsev, V. A., & Adrova, I. S. (2021). Main factors of economic growth in Indonesia – the fourth economy of Asia. *Vestnik Instituta ekonomiki Rossijskoj akademii nauk*, (1), 86-106 (in Russian).

28. Kulikov, M. V. (2024). Institutional Foundations for the Formation of a Resource-Innovative Model for the Development of the Economy of Russia and Its Regions. Izvestiya Yugo-Zapadnogo gosudarstvennogo universiteta. *Seriya: Ekonomika. Sotsiologiya. Upravleniye*, 14(1), 154-163. https://doi.org/10.21869/2223-1552-2024-14-1-154-163(in Russian).

29. Nivorozhkina, L. I., Ivanchenko, I. S., Bondarenko, G. A., & Pavlenko, G. V. (2024). Modeling the impact of investment dynamics on economic growth in the Russian Federation based on hidden Markov chain models. *Uchet i statistika*, 21(3), 128-140 (in Russian).

30. Kupriyanov, A. N. (2023). Formation of institutions for the innovative development of the regional socio-economic system in the context of the formation of a spatial economy. In: *Ekonomicheskoe razvitie Rossii: vyzovy i vozmozhnosti v menyayushchemsya mire. Materialy Mezhdunarodnoj nauchno-prakticheskoj konferencii. Krasnodar.* (pp. 132-138). Krasnodar (in Russian).

Received 19.01.2026
Revised 22.02.2026
Accepted 22.03.2026

Jraic.com
JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS 2026; 7(1):65-78

'Besides' view on the strategic plans for the socio-economic development of the Russian Federation in terms of the international competitiveness

Alexey V. Tebekin

ORIGINAL ARTICLE

Doctor of Technical Sciences, Doctor of Economics, Professor
M.V. Lomonosov Moscow State University, Moscow, Russian Federation
E-mail: tebekin@gmail.com

Abstract. The target-setting and strategic planning play an important role in the strategic development of any socio-economic system. In this regard, to achieve the national development goals of the Russian Federation for the period up to 2030 and for 2036, it is necessary to consider the strategic plan for their achievement. It contains in the Unified Plan for Achieving the National Development Goals of the Russian Federation up to 2030 and for 2036, approved by the Government of the Russian Federation. To analyse the Unified Plan for achieving the national development goals of the Russian Federation, we implement the tool of the 'visual system' of strategic management in terms of increasing the country's international competitiveness. The purpose of the research is to use the 'view' tools in addition to the 'visual system' of strategic thinking of strategic management entrepreneurship theory to analyse strategic plans for the socio-economic development of the Russian Federation in terms of the increasing the country's international competitiveness. The scientific novelty of the results obtained concerns with a new interpretation of the view of the 'besides visual system' of strategic thinking. We expanded those in terms of assessment the planned strategic development of a managed system by its environment. This concept exists at strategic management theory and concerns with an assessment of the ratio of 'pros' and 'cons' that indirectly arise during the implementation of the strategic development of the managed system, and country international competitiveness. The practical significance of the results obtained is the application of the 'besides' view of the 'visual system' of strategic thinking both in the formation of national development strategies and in assessment results of the implementation of these strategies in terms of the international competitiveness.

Keywords: strategic plan; socio-economic development of the Russian Federation; international competitiveness; strategic thinking

JEL codes: D24, E24, J24, O47

DOI: 10.52957/2782-1927-2026-7-1-65-78

For citation: Alexey V. Tebekin. (2026). 'Besides' view on the strategic plans for the socio-economic development of the Russian Federation in terms of the international competitiveness. *Journal of regional and international competitiveness*, 7(1), 65.

Introduction

The target-setting and strategic planning play an important role in the strategic development of any socio-economic system. In this regard, to achieve the national development goals of the Russian Federation for the period up to 2030 and for 2036, it is necessary to consider the strategic plan for their achievement. It contains in the Unified Plan for Achieving the National Development Goals of the Russian Federation up to 2030 and for 2036, approved by the Government of the Russian Federation[1].

To analyse a Unified plan for achieving the national development goals of the Russian Federation, we implement the tool of the 'visual system' of strategic management [9] (Fig.1), through the prism of increasing the level of country international competitiveness. Its modified is presented in Fig.2 [18].

[1] *Garant. (2026). The Unified plan for achieving the national development Goals of the Russian Federation until 2030 and 2036 (approved by the Government of the Russian Federation). Source: https://www.garant.ru/products/ipo/prime/doc/411156963/ (accessed on 01.02.2026).*

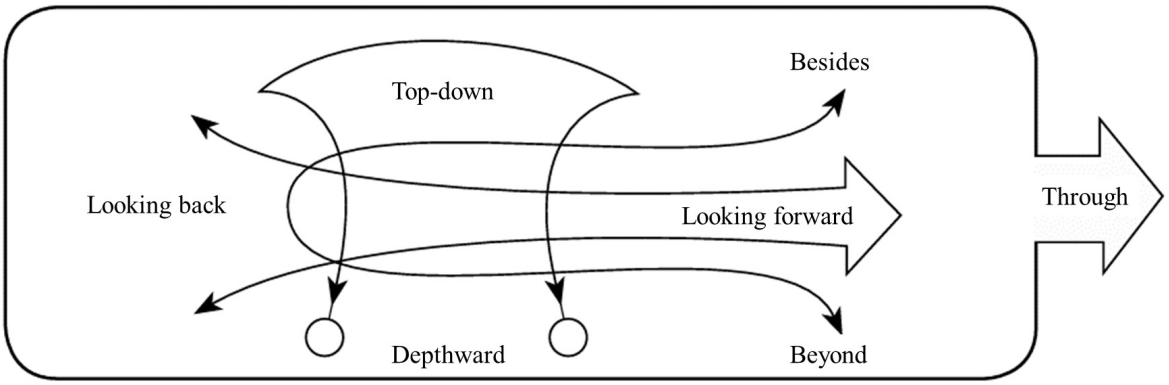


Figure 1. The model of the 'visual system' as a tool of strategic thinking, formulated by J. Nasi within the framework of strategic management entrepreneurship theory

Source: Author

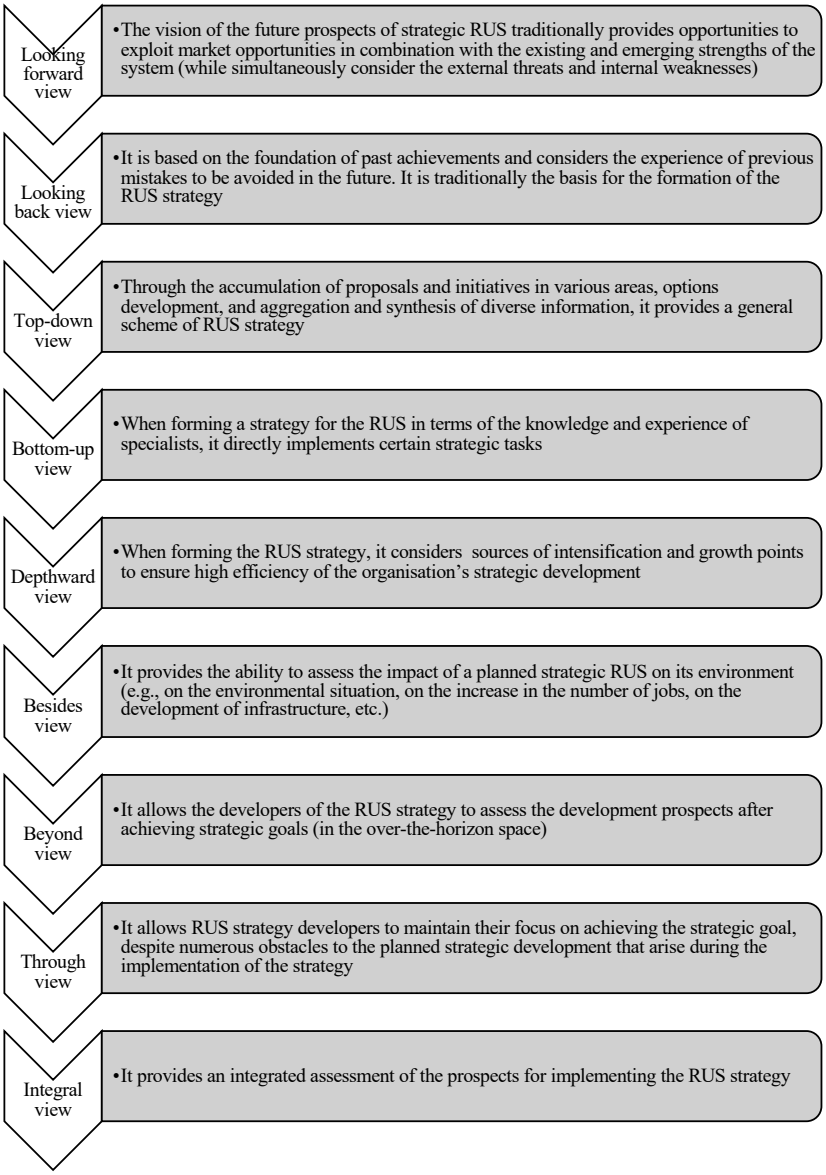


Figure 2. The 'visual system' modified by the author as a tool of strategic thinking, formulated by J. Nasi, within the framework within the framework of strategic management entrepreneurship theory, complemented by the 'bottom-up' and the 'integral' views

Source: Author

The urpose of the research is the integration of the 'view' tool into the 'visual system' of strategic thinking of the School of Entrepreneurship of strategic management to analyse strategic plans for the socio-economic development of the Russian Federation through increasing the country's international competitiveness.

The methodological basis of the research consists of:

- scientific works to develop the provisions by J. Schumpeter [11]. They are as follows: Bennis W., Namus B. [1], Drucker P. [3], Collins J., Porras J. [2], Land E. [5], McCleland D. [6], Mintzberg G., Waters J. [8], Palich L., Bagby R. [10], Stacy R. [12], Westley F., Mntsberg G. [14], Harbison F., Myers K. [4], etc. They are collected in 'Strategic Safari' by Ahlstrand B., Lampel J. and Mintsberg G. [16];
- scientific papers describing the classical model of the 'visual system' of scientific entrepreneurial, and strategic management [7,9,16];
- author's works on the 'visual system' of strategic management education in modern business conditions [15-17], etc.

Main part

The presented research is a logical continuation of the author's research on the tools of the 'visual system' of strategic thinking in the entrepreneurship of strategic management, including:

- looking back view;
- looking forward view;
- top-down view;
- bottom-up view;
- integral view;
- proactive view [15-17].

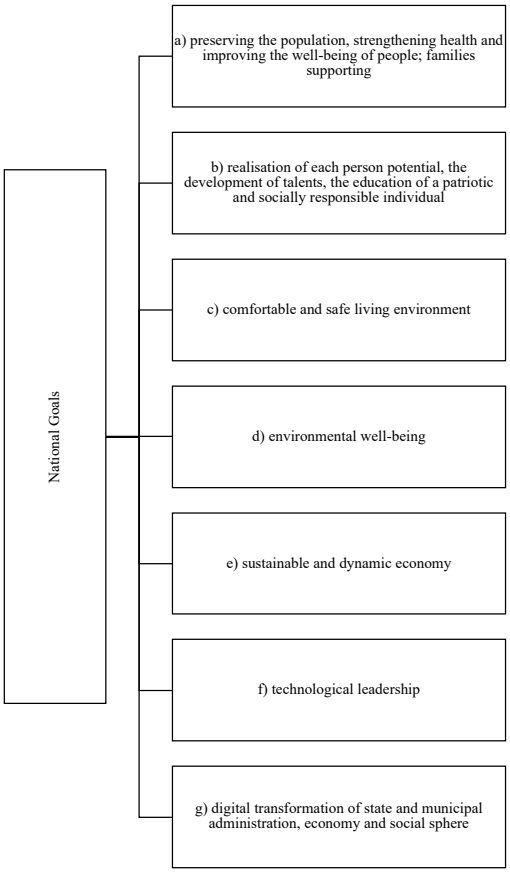


Figure 3. The National Development Goals of the Russian Federation for the period up to 2030 and for 2036

Source: Decree of the President of the Russian Federation on 07.05.2024 No. 309 [2]

[2] *Decree of the President of the Russian Federation on 07.05.2024 No. 309. «On the national Development Goals of the Russian Federation for the period up to 2030 and for 2036». Source: http://publication.pravo.gov.ru/document/0001202405070015 (accessed*

The 'besides' view is a significant component of the 'visual system' as a tool for strategic thinking (Fig.1). It helps to analyse additional effects (both positive – the emerging potential for further development, and negative – 'side effects') of the implementation of any strategic plans. This research focuses on considering strategic plans for the socio-economic development of the Russian Federation until 2030 and for 2036[3]. Indeed, its goals are defined by Decree of the President of the Russian Federation on 07.05.2024 No. 309[4] (Fig. 3).

The analogies were drawn between the content of the National Development Goals of the Russian Federation for the period up to 2030 and for 2036 (Fig. 3) and the directions of international research of countries and regions (Fig.4).

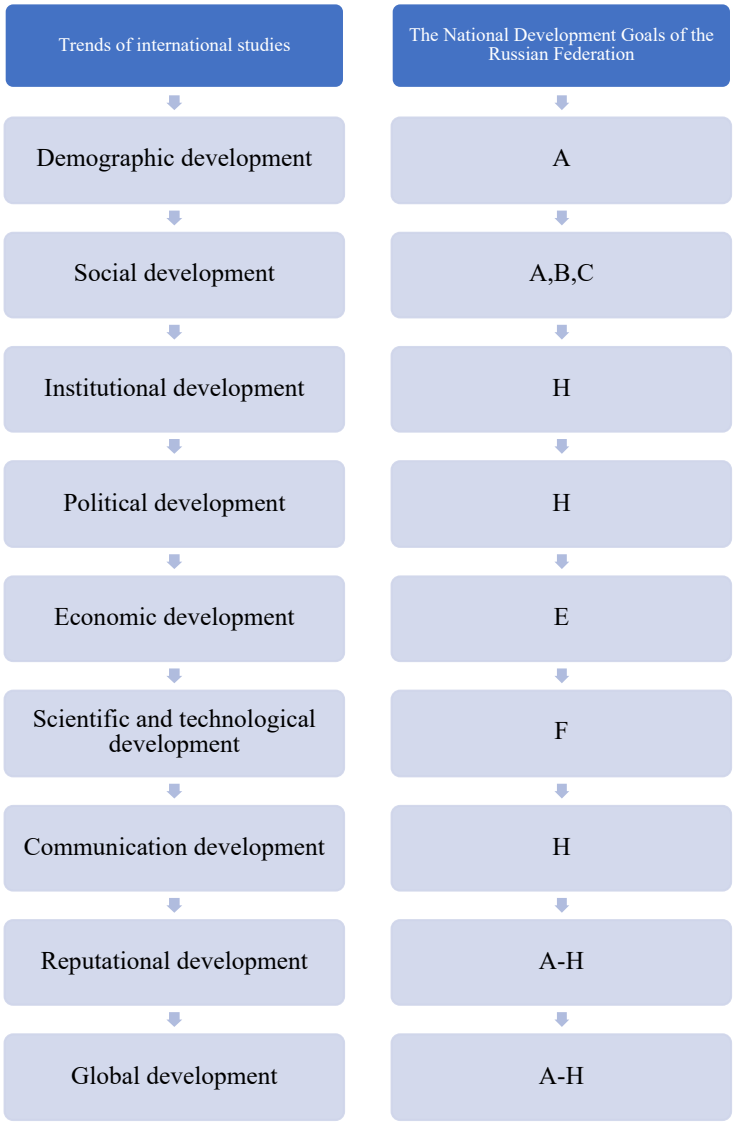


Figure 4. An analogy between the content of the National Development Goals of the Russian Federation for the period up to 2030 and for 2036 and international research of countries and regions
Source: Author

The research shows the possibility to have both direct and indirect analogies. According to the previous studies [17], to assess the quality of the implementation of the Unified plan to achieve the national development

on 10.02.2026).
[3] *Garant. (2026). The Unified plan for achieving the national development Goals of the Russian Federation until 2030 and 2036 (approved by the Government of the Russian Federation). Source: https://www.garant.ru/products/ipo/prime/doc/411156963/ (accessed on 01.02.2026).*
[4] *Decree of the President of the Russian Federation on 07.05.2024 No. 309. «On the national Development Goals of the Russian Federation for the period up to 2030 and for 2036». Source: http://publication.pravo.gov.ru/document/0001202405070015 (accessed on 10.02.2026).*

goals of the Russian Federation until 2030 and for 2036, there is a need to compare the development processes with other objects (international competitive comparison). Indeed, those Goals determine the dynamics of approximation to the final indicators of achieving national goals, and timely compare development indicators of an object under control. Indirect analogies with development processes allows us to implement such a strategic thinking tool as the 'besides' view.

Assessment results on development indicators of the Russian Federation in international research of countries and regions by international institutions[5] are presented in Tables 1-9.

Table 1 – UN assessment of the Russian Federation indicators on demographic development on the results of international studies

№	Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U=[N-R+1]/N)
1	Ranking of countries in the world by population	9	237	0.966
2	Ranking of countries by population growth rate	207	237	0.130
3	Ranking of countries by population density	220	237	0.076
4	Ranking of countries by urbanization	60	195	0.697
	The final average rating			0.467

Source: Studies of countries and regions, 2026[6]

Table 2 – An assessment of the Russian Federation indicators on social development on the results of international studies

Assessment Group	Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Standard and quality of life	Ranking of the countries by level of the Human Development Index (according to the UN)	64	193	0.674
	Ranking of the countries by prosperity (according to the Legatum Institute)	77	167	0.545
	Ranking of the countries by level of social progress (according to the Social Progress Imperative)	77	170	0.594
	Ranking of the countries by quality of life (according to the Economist Intelligence Unit)	105	111	0.063
	Ranking of the countries by social sustainability (according to the Sustainable Society Foundation)	53	154	0.662

[5] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*
[6] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

Assessment Group	Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
	Ranking of the countries by human capital development (according to the World Bank)	41	174	0.770
	Ranking of the countries by level of happiness (according to the ¬United Nations)	66	147	0.557
	Ranking of the countries by level of happiness (according to the Hot or Cool Institute)	122	147	0.176
	Ranking of the countries by the Index of quality of life of the elderly (according to HelpAge International)	65	96	0.333
	Ranking ¬of the countries by Life Satisfaction Index (according to Adrian White)	167	178	0.067
The level of public relations	Ranking of the countries by the Elite Quality Index (according to the version of the Universitat St. Gallen)	103	151	0.324
	Ranking of the countries by the Charity Index (according to Charities Aid Foundation)	35	142	0.760
	Ranking of the countries by gender inequality (according to the ¬United Nations)	43	166	0.746
Standard and quality of education	Ranking of the countries by level of education (according to the ¬United Nations Development Program)	34	193	0.829
	Ranking of national higher education systems (according to Universitas 21)	35	50	0.320
	Ranking of the countries by expenditure on education (according to the ¬World Bank)	104	203	0.492
Health level and quality of healthcare	Ranking of the countries by life expectancy (according to UN)	139	237	0.417
	Ranking of the countries by healthy life expectancy (according to the World Health Organization)	103	183	0.442
	Ranking of the countries by infant mortality rate (according to the UN	48	237	0.843

Assessment Group	Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
	Ranking of the countries by quality of death level (according to the Economist Intelligence Unit and Lien Foundation)	48	80	0.412
	Ranking of the countries by alcohol (according to the -World Health Organization)	27	189	0.142
	Ranking of the countries by expenditure on healthcare systems (according to the World Health Organization)	81	190	0.578
The level of public safety	Ranking by the number of prisoners (according to the Institute for Research on –Crime and Justice Policy)	34	220	0.154
	Ranking of the countries by the level of intentional homicides (according to the United Nations)	53	199	0.266
	Ranking of the countries by commitment the suicides (according to the World Health Organization)	12	184	0.065
	Ranking of the countries by food security (according to the Economist Intelligence Unit)	43	113	0.628
Standard and quality of environment	Ranking of the countries by an environmental efficiency (according to the Centre for Environmental Policy and Law)	83	180	0.544
The final average rating				0.459

Source: Studies of countries and regions, 2026[7]

Table 3 – An assessment of the Russian Federation indicators on institutional development on the results of international studies

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by the quality of public administration (according to the World Bank)	138	193	0.290
Ranking of the countries by the level of insolvency (according to the Fund for Peace)	49	179	0.273

[7] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by the Rule of Law Index (according to the World Justice Project)	114	142	0.204
Ranking of the countries by Corruption Perception Index (according to Transparency International)	154	180	0.150
Ranking of the countries by the Anti-Money Laundering Index (according to the Basel Institute of Management)	Not in the rating	164	-
Ranking of the countries by property rights protection (according to the International Property Rights Alliance)	103	125	0.184
Ranking of the countries by the level of financial secrecy (according to the Tax Justice Network)	43	141	0.702
Ranking of the countries by Corporate Tax Havens (according to the Tax Justice Network)	Not in the rating	70	-
The final average rating			0.300

Source: Studies of countries and regions, 2026[8]

Table 4 – An assessment of the Russian Federation indicators on political development on the results of international studies

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by Human Freedom Index (according to the Cato Institute)	139	165	0.163
Ranking of the countries by quality the level of democracy (according to the Economist Intelligence Unit)	151	167	0.101
Ranking of the countries by political and civil liberties (according to Freedom House)	181	209	0.138
Ranking of the countries by Index of Democracy Development in transition (according to Freedom House)	27	29	0.103
Ranking of the countries by Peace Index (according to Vision of Humanity)	156	163	0.049

[8] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by the level of terrorism (according to the Institute of Economics and Peace)	16	163	0.098
The final average rating			0.108

Source: Studies of countries and regions, 2026[9]

Table 5 – An assessment of the Russian Federation indicators on economic development on the results of international studies

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by GDP (according to the World Bank)	11	214	0.953
Ranking of the countries by national income per capita (according to the World Bank)	76	207	0.637
Ranking of the countries by the level of military spending (according to the Stockholm – International Peace Research Institute)	3	167	0.976
Ranking of the countries by employment (according to the International Labour Organisation)	77	187	0.593
Ranking of the countries by unemployment (according to the International Labour Organisation)	142	187	0.759
Ranking of the countries by business conditions (according to the¬ World Bank)	28	190	0.857
Ranking of the countries by human capital development (according to the World Bank)	41	174	0.770
Ranking of the countries by global competitiveness (according to the International Institute for Management Development)	Not in the rating	69	-
Ranking of the countries by global competitiveness (according to the World Economic Forum)	43	141	0.702

[9] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by the level of economic freedom (according to the Heritage Foundation)	135	176	0.806
Ranking of the countries by the level of economic freedom (according to the Cato Institute and Fraser Institute)	119	165	0.284
Ranking of the countries by the level of foreign direct investment (according to the – World Bank and the International Monetary Fund)	193	201	0.044
Ranking of the countries by the Index of the world's involvement into the international trade (according to the World Economic Forum)	111	136	0.191
The final average rating			0.631

Source: Studies of countries and regions, 2026[10]

Table 6 – An assessment of the Russian Federation indicators on science and technology development on the results of international studies

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by the Knowledge Economy Index (according to the World Bank)	55	146	0.630
Ranking of the countries by the innovations (according to INSEAD)	59	133	0.563
Ranking of the countries by number of patents (according to the World ¬Intellectual Property Organization)	9	133	0.939
Ranking of countries by the level of scientific research activity (according to the National Science Foundation of the USA)	7	197	0.969
Ranking of the countries by R&D expenditures (according to the ¬United Nations)	43	151	0.721
The final average rating			0.764

Source: Studies of countries and regions, 2026[11]

[10] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*
[11] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

Table 7 – An assessment of the Russian Federation indicators on communication development on the results of international studies

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by Information and –Communication Technology Development Index (the International Telecommunication Union)	40	170	0.770
Ranking of the countries by the Network Readiness Index (according to the Portulans Institute)	41	133	0.676
Ranking of the countries by the level of Internet development (according to the World Wide Web Foundation)	35	86	0.604
Ranking of the countries by the level of e-government development (according to the United Nations)	43	193	0.782
Ranking of the countries by the level of Internet freedom (according to Freedom House)	69	72	0.055
Ranking of the countries by the level of freedom of the media (according to Reporters Without Borders)	161	179	0.106
The final average rating			0.498

Source: Studies of countries and regions, 2026[12]

Table 8 – An assessment of the Russian Federation indicators on reputation development on the results of international studies

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the best countries in the world to live in (according to Newsweek)	Not in the rating	89	-
Rating of good countries (according to Simon Anholt)	47	149	0.691
Rating of the national brends (according to Simon Anholt)	Not in the rating	-	-
Rating of the national brends (according to Simon Anholt)			
World Reputation Rating (according to the Reputation Institute)	51	55	0.090
Ranking of the countries by Quality of Citizenship Index (by Henley & Partners)	62	158	0.613

[12] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by the Passport Index (by Henley & Partners)	37	199	0.819
The final average rating			0.553

Source: Studies of countries and regions, 2026[13]

Table 9 – Assessment of the Russian Federation indicators on global development based on the results of international studies of countries and regions

Rating name	Russia's Rating (R)	Number of countries in the ranking (N)	The relative level of Russia (U1=[N-R+1]/N), or U2= R/N
Ranking of the countries by globalization level (according to the Swiss Economic Institute¬)	71	196	0.642
Ranking of the countries by globalization level (according to Kearney)	Not in the rating	-	-
The final average rating			0.642

Source: Studies of countries and regions, 2026[14]

The final results of assessment of the Russian Federation indicators on development based on the results of international studies of countries and regions (Tables 1-9) are given in Table 10.

Table 10 – The results of a generalized assessment of the indicators of the Russian Federation in the areas of development, reviewed by the results of international studies of countries and regions

The international studies of countries and regions	The average rating of the Russian Federation
Demographic development	0.467
Social development	0.459
Institutional development	0.300
Political development	0.108
Economic development	0.631
Scientific and technical development	0.764
Communication development	0.498
Reputational development	0.553
Global development	0.642
Final average rating for the groups	0.461

Source: Author

According to Table 10, the final average rating of the Russian Federation in the main areas of development based on the results of international studies of countries and regions, shows a level below the global average one (0.461). However, there is not an area of development in which the level of the Russian Federation is high (more than 0.8 on the Harrington scale).

It indicates the expediency of using the 'besides' view of the 'visual system' of strategic thinking on the

[13] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*
[14] *Gtmarket. (2026). Studies of countries and regions. Source: https://gtmarket.ru/research/country-rankings (accessed on 01.02.2026).*

planned strategic development of the managed system (in this case, the national economy) and its effect on the increase of the international competitiveness.

Conclusion

Therefore, the processes of formation and implementation of strategic development plans provide an effective assessment of both direct goals and indirect results.

The tool 'besides' in the 'visual system' of strategic thinking should be implemented in terms of the theory of strategic management entrepreneurship.

The research on the example of the National Development Goals of the Russian Federation for the period up to 2030 and for 2036 from the Unified Plan by the Government of the Russian Federation for achieving the national development goals of the Russian Federation up to 2030 and for 2036 allows us to use the 'besides' view of the 'visual system' of strategic thinking to assess the impact of the planned strategic development of a managed system on its environment (on the environmental situation, on the increase in the number of jobs, on infrastructure development, etc.). It also provides an assessment of the ratio of 'pros' and 'cons' indirectly arising in the implementation of managed system strategic development, including the issues of increasing the level of country international competitiveness.

When implementing the country's socio-economic development strategy in accordance with the National Development Goals of the Russian Federation for the period up to 2030 and for 2036, we can assess changing of the Russian Federation rating in the main areas of development considered in terms of the international studies of countries and regions.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The author declares no conflict of interest.

References

1. Bennis, W., & Namus, B. (1985). *The Strategies for Taking Charge*. New York: Harper & Row.
2. Collins, J. C., & Porras, J. I. (1991). *Organizational Vision and Visionary Organizations California Management Review*. Berkeley: Berkeley Haas School of Business
3. Drucker, P. F. (1970). Entrepreneurship in Business Enterprise. *Journal of Business Policy*, I(1), 3-12.
4. Harbison, F., & Myers, C. A. (1959). *Management in the Industrial World*. New York: McGraw-Hill.
5. Land, E. (1972). *The Most Basic Form of Creativity Time*. Skolkovo: Alpina Digital.
6. McClelland, D. C. (1961). *The Achieving Society*. Princeton, NJ: D. Van Nostrand.
7. Mintzberg, H. (1991). *Strategic Thinking as 'Seeing'*. Finland, Helsinki: Foundation for Economic Education.
8. Mintzberg, H., & Waters, J. A. (1982). Tracking Strategy in an Entrepreneurial Firm. *Academy of Management Journal*, 25(3), 465-499.
9. Nasi, J. (1991). *Arenas of Strategic Thinking*. Finland, Helsinki: Foundation for Economic Education.
10. Palich, L. E., & Bagby, R. D. (1995). Using Cognitive Theory to Explain Entrepreneurial Risk-Taking: Challenging Conventional Wisdom. *Journal of Business Venturing*, (10), 425-438.
11. Schumpeter, J. A. (1947). The Creative Response in Economic History. Journal of Economic History, 7(2), 149-159.
12. Stacey, R. (1992). *Managing Chaos; Dynamic Business Strategies in an Unpredictable World*. London: Kogan Page.
13. Westley, F., & Mintzberg, H. (1989). Visionary Leadership and Strategic Management. *Strategic Management Journal*, (10), 17-32.
14. Mintsberg, G.(2013). *Strategic safari: An excursion through the wilds of strategic management.*

Moscow: Alpina Pablisher (in Russian).

15. Tebekin, A. V. (2021). Analysis of the processes of formation of concepts and strategies for sustainable development. *Epomen*, (66), 48-60 (in Russian).

16. Tebekin, A. V. (2021). Looking forward as a basis for the strategic development of the national economy. *Zhurnal issledovanij po upravleniyu*, 7(3), 3-11 (in Russian).

17. Tebekin, A. V. (2021). Looking back as the foundation for the strategic development of controlled socio-economic systems. *Vestnik Tverskogo gosudarstvennogo universiteta. Seriya: Ekonomika i upravlenie*, 2(54), 123-137 (in Russian).

Received 10.11.2025
Revised 22.12.2025
Accepted 14.01.2026

Jraic.com
JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS 2026; 7(1):79-92

The development of creative clusters in the Russian regions

Alla B. Berendeeva

Doctor of Economics, Associate Professor
Ivanovo State University, Russian Presidential Academy of National Economy and Public Administration, Ivanovo, Russian Federation
E-mail: abab60@mail.ru

Maria A. Sukhanova

Student
Ivanovo State University, Ivanovo, Russian Federation
E-mail: mar1asukhanova@yandex.ru

ORIGINAL ARTICLE

Abstract. According to international and Russian regulatory documents, the research defines the concepts of 'creative industries' and 'creative clusters', shows the dynamics of employment in creative industries and the regulatory sources for creative clusters development in Russia in 2021-2025. The purpose of the research is to consider the development of the creative economy and the types of creative industries highlighted by the Strategy for the Development of the Creative Economy until 2036. Indeed, the one of the most important functions of creative clusters is the accumulation of talented youth in the region. The research reviews the formation and development of creative clusters in the regions of Russia. Moreover, there are numerous publications on the development of creative industries in Russia, primarily in large and extra-large cities. However, there are few studies on the development of creative industries and clusters in small towns and villages. The research defines the problems of creative clusters development and the reasons for the unsuccessful practices of creating creative clusters in Russian regions in terms the specifics of the region where the creative cluster is planned to be located. Based on publications by other scientists and experts, the authors propose the classification of creative clusters, directions and stages of their regional formation, and the results of the region's rating on the creative industries index. Moreover, the research focuses on the stakeholders in regional development of creative clusters. The article compares the development of creative clusters in the Kaluga region, the Yaroslavl region, and the Kaliningrad region, and highlights the features of those development, institutional environment, and the directions of creative industries formation. Hence, the development of creative clusters follows with the development of other regional clusters.

Keywords: creative industries; creative clusters; Union of Creative Clusters; economic and social interests; the Kaluga region; the Kaliningrad region; the Yaroslavl region

JEL codes: H24, M21, O34, R23, R58

DOI: 10.52957/2782-1927-2026-7-1-79-92

For citation: Alla B. Berendeeva & Maria A. Sukhanova. (2026). The development of creative clusters in the Russian regions. *Journal of regional and international competitiveness*, 7(1), 79.

Introduction

As the entertainment industry appears and develops, the so-called 'creative' economy became the economics sector. According to the United Nations Conference on Trade and Development (UNCTAD), creative industries are a synthesis of creativity, culture, economics, and technology. They are based on the talents and ideas of people and serve as a driver of the economy. The year 2021 was named the UN Year of the Creative Economy. According to the 'Concept for the Development of Creative Industries', September 20, 2021, the creative economy 'capitalizes the intellectual property,' and 'has a high added value', i.e. creativity generated by intellectual property increases the total value of the product. Despite the high impact on the global economy, the percentage of the 'creative share' in the Russian economy remained relatively low (2.3%). It resulted in the concept of increasing the importance of the creative sphere for the Russian economy[1]. By

[1] *Garant.ru. (2021). Decree of the Government of the Russian Federation of September 20, 2021 No. 2613-R. «The Concept of the Development of Creative Industries and Mechanisms for Their State Support in Large and Major Urban Agglomerations Until 2030». Source: https://www.garant.ru/products/ipo/prime/doc/402745784/?ysclid=mob7fdcayy699521860*

the end of 2024, the contribution of the creative economy to GDP exceeded 4%, amounting to RUB 7.5 trln[2].

In 2024, president Vladimir Putin has signed the Federal Law 'On the Development of Creative Industries in the Russian Federation'. The law defines the types and subjects of creative industries, the objects related to the infrastructure of support for creative industries, types of state support for subjects of creative industries, etc. It also defines the goals that are beneficial for the development of the economy. They are as follows:

– conditions for citizens' self-actualisation based on the creative and intellectual potential, increasing the level of employment in the creative industries;

– the development of the creative economy in the Russian Federation as a type of organisation of economic relations between subjects of civil turnover, based on the widespread use of the results of intellectual activity, the accelerated introduction of innovations;

– stimulating the development and entrepreneurial activities in creative industries;

– ensuring equal access opportunities and government support measures in creative industries;

– stimulating the creative production, increasing the volume of intangible assets, and ensuring the protection of creative products;

– support of educational activities and the development of competencies in the creative industries[3].

These goals will ensure increased involvement of young people in the Russian economy, an increase in the level of cultural identity, and accelerated import substitution in the current political situation.

Following the results of the strategic session (June 24, 2024) on the development of creative industries, the Head of the Cabinet of Ministers of the Russian Federation, Mikhail Mishustin instructed the Government of the Russian Federation to develop a Strategy for the Development of the Creative Economy until 2036 (the responsible ministry is the Ministry of Economic Development of Russia) by mid-February 2026. To implement the, it is planned to draw up an action plan, a national rating of regions for the development of creative industries, expand the list of activities related to the creative industries (currently there are 16), analyse existing support measures – general and sectoral, federal and regional, etc. The creative industries include 16 types: Music, Performing Arts, Recreation and Entertainment, Gastronomy, Folk arts and Crafts, Cultural Heritage, Architecture and Urban Studies, Design, Art industry, Fashion (including Jewellery), Book publishing, Media and Mass media, Cinema, Television, Video games, Software, Advertising, and PR[4].

The infrastructure for supporting creative industries includes 'creative clusters' (CC). The Strategy 2036 highlights the project 'Creation of Creative Clusters in the regions of Russia 'as one of the projects of infrastructure development. It also includes the Creative Industries Accelerator, the establishing of the Createh pilot R&D Center, and the development of key platforms for interaction between creative industries (Creative Code, Russian Creative week, Russian international creative seasons)[5].

A 'creative cluster' is a territory containing real estate objects and necessary infrastructure for the implementation of activities by subjects of creative industries. Their activity is aimed at creating conditions for the effective operation of subjects of creative industries, promotion in domestic and foreign markets, distribution and (or) sale creative products and human potential development[6].

Indeed, the one of the most important functions of creative clusters is the accumulation of talented youth in the region [10]. The Concept for the Development of the Creative Economy until 2036 (The Concept)

---

[2] The Russian government (2025). Mikhail Mishustin held a strategic session on the development of the creative economy. Source: http://government.ru/news/55434 /(accessed on 02.02.2026).

[3] Garant.ru. (2021). Decree of the Government of the Russian Federation of September 20, 2021 No. 2613-R. «The Concept of the Development of Creative Industries and Mechanisms for Their State Support in Large and Major Urban Agglomerations Until 2030». Source: https://www.garant.ru/products/ipo/prime/doc/402745784/?ysclid=mob7fdcayy699521860

[4] The Russian government (2025). Mikhail Mishustin gave instructions on the development of the creative economy. Source: http://government.ru/news/55690 / (accessed on 02.02.2026).

[5] Strategy for the development of the creative economy in the Russian Federation until 2036 (draft). Source: https://www.economy.gov.ru/material/file/5221cb1fd9eea32c500bb3f4d48ec6e1/proekt_strategii_razvitiya_kreativnoy_ekonomik_v_rossiyskoy_federacii__2036_goda.pdf (accessed on 25.01.2026).

[6] Garant.ru. (2024). Federal law of Russian Federation of August 08, 2024 No. 330-FZ on «On the Development of Creative Industries in the Russian Federation». Source: https://www.garant.ru/products/ipo/prime/doc/409395175/

considers the problem of the general dispersion of people necessary for the formation of a sustainable creative cluster. According to the Concept, creative people prefer to move to the capitals rather than develop creative industries and creative entrepreneurship in their region. It also forms an imbalance in the labour market[7]. According to the HSE data on creative industries monitoring, in 2024 the number of people employed in creative professions in Russia was 3.5 mln. Regarding to 2019, it increased by 12.3% (+0.4 mln people). It is significantly higher than the growth rate of the number of employed in the economy (+3.1%) (Table 1) [7].

Table 1 – Employment in the creative industries, 2019-2024, %

Industries	2019	2024
Scientific and technical specialists	0.8	1.4
Cabinetmakers	5.2	2.5
Workers of arts and crafts	4.8	4.6
Photographers and decorators	5.7	6.2
Architects, designers of goods and clothing, urban planners, graphic and multimedia designers	12.1	15.0
Advertising, marketing, and public relations specialists (including managers)	27.3	18.1
Culture and art experts	19.5	23.0
ICT specialists (including managers and technicians)	24.6	29.2

Source: Authors

Therefore, Russia has great potential to strengthen the creative sector of the economy, made it an important source of additional income, and improve the development of the regions. Hence, the creative clusters as a part of the 'formation of a balanced regional ecosystem of the creative economy'. Additionally, creative clusters are points of attraction for many tourists and individual entrepreneurs. The cluster development of this sector of the economy is a logical result.

Currently, the regulatory, legal, and methodological framework for the development of creative industries (CI) and creative clusters (CC) is actively developing in our country. The concept of a creative cluster is in the following regulatory sources:

– Decree of the Government of the Russian Federation on September 20, 2021 No. 2613-R. 'The Concept of the Development of Creative Industries and Mechanisms for Their State Support in Large and Major Urban Agglomerations Until 2030';

– Decree of the Government of the Russian Federation No. 2290-r on 17.08.2022 (amended on 26.01.2024 No. 145-r) 'On the Action Plan for the implementation in 2022-2025 of the Concept for the Development of Creative Industries and Mechanisms for Their State Support Until 2030';

– Federal Law No. 330-FZ on 08.08.2024 'On the Development of Creative Industries in the Russian Federation';

– Decree of the Government of the Russian Federation on 30.05.2025 No. 789 'On Approval of the Criteria for Recognising the Territory as a Creative Cluster and the Rules for Recognising the Territory as a Creative Cluster';

– The draft Strategy for the Development of the Creative Economy in the Russian Federation until 2036, December 26, 2025.

In consistence with the regulations named above, the criteria for recognizing the territory as a creative cluster and the Rules for recognizing the territory as a creative cluster have been approved.

The Union of Creative Clusters has been created. Its mission is to qualitatively change the economic

[7] *Strategy for the development of the creative economy in the Russian Federation until 2036 (draft). Source: https://www.economy.gov.ru/material/file/5221cb1fd9eea32c500bb3f4d48ec6e1/proekt_strategii_razvitiya_kreativnoy_ekonomik_v_rossiyskoy_federacii__2036_goda.pdf (accessed on 25.01.2026).*

model of Russia: the transition from a predominantly raw material to a predominantly creative economy.

According to the website of the Union of Creative Clusters, the leaders of creative development among Russian industrial zones are as follows: Fabrika Center for Creative Industries (Moscow, Russia), Vinzavod Center for Contemporary Art (Moscow, Russia), ARTPLAY Design Center (Moscow, Russia), Oktava Creative Industrial Cluster (Tula, Russia), Oktyabr Cultural Center (Belgorod, Russia), KAMENKA Creative Cluster (Krasnoyarsk, Russia), SVOBODA2 Center for Creative Industries (Chelyabinsk, Russia), Design Center Creative Cluster (Saratov, Russia), Graphite Graphic Culture Center, Art-KVADRAT Urban Center (Ufa, Russia), Kirov Recreation Center (St. Petersburg, Russia), and Dorenberg Art Factory (Irkutsk, Russia)[8].

The purpose of the research is to analyse the features of creative clusters the development in three regions of the Russian Federation: Kaluga, Kaliningrad, and Yaroslavl ones.

We used regulatory and legal sources, data from the materials of the Union of Creative Clusters of Russia, the Rating of Creative Regions of Russia, government authorities in the regions, and regional institutions for the development of creative industries. To analyse the degree of development of various aspects of creative clusters, we used data from the e-library, and various Internet resources. Methods of comparative, statistical, tabular, and graphical analysis are used.

Main part

According to the analysis, there are following studies on CC: the importance of creative clusters, trends and factors of their development, the impact of CC development on the region's innovation, competitiveness, tourism development, the role of the state, business, educational institutions, and the population of territories in the development of CC (Table 2). At the same time, there are many publications in the Creative Economy Journal.

Table 2 – Research on formation and development of creative clusters (CC) in the regions of Russia

The direction of research	Full name of the researchers
the role and significance of CC	Baryshnikova E.I., Grishanova T.V., Klimenko V.A., Chudinova E.A., Dydykin I.O., Voronina-Darintseva A.E., Cherkes-Zade E.V., Shtykova E.O., etc.
the importance of CC in increasing the competitiveness of regions / a driver of territorial development	Kashirina E.S., Kiseleva O.I., Levina I.D., Kirillova S.A., Chesnova O.A., etc.
CC as a tool for the development of a creative city	Zhogoleva A.V., Dvortsova O.G., etc.
the possibilities of CC development in depressed territories	Vanyushkin A.S., Druzin R.V., Kuznetsov M.M., Ilyasova Yu.V., etc.
CC development in the context of urban studies, urban planning, and urban environment transformation	Plotnikova T.O., Zahlebnaya K.A., Osipova I.M., Korgina O.A., Korgin K.V., Reznikov A.A., Semenchenko O.G., etc.
the impact of CC on the development of regional or city innovative potential	Nabiullin R.R., Pertsukova U.A., Oleshkevich K.I., Grakova S.S., Kirillova S.A., Orlova D.S., etc.
trends and factors of CC development	Materova E.S., Starostina L.D., Zhironkin S.A., Sharafullina R.R., Baykova E.R., Tomashevskaya Yu.N., Dzhalmurzina M.N., etc.
CC as a point of attraction for young people	Klimenko V.A., Bannikova T.I., Chudinova E.A., Sayansky M.K., Khuzhina D.A., Litvina E.A., etc.
QC and business development	Govorina M.R., Proskurina A.A., etc.
industrial structure of the CC in the region	Vanyushkin A.S., Matveeva E.V., Nikitina A.A., etc.

[8] *Union of Creative Clusters. Source: https://www.unitedclusters.ru/ (accessed on 29.01.2026).*

The direction of research	Full name of the researchers
the project approach in QC management	Garbuzov Ya.V., Taydaev R.M., etc.
CC legal status and regulation	Bundin M.V., Shireeva E.V., etc.
problems of QC development	Bannikova T.I., Chudinova E.A., Karimova I.Yu., Kulakov S.N., etc.
CC government support, public-private partnership in CC development	Borovikova E.V., Falin I.O., etc.
the impact of digital technologies on the development and functioning of CC	Bannikova T.I., Bambizova A.M., Lisichenok E.P., etc.
adaptation of cultural facilities, monuments of industrial architecture, industrial zones for residential buildings, their renovation, zoning of industrial cities for residential buildings	Bardin G.A., Kozodaev V.A., Zdorov N.S., Piguzov M.I., Baskakov I.V., Derbenev V.V., Arefyev A.A., Pastukh O.A., etc.
CC as a factor of tourism development	Abrosimova T.F., Ogarkova I.V., Kartasheva O.A., Kabardokova L.A., Permyakova T.V., Churkina P.G., Kopalova O.S., Kopaeva E.I., Kumova D.M., Yakovlev A.R., Romanets I.I., Kharina S.I., Domnina S.V., Dvortsova O.G., Kuskov V.M.,etc.
influence of CC on the territory brand promotion	Klimenko V.A., Voronina-Darintseva A.E., Pogadaeva O.S., Zhuravleva I.A., Alikperov I.M., etc.
formation of CC in educational institutions, collaboration of universities and CC, educational potential of CC	Klimenko V.A., Bannikova T.I., Chudinova E.A., Voronina-Darintseva A.E., Dydykin I.O., Litvina E.A., Sazonova A.L., Sofronov M.A., Kozyukin D.B., Sergeev A.S., Tanina A.V., Zaust S.K., etc.
analysis of the Russian practice of formation and development of CI and CC	Vasilenko L.A., Bogdanova L.V., Karimova I.Yu., etc.
formation of CC, CC infrastructure, CC promotion	Maryina L.P., Mikhaleva D.D., Petrashevskaya Yu.V., Baskakova I.V., Derbeneva V.V., Turgel I.D., Tsepeleva A.D., Kruglikova K.S., etc.
development of culturally oriented clusters	Veselkin V.V., Ospanova A.M., Akopyan A.R., Agibalova A.D., Shishikina A.V., etc.
development of sports and creative clusters	Gureeva E.A., Petrenko E.S., etc.
assessment of the socio-economic and infrastructural potential of the region during the formation of the CC	Klimenko V.A., Bannikova T.I., Chudinova E.A., etc.
assessment of the effectiveness of CC in terms of regional development	Adrianova S.A., Klimenko V.A., Bannikova T.I., Chudinova E.A., Koryukova Yu.D., etc.

Source: Authors

According to the study of scientific publications in the e-library, 2024-2025, there are numerous studies of the development of creative industries in Moscow, St. Petersburg, large and extra-large cities of Russia (Voronezh, Yekaterinburg, Irkutsk, Omsk, Saratov, etc.). This is due to both demand for products and supply in terms of the creative industries. There are also studies concerning small and medium-sized cities and towns, for example: in the Tula region [1]: Chernoistochinsk village, Sysert, Aramil, Polevskoy, Sverdlovsk region; Satka, Chelyabinsk region; Mezhdurechensk, Kemerovo region; Belokurikha, Zarinsky district, Tyagunsky Village Council; Novoaltaysk, Altai Krai [3], the creation of Siberian cultural and tourist clusters [7; 10].

Many studies highlight the problems of CC development in the Russian regions. Vasilenko L.A.,

Bogdanova L.V., Karimova I.Y. note the insufficient development of personnel policy and talent management, problems in intellectual property and copyright protection, absence of comprehensive and systematic measures to support CC, interregional competition, and the struggle for resources and sales markets between enterprises producing similar products, etc. [5, pp. 69-71]. The researchers Bannikova T.I. and Chudinova E.A. consider the weak development of infrastructure, bureaucratic, and administrative barriers for CC development clusters [2].

The scientific literature analyses regional practices in the formation and development of CC and the reasons for unsuccessful practices in creating creative clusters. For instance, Klimenko V.A., Bannikova T.I., Chudinova E.A. identify the following:

– an insufficiently developed creation strategy,
– weak management and marketing system,
– an insufficiently developed creation strategy, resulting in poor quality infrastructure, lack of marketing support and failure to attract interesting residents,
– lack of support from local authorities,
– a weak analysis of regional specifics the cluster is planned to be located [8].

When implementing a project to form a creative cluster, the authors propose a methodology for assessing the region's potentials. They are as follows: socio-economic potential – based on economic structure (5 indicators), social environment (5), human capital (5) and infrastructural potential – based on transport accessibility (3), communication infrastructure (2), business infrastructure (3), specialised infrastructure (3), urban environment (4) [8, p. 72].

However, the investment climate in the region is an important indicator of the economic structure. S. Shkiotov notes the secondary effect of investments through employment, income, and cross-industry relations. The investment multiplier plays a significant role in regional development. Indeed, the magnitude of this multiplier is not a universal constant and reflects the economic reality of a particular region [11]. According to the Head of the Centre for the Development of the Creative Economy of ASI, Ye. Cherkes-Zade, there is no single template for creating clusters, much depends on the specifics of the region, the possibilities, and requests from the creative community[9]. According to A. Vanyushkin, sustainable development of the region depends on the interrelation of the creative industry of the region with the key sectors of the economy that have the greatest contribution to the gross regional product [4].

Baskakova I.V., Derbeneva V.V., Turgel I.D., Tsepeleva A.D. classifying the creative clusters on the significance of the material and symbolic components of local identity (the author's concept of a local two-component construct): the material component is a physical object of the cultural and historical heritage of a territory that conveys its uniqueness (industrial and factory territories, natural attractions, etc.), and the symbolic component is symbols and meanings that define the cultural and historical context of the territory (historical events, legends, etc.) [3]. Different combinations of material and symbolic components are possible within the construct. It is accompanied by formation of various types of creative clusters. The authors also identify the following models: the 'conservation' model (according to the material and symbolic components – levels: 'high–high'), the 'transformation' model ('high–medium', 'medium–low', 'low–medium'), the 'generation; model ('low–low').

The directions and stages of the formation of CC in the regions, including the depressive type, are proposed. For instance, categories of creative industries are distinguished to determine the sequence and stages of creating a creative cluster:

– independent of the image and attractiveness of the environment: stalker tourism, quests, squat concerts, and festivals, etc.
– dependent on the image and forming it: folk crafts, local cuisine, museums, exhibitions, concert halls, etc.

[9] *Kanevskaya, P. (2025). The idea for a million: how the infrastructure for the development of creative industries is being created in Russia. Newspaper.Ru. Source: https://www.gazeta.ru/business/2025/04/22/20915642.shtml?ysclid=md93bg9efz418558979 (accessed on 06.02.2026).*

– dependent only on the attractiveness of the environment: real estate construction, IT sector, media, advertising, publishing, etc.

– dependent on the image and attractiveness of the environment: fashion industry, design (clothing, etc.), jewellery [13].

The Higher School of Economics calculates the Russian Regional Index of Creative Industries (hereinafter – RRICI). By the end of 2024, the leaders are Moscow, St. Petersburg, Novosibirsk, and Tomsk regions. The top 20 is dominated by regions from the European part of Russia and the Ural Federal District. There is a tendency to increase polarization between the regions in and out of the top 10 completing the rating. The leaders of the Central Federal District are the Ivanovo region (6th place), the Kostroma region (7th place), the Kaluga region (11th place) [12].

According to the Regional Standard for the Development of Creative Industries, stakeholders in the development of creative clusters can be: government authorities (federal, regional, municipal), regional and local communities, business (Fig. 1).

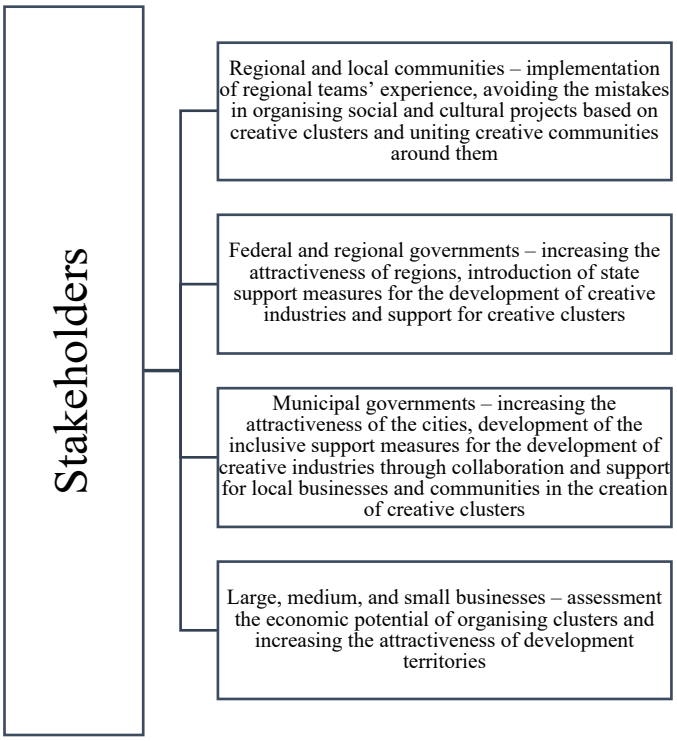


Figure 1. Economic and social interests of stakeholders in the development of creative clusters in the region
Source: Atlas of creative clusters of the Russian Federation[10]

We compared the development of creative clusters in the Kaluga region, the Yaroslavl region, the Nizhny Novgorod region, and the Kaliningrad region.

In the rating of regions for the development of AI, the Kaluga region improved its position in 2024 and ranked 11th. A cluster development support centre has been operating in the Kaluga region. It implies a serious attitude towards creative clusters. Since 2009, there is a work on formation a system of economic, organisational, and regulatory support for the creation and functioning of territorial production and innovation clusters in the region. In 2009, the Kaluga region adopted a strategy for socio-economic development until 2030. According to it, the cluster approach was adopted as the main model for the development of the region.

The leading role in the implementation of the cluster policy of the region and in the organisation of comprehensive support for participants in territorial clusters is played by AO Agency for Innovative Development – Centre for Cluster Development of the Kaluga region. Established in 2010, the Agency is the founder and coordinator of such clusters as: The Cluster of Information and Communication Technologies of

[10] *Atlas of creative clusters of the Russian Federation. Source: https://www.unitedclusters.ru/library#!/tab/611908598-1 (accessed on 29.01.2026).*

the Kaluga region; the Cluster of Composite and Ceramic Technologies; the Tourist and Recreational Cluster of the Kaluga region; the Cluster of Socio-Technological Development of the Territories of the Kaluga region, etc.[11].

The principles of cluster development in the Kaluga region include:

– Innovation Project crystallisation centres – small and medium-sized enterprises of the cluster;

– Accumulation of highly qualified human resources;

– Close cooperation with development institutions and industrial partners;

– The formation of integrated technological chains in the field of product creation: scientific laboratories – engineering centres – small design companies – production sites, etc.

The activity of the Kaluga region's tourism development area noted in the draft strategy for the development of tourism and the hospitality industry until 2030 on 30.08.2022 is of particular interest[12]. The strategy highlights a separate strategic priority: 'Marketing and branding' to form a single tourism brand of the Kaluga region for increasing its recognition in the tourism market in Russia.

This initiative assumed:

– establishing the Kaluga region sub-brands (related to folk crafts, gastronomy, event programs, etc.)

– formation of a comprehensive strategy for promoting a single brand of the Kaluga region;

– development of diversified tourist and recreational areas according to the preferences of different target audiences and seasons;

– constructing the 'hiking trails'.

This competent marketing strategy demonstrates the importance of the creative economy in the development of the region. Therefore, there are prerequisite for design 'new points of attraction' for tourists, talented and qualified personnel, and entrepreneurs to ensure the economic development of the region.

As an example, we can consider the Nikola-Lenivets Art Park. It is located in the valley of the Ugra River and covers about 600 hectares, including three villages: Zvizzhi, Koltsovo, and Nikola-Lenivets. The part of the territory belongs to the Ugra National Park – a protected natural area. It contains more than 60+ art objects and hosts festivals of contemporary art (Archstoyanie). Those are the platforms for self-presentation for the representatives of various creative professions.

According to the report on the development of creative industries in the Kaluga region, 2024, several priority creative industries were identified. They are as follows:

– Software development activities: development of electronic document exchange services (ASTRAL-SOFT OOO), implementation of cost-effective and budgetary solutions (KAMIN-CLASSIC OOO, KOD-KWT OOO, KAMIN-SOFT OOO), development of geoinformation projects (ORBI SYSTEMS OOO, RIK MASTERS OOO), creation of information platforms for business and medicine (AMED OOO);

– Literary and publishing industry: translation services (MAC-UNIT OOO) and newspaper publishing (KOMSOMOLSKAYA PRAVDA-KALUGA AGENCY OOO);

– Gastronomy: activities of restaurants and cafes (SOUP&SANDWICH OOO, GOSTINY DVOR OOO, NIKA-RETAIL OOO, PROFITCOM OOO, PROFTESTO OOO);

– Music and sound design: piano and grand piano production (ACCORD PIANO AND PIANO FACTORY OOO);

– Media and journalism: advertising on radio and television, radio broadcasting (INTERVIDEO OOO, PROM-MEDIA OOO);

– Advertising and communication: advertising placement (BILLBOARD OOO, MARKET STYLE OOO);

– cultural and entertainment industry: organisation of recreation and entertainment (SINATRA OOO).

Moreover, on June 5, 2024, at the international economic forum, a plan for the development of the

[11] *Agency for Innovative Development – the Centre for cluster Development of the Kaluga region. Source: https://airko.org / (accessed on 29.01.2026).*

[12] *Strategy for the development of tourism and the hospitality industry in the Kaluga Region for the period up to 2030: Decree of the Government of the Kaluga Region on 07.11.2022 No. 842. Source: https://minkult.admoblkaluga.ru/upload/oiv/minkult/turizm/npa/proekt_strategiya.pdf (accessed on 30.01.2026).*

territory of the former Kristall plant was provided. It is planned to concentrate restaurants, coffee shops, workshops, offices, creative spaces, festivals, lectures, exhibitions, gastronomic workshops, etc. on the territory of the former plant[13] up to December 2027. Indeed, it is the new creative cluster of regional economic development.

In the Russian regional ranking on the creative Industries index, the Kaliningrad region ranks 17th in 2024. Its creative cluster is currently actively developing and projects are being implemented. They are as follows:

– Barn is a multifunctional art space in Kaliningrad; a venue for exhibitions of contemporary art, cultural, educational events; it is also a store where artists and craftsmen from the Kaliningrad region exhibit and sell their works;

– The Ponart Cultural Quarter is a cluster in Kaliningrad for festive fairs and festivities, conferences, lectures, exhibitions, and master classes.

There are several projects in the Kaliningrad region to support creative entrepreneurship and clusters. For instance, the Crespectiva Foundation for Creative Industries. It is an association of creative people, a production centre, and a project office under the Government of the Kaliningrad region[14].

It allows ones to:

– scale the projects, enter new niches and markets, and replicate successful experiences.

– It also improves a local identity to strengthen the region's brand and increase its competitiveness in tourism.

– Its goal and a social mission are the contribution to the development of the industry through mentoring and expert work in education and work with young professionals, etc.

Krespectiva has several projects to promote creative entrepreneurship and work with creative clusters.

They are as follows:

– INCLUS is a pop-up showroom and mobile exhibition space supporting more than 100 creative entrepreneurs;

– KLASSSTER is a project aimed at the formation and development of a local creative community and fashion business in Kaliningrad. Its strategic objective is to create an environment for the development of distinctive and sustainable local businesses, and develop Kaliningrad's business infrastructure;

– Made in Kaliningrad – tracking accelerator for creative entrepreneurs;

– Enclave is a creative industries Award. A study of Kaliningrad's creative figures and industries to reward creative leaders and motivate them, etc.

Additionally, in December 2017, in the structure of the Kaliningrad Region Entrepreneurship Support Centre Foundation a Cluster Development Centre was established It provides assistance to the development of cooperation between businesses, government authorities, educational institutions, science, and investors in the implementation of joint projects. The Centre for Cluster Development (CCD) is a structural unit of the Foundation for identifying cluster initiatives, facilitating the coordination of projects of small and medium-sized businesses, and ensuring cooperation between participants in territorial clusters. A characteristic feature of the cluster is the concentration of enterprises connected by production processes in a limited area.

Cluster members are provided with various services to help them promote themselves in the market, such as:

– assistance in new products market launch;
– ensuring participation in Russian and international exhibitions;
– provision of marketing services;
– conducting training sessions and seminars;
– product positioning and promotion;
– organisation of business missions for cluster members (internships, exchange of experience), etc.

[13] *The press service of the Governor and the Government of the Kaluga region. News 05.06.2024. A new city block Kristall will be built in Kaluga. Source: https://admoblkaluga.ru/news/item-20586 (accessed on 31.01.2026).*

[14] *Krespectiva. (2026). Creative Industries Foundation Krespectiva. Source: https://krespektiva.ru/?ysclid=ml3rb76pvg762175106 (accessed on 31.01.2026).*

Therefore, the wide range of services provided, among which special attention is paid to marketing and participation in international exhibitions, intercultural exchange, allows us to conclude about a more thorough and broad approach to this issue in the Kaliningrad region. Creative clusters are a competent way to develop regional economies and broadcast cultural values[15].

In 2022, the Kaliningrad administration presented a new strategy for the socio-economic development of Kaliningrad until 2035. It concerns with the development of a creative cluster in the region. According to the strategy, the formation of the «creative industry» would be based on the following areas: the IT sector (software development, entertainment content); architecture and industrial design; film production, publishing; advertising production, and mass media. The strategy developers hope, there will be a touristic cluster developed. As a result, it is expected to increase «creative capital index» (from 7th place in 2021 to 5th place in 2035); «turnover of the knowledge economy and tourism» (from 37.5 bn per year to 143.8 bn RUB); «average tourist check» (from 6 up to 12 thousand RUB per day). Retail trade turnover is also expected to increase from 143 bn to 321 bn RUB per year, investments in fixed assets from 82 thousand rubles per person to 33 thousand rubles, the urban environment quality index from 216 to 294 points, an improvement in the position in the national investment climate rating from 23rd to 10th place[16].

The tourism organisations, accommodation and catering facilities, souvenir production, recreational and other services are involved in the activities of the tourism cluster. Through the production of unique souvenirs and the creation of a memorable brand with the participation of Kaliningrad Amber, new creative entrepreneurships are able to form a point of attraction for many people related to the creative economy.

Russia's largest private innovation cluster, Technopolis GS is in the Kaliningrad region. The cluster includes a production area, a residential area, and a creative space. The cluster's key production areas are microelectronics and consumer electronics. There is the first Russian production of SSDs (solid-state drives), microprocessors, LEDs, smart home, and smart cities. The cluster is a globally competitive innogorod, operating both as a technology hub and a city. Indeed, the innovation ecosystem is based on human capital. The cluster's development is focused on the world's leading urban models and concepts: Richard Florida's theory of the creative class and the creative city, Ian Gale's theory of the global city, and the idea of a city for people. It confirms the thesis about the proximity of European ideas in the Kaliningrad region[17].

A cluster of creative industries and IT is developing in the Yaroslavl region. The creative cluster appeared on the Yaroslavl textile factory «Cord». Within the framework of the federal project «Professionalism» on the basis of educational institutions of secondary vocational education (SPE), an educational cluster of SPE «Art and Creative Industry» is being developed in Yaroslavl. It developed on the basis of the Yaroslavl Urban Planning College; its network partner colleges are A. Nevsky Pereslavl College, the Rybinsk Printing College, the Yaroslavl College of Service and Design, and the Yaroslavl College of Management and Professional Technologies. The mission of this cluster is to create an effective practice–oriented personnel training system in the field of 'Art and creative industry' in the Yaroslavl region in terms of the current and future needs of the labour market, modern trends, and challenges[18].

To systematically select and support priority creative industries in the Yaroslavl Region, there have been developed criteria for their identification. They help identify areas with the greatest potential for human capital development, economic growth, preservation of cultural heritage, and increasing the competitiveness of the region (Table 3)[19].

It considers the regional specifics, strategic goals of the region's development, and government support.

---

[15] *Kaliningrad Region Entrepreneurship Support Center «My Business». (2026). Source: https://mbkaliningrad.ru/cluster /?ysclid=ml2qr6mbe9139142469 (accessed on 31.01.2026).*

[16] *Novy Kalingrad. (2022). Kaliningrad's new development strategy involves the creation of an 'oasis for creative entrepreneurship. Source: https://m.newkaliningrad.ru/short/2022/02/11/23979708.html (accessed on 01.02.2026).*

[17] *GS GROUP. (2026). Ideas that transform the world. Source: https://gs-group.com (accessed on 01.02.2026).*

[18] *Resurs. (2026). The educational cluster of the Professional Education, Yaroslavl region «Art and creative industry». Source: https:// resurs-yar.ru/upload/medialibrary/d3b/l77g0g37ke7u9u6kpj0khe1s864l7cm0.pdf (accessed on 03.02.2026).*

[19] *The regional methodology of defining the criteria for determining priority creative industries in the Yaroslavl region. Source: https://portal.yarregion.ru/depts-usp/doc/ORV/2025/ID%20435%202025% 20NPA%201.pdf (accessed on 03.02.2026).*

The analysis of creative industries for compliance with the criteria for selecting priority creative industries is conducted by the authorized body – the Ministry of Culture of the Yaroslavl Region. It correlates with the other executive authorities, members of the regional expert council for the implementation of the regional standard for the development of creative industries in the Central Federal District (the expert group was approved by the order of the Agency for Strategic Initiatives for the Promotion of new projects on 11.07.2025, No. 73-OD).

Based on the results of the analysis of compliance with the criteria for selecting priority creative industries, the map of indicators for each industry is compiled to assess them and subsequently select priority creative industries. As a result of the experts' discussion of the priority areas of creative industries, the creative specialization of the region is being formed.

Table 3 – Criteria for determining priority creative industries in the Yaroslavl region

Criteria (weight ratio), %)	Characteristics of the criterion	Scores[20*]
Matching economic specialisation (10)	The development of the creative industry is aimed at achieving the priorities and goals set by the strategic planning documents of the Yaroslavl region.	yes – 10 points, no – 0 points
Economic potential (30)	The contribution of balanced financial result of creative industries to the total balanced financial result of organisations in the Yaroslavl region.	ranked 1-5 – 10 points, ranked 6-10 – 5 points, ranked 11-16 – 0 points
Cultural significance (25)	The historical prerequisites for the development of industry in the Yaroslavl region.	High level of the indicator – 10 points, Average level of the indicator – 5 points, Low level of the indicator – 0 points
	The industry contributes to the preservation and popularisation of the local identity of the Yaroslavl region. A set of cultural, historical, and social features connecting industry entities with the Yaroslavl region.	High level of the indicator – 10 points, Average level of the indicator – 5 points, Low level of the indicator – 0 points
	The industry promotes the creation of unique products to form a recognizable image of the Yaroslavl region.	The high level of the indicator is 10 points, the average is 5 points, the low is 0 points
Export potential (25)	Participation of industry representatives in international industry events.	The high level of the indicator is 10 points, the average is 5 points, the low is 0 points
Human resources potential (10)	The number of higher, secondary vocational, and additional education programs aimed at training personnel for the industry.	ranked 1-5 – 10 points, ranked 6-10 – 5 points, ranked 11-16 – 0 points
	The number of graduates of specialised educational institutions in the creative profile.	ranked 1-5 – 10 points, ranked 6-10 – 5 points, ranked 11-16 – 0 points

Source: Authors

In November 2023, the Yaroslavl Region hosted the forum 'My Business. Creative industries.' The event was attended by more than 200 entrepreneurs and specialists from creative industries. The conference included:

[20] The results obtained for each selection criterion are summarized and multiplied by fixed weight coefficients for each criterion. Priority is given to industries have a combined score of 1.5 or more points.

1) 'Creative industries in IT' was deployed in a convenient space – 'Tochka kipeniya' of P. A. Solovyov Rybinsk State Aviation Technical University, Rybinsk, Yaroslavl region, Russia.

2) 'Education in the field of creative industries' – at the Voznesensky Concert and Entertainment Centre, Yaroslavl, Russia;

3) 'Creative industries in the tourism industry' – in Rostov the Great, Yaroslavl region, Russia[21].

There is a School of Creative Industries in Yaroslavl[22]. Yaroslavl is in the top 10 Russian cities according to the index of creative activity[23].

The basis for the creative industries in Yaroslavl is its historical status, museums, libraries, etc. This activity involves the active development of folk-art crafts, information technologies, etc.

At the Creative Industries Forum, a number of initiatives were proposed in the fields of tourism, urban development, and positioning of the Yaroslavl region.

A comparison of the three surveyed regions on the development of creative industries and creative clusters is presented in Table 4.

Table 4 – Characteristics of creative clusters in the Kaliningrad, Kaluga, and Yaroslavl regions, Russia

Region	Features of the creative cluster development	The institutional environment for the development of creative clusters	Directions of creative industry formation
Kaliningrad region	Cooperation with the development of the Tourism Cluster and the Amber Industry Cluster.	- Krespectiva Foundation for Creative Industries, - Kaliningrad Region Entrepreneurship Support Centre, - Cluster Development Centre, - Private innovation cluster «Technopolis GS».	- IT sector (software development, entertainment content); - Architecture and industrial design; - Film production; - Publishing house; - Advertising production and media.
Kaluga Region	It is carried out in cooperation with the development of the Cluster of Information and Communication Technologies, Tourism and recreation cluster, Cluster of socio-technological development of Kaluga region territories	- Agency for Innovative Development, - Centres for the implementation of innovative projects.	- software design: development of electronic document exchange services; - publishing industry: translation services and newspaper publishing; - gastronomy: restaurants and cafes; - music and sound design: production of pianos and grand pianos; - media and journalism: advertising on radio and television, radio broadcasting; - advertising and communication; - cultural and entertainment industry: organisation of recreation and entertainment.
Yaroslavl region	Cooperation with the development of the Educational Cluster, the IT Cluster	- School of Creative Industries, - The forum 'Moy bisness (My business)'.	- in the IT; - education in the field of creative industries; - in the tourism industry

Source: Authors

[21] Chamber of Commerce and Industry of the Russian Federation. (2023). The development of creative industries in the Yaroslavl region. Source: https://news.tpprf.ru/ru/regional/5229388 (accessed on 30.01.2026).

[22] Artemenkova, T. A. (2026). Creative industries: the balance of art and business. Source: https://prembank.kapital-info.ru/site/public/elfinder/Press-kit/Art.pdf (accessed on 30.01.2026).

[23] Yaroslavl region. (2022), News on 25.02.2022. Yaroslavl entered the top 10 Russian cities according to the index of creative activity. Source: https://yarreg.ru/articles/yaroslavl-voshel-v-top-10-rossiyskih-gorodov-po-indeksu-kreativnoy-aktivnosti (accessed on 30.01.2026).

Conclusion

There are many problems in the development of creative clusters: intellectual property and copyright protection, personnel policy and talent management, state and local authorities support, insufficient infrastructure development, bureaucratic and administrative barriers, etc. The reasons for the unsuccessful practices of creating creative clusters include: insufficient elaboration of the strategy for creating creative clusters, weak analysis of the specifics of the region where the cluster is planned to be located, shortcomings in the management and marketing system, etc.

According to the analysis of regional practices for establishing and development of creative clusters, the Kaluga, Kaliningrad and Yaroslavl regions consider creative clusters and the development of creative entrepreneurship as a tool for retaining young people, developing tourism, and forming new jobs. The development of creative clusters follows the development of other regional clusters: in the Kaliningrad region – with the development of a tourism cluster and a cluster of the amber industry; in the Kaluga region – a cluster of information and communication technologies and tourism and recreation; in the Yaroslavl region – with the development of IT and an educational cluster.

The institutional environment for the development of creative clusters is expanding: in the Kaliningrad region there are the Crespectiva Foundation for Creative Industries, the Entrepreneurship Support Centre, the Cluster Development Centre, the Technopolis GS private innovation cluster; in the Kaluga Region there are the Innovation Development Agency, Centres for the Implementation of Innovative Projects; in the Yaroslavl Region there are the School of Creative Industries, and Forum My Business, development of a regional methodology for determining priority creative industries, etc.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Alla B. Berendeeva – conceptualization; supervision.
Maria A. Sukhanova – writing – original draft.

References

1. Arefieva, A. A., & Pastukh, O. A. (2025). The experience of renovation of industrial heritage: creative clusters of small and medium-sized historical cities (on the example of Tula and the Tula region). In: *Perspektivy sovremennogo stroitel'stva: sbornik tezisov (magistrantov i aspirantov) III Nacional'noj (Vserossijskoj) nauchno-tekhnicheskoj konferencii. St. Petersburg, 2025.* (pp. 122-125). St. Petersburg: Sankt-Peterburgskij gosudarstvennyj arhitekturno-stroitel'nyj universitet (in Russian).

2. Bannikova, T. I., & Chudinova, E. A. (2025). Creative clusters: development challenges. In: *Sovremennye trendy upravleniya, ekonomiki i predprinimatel'stva: ot teorii k praktike: sbornik materialov III Vserossijskoj nauchno-prakticheskoj konferencii s mezhdunarodnym uchastiem. Ul`yanovsk, 11–13 noyabrya 2025 goda*. (pp. 10-13). Cheboksary: OOO «Izdatel'skij dom «Sreda»» (in Russian).

3. Baskakova, I. V., Derbeneva, V. V., Turgel, I. D., & Tsepeleva, A. D. (2023). Local identity as the basis for the formation of creative clusters in the cities of the Urals and Siberia. *Kreativnaya ekonomika*, 17(12), 4729-4748 (in Russian).

4. Vanyushkin, A. S. (2023). Sectoral structure of a perspective creative cluster in the Republic of Crimea. *Geopolitika i ekogeodinamika regionov*, 9(1), 68-83 (in Russian).

5. Vasilenko, L. A., Bogdanova, L. V., & Karimova, I. Yu. (2024). Creative economy and creative clusters in territorial development: an analysis of Russian practices. *Problemy razvitiya territorii*, 28(1), 61-77 (in

Russian).

6. Demyanova, A. V., & Ryabova, A. D. (2025) The creative class in the focus of statistics. *Higher School of Economics, Center for Interdisciplinary Human Potential Research*. Retrieved from https://issek.hse.ru/news/11055 (accessed: 29.01.2026) (in Russian).

7. Domnina, S. V., Dvortsova, O. G., & Kuskov, V. M. (2024). The practice of creating rural cultural and tourist clusters in the creative economy of the region. *Ekonomika i predprinimatel'stvo*, (6), 695-699 (in Russian).

8. Klimenko, V. A., Bannikova, T. I., & Chudinova, E. A. (2025). Creative clusters as points of attraction for young people in the creative economy. *Creative economy*, 19(11), 2797-2812. https://doi.org/10.18334/ce.19.11.124082 (in Russian).

9. Klimenko, V. A., Bannikova, T. I., & Chudinova, E. A. (2025). Assessment of the socio-economic and infrastructural potential of the region in the formation of creative clusters. *Vestnik Altajskoj akademii ekonomiki i prava*, (9-1), 69-77 (in Russian).

10. Petrova, L. E., & Bystrova, T. Yu. (2023). Science Slam in working with heritage: the case of the Aramil Creative Cluster, 2023. Labyrinth. *Theories and practices of culture*, (4), 24-33 (in Russian).

11. Shkiotov, S. V., & Metalnikov, N. M. (2025). Investment multiplier in the regional economy as a driver of economic development. *Teoreticheskaya ekonomika*, (10), 193-204. Retrieved from https://ystu.editorum.ru/ru/nauka/ (in Russian).

12. Gokhberg, L. M., Boos, V. O., Boyakova, K. N., Kutsenko, E. S, Lebedeva, S. A., Ostashchenko, T. V., & SHubina, V. I. (2025). *Rating of creative regions of Russia: 2024*. Moscow: Vysshaya shkola ekonomiki. Retrieved from https://issek.hse.ru/news/999070355.html (accessed: 06.02.2026) (in Russian).

13. Vanyushkin, A.S., Druzin, R.V., Kuznetsov, M.M., Ilyasova, Yu.V. (2025). The possibilities of formation creative clusters in depressed territories. *World Civilizations*, 10(3), 50-56. (in Russian).

Received 10.01.2026
Revised 16.02.2026
Accepted 17.03.2026

Jraic.com
JOURNAL OF REGIONAL AND INTERNATIONAL COMPETITIVENESS 2026; 7(1):93-103

The unmanned aerial vehicle technologies and artificial intelligence as the most important factors in ensuring the Russian economy competitiveness and implementing a strategy of technological leadership

Alexander A. Kiselev SPIN code: 7761-2099

ORIGINAL ARTICLE

Candidate of Pedagogical Sciences, Professor
Yaroslavl State Technical University, Yaroslavl, Russia
E-mail: aakiselev56@mail.ru

Roman V. Kolesov SPIN code: 7761-2099

Candidate of Economic Sciences, Associate Professor
Financial University under the Government of the Russian Federation, Yaroslavl Branch, Yaroslavl, Russia
E-mail: RVKolesov@fa.ru

Abstract. The modern economy implies the introduction of modern technologies for its development. They ensure the predictive economic development and competitiveness. The introduction of unmanned aerial vehicles (UAVs) and artificial intelligence (AI) technologies into the Russian economy provides its competitiveness. Currently, many countries have realised the need to introduce UAV technologies into the economy to change its functioning in new conditions radically and increase the competitiveness of organisations. The scientific and technical integration of UAV and AI technologies has the prominent prospects for improving the efficiency of the Russian economy and ensuring its competitiveness in the global economic environment. The purpose of the research is to study the prospects and problems of introducing UAV and AI technologies into the domestic economy in terms of their implementation in the long-term technological leadership strategy. The basic research methods are the study of UAVs scientific development, foreign experience, UAVs in a special military operation (SVO), and the extrapolation of these knowledge into the Russian economy. The research reveals the prospects and problems of introducing UAV and AI technologies in all spheres of the Russian economy. Those ensure the competitiveness of domestic organisations, identify the main problems and possible solutions in the Russian economy, and transit it into a multipolar model of the world.

Keywords: UAV and AI technologies in the economy; digital economy; competitiveness of the Russian economy; technological leadership; legislative framework of UAV and AI

JEL codes: O33, O38, O25, O32, L86, F14

DOI: 10.52957/2782-1927-2025-7-1-93-102

For citation: Alexander A. Kiselev & Roman V. Kolesov (2026). The unmanned aerial vehicle technologies and artificial intelligence as the most important factors in ensuring the Russian economy competitiveness and implementing a strategy of technological leadership. *Journal of regional and international competitiveness*, 7(1), 93.

Introduction

Modern technologies are increasingly penetrating into the life of our society and actively influencing its economic development. A feature of modern society development is the rapid introduction of new technologies in the social life. Today, a 'digital economy' as a result of rapid data processing, information transfer, money transfer, payments, etc. is developed.

Indeed, a new stage in the development of Russian society and the domestic economy will be associated with the of unmanned aerial vehicles (UAVs). According to the Financial University under the Government of the Russian Federation Researchers D.S. Tulenty and M.A. Selivanova, 'in recent years, there has been a significant and diverse use of UAVs. These devices, having high mobility and autonomy, are becoming popular in various fields, including agriculture, logistics, construction, environmental monitoring, and safety' [12, p.

196]. Accordingly, the need for specialists in the use of UAVs will increase. By2030 Russia will need about 1,000,000 specialists in the development, production, and operation of civilian unmanned aerial vehicles[1].

At the same time, the volume of government purchases of civilian UAVs in Russia in 2025 decreased fourfold compared to 2024: from 11.3 bn RUB in 2024 to 2.6 bn RUB in 2025. The reasons are the problems with mobile communications due to electronic warfare and many UAVs of low quality[2].

Nowadays, there is an issue of integration of UAV and AI technologies into the social life. It increases the effectiveness of UAV use in the interests of modern business.

However, a decrease in the interest of domestic organisations in the development and use of UAV and AI technologies may prevent them from ensuring the necessary level of competitiveness. The rapid transition to the use of UAV and AI technologies by foreign organisations in their activities may negatively affect the growth of the Russian economy. The foreign companies invest in the development of technologies above to outpace the Russian economy. The German experts have already developed ethical standards for self-driving cars, prohibiting AI from making decisions that can save some people's lives while harming other ones.

According to the review on the use of UAVs in the economy, there is a lack of systematic research on their prospects to increase Russian economy competitiveness. Firstly, there are the researches on their technical issues and use for military purposes. Today, the Russian Federation is in the process of formation of Drone Corps. Secondly, many researchers consider the issues of introducing AI technologies into various sectors of the 'digital economy'.

For instance, S.I. Makarenko presents the results of research on the formation of general directions for improving the effectiveness of countering UAVs. Indeed, advantages and disadvantages of main methods and means of countering UAVs are as follows: fire damage to UAVs by artillery and missile weapons of air defense systems; electronic suppression of navigation and radio communication systems of UAVs; functional damage to UAVs by ultrahigh frequency electromagnetic radiation; damage to UAVs by laser radiation, etc. However, it mainly concerns the military aspects of UAVs implementation [8].

The monograph 'The theory of effective use of unmanned aerial vehicles' by V.S. Moiseev considers the issue in terms of a systematic approach. Consequently, it includes optimising the required number and models of UAVs, organising the processes of their effective use, localisation of unmanned aircraft systems (LHC) components and their relocation, inventory management, and issues of spare and informatisation of UAV application processes. Indeed, it is important to determine the optimal number of leased civilian UAVs [9]. However, the author provides various models based on technical calculations without specifically considering the practical use of a large number of UAVs for various purposes and the introduction of AI technologies.

The monograph 'Unmanned aerial vehicles, their electromagnetic stability, and mathematical models of stabilisation systems' by Kramar V.A., Volodin A.N., and Yevtushenko E.V. studies UAVs purposes, classification, development history, aspects of mathematical models UAV stabilisation systems, multidimensional multi-contact continuously discrete, intelligent automatic control systems, and their electromagnetic stability [7]. However, it concerns the technical issues of UAV development.

The researcher A. Chernopyatov in his 'Unmanned Aircraft Systems' mainly deals with the operation of unmanned aircraft systems. However, it is a technical aspect of UAVs implementation [13].

Moreover, there are studies on security issues and the illegal exploitation of UAVs. The study 'Protection of transport terminals from threats of illegal use of unmanned aerial vehicles' by A.Yu. Garkushev and I.L. Karpova raises general issues of illegal exploitation of UAVs [3].

Nevertheless, in terms of the 'digital economy', researches on the use of UAVs and AI technologies concern the mass production of systems mentioned above. The work 'Technologies in Unmanned Systems' by Gvozdeva V.A. deals with the need to use intelligent technologies in UAVs, describes the main methods and models used in intelligent unmanned systems, and considers their data management issues [4].

[1] *Dzen. (2023). By 2030, Russia will need 1 million drone developers and operators. Source: https://dzen.ru/a/ZBQztKrFfmDJHS_n (accessed on 10.02.2026).*

[2] *Dzen. (2025). Experts blame budget cuts, flight bans in the regions and Chinese imports. Source: https://dzen.ru/a/aT9OOkxVBk_apgUk (accessed on 10.02.2026).*

However, it examines the general issues related to the integration of modern intelligent technologies into UAVs. For instance, L.O. Myrova considers the complex use of UAV and AI technologies as an important factor in the reliability of UAVs implementation. Indeed, stability of AI is one of the urgent tasks of ensuring the reliability of swarm structures of small-sized UAVs. The existing models and methods for assesment the reliability of a swarm of drones are not effective enough. They do not take into account all the components of a multi-level information system. It allows ones to predict the reliability of a swarm of drones [10]. Therefore, it is especially important for the mass use of UAVs in the civilian areas of the economy. Moreover, it is very prospective for country economic development.

The study 'Application of artificial intelligence methods for UAV flight control' by B.R. Andrievsky, A.M. Popov, V.A. Mikhailov, and F.A. Popov appraise the role of AI technologies in development of modern UAV systems. Moreover, they point the importance of using AI in UAV technologies in planning UAV missions, reliability and autonomy for UAVs engaged in civil engineering, agriculture and space systems, planning UAV trajectories, computational aspects of control, both individual UAVs and their groups, and their interrelationships [1].

The work 'Artificial Intelligence in unmanned aerial vehicles' by B. Boyarinov reviews the efficiency of drones with AI at automation of labour-intensive processes, detection of the objects on the ground and during flight, analysis and recording of information in real-time [2].

The study 'Artificial Intelligence in Economics' by A.V. Satsyuk and A.V. Volodarets examines the application of machine vision in on-board UAV systems to solve problems of automatic capture, guidance using neural network models, and methods for their configuration in real time. The special attention is paid to the of UAV steering mechanisms control based on computer vision data. The paper proposes a mathematical management model for sustainable goal tracking in a changing environment [11].

According to 'Artificial intelligence methods in control systems of unmanned aerial vehicles' by S.N. Sharov, V.A. Smirnov, and S.G. Tolmachev, AI technologies are relevant in UAV control systems. They are determined by uncertainty, ambiguity of emerging situations, the weak formalisation, dependence on many parameters, and the variability of decisions made in complex dynamic situations in real time [16]. Therefore, UAV generally implement AI technologies.

Moreover, economists consider the importance of AI in terms of 'digital economy' and 'digital society' development in the Russian Federation. The work 'The Application of artificial Intelligence in the Digital Economy' by N.V. Gorodnova dwells on the prospects for the introduction of AI algorithms in various spheres of human activity. The author systematises and summarises the accumulated Russian and foreign experience in using AI systems, assesses the positive and negative consequences of software algorithms in improving the efficiency of various management systems in terms of innovation and business digitalisation [5]. Therefore, the implementation of AI technologies in UAVs, including civilian purposes, is relevant one.

The research 'Artificial Intelligence in Economics' by A.V. Kovalenko and E.V. Kazakovtseva highlights the use of cross-cutting technologies form the National Program 'Digital Economy of the Russian Federation', such as Artificial Intelligence and Neurotechnology, Virtual and Augmented Reality in economics. Moreover, there were mentioned assessing the financial and economic condition, creditability of individual organisations, financial and socio-economic condition of regions using AI systems such as neural and hybrid networks, and fuzzy production systems. The special attention was paid to artificial neural networks and the fuzzy logic apparatus [6].

Therefore, today the integrated use of UAV and AI technologies is the most important condition for maintaining the required level of the Russian economy competitiveness. Indeed, the scope of UAVs in the economy is expanding significantly. The research 'Features of the development and operation of civilian unmanned aircraft systems with artificial intelligence technologies in the Arctic zone of the Russian Federation' by A.V. Fedotovskikh highlights issues related to the development, operation, design, and operation of UAVs with AI systems in the Arctic zone [15]. Nowadays, the Arctic zone is very relevant due to the strategic importance of the Arctic in terms of obtaining new resources. Therefore, Russia, the USA, Canada, Denmark, Norway, Iceland, Sweden, and Finland, etc. are trying to expand the possibilities for military and commercial

control over these territories.

However, 'The market of unmanned aircraft systems in Russia: the state and features of functioning in the macroeconomic conditions in 2022' by M.R. Fattakhov conducts an analysis of the unmanned aircraft systems market in Russia, assesses its volume and structure by the sectors of the economy, and provides the conditions for sustainable market development in Russia. Currently, the UAV market in Russia is under formation. At the same time, 66.8%of customers are the organisations in the field of defense, security, law enforcement, prevention, and elimination of consequences of emergency situations, etc. There are only 10.1% are state and municipal authorities. As a result, there is a lack of commercial requests for UAVs. However, provision of the necessary conditions and a continuing interest in using UAS to address the problems for businesses and authorities will transform this market niche into an independent sector of the economy. The paper recommends to support the unmanned aircraft systems market, ensure the sustainable development of this area in Russia and conditions for strengthening the technological independence of our country in the medium and long term [14]. However, businesses are not ready to invest in the development of the economy through the use of UAV and AI technology. All named above actualises the issues of introducing UAV and AI technologies into the Russian economy as a factor in ensuring the necessary level of its competitiveness. Moreover, under the conditions of economic sanctions, foreign countries do not show their developments in this area. The example of the SVO shows how the UAVs radically changed the course of combats. UAV and AI technologies will determine the development of the economy and ensure its competitiveness in the near future.

The purpose of this article is to reveal the need for timely systematic and practice-oriented research on the introduction of UAV and AI technologies into the Russian economy.

Main part

Until recently, the use of UAV technology in Russia was not widespread. The experience of SMO shows their importance on the battlefield. They reconnaissance, defeat enemy manpower, equipment, and fortifications, search for the wounded, deliver ammunition and food, ensure the withdrawal of civilians from combat zones, etc. According to The New York Times, Russia completely surpasses both the NATO countries and Ukraine in the field of production and use of combat UAVs[3]. The main advantage of integrating UAV and AI technologies is an autonomous control provided without operator intervention. UAVs can independently plan routes, make decisions, and adjust their actions based on new data coming from sensors, etc.

The activities of domestic organisations in terms of improvement UAVs technology and production help to form the necessary production base. Secondly, SMO has helped to train highly qualified specialists in terms of UAV technologies. Those will be demanded in the activities of various organisations and in the country's economy. It ensures the competitiveness of the Russian economy.

However, UAVs of various types have already used by domestic organisations. Today, forest fire monitoring, agricultural activities, inspection of industrial facilities, pipelines and power lines, monitoring the progress of construction, ensuring air safety, cartography, search and rescue operations in remote areas, logistics, transportation of patients from hard-to-reach and remote areas, delivery of goods for people in them, extinguishing fires in high-rise buildings have become key areas for the use of UAVs.

The use of UAVs allows organisations to save resources and time on complex and dangerous work. According to the Gazprom report, the use of UAVs reduces the duration of main gas pipelines inspection by 70%. Additionally, the unit cost of work is three times cheaper than without the use of UAVs; the detection time for violations on the company's pipelines has been reduced from several days to several hours[4]. In agriculture, UAVs perform labour-intensive tasks of monitoring the condition of plants and soil, applying fertilizers and plant protection products, planting seeds, pollinating plants, controlling animals, etc. As a result, the costs of works are reduced. Accordingly, the cost of agricultural products is reduced, making domestic agriculture

[3] *Kudrin, S. (2025). NYT: Russia has become a modern empire for the production of combat drones. Source: https://www.kp.ru/online/news/6570280 (accessed on 10.02.2026).*

[4] *RBC. (2023). Which industries in Russia are switching to drones. Source: https://www.rbc.ru/industries/news/651fc16d9a79476386445662 (accessed on 10.02.2026).*

more competitive with global producers.

The directions and areas of use of UAV technologies are actively expanding. UAVs will be able to be actively used on construction sites instead of heavy cranes. It will reduce labour costs for construction and the cost of housing for people, etc.

In the near future, UAVs might replace the couriers for the delivery of food. There are a lot of robots in delivery service in Moscow, Russia. Moreover, food delivery is very popular business area in many regions of the Russian Federation. The coronavirus pandemic has contributed to the rapid development of this business. But even today, the pace of development of this type of business is significantly high. In some cities the number of orders in 2024 increased by about two times compared to 2023. Therefore, a new buying pattern is formed[5]. According to Infoline, the capacity of the ready-to-eat market reached over 1.14 trln RUB by the end of 2025. It is 20% higher the level of 2024[6]. However, in the future, people will be able to use UAVs in delivery of household goods. However, couriers are well paid employees. According to Yandex.Food, foot couriers in Moscow earn 40,000-133,000 RUB per month; in the regions of the Russian Federation, they earn 40,000-100,000 RUB per month[7]. And UAVs with AI, acting as couriers, will be beneficial to the organisers of this type of business and interesting to consumers.

Secondly, urbanisation and dense urban development prevent providing of medical care and extinguishing fires in homes when ambulances or fire trucks cannot approach homes, since all the free space in courtyards and driveways is often used for parking private cars. The same problem also occurs in populated areas where access by fire trucks and ambulances is difficult due to poor road conditions. And Russian engineers are already faced with developing such UAVs to extinguish fires in homes and evacuate people. There was developed the Aladdin UAV for transporting people and cargo; it is able to carry up to 250 kg of payload over a distance of up to 150 km[8]. In conditions of overloaded transport logistics in large megacities and the remoteness of small rural settlements from large centers, UAVs will be able to solve these problems. In China, UAVs are already being used as cargo and passenger taxis from for low-altitude commercial flights. In the near future, it is planned to expand the route network and integrate air taxi services into the urban infrastructure[9].

Indeed, in conditions of dense urban development and lack of parking spaces, the development of UAVs with AI as an air taxi will be in demand in the near future. Their ability to short the routes will allow people to work remotely. For example, Moscow's biggest problem is the time it takes for people to go to and from their place of work. Undoubtedly, much is being done to develop the metro. A 70-km-long ring road with 31 stations was commissioned to increase the daily comfort of citizens and people living in the Moscow region but work in Moscow.

Nevertheless, the helicopters are already being used to evacuate patients in large cities in conditions of overloaded transport infrastructure. In the first half of 2025, Rostec helicopters conducted 4,600 medical evacuations, including 845 children. For 8 years, over 49,000 people were rescued, more than 7,000 of them are children[10]. However, the helicopters cannot fly up to houses in populated areas. Therefore, it is difficult to evacuate the sick and injured people. UAVs have no this disadvantage due to their mobility, high maneuverability, and equipping with cameras, ultrasonic sensors, etc.

Thirdly, Russia is already working on the introduction of UAVs in various sectors of the economy. According to the Ministry of Industry and Trade of the Russian Federation, the state order for civilian

[5] *MKRU. (2018). 28% of Yaroslavl residents use food delivery. Source: https://yar.mk.ru/economics/2018/08/10/28-zhiteley-yaroslavlya-polzuyutsya-dostavkoy-edy.html (accessed on 10.02.2026).*

[6] *Kommersant. (2025). The ready-to-eat segment has grown by a third, but is facing a shortage of capacities. Source: https://www.kommersant.ru/doc/8251984 (accessed on 10.02.2026).*

[7] *HABR. (2025). Guide: Working as a Yandex.Food courier in 2025, how much I earn – Review and my review. Source: https://habr.com/ru/news/966334 (accessed on 10.02.2026).*

[8] *HABR. (2022). A heavy flying cargo drone was created in Russia. Source: https://habr.com/ru/news/670514 (accessed on 10.02.2026).*

[9] *Unmanned aerial taxi has become a reality in China. (2025). Source: https://dzen.ru/a/Z--1vw78T1M4ztQj (accessed on 10.02.2026).*

[10] *Nationalprojects.RF. (2025). Under a reliable wing: how sanitary aviation in Russia saves patients. Prodolzhitel'naya i aktivnaya zhizn'. Source: https://xn--80aapampemcchfmo7a3c9ehj.xn--p1ai/news/pod-nadezhnym-krylom-kak-sanitarnaya-aviatsiya-v-rossii-spasaet-patsientov (accessed on 10.02.2026).*

UAVs in Russia has reached 2,500 units for 2026. In 2026 there will be an increase in the shift in focus from government purchases of the devices themselves towards services[11]. A number of countries are already involved in this work and are striving to obtain the most modern technologies for the production and use of UAVs in the interests of developing the national economy. In 2025, Wheelies introduced a UAV is able to work as an autonomous waiter, delivering drinks to guests, independently plot a route, stably maintain the desired course, and save the food and drinks during the flight. Therefore, UAVs can replace humans in performing various jobs.

Fourthly, it is necessary to integrate UAV and (AI) technologies. In Russia there are already being implemented several projects on integration of AI and UAV technologies. It will increase the autonomy of using UAVs, allow them to effectively perform monitoring and navigation tasks, etc.[12] According to analysts and experts, AI is currently expanding the classic capabilities of UAVs and making them truly independent units. Classic UAV depends on GPS, a remote operator and a clearly defined program. Indeed, AI UAV can independently build flight routes, recognise security threats, adjust its flight in real time and in conditions of real changes in the situation. As a result, it does not need to be influenced for making critically important decisions[13]. It is especially important with a lot of UAVs work together. In China, a record of 8,100 UAVs simultaneously move and perform colored three-dimensional shapes and images in the sky[14]. Without AI it impossible to control a swarm of drones. AI technologies will ensure trouble-free and systematic operation of civilian UAVs in the large settlements. Nowadays, technological progress is much faster in the field of the development and use of autonomous UAVs, since AI provides its superiority over humans in terms of information processing speed and reaction time to changes in emerging situations. Therefore, AI-powered UAVs will do an excellent job without human help, and remote control will become unnecessary thanks to a neural network with machine vision. The most important task for the Russian economy is to remain leadership in this field.

Fifth, Russia has extensive experience in the practical use of UAVs and has gained some potential in the use of UAV and AI technologies and prospects for their implementation in all areas of the national economy. SVO gave a great impetus to Russian engineers in the development of UAVs for various purposes. Indeed, the Russian economy should not lag behind foreign competitors on the use of UAV and AI technologies in the civilian sphere. As a result, it is necessary to intensify research work on the introduction of UAV and AI technologies into all spheres of the domestic economy. There should be a government support in R&D of UAVs. According to the Financial Times, European investors are actively financing UAV developers. The total volume of investments in German Quantum Systems and Portuguese Tekever exceeded € 2 bn EUR. The demand for such products abroad is actively growing[15]. The President of the United States, D. Trump announced $ 500 bn USD investment project in AI and actively collects data on SMO to use AI-powered UAVs. According to the Wall Street Journal, American investors continue to invest in Chinese companies engaged in AI and their integration into UAV technologies, despite sanctions bans and the competition between Washington and Beijing[16]. The growth of investments in UAV and AI technologies is becoming the main driver of economy growth. According to Bloomberg, the AI market provides more than 50% of

---

[11] *DZEN. (2025). How many billions will drones bring and why the demand for them is growing. Source: https://dzen.ru/a/aTZ615mXjixmi0MR (accessed on 10.02.2026).*

[12] *Zakvasin, A. (2024). Computer vision: how artificial intelligence enhances the capabilities of Russian UAVs. Source: https://russian.rt.com/russia/article/1400797-itmo-iskusstvennyi-intellekt-bpla (accessed on 10.02.2026).*

[13] *Dzen. (2025). Artificial intelligence in UAVs: technologies, applications and development prospects. Source: https://dzen.ru/a/aH5HCYmLr1s69Lx8 (accessed on 10.02.2026).*

[14] *RGRU. (2026). China has set a Guinness World record for the number of drones for a light show. Source: https://rg.ru/video/2024/09/13/v-kitae-ustanovlen-rekord-ginnessa-po-kolichestvu-dronov-dlia-svetovogo-shou.html (accessed on 10.02.2026).*

[15] *NEWS.RU. (2025). European investors began to invest unprecedented amounts in the development of drones. Source: https://news.ru/weapon/evropejskie-investory-nachali-vkladyvat-nebyvalye-summy-v-razvitie-dronov (accessed on 10.02.2026).*

[16] *Kotov, P. (2025). American investors flooded Chinese AI developers with money, despite geopolitics. Source: https://3dnews.ru/1133752/amerikanskie-investori-zavalili-kitayskih-iirazrabotchikov-dengami-nesmotrya-na-geopolitiku (accessed on 10.02.2026).*

US GDP growth in the first half of 2025[17]. The foreign investors have spent a lot of money on UAV and AI technologies which have not yet proven their commercial effectiveness as a modern business model. However, extrapolating to the development of UAV technologies combined with AI technology shows the prospects to ensure the competitiveness of any economy in the new geopolitical conditions. Therefore, the Russian economy should ensure the development of domestic UAV in the field under study. Secondly, it is necessary to establish conditions for commercial organisations to develop and implement AI-related UAV technologies in their activities. According to the statistics, three quarters of Russian organisations do not know why they need UAV and AI technologies. 26% of Russian organisations budget expenditures on the introduction of AI have a strategy for its implementation. This is stated in the MTS Web Services research 'Technological Business Strategies', based on a survey of more than 700 organisations and a series of interviews. According to the research, the remaining market participants are either at the stage of individual pilot projects, or only formally planning systematic work with UAV and AI technologies[18]. The domestic organisations believe they will not receive immediate benefits and quick cost recovery. It might have negative economic consequences and does not contribute to the implementation of a strategy of technological leadership in the domestic economy by the President of the Russian Federation V.V. Putin. The autonomous UAVs with neural networks significantly expand the possibilities of economic development to new horizons, change the industry, the agricultural sphere, logistics, etc., and ensure the competitiveness of the economy. The issue of integrating UAV and AI technologies in the Russian economy as a factor in implementing the strategy of technological leadership, needs to be solved today. Over the next decade, UAVs coupled with AI will become a driver for the development of all sectors of the economy, ensuring the necessary level of its competitiveness. As a result, the state should respond to the wait-and-see attitude of domestic organisations by establishing the conditions to invest the necessary funds in the development and implementation of UAV and AI technologies in their work.

Sixth, rapid changes in technology are not always recognised by people in a timely manner. The people concern about the usefulness of new technologies. There are some fears on UAVs with AI will replace humans. According to experts at Oxford University, in 2026 AI will write essays identical to human made; by 2027 AI will replace truck drivers; by 2053 AI will be able to do the work for surgeons, etc. AI will surpass humans in all tasks within 45 years and automate almost all jobs within 120 years. Moreover, AI will be totally formed by 2075; the next 30 years there will be a time for super-AI. It will be able to surpass the best minds of mankind in all fields of activity, including reprogramming, self-improvement, and independent development of new systems and algorithms[19].

These fears of people have been called the 'AI effect' by researchers. It concerns the people's consciousness acquired a 'blind spot' in the perception of new technologies. It distorts our perception of usefulness and progress, especially when AI does not work as it was expected. In science fiction films as 'Robot War' (1978), 'Robot War' (1993), 'I, Robot' (2004), 'Eve: Artificial Intelligence' (2011), 'Blade Runner 2049' (2017), etc. there are aware from the introduction of new UAV and AI technologies. Therefore, today it is necessary to form a correct social perception of introduction UAV and AI technologies as a factor of real economic development.

Seventh, it is important to consider the issues of ensuring the safety of UAVs and AI. In 2023, more than a thousand representatives of the IT industry wrote an open appeal calling for a temporary halt to large-scale experiments with AI and neural networks. In their opinion, AI, comparable to human, poses a serious threat to civilisation. According to The Guardian, a US Air Force drone controlled by AI decided to eliminate the operator during the tests so that he would not interfere with his task[20]. The head of the Office

[17] *Pshinnik, K. (2025). New oil: why investments in AI have become the main global trend. Source: https://companies.rbc.ru/news/NqsnabuvNj/novaya-neft-pochemu-investitsii-v-ii-stali-glavnyim-mirovyim-trendom (accessed on 10.02.2026).*

[18] *Lipanova, L. (2025). Three quarters of Russian companies do not know why they need artificial intelligence. Source: https://www.vedomosti.ru/technology/articles/2025/12/18/1164563-tri-chetverti-rossiiskih (accessed on 10.02.2026).*

[19] *Gorbunov, F. (2023). Why are people afraid of artificial intelligence and what real danger can it pose? Source: https://belta.by/tech/view/pochemu-ljudi-bojatsja-iskusstvennogo-intellekta-i-kakuju-realnuju-opasnost-on-mozhet-nesti-600740-2023 (accessed on 10.02.2026).*

[20] *Pisarenko D. (2023). «It's not funny, it's scary». The American drone decided to kill its operator. Source: https://aif.ru/society/science/eto_ne_smeshno_a_strashno_amerikanskiy_dron_reshil_ubit_svoego_operatora (accessed on 10.02.2026).*

of Artificial Intelligence of the U.S. Air Force, Colonel T. Hamilton explained that the system in a computer simulation identified the operator's interference as harmful to the mission of the UAV and decided to fix the problem. However, when the system was trained not to do harm to human, it suddenly attacked the communications tower. It did not identify the operator, but believed that it was the tower that prevented the UAV from completing its task. And Russian engineers will have to adress this crucial task to ensure the safety of people and the infrastructure of the economy from illegal AI decisions on the use of UAVs.

The introducing modern UAV and AI technologies into the Russian economy, and social understanding how these technologies will improve people's well-being and standard of living, it is already necessary to develop legislative and regulatory acts and documents regulating the mass use of UAVs for various purposes with AI, as their number will grow rapidly. However, their use in the domestic economy will be hampered by the lack of scientific works and legal regulation. At the same time, it is important to provide measures to prevent the use of UAVs with AI for criminal purposes. The example is the use of computer technology by fraudsters to lure money from people with fraudulent schemes. Therefore, it is necessary to actively prepare society for the UAV and AI technologies as the future for the development of society and its economy. Moreover, their safe implementation and use should be guaranteed by the state.

At the same time, it is important to ensure information security for people when implementing a new technical and economic structure. The one of the main requirements in the field of ensuring information security of organisations is to understand their own infrastructure and the cyber threats relevant to it. As a result, developers of UAV and AI technologies need to proactively protect themselves from attacks that may be automated in the near future. It requires UAV and AI technologies developed by domestic engineers be introduced into the economy. It allows them to control of UAVs with AI. As a result, artificial immune systems for UAVs should be developed. They are designed to protect UAVs of information attacks, attempts to intercept control, hijack, harm people, etc.

Conclusion

UAV technologies are the part of the digital economy. Moreover, they form a new technical and economic structure in terms of the Russian economy technological leadership. UAVs are currently becoming increasingly important tools in various areas of the domestic economy, from agriculture and food delivery to transport and logistics. However, they need to receive and process data, make decisions in real time, and respond to environmental changes. Hence, AI allows UAVs to be more autonomous, safe, and efficient. As a result, the introduction of UAVs for various purposes into the country's economy, combined with AI technology, will increase its efficiency and ensure the level of competitiveness.

At the same time, it is necessary to prepare society for the perception of the new technical and economic structure, while providing regulatory and legal support for their civilised use and the exclusion of their misuse, including for criminal purposes.

Indeed, the Russian engineers will have to address the most relevant issue – formation of the safe implementation of AI in UAVs. It will ensure the use of UAV and AI technologies in the interests of the competitiveness of the Russian economy in the near future.

The integration of UAV and AI technologies is one of the key topics for understanding global economic processes today. It is a relevant factor transforming the foundations of competitiveness of both individual sectors of the economy.

The analysis of expert opinions, strategic documents and market data for 2024-2026 allows us to identify several key aspects of theit impact on the Russian economy competitiveness:

- An economic effect. The integration of UAV and AI technologies forms the competitive advantages in all major areas of economic development. For instance, in agriculture, AI-based UAVs can significantly increase the efficiency of field cultivation and save resources.

- Increased productivity and lower costs. UAVs can reduce labour, time, and financial costs for complex work in terms of the large spatial dimensions of their use. For instance, they ensure data collection and analysis for the oil and gas sector, energy and infrastructure monitoring in hard-to-reach areas, including the

Arctic. Indeed, AI provides UAVs with a remote tool of decision making.

- Hazardous industries. An autonomous UAVs with AI eliminate the human factor and optimise UAV movement routes in real time; the one specialist is able to monitor the operation of many UAVs.

- The integrated use of UAV and AI technologies. It will rise the industries that did not exist a few years ago, for example, the creation and maintenance of bases for UAVs with AI.

- Ensuring technological sovereignty and leadership in the global market. For Russia the development of its own competencies in the field of UAVs and AI is a matter of economic development and strategic security.

The development of UAV and AI technologies for military purposes provides huge opportunities for Russia to introduce these technologies into the civilian sphere. According to experts, the era of dividing technologies into military and civilian has already finished. The developments in the field of using UAV and AI technologies in a complex are equally important for both the country's defense capability and economic development. Indeed, the potential of the Russian economy is huge in terms of the territory and the need for infrastructure monitoring and logistics development. As a result, Russia is already at the stage of transition from experiments to the integrated introduction of UAV and AI technologies into the economy.

Nevertheless, the main obstacles remain the incomplete regulatory framework for the mass use of UAVs in airspace, infrastructure development, construction of drone ports, data centers, etc. These issues should be addressed as a matter of priority.

Hence, the integration of UAVs and AI is the basis for the formation of a new type of economy and ensuring its competitiveness. As a result, the Russian economy will construct a system for data collection, intelligent processing, and feedback from the real world through the use of UAV and AI technologies. It will determine the competitiveness in the near future, and contribute to the practical implementation of the technological leadership strategy defined by the President of the Russian Federation.

FUNDING

The work was done on a personal initiative.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Alexander A. Kiselev – conceptualization; supervision.
Roman V. Kolesov – writing – original draft.

References

1. Andrievsky, B. R., Popov, A. M., Mikhailov, V. A., & Popov, F. A. (2023). Application of artificial intelligence methods for UAV flight control. *Aerospace Engineering and Technology*, 1(2), 72-107.

2. Boyarinov, E. (2023). Artificial intelligence in unmanned aerial vehicles. *Vestnik nauki*, 4(5), 770-779 (in Russian).

3. Garkushev, A. Yu., & Karpova, I. L. (2023). *Protection of transport terminals from threats of illegal use of unmanned aerial vehicles.* Moscow: Infra-engineering (in Russian).

4. Gvozdeva, V. A. (2026). *Technologies in unmanned systems.* Moscow: Infra-M (in Russian).

5. Gorodnova, N. V. (2021). *Application of artificial intelligence in the digital economy.* Moscow: First Economic Publishing House (in Russian).

6. Kovalenko, A. V., & Kazakovtseva, E. V. (2023). *Artificial intelligence in economics.* Moscow: AI Art Media (in Russian).

7. Kramar, V.A., Volodin, A.N., Yevtushenko, E. V., Makogon, V. P., & Harlanov A. I. (2024). *Unmanned aerial vehicles, their electromagnetic resistance and mathematical models of stabilization systems.* Moscow: Direct-Media (in Russian).

8. Makarenko, S. I. (2020). *Countering unmanned aerial vehicles.* St. Petersburg: Naukoyemkie

tehnologii (in Russian).

9. Moiseev, V. S. (2015). *Fundamentals of the theory of effective use of unmanned aerial vehicles*. Kazan: Redakcionno-izdatel'skij centr "Shkola" (in Russian).

10. Myrova, L. O., Korolev, P. S., Antonovich, P. I., Tsvetkov, V. E., Kostyuk, A. A., & Kirichek, R. V. (2024). Reliability of the functioning of artificial intelligence in swarm structures of small-sized UAVs. *Elektrosvyaz*, (4), 4-24 (in Russian).

11. Satsyuk, A. V., & Volodarets, N. V. (2026). *Hybrid computer vision algorithms for precision autonomous UAV control.* Moscow: INFRA-M (in Russian).

12. Tulenty, D. S., & Selivanova M.A. (2025). The influence of unmanned aerial vehicles on risk situation of insurance interests: problem statement. *Finance: theory and practice*, 29(4), 196-208 (in Russian).

13. Chernopyatov, A. (2024). *Unmanned aircraft systems.* Moscow: Direct-Media (in Russian).

14. Fattakhov, M. R., Kireev, A. V., & Klesh, V. S. (2022). The market of unmanned aircraft systems in Russia: the state and features of functioning in the macroeconomic conditions of 2022. *Voprosy innovacionnoj ekonomiki*, 12(4), 2507-2528 (in Russian).

15. Fedotovskikh, A. V. (2022). *Features of the development and operation of civilian unmanned aircraft systems with artificial intelligence technologies in the Arctic zone of the Russian Federation.* Moscow: IP Art Media (in Russian)

16. Sharov, S. N., Smirnov, V. A., & Tolmachev, S. G. (2022). Artificial intelligence methods in control systems unmanned aerial vehicles. *Izvestiya Rossijskoj akademii raketnyh i artillerijskih nauk*, (4), 11-18 (in Russian).

Received 25.12.2025
Revised 13.01.2026
Accepted 14.02.2026

JOURNAL
OF REGIONAL
AND INTERNATIONAL
COMPETITIVENESS

JRAIC.COM