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JOURNAL OF SCIENTIFIC HYPOTHESES AND SUCCESSFUL BUSINESS DECISIONS

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Transformation of the International Monetary System and the Formation of a Non-emission Circuit of the National Financial System

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ABSTRACT

The relevance of the article: the direction of transformation processes in the international monetary system gives grounds to assume that real assets will be able to play a rather noticeable role in ensuring the stability of the entire system in its future version. **The purpose** of the study is to identify signs that one of the mechanisms for maintaining the stability of the new version of the international monetary system, which retains its dollar-centric nature, may be the use of financial instruments secured by real assets. This primarily concerns gold and, probably, other mineral resources. In order to identify future trends, the article specifically examines the circumstances when the international monetary system was really on the verge of, if not collapse, then at least an immediate loss of its stability. Since Russia faces the task of forming a truly sovereign national financial and monetary system, this aspect becomes an absolute necessity. In this context, the succession of steps to create a non-emission (reserve) contour of the national financial system and financial instruments for its circulation is considered.
Keywords: international monetary system; COMEX; gold; non-emission circuit; dual goods

INTRODUCTION

Currently the international monetary system (IMS) experiences a period of transformation. However, evidently, if the dollar-centric nature is maintained, its new "edition" will not be able to do without at least a partial reliance on real assets, primarily gold, that must become a significant element in maintaining its stability.

Its significant direction could become the development of a plan to create a non-emission backed-by-real-assets (investment) circuit for the national financial system.

The principal task of the authors is to demonstrate that their proposed option takes into account the main peculiarities of the contemporary transformational processes held in the IMS.

Although a variety of publications cover this issue [1–4], practically, any of them overlook the use of financial instruments backed by real assets. This study is dedicated at least to fill this gap to some extent, which, in turn, demonstrates the novelty of the research.

RISKS TO STABILITY OF THE IMS

First of all, we point out, the IMS is forced to start transition to a new standard. It is appropriate to recall two events when the IMS was in fact on the brink of collapse.

The first one occurred on September 17, 2019 when the Federal Reserve System (the Fed) launched another round of increasing the money supply.[1] It was "triggered" by emergency measures due to the collapse of the New York interbank market: by mid-September, interest rates in the market exceeded the Fed's target rate by four times, which left no doubt, that Wall Street was on the brink of a systemic crisis.[2] The potential scale of the crisis was indicated by the amounts the Federal Reserve transfered to a number of leading global banks: in overall, from September 17, 2019 to January 31, 2020, emergency repo loans totaled to 19.9 trillion USD.

Mass media described this state of affairs mainly from a formal viewpoint. Never the less, according to Swiss experts, the repo money market suddenly dried up, so that panic erupted at the Fed due to a sudden failure in its "insider scheme" when a shortage of funds was discovered, which directly damaged major banks. This skyrocketed repo market rates, entirely undermined the Fed's plan to suppress the yield on Treasury bonds (Treasuries). "Last week we saw the first warning signs of this crude imbalance between demand and supply, i.e., a liquidity crisis, otherwise known as a crisis of insufficient dollars in the repo market, which the Fed can only 'solve' by printing more money."[3]

The second event, when the system nearly lost its stability, occurred quite recently. The reason behind it was an unexpected deficit of physical gold on the COMEX exchange. It is hard to identify the exact dates of the climax of the crisis, but obviously, this took place approximately between early December 2024 and mid-January 2025. Although, based on the chart data from COMEX Gold, presumably and with high probability, the crisis started to unspool on December 9, 2024.[4] Exactly at that point, demand for physical gold from derivative holders surged by 750 per cent, leading to a failure in their financial rollover mechanism, which bolsters the entire "paper gold" market. In the essence, it functions to constantly deflate the price of gold, which is conducted by a number of global banks by means of short positions daily, which are usually backed by 4 per cent of real gold and 96 per cent of paper credit leverage. Consequently, the physical gold (which is equal to the permanent short position) neverleft the storages and remained there until 8:30 a.m.: the generally established price-fixing time [5, 6]. However, the situation took an unforeseen shift, so that only the rapid delivery of physical gold, mainly from the UK (400 tonnes) and Switzerland (193 tonnes), helped thwart very grave outcomes for the entire dollar system [7]. Overall, from December 2024

[1] URL: https://fred.stlouisfed.org/series/RPONTSYD

[2] URL: https://www.reuters.com/article/us-usa-fed-repo-analysis/fed-focuses-on-repo-market-exit-strategy-after-avoiding-year-end-crunch-idUSKBN 1Z50HC/

[3] URL: https://www.signalsmatter.com/repo-market/

[4] URL: https://comexlive.org/gold/

to March 2025, 720 tonnes of gold was delivered to COMEX warehouses although previously only an average of 40 tonnes was annually supplied there [8].

What were the reasons for such a dramatic shift? Definitely, one could be content with the frequently announced explanations that such an overwhelming influx was related either to fears of potential US import duties on gold, or to potential arbitrage game between its spot price in the UK and its futures price in New York.[5]

One may also refer to the fact, that the situation for banks has been deteriorating for a few years due to the need to comply their assets with Basel III rules, which required more allocated, or physical gold for them.[6] Such document is *per se* an element of a long-delayed, contentious, and internationally agreed element within the Bank for International Settlements for banking regulation, which currently, among other needs, requires commercial banks to transform their "net stable funding ratio" for gold held as a Tier 1 asset on their balance sheets from 50 to 85 per cent [9].

Notwithstanding the impact of Basel III on the situation with gold, as well as the efforts of the Bank for International Settlements to accelerate the adoption of these rules, we may also possibly assume that all ups and downs with their introduction are just related to some deeper processes occurring in the IMS.[7] Notably, by mid-2025, not a single country in the world fulfilled Basel III, although mass media keep constantly claiming that this should occur in the nearest future both in the USA and in the EU.[8] In this regard, it is necessary

to find out some other than the mentioned above explanations for the fact that in December 2024, some of the largest players of COMEX, including banks, suddenly decided to apply to physical gold. Most likely, two main factors were a driving force. First, the catastrophic mistrust in treasuries and subsequently, a turn towards real assets, primarily, gold. In this case, the most important factor was the transformation of the dollar into a political weapon within the framework of anti-Russian sanctions. Secondly, it cannot be excluded that coordinated actions by some of the opponents of Trump's anti-globalist policy possibly triggered a financial crisis on the eve of his inauguration. In fact, this nearly led to catastrophic consequences for the entire dollar system, so some strong measures had to be taken.

REAL ASSETS IN THE NEW IMS STANDARD

Thus, gold turned out to be the core issue of fierce competitive struggle precisely at the present time, which is of no coincidence. The fact is that in the currently newly formed IMS standard, gold plays a much more important role than before, within the entire post-1971 period. Such circumstances do not at all disprove with the fact, that already in the second half of 2023, mass media started promoting cryptocurrencies as the cornerstone and most dynamic element of the IMS. When Trump came to power, this activity turned out to be more purposeful and systemic: it was at this time that new evidence came to light that this not merely indicated a reform of the IMS, but an attempt to build a new monetary standard, which should be stemmed from the proactive use of cryptocurrencies. There even exist a viewpoint, that currently, petrodollar has been substituted by a token-dollar system, with stablecoin as the global digital reserve currency.

Concurrently, it is implied that the promotion of stable coins with intensive use of bitcoin (BTC) can significantly contribute to the monetisation of US national wealth, so that it would allow to start the solution of the problem of the US debt. In its turn, the lion's share of stable coins should

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[5] London usually sets the spot price for physical gold, while New York makes futures deals.

[6] According to A. Likhodeev, "The most important aspect of Basel III is the distinction between allocated and unallocated gold. The rules give preference only to physical gold held on balance sheets and assigned to an owner (allocated gold)… Paper gold (unallocated meaning futures, swaps, ETFs, and other derivatives), on the other hand, has been given the status of a risky asset… By means of positioning gold this way, regulators are clearly encouraging the ownership of real gold over derivatives.URL: https://teletype.in/@lixodeev/g6je_FcBgbT

[7] URL: https://www.bis.org/press/p250521.htm

[8] URL: https://www.energyandcapital.com/the-basel-iii-bombshell-why-digital-gold-could-be-the-decades-top-trade/

now be supported by US Treasury bonds, dollars, and gold, and subsequently by other mineral resources, which are under the US control. However, it is necessary to increase the collateral base in order to make a stable coin a reserve currency.

Thus, here according to a number of American experts, gold should take the leading place. Some of the experts believe that the authorities should primarily perform the promised audit of the gold reserve, which, according to financial statements, has been intact for several decades, and after that, they can proceed to use it.

Next step: it is necessary to bring the value of official US reserves into line with market conditions. If they take a political decision to revalue all reported gold, for example, at a price of 4,000 USD per ounce, this would make an additional instant liquidity of 1.2 trillion USD, which means an increase the M2 aggregate on a non-inflationary basis. Moreover, such revaluation of gold reserves can be repeated, and the gold reserve can be used in such a way that it yields a good profit for the treasury.

Nowadays, they more often advance the idea of spending the gold reserve to replenish the strategic BTC (bitcoin) reserve [2].[9] One of the most persuasive and, at the same time, cynical argument for this measure was the following: *If there occurs indeed some problems with the US gold reserves, so, exchanging them for BTC through Federal Reserve gold certificates could compensate for the shortage of physical gold. Besides, it is unlikely that investors buying such certificates would be able to claim delivery of physical gold from official vaults.* Notably, however, that any major changes in policy regarding gold reserves usually require approval of the US Congress and detailed legislative pro-

cedures. Thus, it is hardly possible, this can be implemented quickly only through presidential executive orders.

According to experts, the next step could be the "tokenisation of gold", and not only that already existing in circulation, but also as extractable reserves. If so, tokens in their turn, should become a security guarantee for stablecoins, and thus, tokenised gold should become not just the second in-top-list demand asset after the US dollar, but also the key financial asset of the future [10].

However, we foresee the situation differently. First, the US will turn to revaluation of official gold reserves only in the worst case-scenario. After all, if the revaluation process reveals that they have far less gold than it is declared, the reputation of the world leader would be irreparably ruined.

Furthermore, it is not clear at all, how to increase significantly real assets by "tokenizing" gold or other mineral resources that have not yet been extracted: the procedure is very unclear. Actually, this involves an entire new class of financial instruments, which the market will not perceive as a pro-inflationary resource due to some purely psychological reason. It seems to be more probable that these assets, accessible to a wider range of investors, could be just used to raise funds from all over the world.

Here it is worth accepting the general approach of Swiss experts in financial markets, who believe that all-round digitalisation and tokenisation are nothing more than a modern and efficient analogue of the campaign imposed on the US population by Roosevelt's famous Executive Order 6102 on the confiscation of gold.[10] Within this concept, it is not hard, for example, to clarify the contradictory behaviour of the global fund BlackRock, which only a few years ago criticised BTC as a fraud, and later founded an Exchange-Traded Fund (ETF) for spot BTC operations. Ultimately, these experts come to conclusion that the centralisation of this once "decentralised" instrument facilitates for governments (and their proxies) controling any assets of their citizens. In their viewpoint,

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[9] Bo Haines, Executive Director of Digital Asset Advisory Council under President Trump, proposed amendments to the bill of U.S. Representative Cynthia Lummis to increase the BTC reserve from the Treasury, regulating the targeted use of U.S. gold reserves to replenish the BTC Strategic Reserve. Supposedly, the purchase price of one BTC coin in this conversion is 100,000 USD, thus, purchasing 1 million "coins" would require 100 billion USD. With the current price of gold, approximately one-eighth of the officially declared gold reserves would need to be sold, or approximately 1,000 tonnes. URL: https://www.gate.io/ru/post/status/9912161

[10] URL: https://en.wikipedia.org/wiki/Executive_Order_6102

the same also applies to stablecoins and central bank digital currencies (CBDCs), both direct and hidden. "Yes, 'digitalisation' openly ballyhooed as so modern, so innovative and so efficient, but those at the top are not saying that such 'digitalisation' is at the same time pre-programmed and … creating opportunities for tracking and seizure (of assets)" [4].

Overall, it is still hard to give a definite assessment of the US establishment's initiatives. Concurrently, one cannot overlook the constantly recurring leitmotif about the increasing role of financial instruments backed by real assets, capable to perform monetary functions as well. It is most probably, the idea of monetising not-yet-extracted but already explored mineral resources is under a very serious consideration at the highest level, and hence, the pressure is imposed on Greenland and Canada.

Thus, it can be maintained, that at least one of the main venues of the transformational processes in the IMS leads to reinforcing collateral base by increasing the role of gold and, probably, other minerals too. In addition, primarily this should be implemented by pegging stablecoins to the US dollar. This means, that undoubtedly, the system is of the dollar-centric nature, however, there is still a possibility of a change in standard, which could become, for example, cryptocurrency-based, although this issue is still unclear.[11]

CREATION OF A NATIONAL NON-EMISSION (RESERVE) CIRCUIT, AS AN OPTION FOR INCREASING THE ROLE OF REAL ASSETS

Amid the transformational processes in the IMS, it seems quite logical for Russia to initiate the intensification of efforts to increase the role of real assets in the national financial and monetary system. In this case, the most balanced solution appears to be the establishment of a non-emission circuit, which would not infringe on the prerogatives of the Bank of Russia, so that within this structure, it becomes possible mobilising real re-

sources not previously used as collateral. In other words, besides gold and foreign exchange reserves, there can be utilised the so-called dual-use goods, which can become the basis for new financial instruments purely directed for investment policy.[12] Such approach can also be applied likewise for the settlement instruments with friendly countries.

Due to the availability of their significant reserves in Russia and in a few friendly states, it seems reasonable to choose dual-use goods for ensuring such collateral instruments as well as measures of their internal value correspondingly. Besides this would noticeably reduce the risks of manipulating their price values: in this case, the benchmark will be a price index not of a single, but of a whole group of goods, which are combined in accordance with a predetermined algorithm.

Thus, one can resort to the Multi-Commodity Price Stability Index (MTZ-index), created for a group of dual-use goods with an anchor in the form of gold, which allows to expand the gold base [11]. For example, on June 6, 2025, the Moscow Exchange began calculating and publishing the MTZGc of synthetic gold.[13] Its description states that this is an alternative way of expressing the price of the precious metal of gold, based on a mathematical model, which ties its price to other commodity assets. Their economic significance for Russia and their role in the world market are accounted for in the basket of commodity assets.[14]

If the MTZGc-index allows for the creation of synthetic gold, then the Multi-Currency Value Price Stability Index (MVZ-index) can be used to denominate a synthetic currency, the volatility of which from the anchor is minimal. It is created on the basis of a basket containing the Ruble and the national currencies of friendly countries with an anchor in the form of IMF reserve currencies.

Financial instruments ensured by commodity assets and currencies of friendly countries, as well as other assets, can be issued on the basis of these indices, thus, in turn, they may create the core of

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[11] URL: https://www.binance.com/ru/square/post/22309347324642

[12] Dual goods obtain both commodity and monetary properties.

[13] URL: https://www.moex.com/n90927

[14] URL: https://www.moex.com/ru/index/MTZGC

a reserve circuit for the national financial system. For instance, one should cite the principal scheme for the circulation of these financial instruments, developed by a team of researchers from the Institute of Innovative Financial Instruments and Technologies (IFIT) of the Plekhanov Russian University of Economics. In particular, it implies the issuance of government securities backed by reserves of dual-use goods, which guarantees the income exclusively for investment purposes. In addition, the proposed scheme is also relevant to create settlement instruments used in cooperation with friendly countries, e.g., within the framework of BRICS or the SCO [12].

CONCLUSIONS

The given research illustrates that one of the major directions of transformational processes in the IMS ensuring its stability is to reinforce the collateral base by increasing the role of gold and, possibly, other minerals. Moreover, the monetisation of US national wealth can be significantly increased by means of promotion of stablecoins with the active use of BTC, which allows to initiate solving the problem of American debt. In turn, the lion's share of stablecoins should currently be backed by dollars and gold, and subsequently by other mineral resources under the US control. However, it is necessary to start increasing col-

lateral base of stablecoins in order to make it a reserve currency.

Overall, the general venue of the given processes indicates that real assets are able to play a rather notable role for the stability of the entire system in its future. This is also evidenced by the circumstance that exactly the deficit of physical gold on the COMEX exchange which instantly emerged in December 2024 became the cause of a crisis, when the IMS was actually on the brink, if not of collapse, then, at least, of an instant loss of its stability.

As to Russia, undoubtedly, it is vital to bear in mind this aspect, as the country faces the task of building a truly sovereign national financial and monetary system as a cornerstone of ensuring economic security. As the most balanced option here, it appears to be the establishment of some investment (reserve) circuit of a non-emission nature, based on the releasing into circulation of financial instruments backed by real assets. Speaking of assets capable of becoming the foundation of these instruments and, accordingly, indices of their internal value, it is worth noting, that instead of a single commodity, or a single currency, it is feasible to use a multi-commodity and multi-currency price stability index relative to the price values of an anchor commodity and / or currency.

REFERENCES

1. Katasonov V. Yu. Gold in world and Russian history of the 19th-21st centuries. Moscow: Rodnaya Strana; 2017. 448 p. (In Russ.).
2. Katasonov V. Yu. Trump's plan: Transforming gold reserves into Bitcoin reserves? Zolotoi invest klub. URL: https://www.zolotoy-club.ru/tpost/5cvz6oyl11-plan-trampa-transformatsii-zolotogo-reze (In Russ.).
3. Baghdasaryan V.E., Ierusalimskii Yu. Yu., Archimandrite Sylvester (Lukashenko S. P.). Chaos as a strategy of globalism. Moscow: Otchii Dom; 2023. 688 p. (In Russ.).
4. Piepenburg M. Gold vs toxic brews of financial repression & capital controls. Von Greyerz AG. URL: https://golnk.ru/vwqOL

5. Piepenburg M. Making sense of COMEX insanity. Von Greyerz AG. URL: https://vongreyerz.gold/making-sense-of-comex-insanity

6. Piepenburg M. Tonya Harding explains gold's "flash crash". Von Greyerz AG. URL: https://vongreyerz.gold/tonya-harding-explains-golds-flash-crash

7. Piepenburg M. COMEX flows: Is the gold case almost too obvious? Von Greyerz AG. URL: https://vongreyerz.gold/comex-flows-is-the-gold-case-almost-too-obvious

8. Jubert C. The foretold death of paper gold. Goldbroker. URL: https://goldbroker.com/news/the-foretold-death-paper-gold-3528

9. Piepenburg M. Basel III and gold: The trillion-dollar question. Von Greyerz AG. URL: https://vongreyerz.gold/gold-basel-iii-trillion-dollar-question

10. Hicks B. The gold crunch of 2025: Why you may never hold a gold coin again (unless you act fast). Wealth Daily. URL: https://golnk.ru/OenD6

11. Ryabukhin S.N., Minchenkov M.A., Vodianova V.V., et al. Dual goods. Innovative financial instruments and technologies. Moscow: Nauchnaya biblioteka; 2023. 216 p. (In Russ.).

12. Vasyukov E.A., Kolesov V.P. Cooperation of the BRICS in currency policies: Problems and prospects. *Finansy, den'gi, investitsii = Finances, Money, Investments*. 2023;(1):3–9. (In Russ.). DOI: 10.36992/2222-0917_2023_1_3

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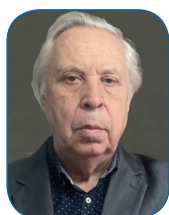
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S.N. Ryabukhin — scientific supervision.
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V.V. Vodyanova — participating in development of research methodology, drawing conclusions.
S.I. Belenchuk — preparing the initial version of the text.
M.A. Ivanova — conducting a critical analysis of materials, translating elements of the article into English language.

Conflicts of Interest Statement: The authors have no conflicts of interest to declare.

Method of Selecting Threshold Values for Growth Rates of Economic Security Indicators

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ABSTRACT

The relevance. Monitoring of economic security has recently become increasingly important due to the emergence of new challenges and threats associated with the complication of the geopolitical situation. One of the methodological aspects of monitoring is the selection of a system of indicators and justification of their threshold values. **The purpose** of the article is to develop a methodology for threshold values of economic security. The subject of the study includes an analysis of existing approaches to defining the concept of threshold values and justifying their values for various monitoring models, as well as barriers that arise in the process of such justification, and finding ways to overcome them. **Novelty of the study:** a new method is proposed that uses a three-threshold model of monitoring economic security, and the growth rates of various socio-economic indicators as indicators. The first threshold is the threshold of system survival, the second threshold is associated with a possible violation of the stability of the system. The third threshold determines the target value of the indicator. **The theoretical and practical significance** of the study lies in the creation of a reliable tool for positioning economic security indicators, which can be effectively used, among other things, for analysing and forecasting economic crises.

Keywords: economic security; threshold values of indicators; single-threshold, two-threshold and three-threshold monitoring models; growth rates of indicators; survival threshold; threshold of violation of stability; threshold of target stability

THRESHOLD VALUES FOR ECONOMIC SECURITY

The practice of using threshold values for economic security indicators has a deep history and it is successfully employed in various fields. In 1994, the idea appeared to use the apparatus of critical maximum values in the social sphere at the Institute of Socio-Political Research of the Russian Academy of Sciences (ISPR RAS). It was an important step in the development of economic security research in Russia. At that time the scale of 20 criteria with corresponding threshold levels was developed, which allowed assessing more precisely and objectively the state of the social sphere and identify potential threats [1].

In the early 2000s, the Section on Economic and Social Security of the Scientific Council under the Security Council of the Russian Federation approved a system of 19 indicators and threshold values which had been developed earlier.[1] In 2008, the Institute of Economics of the Russian Academy of Sciences (IE RAS) suggested an comprehensive system with 36 indicators and their threshold levels[2], which was refined in 2011 [2]. In 2017, the Strategy for the Economic Security of the Russian Federation was adopted for the period up to 2030. It included 40 economic security indicators,[3] many of which had already been used in research by the IE RAS scholars. Initially, the indicators lacked threshold values but received them after the Ministry of Economic Development of the Russian Federation published draft passports for economic security indicators.[4]

Let us consider different definitions of the category "threshold values" in the context of economic security. V.K. Senchagov called them "limit values, which (if disregarded) impede the normal development of the economy and social sphere and cause the development of destructive trends in the sphere of production and the people's standard of living" [3]. S. Yu. Glazyev and V.V. Lokosov interpret such "a value of an indicator, the deviation beyond the framework of which indicates the emergence of a threat to the economic functioning and the life of society triggered by the interruption of the ordinary course of the processes reflected by this indicator" [4, p. 24]. V.K. Senchagov and V.I. Avdiysky specify that these metrics in numerical form reflect the maximum permissible magnitudes and the failure to achieve threshold levels leads to a disruption in the normal functioning and progress of the socio-economic system [5].

Traditional interpretation of threshold values requires re-assessment, assuming the inevitability of a threat upon reaching a critical level of an economic security indicator. Rigid definitions prevailing in the scientific community in the late 20th and early 21st centuries demonstrate restricted empirical applicability. Analysis of the indicators' dynamics within a long time period has revealed that the majority of indicators remain permanently below the critical maximum level, which is not caused by the destruction of the economic system or the loss of its potential for self-development. In this regard, it is feasible to consider threshold values not as absolute barriers, but as reference benchmarks that combine non-optimal conditions of indicators of economic security. This transformation of the methodological approach is necessitated by the requirement to take into account the dynamic state of socio-economic processes and to adapt to external change of environment.

Besides, one of the emerging directions is the "traffic light" model including three possible settings for indicators: red (danger), yellow (intermediate level), green (stable growth level) and two threshold levels involving the critical maximum and the target value of the indicator. In most cases, the latter has a subjective assessment

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[1] Senchagov V.K., ed. Economic Security of Russia. Textbook. General Course. Moscow: Delo; 2005. 896 p.

[2] Economic Security Strategy in the Development of Indicative Plans for Long-Term and Medium-Term Socioeconomic Development. Monograph. Moscow: Institute of Economics, Russian Academy of Sciences; 2009. 232 p.

[3] Decree of the President of the Russian Federation dated May 13, 2017, No. 208, "On the Economic Security Strategy of the Russian Federation through 2030. URL: https://www.garant.ru/products/ipo/prime/doc/71572608/

[4] URL: https://www.interfax.ru/busi ness/656619

defined in strategic planning documents. This model is described in the author's article "Analysis of Crisis Phenomena in the Russian Economy Using Rapid Indicators of Economic Security" [6] and it is included in the recommendations of the Ministry of Economic Development[5] with two thresholds for most indicators defined in the Strategy for the Economic Security of the Russian Federation.[6] However, the status of the first threshold remains highly indefinite: it is hardly could be related to critical maximum, since no serious destruction of the economic system has occurred over a long observation period.

The article by A.B. Vissarionov and R.R. Gumerov describes a three-level scale model [7] with the first-level thresholds (critical) fix limit values when the country loses its economic and political independence, as well as the ability to oppose external impact, that indicates a threat to state sovereignty. The second level (transitive thresholds) occurs at a break point, when the system's stability and competitiveness significantly decrease, so that crisis management measures are required to restore its functioning. The third level, or target thresholds represent the desired values, fixed in strategic documents, when the system functions efficiently. In this case, the first-and-second-level thresholds are in fact 'floating', calculated as the average values of the indicators within the certain period. In Russia, the year of 1995 was a crisis year, when the catastrophic stage of shock therapy was mostly complete, and the year 2013 was transitional (before the 2014–2015 crisis) and accompanied by a slowdown in economic growth rates.

In addition to the abovementioned models, scholars advanced other models with a larger number of risk zones. For example, V.K. Senchagov and S.N. Mityakov [8] put forward a seven-level model for a better accuracy of positioning the indicator. However, it turned out inconvenient in operation due to its unwieldiness.

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[5] URL: https://www.interfax.ru/busi ness/656619

[6] Decree of the President of the Russian Federation of May 13, 2017, No. 208, "On the Economic Security Strategy of the Russian Federation through 2030." URL: https://www.garant.ru/products/ipo/prime/doc/71572608/

ANALYSIS OF APPROACHES TO THRESHOLD VALUES SUBSTANTIATION

The substantiation of threshold values for economic security requires the aggregated application of various methods enabling to explore and interpret data, as well as to outline recommendations for decision-makers.

One of the basic methods is *time series analysis*. It enables to study dynamics of key economic indicators within a specific time-period, or, for instance, identify trends, seasonal variations, and cyclical fluctuations in such indicators as the inflation, or unemployment rates, or GDP. Thus, based on the obtained data, threshold values can be established when the indicators begin to threaten economic stability.

Another essential method is *regression analysis*, enabling to determine dependency between various economic variables and identify factors of the utmost impact on economic security. Regression models helps to estimate how changes in one indicator affect others and this allows to establish critical levels for each of them, for example, to identify which level of unemployment the economy starts causing instability.

One more widely used method is *scenario analysis*. It involves building various scenarios for the development of economic situation based on existing data and future prognosis, and helps to assess the circumstances leading to a transition into the risk zone, thereby determining measures to prevent negative outcome. Thus, a high-inflation level scenario may indicate when the economy starts to degrade, and this makes it possible to establish the corresponding threshold values.

No less essential is the method of *expert assessments*, when specialists from various fields (economists, financiers, representatives of business and state structures) are involved in the process of substantiating threshold values. Their opinions and assessments complete quantitative methods with qualitative data, which eventually makes the final analysis more comprehensive and in-depth.

Besides, there exist a method of *comparative analysis*. It involves exploring the experience of other countries and regions, their approaches to defining economic security and threshold values, helping to find successful practices and adapt them to the conditions of a specific country.

Scholars engaged in this exploration, use to employ these methods in their works, however, this process of scientific substantiation of threshold levels appears to be quite problematic.

V.K. Senchagov suggests starting with the social sphere. He provides a substantiation for the critical threshold of the indicator of the population share with incomes below the subsistence minimum at a level of no more than 7 per cent. As for the gap between the incomes of the rich and the poor (the income quintile share ratio) it is barely 8 per cent (both indicators are adopted in accordance with world experience in preventing social catastrophes) [3]. Next, the scholar calculates the threshold value for the ratio of the average monthly income to the subsistence minimum level (no less than 3.5). Then he resorts to the financial sphere with threshold values for the ratio of the money supply M2 to GDP (not less than 50 per cent) and the volume of gold and foreign exchange reserves (not less than 250 billion USD). Subsequently, 36 indicators are substantiated which were proposed by the IE RAS. Notably, nowadays, some threshold levels have lost their relevance, and some others require revision.

S. Yu. Glazyev and V.V. Lokosov point out: "Most indicators of the state of the Russian economy are beyond the critical values reflecting its ability to reproduce. For long, the economy has been functioning in a mode of narrowed reproduction, despite the existing opportunities to transform accumulated savings into investments and convert gigantic natural rent into technological development. The situation is even worse regarding indicators that reflect the capability of the Russian economic system to develop." [4, p. 596]

The article by S.V. Raevsky, L.A. Belyaevskaya-Plotnik and N. Yu. Sorokina describes methodology for assessing the ranges of permissible values for indicators of the condition of the Russia's economic security [9]. The methodology may need indicators for which target and/or threshold values are not defined in official documents. The method seems to be insufficiently applicable to a certain limit for forecasting the behaviour of objects in the long term too.

I.V. Karavaeva, E.A. Ivanov and M. Yi. Lev make a critical analysis of the indicator passports in the Strategy for the Economic Security of the Russian Federation until 2030 [10]. Their assessment is quite justified, although not all of their conclusions seem well grounded. For instance, they and the Ministry of Economic Development of the Russian Federation claim that the maximum GDP growth rate is 1.5 per cent, and industrial production is 0 per cent. This means that the growth of other sectors of the economy must be of the exceeding pace.

According to M. Yu. Lev, the most notable indicators for determining threshold values have a sufficiently wide range of dimensions: in some cases, they serve as absolute indicators in various sectors, which makes it difficult to compare them [11]. Thus, the scholar suggests using dimensionless indices, since it solves the problem of factors' comparability and their reduction to uniform measurement indicators. Hence, the substantiation of economic security threshold values needs a comprehensive approach and various methods, each of which has its own pros and cons, while their combination leads to more accurate and validated results.

However, the following problems may occur:

1. During a long-term analysis using monetary indicators, due to inflation their threshold values need adjustment by means of deflators.

2. Occasionally, indicators lose their relevance for threat monitoring, as they significantly exceed threshold levels for a long time.

3. Since many indicators are composite (e.g. the ratio of the money supply to GDP), it requires analysing both the numerator and the denominator, which sometimes leads to certain defiance.

4. Substantiation becomes much more difficult for multi-threshold systems.

THE SYSTEM OF ECONOMIC SECURITY INDICATORS AND THE SUSCEPTIBILITY MATRIX

To solve the abovementioned problems, here we outline a system of indicators used for the operational analysis of economic security, particularly of economic crises.

Presumably, the economic security of a country is described by a number of indicators, where $i = 1, ..., n$, and n is their total number. For simplicity, we assume that all indicators are dimensionless and homogeneous (based on a single principle). As such, we can select the growth rates of certain natural indicators, calculated as the ratio of the value in the current month to the corresponding value in the same month of the previous year, minus one. If measured in percentages, the specified ratio should be multiplied by 100.

The substantiation of the quantity and selection of specific indicators is determined by the requirement of updating and identifying threats for solving the tasks outlined in the Strategy for Economic Security. Besides, since the duration of a crisis can last for several months, one should consider the use of open official sources of information, the comparability of chronological data, their independence, and frequency of monthly updates.

Let us explore a few periods when crises hit economy. The number of the crisis is denoted by the letter j. So, $j = 1, ..., m$, where m signifies the total number of crises.

By the **susceptibility** of the i-th "positive" indicator of x_i, which, if increased, strengthens the level of economic security, to the j-th crisis y_{ij}, we perceive the maximum downslope of the growth rate relative to the zero mark, to be measured as a percentage. A 'negative' indicator, whose growth reduces the level of economic security, we consider the maximum increase of its growth rate relative to the zero mark.

During these calculations, we carried out preliminary processing of the initial data series. Thus, if a minor noise, or minor fluctuations occur we apply filtering via a five-point moving average. A pronounced trend in the series indicated that data was clear of fluctuations.

Table 1 demonstrates the results of estimation of the susceptibility for the percentage alterations of economic security indicators related to five crises that occurred in the Russian economy over the past 30 years (1998, 2009, 2015, 2020 and 2022).

By averaging the susceptibility of each of the indicators throughout all crises, one can obtain data to substantiate the critical maximum threshold value.

METHODOLOGY FOR SUBSTANTIATING THRESHOLD VALUES OF ECONOMIC SECURITY INDICATORS

In our case, the most adequate is the described above model suggested by A. B. Vissarionov and R. R. Gumerov [7]. However, we will use specific threshold indicators, not the average values of indicators during this interim.

First-level thresholds are associated with the concept of the **sustainability** of the economic system. G. N. Cherkesov and A. O. Nedosekin admit the expansion of this terminology for economic systems [12], and we define it as the capability of the economy to be resilient to external and internal shocks curbing the snowballing development of crises that could lead to massive economic losses and destroy the structure of consumption and production.

Economic system is liable to a variety of factors, such as global crises, political instability, natural disasters, technological breakdowns, etc. capable to disrupt its operation. The system's sustainability implies its ability to adapt to changes, minimise negative consequences (both short-term and long-term), and recover from shocks. When disruptions of sustainability reach a critical point, and the system cannot recover or adjust, this causes its destruction. Therefore, a key factor for sustainability is effective management.

In a developed crisis, it is necessary to determine a critical threshold for each indicator, at which level the system can still operate. Such a situation implies declining living conditions of the population, a slowdown of consumer demand, and capital outflow, which require urgent intervention by state bodies.

Susceptibility of Growth Rates of Economic Parameters to Crises (in %)

i	Name of the indicator	*J = 1*	*J = 2*	*J = 3*	*J = 4*	*J = 5*
1	Industrial production	−9	−16.2	−1	−6	−1.8
2	Gross domestic product	−	−10.3	− 4.2	−6.32	− 4
3	Investments in the fixed capital	−7.8	−19.8	−13.8	−12.5	−
4	Index of consumer prices	−	6.8	9.9	0	11.66
5	Index M2 / Money supply M2 volume	−	−28.1	−11.7	0	−1.9
6	Overdue loan debt	−	60	42	24	26
7	Volume of household deposits	−	−11.3	−9.4	0	−12.8
8	Number of unemployed	−	49	10	40	0
9	Real wages	−	−11.8	−15.6	−5	−10
10	Volume of paid services for the population	−	−7	−3	−37.1	−5
11	Physical export quantity	−	− 49	−38	− 35	−40
12	Physical import quantity	−	− 45	− 40	−12	− 35
13	Extractive industries	−	−5.5	0	−11.8	− 2.2
14	Manufacturing industries	−	−23.3	−1.1	−2.6	−1.8
15	Construction	−8	−18	− 6.1	−2.1	0
16	Freight capacity of transport	−	−18.8	−2.6	−7.9	−5.4
17	Retail trade turnover	−10	−9	−12	−9	−10

Source: calculated by the author.

Note: i — name of the indicator; *j* (1, ..., 5) — levels of susceptibility to the crisis.

The possibility of the system's complete destruction depends on how many indicators have reached the critical level, how far the lowest ebb of the crisis, and how long the system stays in the danger zone. S. Yu. Glazyev and V.V. Lokosov, point out that "the selective capacity of the management system has a key importance in determining the possible duration of society's functioning beyond the boundaries of the critical maximum values, which characterise the state of its indicators. The system must be efficient to timely identify emerging threats, eliminate them, curb destructive processes, overcome emerging constraints, and find new development prospects [4, p. 592].

Furthermore, in order to establish *survival thresholds* (critical maximum levels) for the indicators presented in *Table 1*, we can assume that they are proportionate to the average level of susceptibility to crises: for example, from 0.5 to 0.8. The final decision, in our opinion, should be made by taking into account expert assessments in combination with retrospective data analysis. At the same time, we admit that the threshold value may eventually fluctuate with new factual data obtained.

The second threshold value for all indicators is assumed as zero, which means frozen growth or stagnation. We call this corresponding level *the stability violation threshold*. It serves as a kind of alarm signal for the state and business, as it indicates the system's failure for development in real terms. In the context of global competition and technological progress, nought-growth can lead to a loss of competitiveness and a decrease in market share, as well as a drop of the living standards of population. Its long-lasting duration

Threshold Values of Economic Security Indicators (in %)

Indicator growth rates, %	First threshold: survivability (based on susceptibility level)	Second threshold: disruption of stability	Third threshold: stability		
			Inversion of first threshold	Exceeding global average levels	Target values according to strategic planning documents
Industrial production	−6	0	6	5	7
Gross domestic product	−5	0	5	4	4
Investments in fixed capital	−10	0		4	5
Consumer price index	4	0	−4	–	-
Index M2 / Money supply M2 volume	− 8	0	8	–	-
Overdue loan debt	12	0	−12	–	-
Volume of household deposits	−5	0	5	–	-
Number of unemployed	12	0	−12	–	-
Real wages	−5	0	5	–	-
Volume of paid services for population	−4	0	4	–	-
Physical volume of export	−20	0	–	–	-
Physical volume of import	−20	0	–	–	-
Extractive industries	−4	0	4	–	-
Manufacturing industries	−7	0	7	–	5
Construction	−6	0	6	–	-
Freight capacity of transport	−6	0	6	–	-
Retail trade turnover	−6	0	6	–	-

Source: compiled by the author.

contributes to economic stagnation and increases the risk of crisis.

The third value is the ***target threshold*** or ***stability threshold***, which serves as a reference point, indicating the achievement of desired key economic indicators. In our viewpoint, due to a lack of information, its substantiation is the most complicated issue. Firstly, one should resort to strategic planning documents. Thus, the Decree on the National Development Goals of the Russian Federation for the Period up to 2030 and for the Future up to 2036[7] stipulates the requirement to maintain a GDP growth rate above the world average. Since the global medium is 3–3,5 per cent, it seems appropriate to set the threshold for

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[7] Decree on the National Development Goals of the Russian Federation for the Period up to 2030 and for the Future up to. URL: http://www.kremlin.ru/events/president/news/73986

our annual indicator at no less than 4 per cent, which coincides to the recommendations of the Ministry of Economic Development of the Russian Federation.

In accordance with the Consolidated Strategy for the Development of the Manufacturing Industry of the Russian Federation until 2030 and for the Period up to 2035, by this time the target volume of domestic yield of machine-tool and instrumental products should surpass 150 billion rubles. To reach such level, the average annual production growth of the industry must be at least 5 per cent. Moreover, the objective of the federal project "Development of the Machine-Tool and Instrumental Industry" is to increase production by 103 per cent throughout 2022–2030, which is on average 9,3 per cent per annum [13].

The second method to determine target thresholds is to fix them at the level (or slightly above) of the forecasted world-average growth rates of the corresponding indicators. Finally, if they are not available in strategic planning documents, as initial approximation, one can set them by inverting the critical thresholds, which will allow for determining realistic target values, accounting for the specifics of all indicators, and maintaining their counterbalance. However, then target thresholds may look too exaggerated, so this is good to be applied only to indicators with low sensitivity to crises.

In conformity with the abovementioned aspects, *Table 2* illustrates three possible options for estimating target thresholds for different indicators.

Figures 1–3 demonstrate the dynamics of three economic security indicators: the growth rates of industrial production, the physical volume of exports, and the money supply M2 (in comparable prices) throughout January 1997-January 2025. The dotted lines indicate threshold levels (the third threshold in Figs. 1–3 is presented as the inverse of the first one).

The analysis demonstrates that the growth rates of the physical volumes of exports and imports are mostly prone to crises. There are several reasons to it. Firstly, international trade has a multiplier effect. Secondly, the reduced availability of trade financing hindered export-import operations for entities. Thirdly, the demand for many goods of international trade is more elastic relatively to incomes and expectations than for items consumed domestically.
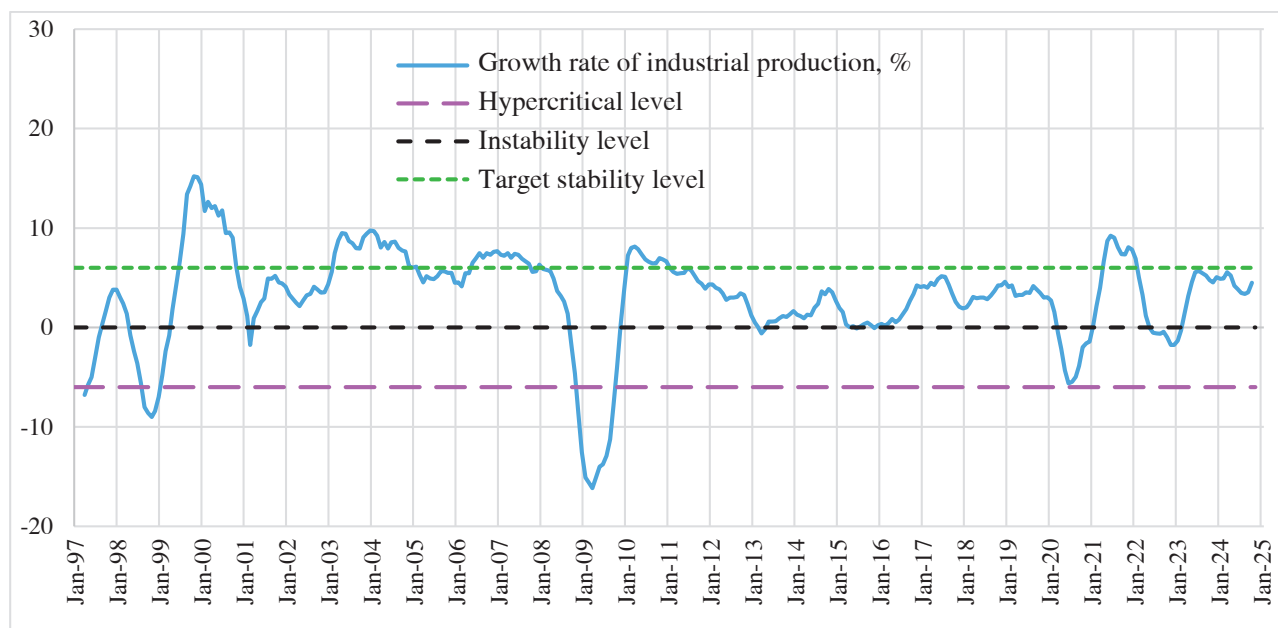
Fig. 1. **Dynamics of Industrial Production Growth Rate with Indication of Thresholds (Processing — Moving Average, in %)**

Source: compiled by the author.
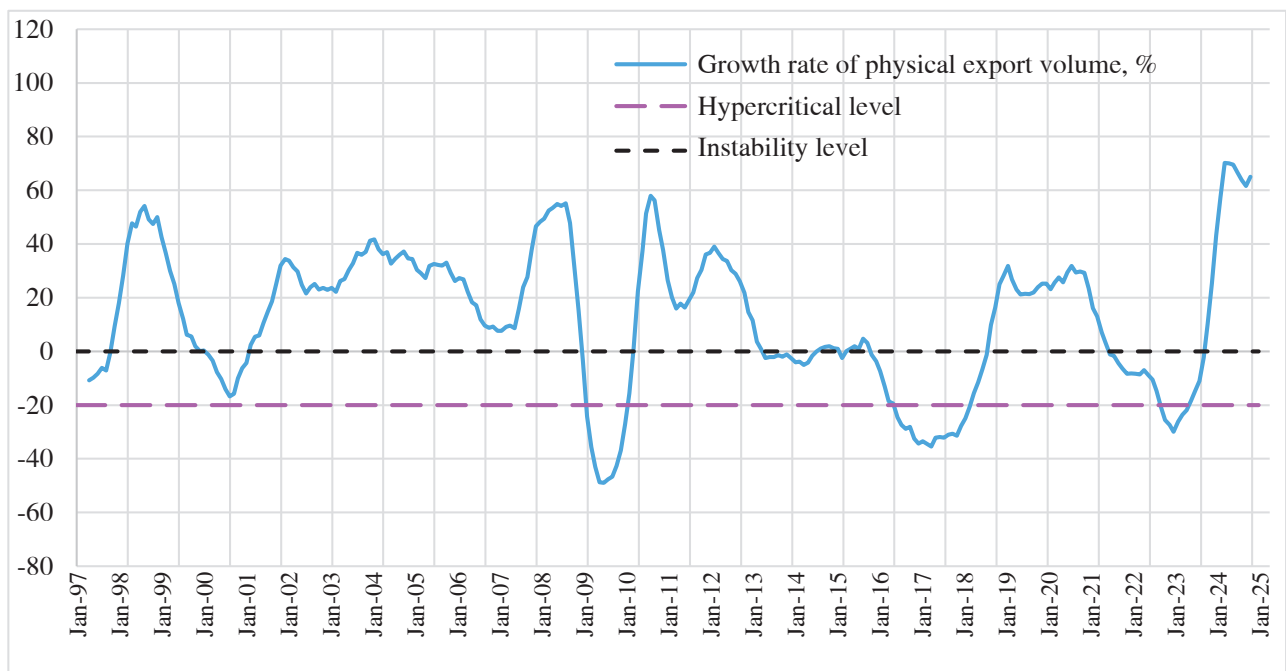
Fig. 2. **Dynamics of the Growth Rate of Physical Export Volume with Indication of Thresholds (Processing — Moving Average, in %)**

Source: compiled by the author.
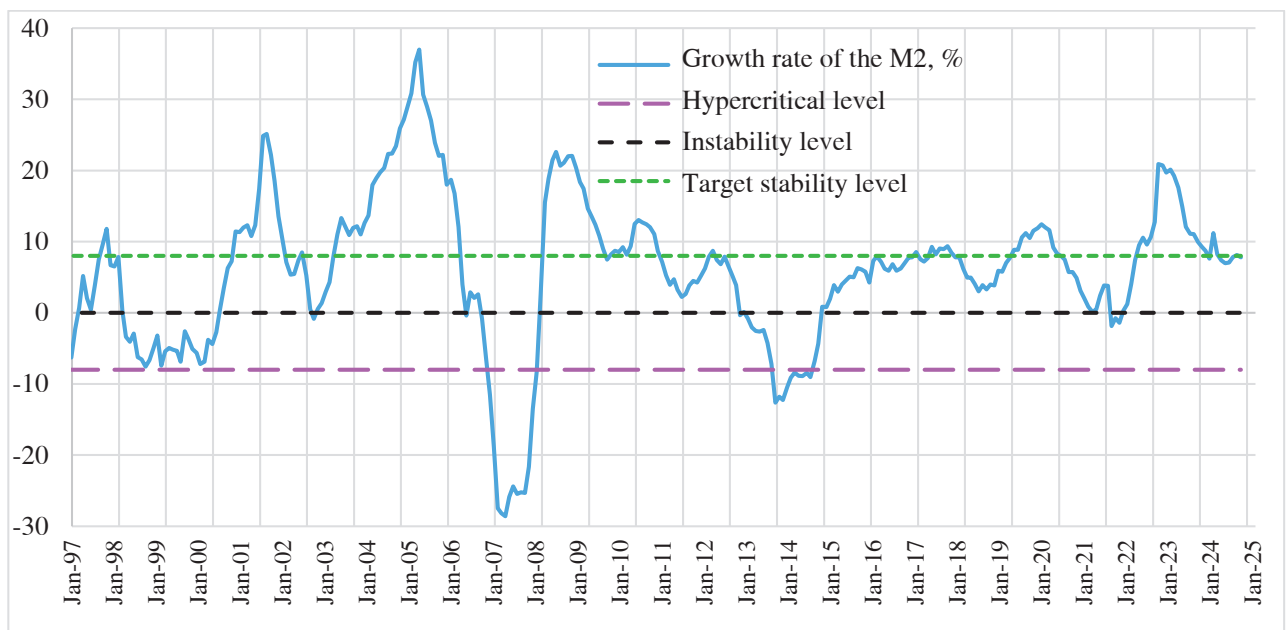
Fig. 3. **Dynamics of the Growth Rate of the M2 Money Supply with Thresholds Indicated (Processing — Cleared of Trend, in %)**

Source: compiled by the author.

CONCLUSIONS

The given research provides a literature survey aimed to determine threshold values for economic security indicators. The primary methodological challenge is linked to differences in their dimensionality, which led to the objective of advancing homogeneous indicators in the form of growth rates of specific indicators of the national socio-economic development.

As a result, a system of seventeen indicators has been elaborated, the advantages of which are the data collection of monthly frequency, facilitating analysis of the development of economic crises, as well as a unified methodology of calculation that excludes the seasonal component.

Moreover, the article introduces the concept of an indicator's susceptibility to a crisis defined as the maximum decrease in its growth rate relative to the zero mark, which is measured as a percentage. A susceptibility matrix has been compiled based on the dynamics of indicators, taking into account the impact made on them by five contemporary crises.

The given research also employs a monitoring model that includes three threshold levels. The first, survival threshold, is based on the author's concept of the sustainability of the economic system as its ability to withstand external and internal shocks deescalating the snowballing process of crises. The second threshold, linked to the violation of stability, is adopted for all indicators in the form of a zero growth rate. Three different options are described for calculating the third threshold of target stability. The first one is associated with the inversion of the first threshold and can be used with insignificant indicator susceptibility to a crisis. The second one refers to the necessity of exceeding the world average growth rates of the corresponding indicators, and the third one to the direct or indirect inclusion in strategic planning documents.

The given methodology can be employed for the operational monitoring of economic security, including the analysis and forecasting of crises, but, like any other method, it should be applied correctly, in view of its limitations.

REFERENCES

1. Osipov G.V., Lokosov V.V. Limits of fall. In: Sociology and politics. Moscow: Institute of Social and Political Research of RAS; 1995:556–568. (In Russ.).

2. Senchagov V.K. Modernization of the financial sphere. *Voprosy ekonomiki.* 2011;(3):53–64. (In Russ.). DOI: 10.32609/0042-8736-2011-3-53-64

3. Senchagov V.K. Economy, finance, prices: Evolution, transformation, security. Moscow: Ankil; 2010. 1120 p. (In Russ.).

4. Glaz'ev S. Yu., Lokosov V.V. Evaluating extremely critical indicators of the state of Russian society and managing socioeconomic development with them. *Herald of the Russian Academy of Sciences.* 2012;82(4):229–245. (In Russ.: *Vestnik Rossiyskoy akademii nauk.* 2012;82(7):587–614.).

5. Avdiyskii V.I., Senchagov V.V. Methodologies for determining the threshold values of the main (priority) risk factors and threats to the economic security of business entities. *Ekonomika. Nalogi. Pravo = Economics, Taxes & Law.* 2014;(4):73–78. (In Russ.).

6. Mityakov S.N., Mityakov E.S. Analysis of crisis phenomena in the Russian economy using fast indicators of economic security. *Studies on Russian Economic Development.* 2021;32(3):245–253. DOI: 10.1134/S 1075700721030096 (In Russ.: *Problemy prognozirovaniya.* 2021;(3):29–40. (In Russ.). DOI: 10.47711/0868–6351–186–29–40).

7. Vissarionov A.B., Gumerov R.R. Concerning the use of indicators' marginal (threshold) values of the Russian Federation economic security. *Upravlencheskie nauki = Management Sciences in Russia.* 2017;7(3):12–20. (In Russ.).

8. Senchagov V.K., Mityakov S.N. Using the index method to assess the level of economic security. *Vestnik Akademii ekonomicheskoi bezopasnosti MVD Rossii = Vestnik of Academy of Economic Security of the Ministry of Internal Affairs of Russia.* 2011;(5):41–50. (In Russ.).

9. Raevskiy S.V., Belyaevskaya-Plotnik L.A., Sorokina N. Yu. Methodical approach to the estimation of ranges of admissible values indicators of the state of economic security Russian Federation. *Ekonomika i upravlenie: problemy, resheniya = Economics and Management: Problems, Solutions.* 2018;1(7):19–25. (In Russ.).

10. Karavaeva I.V., Ivanov E.A., Lev M. Yu. Passportization and assessment of Russia's economic security indicators. *Ekonomika, predprinimatel'stvo i pravo = Journal of Economics, Entrepreneurship and Law*. 2020;10(8):2179–2198. (In Russ.). DOI: 10.18334/epp.10.8.110705

11. Lev M. Yu. Concerning the increasing importance of national security research in modern economics. *Ekonomicheskaya bezopasnost' = Economic Security*. 2022:5(1):303–338. (In Russ.). DOI: 10.18334/ecsec.5.1.114415

12. Kornilov D.A., Kornilova E.V. The role of leading indicators in diagnostics of various types of crises. *Razvitie i bezopasnost'= Development and Security*. 2025;(2):33–48. (In Russ.).

13. Cherkesov G.N., Nedosekin A.O. Description of approach to estimating survivability of complex structures under repeated impacts of high accuracy. *Nadezhnost' = Dependability*. 2016;(2):3–15. (In Russ.). DOI: 10.21683/1729-2640-2016-16-2-3-15

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The Role of Modern Technologies in the Development of Medium-Sized Businesses in Russia: Institutional and Cultural Constraints

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ABSTRACT

The research objective of the article is to examine the institutional and technological constraints on the development of medium-sized businesses in Russia. The author introduces the concept of the "medium business trap" and analyses its relationship with digitalisation, monetary policy, and cultural context. The study analyses the factors supporting the persistence of this trap and assesses the potential for overcoming it by means of modern technologies, primarily, such as digital solutions, automation, and institutional reforms. Particular attention is paid to the cultural and historical factors, that shaped entrepreneurs' economic behaviour, as well as to systemic constraints associated with money supply and labour productivity. **Scientific significance** of the article involves strategies for overcoming this trap based on institutional reforms and modern technologies, including blockchain, platform solutions, and automation.

Keywords: medium-sized business; institutional environment; digitalization; medium business trap; labor productivity; blockchain; money supply; automation

INTRODUCTION: CULTURAL CODE OF RUSSIAN ENTREPRENEURSHIP

It is impossible to consider the issue of development of medium-sized businesses in Russia beyond its cultural-historical context. As N. Y. Danilevsky justifiably pointed out in his work Russia and Europe, Russian civilization differs from Western European civilization not only in its geographical position but also in the logic of its societal development [1]. The Russian model of entrepreneurship was shaped within different institutions, with such ideas of priority as collectivism, paternalism, and underdeveloped horizontal networks. These specific features persist up to this day, manifesting in a very strong institutional distrust, skepticism about investment partnerships, and excessive state control.

Merchant E. N. Sivokhin[1] exemplified such a typical mentality and demonstrated a high economic discipline, financial calculation, and spiritual rootedness. Such entrepreneurs personified the image of a distinctive "cultural capital" of Russian business with such qualities as hard working, the ethics of one's word, and autonomy from the state. P. I. Melnikov-Pechersky highlighted similar human qualities describing the Old-Believer' society of Russian merchants as a foundation of business reliability and social responsibility [2].

Nowadays, despite evident progress in the spheres of digitalisation, automation, and the development of institutions of formal support in Russia, there still exists a range of institutional and behavioural traps. One of such phenomenon is the "medium business trap": when a small enterprise, upon reaching a certain progress, experiences not institutional support, but rather an increased pressure: the loss of benefits, intensified control, credit obstacles, and isolation from large-scale contracts.

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[1] Efrem Nikiforovich Sivokhin (1825–1889) — famous Russian philanthropist, state councilor, 1st guild merchant, hereditary honorary citizen and knight, founding member of the Imperial Orthodox Palestine Society (IOPS).

INSTITUTIONAL CONSTRAINTS ON THE DEVELOPMENT OF MEDIUM-SIZED BUSINESSES IN RUSSIA

Currently, the process of development of medium-sized businesses in Russia experiences contradictory trends. On the one hand, strategic documents confirm the priority of the small and medium-sized enterprise (SME) sector as a driver of economic growth, innovation, and employment. Thus, according to the "Strategy for the Development of Small and Medium-Sized Entrepreneurship in the Russian Federation for the Period up to 2030",[2] the state plan envisages increasing the share of SMEs in GDP to 40 per cent by the determined deadline. However, according to data reports of the Federal State Statistics Service,[3] the actual figures are 20–22 per cent and the share of medium-sized businesses is inadequately small: below 2 per cent. This situation indicates some systemic institutional constraints preventing small enterprises from transitioning to the higher medium-sized class.

Among all of them, institutional barriers perform a key role. Most dramatically, it occurs during the transition from small to medium-sized business. Companies lose benefits (simplified tax regimes, subsidies, and support programmes), as soon as they barely enter the new established phase in terms of headcount or revenue. Concurrently, they face intensified requirements for account reporting, control, certification, and obligatory checks of labour and sanitary norms. As researchers point out, these barriers are the second-tier institutional trap: formally operating institutions start generating extra-costs for businesses, impeding their development.

Moreover, the structure of state support is initially oriented to deal with extremes: either large corporations or micro-businesses and start-ups. Medium-sized entities often hardly manage to fit into the format of programmes aimed to either grand investments or easier procedures of applications. The scientific literature makes a

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[2] URL: https://www.consultant.ru/document/cons_doc_LAW_199462/f3fa9da4fab9fba49fc9e0d938761ccffdd288bd/

[3] URL: www.rosstat.gov.ru

special emphasis on the fact, that medium-sized businesses are estranged from the main venues of state procurement distribution, particularly within the centralised procurement system, where suppliers are selected predominantly with formal criteria unavailable for such companies.

Moreover, informal institutions generate serious hindrances due to the absence of stable relationship of trust, institutional paternalism, and low legal security for entrepreneurs. The research by A.A. Auzan[4] illustrates a highly asymmetric environment of the Russian business: competitive advantages, not inventiveness, or growth potential in business provide access to administrative resources.

All the factors mentioned above create threshold traps, which make enterprises "stuck" between the support measures for small business and their inability to compete with larger corporations. This is aggravated by ineffectiveness of collective action institutions that demonstrate a low level of cooperation, clustering, and weakly institutionalised business associations reducing the opportunities to overcome barriers.

Thus, in contemporary Russia, medium-sized businesses turns out to operate in institutional compression: due to excessive costs of formal procedures and lack of growth mechanisms. This requires finding new adaptation tools, primarily based on digital technologies.

MODERN TECHNOLOGIES AS A POTENTIAL DRIVER FOR ESCAPING THE TRAP

The development of modern technologies provides a chance for a breakthrough in the medium-sized business sector, especially in view of institutional constraints. Digitalisation, automation, blockchain systems, and platform solutions facilitate mitigating drawbacks in the external environment by reducing transaction costs, increasing the transparency of operations and business processes.

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[4] Tambovtsev V.L., Auzan A.A., Doroshenko V.E. (edit). Institutional Economics. New Institutional Economic Theory. Textbook. Moscow: Infra-M; 2011. 447 p.

Nobel laureate D. North pointed out that institutional changes require not only legislative reform but also the introduction of technologies, which transform interaction rules and behavioural models [3]. The latter act in this logic as institutional meta-factors, generating new norms and standards even despite any political reform.

However, the problem is that technological transformation and institutional modernisation happen not simultaneously in Russia. The level of introduction of digital solutions in the real sector is extremely low (among only 32 per cent of companies) despite the existence of strong scientific schools, especially in applied mathematics, programming, and cybersecurity. The domestic IT sphere makes a good example: scientific groundwork is high, but the level of industrial implementation is quite limited, especially in small and medium-sized businesses.

As Finnish philosopher P. Himanen has emphasised, the information efficacy of the society depends on an ethic of openness and cooperation [4]. However, the Russian business society is often reserved and distrustful of collective management, which manifests in entrepreneurs' hesitation to attract external investments or join partnership projects, including those of digital transformation.

Another barrier is related to the fear of losing operational control: entrepreneurs reluctantly expand the share of other participants (investors, funds), thus, preferring a family or quasi-family type of management. As D. Conley and W. O'Barr note in their ethnographic studies of American business, this factor is closely linked to narratives of a "personal path" and rejections of developing complex structures. In Russia, such a model is combined with problematic access to venture capital, which leads to stagnation in business scale [5].

On the other hand, if technological process runs properly, this can serve as a growth driver. Research work by M.E. Makarov [6], M.A. Afonasova [7], and A.V. Klechikov [8] indicates that blockchain and smart contracts allow decrease of administrative burden, automate audit, logistics, and document flow processes. Digital platforms

and electronic trading systems also facilitate access to new markets for medium-sized businesses, bypassing traditional barriers, such as territorial remoteness and operational bottlenecks. Empirical research confirms that digital transformation and process automation become key factors in boosting the competitiveness of SMEs in a post-crisis economy [9].

Finally, integration into network forms is important, including digital clusters, sectoral platforms, and distributed databases. The experience of China and South Korea indicates: it is medium-sized businesses, integrated into value-added chains through digital interfaces, which ensure productivity growth and competitiveness.

Thus, modern technologies are not only automation tools: they become an alternative to non-productive institutions, as they give medium-sized businesses a chance to avoid the trap by enhancing transparency, flexibility, and network interaction.

THE MONETARY-CREDIT TRAP AND THE ROLE OF MONEY SUPPLY

One of the key factors restricting the growth of medium-sized businesses in Russia is the insufficient monetisation of the economy. Academician Abalkin emphasised, that a low level of economic monetisation (an insufficient quantity of money supply relative to the production volume) leads to a shortage of working capital for enterprises, especially for small and medium-size entities [10], which hinders their development, narrows investment opportunities, and reduces all-round economic growth. According to the Central Bank of Russia, the level of money supply (aggregate M2) in Russia compared to GDP fluctuates about 45 or 50 per cent, while in most developed countries this indicator exceeds 100 per cent, and in China — 200 per cent. This indicates a limited nature of internal sources of liquidity and reduced investment potential in real sector.[5]

Monetarist economists M. Friedman and A. Schwartz emphasised the direct dependence between the growth of money supply and eco-

nomic activity, particularly regarding scarcely-monetised economies [11]. However, a purely monetarist approach can only undermine the Russian economy. A critical factor for stagnation among medium-sized enterprises becomes lack of liquidity together with high transaction costs and limited access to borrowed capital.

For example, in 1995–1996, the Russian government resorted to temporary liberalization of monetary circulation despite a strict fiscal policy. As a result, the economy obtained huge funds previously available in the black market. This generated a short-term increase in investments, reduced inflation, and enhanced productivity, although on an unstable basis. However, this mechanism confirmed an important concept: the intensity of capital turnover and access to financing are drastically vital for economic growth.

Large business has access to stock markets and preferential bank lending, small business operates with a simplified system and support of grants. Medium-sized business is unable to reach both forms of access mentioned above: it faces too high requirements and diminished opportunities. Therefore, it is particularly vulnerable to the restrictions mentioned above.

Similarly, regarding the concept of the "middle-income trap", one can define this as a "monetary trap for medium-sized business", involving a structural segment unable to boost investments, enter new markets, or automate processes due to a shortage of available credit and working capital.

According to Russian economists A.A. Auzan[6] and V.M. Polterovich [12], institutional conditions for lending in Russia are still associated with concern, not growth: banks demand tough guarantees and demonstrate distrust instead of partnership. This increases informal risks, the cost of borrowed capital, and, consequently, curbs development.

In the sphere of digitalisation, the problem can be partially mitigated by means of access to alternative forms of financing, namely: crowdfunding, digital peer-to-peer (P2P) lending platforms,

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[5] URL: https://cbr.ru/statistics/macro_itm/dkfs/monetary_agg/

[6] Auzan A.A., Doroshenko M.E., Kalyagin G.V. Institutional Economics. New Institutional Economic Theory. Textbook. Moscow: Prospect; 2020. p. 448.

blockchain-based smart contracts, regional-level digital bonds. However, institutional support and legal adaptation are necessary for large-scale implementation of these forms of financing.

Thus, medium-sized businesses will survive rather than expand until the problem of insufficient monetisation of the economy is resolved at the macro-policy level involving easy credit constraints, support of refinancing, and implementation of digital instruments.

MEDIUM BUSINESS TRAP AS AN INSTITUTIONAL PROBLEM

The idea of a "trap" in economic science terminology is traditionally associated with the concept of a suboptimal equilibrium, when a system or its element jammed in a stable but low-efficiency position. I. Gill and H. Kharas described [13] that countries of a middle-income level often face a situation with previous sources of growth exhausted, while some new ones are still inaccessible due to institutional and technological inertia. This approach can be easily adapted to the level of enterprises, and it is exactly in this context that "the medium business trap" turned out to be discussed more often over the recent years.

We propose interpreting this term in light of a situation when an entity has crossed the threshold of small business (in terms of headcount, revenue, or taxation type) and encounters barriers in sustainable transition into the large business category. Concurrently, a number of institutional and behavioural constraints persist leading to stagnation or return to a smaller scale activity. The following aspects manifest such a situation:

• loss of preferential regimes (such as simplified taxation system, patents, subsidies) and transition to the general taxation system with subsequent reporting and fiscal risks;

• increased burden from supervisory and control bodies, like Rosprirodnadzor, Rospotrebnadzor, labour inspectorate, etc.

• lack of human, managerial, and technological resources, preventing the introduction of professional business processes at the level of a large company;

• limited access to credit and investment resources: lack of collateral, credit history, and institutional maturity;

• fear of losing control, avoiding partnership or external investment, which is characteristic for entrepreneurs of the traditional Russian style of management;

• lack of faith in the state as a support institution: expectation of repressive rather than stimulating measures.

As a result, a self-sustaining equilibrium is formed: a sort of "institutional trap". D. North [3] described it, as a system of formal freedom to conduct business, but informal constraints, transaction costs, and entrepreneurs' hopes narrow down the potential for the growth.

V.M. Polterovich noted in his research, that many entrepreneurs consciously do not strive for growth, considering it a source of potential risks and instability [12]. This can be called behavioural inertia, aggravated by institutional signals: the larger the business, the tougher is administrative pressure and the less support.

Such situation is particularly dangerous in the absence of network cooperation. When medium-sized business is not involved into value-added chains (neither vertical nor horizontal), such isolation leads to its forced competition simultaneously with small (more flexible) and large (better-capitalised) businesses. It creates the vacuum of institutional trust and economic integration.

As a result, a paradoxical situation occurs: the state declares support for the growth of SME, but the current institutional configuration generates barriers instead of removing them. This is proved by numerous cases when businesses start fragmentation, restrain revenues on paper, or split enterprise' structures to retain "small" status.

Thus, "the medium business trap" in Russia is not merely an economic but an institutional and behavioural problem, which indicates the weakness of scaling institutions, the obscurity of rules, and distrust in the institutional environment. The solution requires not only applying digitalisation tools but also a deep-rooted transformation of

administrative and fiscal logic, a reframing from fiscal control to economic growth.

EXIT STRATEGIES: TECHNOLOGISATION AND INSTITUTIONAL REFORMS

Escaping the medium business trap requires a comprehensive approach, which combines institutional reforms and an active introduction of modern technologies to create an environment, where business develops without administrative risks and transaction costs, so that it is regarded as the norm encouraged by both the state and the business community.

Institutional Reforms: from Fiscal Control to Development

As D. North and O. Williamson emphasise [3, 14], the efficacy of institutions is determined not only by their legal content but also by the quality of operation, predictability, and the level of transaction costs. In Russian practice, many formal institutions (the tax system, the procurement sphere, licensing) operate focusing on control-and-suspicion logic, rather than support tracking and development.

The key directions for institutional reform should be the following:

• tailored support for medium-sized businesses by adapting programmes of wage funds, guarantee agencies, and development funds to meet the needs of medium-sized enterprises.

• modification of the tax system by the possibility to use elements of a simplified regime or tax credit for enterprises that have moved to the medium-sized level.

• demarcation of control functions by determining predictable and straight inspection procedures, implication a risk-oriented approach.

• support for cooperation by developing network structures (clusters, sectoral unions, digital platforms), including tax preferences and administrative benefits for integrated businesses.

Anti-Crisis Tool: Digital Technologies

Digitalisation in the given context is not regarded as just an auxiliary factor but as an alternative to administrative pressure. L. V. Cherkashina and V. V. Tekouchev showed in their analysis [15], that introduction of blockchain technologies, smart contracts, and digital document management can reduce control costs, eliminate corruption risks, and simplify business interaction with the state. Concurrently, the following measures are necessary too:

• support of platform solutions greenlighting small and medium-sized entities to integrate into virtual value chains;

• introduction of digital identification, credit, and tax profiles for access to financing based on such objective information;

• digital transformation of state procedures: licensing, subsidising and tenders altogether in a "single window" format based on transparent data and algorithmic risk analysis.

The Model of Development Through Labour Productivity

As T. Piketty points out, enhanced labour productivity becomes the main source of expanding GDP per capita in the countries with slow population growth. However, it does not solve *per se* the problem of disparity without proper institutional mechanisms of redistribution [16]. Medium-sized business, by its very nature, is the most sensitive to the cost-effectiveness of use of resources: it is too large-scale to use manual labour and not strong enough to afford excess resources. This is why it becomes a natural platform to implement automation, digital management tools, CRM, and ERP systems. Besides technological solutions in the production sphere, it is of paramount importance to digitalise management and personnel processes, including HR analytics and recruitment automation, which enhances the all-round effectiveness of entities [17].

However, as the experience of the Russian IT sector indicates, such implementation is hindered by low financing, weak institutional support, and reluctance of technological transparency.

Consequently, it is essential not only to subsidise the application of IT solutions but also to create an ecosystem of trust: from guaranteed

conditions for digital protection to a legally established status of digital contracts.

To transform the medium-sized businesses into a cornerstone for the Russian economy, it is necessary to advance beyond short-term support measures. Technological policy in adjacent sectors, ranging from industry to space, indicates that digital autonomy and the development of domestic technologies are becoming core elements of strategic sovereignty [18]. It is required to reboot regulatory mindset: from hindrance to assistance, from fiscal centralisation to institutional partnership. Modern technologies are not the goal in this process, but a tool for erasing old barriers and creating a new environment.

CONCLUSIONS

Medium-sized business in Russia is not only an underused resource for development, it is a key link capable of overcoming institutional and technological stagnation. Due to a lack of support tools, its position between small and large businesses makes it vulnerable. However, concurrently, it is strategically significant, thanks to its taxable base, potential to generate employment and increase productivity.

The image of the Old Believer merchant, traditions of trustworthy management, and responsibility to society, represent cultural and historical aspects, which indicate that entrepreneurship in Russia can rely on deep-rooted archetypes compatible with modern digital ethics. However, institutional mistrust, fiscal centralisation, and unfair redistribution of risks often dominate over this potential.

Modern technologies ranging from digital platforms and automation to blockchain systems can become not just a move towards modernisation, they can constitute an institutional clearance of the barriers which hinder growth. Digital tools can ensure transparency, reduce costs, and restore entrepreneurs' feeling of security in the existing atmosphere of mistrust for state institutions.

Withdrawal from the medium business trap signifies "breaking the vicious cycle" of stagnation, where every step generates new risks. This is possible only by means of rebooting institutional mindset: that transforms administrative oversight into partnership, bureaucracy into technological rationality, isolation into network forms of collaboration. Medium-sized business is able to become the core of Russia's new production economy only if its growth is regarded not as a threat, but as the foundation for sustainable and harmonious development.

REFERENCES

1. Danilevskii N. Ya. Russia and Europe: A look at the cultural and political relations of the Slavic world to the Romano-Germanic world. Moscow: Librokom; 2015. 704 p. (In Russ.).
2. Melnikov P.I. (Andrei Pecherskii). In the Forests. Moscow: Sovetskaya Rossiya; 1984. 1180 p. (In Russ.).
3. North D.C. Institutions, institutional change and economic performance. Cambridge: Cambridge University Press; 1990. 159 p. (Russ. ed.: North D. Instituty, institutsional'nye izmeneniya i funktsionirovanie ekonomiki. Moscow: Nachala; 1997. 180 p.).
4. Himanen P. The hacker ethic and the spirit of the information age. New York, NY: Random House, Inc.; 2001. 232 p. (Russ. ed.: Himanen P. Khakerskaya etika i dukh informatsionalizma. Moscow: Mann, Ivanov and Ferber; 2012. 256 p.).
5. Conley J., O'Barr W. Rules versus relationships: The ethnography of legal discourse. Chicago, IL: University of Chicago Press; 1990. 352 p. (Chicago Series in Law and Society).
6. Makarov M.E. Blockchain technologies in public administration. In: Proc. 19th Int. sci. conf. of young researchers (Kazan, April 2021). Kazan: Molodoi uchenyi; 2021:27–30. (In Russ.).
7. Afonasova M.A. Systemic transformation and blockchain technologies in public administration. In: System analysis in design and management: Proc. 22nd Int. sci.-pract. conf. (St. Petersburg, May 22–24, 2018). St. Petersburg: Peter the Great St. Petersburg Polytechnic University; 2018:315–319. (In Russ.).

8. Klechikov A.V., Pryanikov M.M., Chugunov A.V. Blockchain technologies and their application in government administration. *International Journal of Open Information Technologies*. 2017;5(12):123–129. (In Russ.).

9. Voropaev P.V., Nait K.A. Methods for improving the competitiveness of small and medium-sized businesses in the context of digital transformation. *Ekonomika stroitel'stva = Economics of Construction*. 2025;(1):203–205. (In Russ.).

10. Abalkin L.I. On a new concept of long-term strategy. *Voprosy ekonomiki*. 2008;(3):37–38. (In Russ.). DOI: 10.32609/0042-8736-2008-3-37-38

11. Friedman M., Schwartz A.J. A monetary history of the United States, 1867–1960. Princeton, NJ: Princeton University Press; 1963. 860 p.

12. Polterovich V.M. Institutional traps and economic reforms. *Ekonomika i matematicheskie metody = Economics and Mathematical Methods*. 1999;35(2):3–20. (In Russ.).

13. Gill I.S., Kharas H. An East Asian renaissance: Ideas for economic growth. Washington, DC: World Bank; 2007. 196 p.

14. Williamson O. The economic institutions of capitalism. New York, NY: Free Press; 1985. 450 p.

15. Tekuchev V.V., Cherkashina L.V. Using blockchain technology for document management. In: Theoretical and practical problems of development of the penal system in the Russian Federation and abroad: Proc. Int. sci.-pract. conf. (Ryazan, November 28–29, 2018). Vol. 2. Ryazan: Academy of Law and Management of the Federal Penitentiary Service; 2018:1492–1495. (In Russ.).

16. Piketty Th. Le capital au XXIe siecle. Paris: Éditions du Seuil; 2013. 976 p. (Russ. ed.: Piketty Th. Kapital v XXI veke. Moscow: Ad Marginem Press; 2015. 576 p.).

17. Avdeenkov V.A., Andreev A.V., Bunkin V.I., Mastyaev F.A. Digitalization of HR processes in Russian organizations: Current situation and prospects. *Voprosy innovatsionnoi ekonomiki = Russian Journal of Innovation Economics*. 2025;15(1):271–282. (In Russ.). DOI: 10.18334/vinec.15.1.122505

18. Sergeeva A.E. Development of advanced space technologies and systems as the basis for Russia's technological sovereignty. *Mir novoi ekonomiki = The World of New Economy*. 2025;19(1):17–26. (In Russ.). DOI: 10.26794/2220-6469-2025-19-1-17-26

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Conflicts of Interest Statement: The author has no conflicts of interest to declare.

Improving the Innovation Ecosystem as a Key to Successful Development of Russian Fintech Startups

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ABSTRACT

Relevance. The article presents the results of a study of the criteria and factors contributing to the success and failure of Russian fintech start-ups, as well as their important role in the development of the economy and the financial sector. **The aim** of the study was to identify and assess the impact of stakeholders' coordinated activities on the success of Russian start-up projects. **Methods** used by the authors involved empirical analytic methods, case studies, focus groups, surveys, in-depth interviews, and qualitative comparative analysis. **Research results** include an assessment of the state and prospects of financial technology development and the formation of a fintech ecosystem, as well as the problems of financing technological innovations in Russia. The authors have studied barriers to the growth of the Russian venture capital market and ways to overcome them. The article also presents the findings of 32 in-depth interviews with experts and entrepreneurs in the domestic fintech market, as well as a survey of owners and managers of 44 start-ups in the early or seed stage of business development. As a follow up of a thorough research, a list of 30 factors for startup success was compiled and seven configurations identified for potential estimation of either success or failure for the projects. **The practical implication** of the work lies in its potential use for participants in the startup ecosystem to increase the chances of success in the early stages of fintech projects.

Keywords: fintech; ecosystem; stakeholders; fintech start-ups; Russian venture capital market; barriers to growth; criteria and factors for success and failure; stakeholder approach

INTRODUCTION

After the global crisis of 2008–2010, the world opened *FinTech*, or "era of financial technologies', which the Basel Committee on Banking Supervision defines as "technology-generated financial innovations that lead to new business models, applications, processes or products which eventually influence financial markets and institutions and the provision of financial services".[1]

The Bank of Russia regards FinTech as "the provision of financial services and solutions using innovative technologies, such as Big Data, AI and machine learning, robotic process automation, blockchain, cloud technologies, biometrics etc."[2]

The authors of this article interpret it as innovative technologies in the financial sector transforming the established value chain (or its component), providing more efficient services and solutions for businesses and consumers.

There exist many various definitions for the notion of "innovation". In this regard, for the definition purposes of the OECD Innovation Strategy, they decided to refer to the *Oslo Manual*[3] *describing the following four types of innovation:*

• *Product innovation. The use of a new or significantly upgraded product (good or service), including significant upgrading of technical specifications, components and materials, embedded software, or other functional characteristics.*

• *Process innovation. Employing a new or considerably improved method of production or delivery, involving significant changes in techniques, equipment and/or software.*

• Marketing innovation. Introduction of a new marketing method (product launch) involving major changes in product design or packaging, product placement, promotion or pricing.

• Organisational innovation. Implementing a new organisational method in business practices, workplace structure or public relations.

One can hardly avoid but adding to this list as well "pseudo-innovations": useless or harmful novelties, unfinished projects, speculative and other imitations.

We employ the following synonyms for the term "innovation": "novation", "novelty", "new development", "introduction of the new", or sometimes "novella".

The term "startup" deriving from English *start up* (launch, beginning of operation) meaning a nascent innovative company. In some cases, it is replaced by "project" or "FinTech project": since innovations develop most dynamically in the financial technology sector due to high demand and resource availability, which provides a significant amount of data for research. Technological startups are knowledge-intensive small-scale ventures.

The "founding member" of a startup may be referred to as an initiator, organiser, author of the idea/project, as well as an innovator, rationaliser, inventor, innovative entrepreneur, project manager, or owner of an innovative product. The term "introduction of innovations" in our viewpoint involves the creation and development of a new, unprecedented product, or service idea, its realization, or manufacture, and application.

DEVELOPMENT FEATURES OF INNOVATION ECOSYSTEMS

Since the end of the 20th century, the adoption of the ecosystem approach in various spheres of socio-economic activity has greatly expanded, primarily among innovations. Companies (actors) in the business ecosystem model formally or informally unified in a network generate new value propositions (public goods) by means of various types of collaboration, that include unusual partnership mechanisms and unprecedented forms of competition. Practice has demonstrated that ecosystems make the most favourable environment generating and implementing innovations.

The terms "business ecosystem" (BES) and "innovation" are inextricably interrelated. On the one hand, the initial ecosystems emerged in innovation clusters; on the other hand, all BESs are

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[1] URL: https://www.rbc.ru/finances/04/09/2017/59ad67f39a79477e3de93754

[2] URL: https://trends.rbc.ru/trends/industry/618b6f349a794772fa50adf4

[3] URL: https://www.oecd.org/en/publications/oslo-manual-2018_9789264304604-en.html

in some way engaged in innovation, and without it, they have no chance to exist for long and develop sustainably. Charles W. Wessner suggested the concept of an innovation ecosystem in 2004, and it serves as an instrument for conditions enhancing the entities' competitiveness in national and regional economies [1].

Amidst various interpretations of the concept of an innovation ecosystem (IES), there is no universally accepted definition yet, because a complicated network architecture and unpredictable nature of multiple interactions coexist within it among its heterogeneous participants, and each of them has certain competencies, strategies, and objectives. In accordance with Robert Metcalfe's law, the value/utility of communication networks rises proportionally to the number of users, although, practically, not all participants establish ties and interact with each other.

The authors of the given article have taken as a basis supplementing and expanding the version of American scholars Ron Adner and Raul Kapoor. We view an IES as an aggregate of multiple stakeholders (interested or involved parties): first of all innovators, investors, and clients, whose interests must be coordinated, balanced, or brought to a dynamic harmony, so that a company's innovative value proposition get materialised in the market [2].

In our point of view, ecosystem management, including innovation ecosystems, is the distributed regulation of the process of mutually beneficial exchange of resources (involving technologies, explicit and tacit knowledge, competencies and innovations, human resources) among their autonomous participants aiming to permanently create new values for consumers, as well as added value or public goods for stakeholders.

S.E. Proskurnin, First Deputy Head of the Administration of the closed administrative-territorial formation of Zheleznogorsk, Krasnoyarsk Krai, distinguishes the following types of innovation ecosystems: global, national, regional, local (technopolises), corporate (sectoral), entrepreneurial, and individual. In his opinion, the IES' specialty implies in the fact that it "generates innovations, ideas, intellectual property, and people for society

and other sectors that in turn provide the IES with problems and requests, as well as resources for self-development".

He also points out that "the ecosystem approach emphasises not so much the participants of the system themselves, but the nature and dynamics of their interactions (with each other and with potential participants)". He also stresses the point that "it is precisely collaboration, viewed as a horizontal network environment of communications among all sectors and organisations, that ensures generation and delivery of knowledge flows, the transformation of these flows into innovations, and the further dissemination of novelties throughout the economy" [3, p. 5].

The literature describes different alternative, but not mutually exclusive ecosystem models. For instance, the consulting company PricewaterhouseCoopers (PwC) presented an ecosystem with four groups of internal stakeholders (financial institutions, technology companies, infrastructure players, startups) as well as external participants (investors, incubators and accelerators, regulatory bodies and the State, new technologies and instruments, consumers and users).

STARTUPS: DRIVING FORCE FOR PROGRESS

The FinTech industry has become one of the most innovation-resourceful and highly competitive sectors. New technologies are developing primarily in startups of small tech companies (hereinafter referred to as STCs).

FinTech projects are deployed within the framework of complex ecosystems, which in recent years have been fast-developing in breadth and depth, thereby increasing the number of stakeholders.

E.V. Burdenko, Associate Professor of the Plekhanov Russian University of Economics considers the external ecosystem of startups and its elements as universities, scientific and financial entities, large corporations, and state institutions. They generate conditions for financial and economic activity for aspiring entrepreneurs and STCs as the main components (cores) of the ecosystem. The scholar attributes the leader to

the internal ecosystem of a startup capable to advance ideas for creation of a new product, as well as a team of like-minded individuals ready to spare no effort or time working on the project. Startup's specific aspect lies in the absence of limits and restrictions on growth, which means, scalability [4].

Venture funds are made by investors (private, public-private, and corporate), corporations and banks, incubators, accelerators, as well as "business angel" investors. Investment intermediaries (consultants, brokers, representatives of investment platforms, etc.) participate in attracting venture investments too.

Startup projects have various definitions. Lisa Barrehag with co-authors define a startup as a "human institution designed to create new products and services under the extreme-uncertainty consequences" [5]. Steve Blank and Bob Dorf call it "a temporary structure in search of a scalable, repeatable and profitable business model" [6].

Other definitions include time limit (no more than 5 or 10 years), as well as such characteristics as a state of high uncertainty and novelty of the product/service, often implying "disruptive innovation".

Notably, the terms "disruptive innovation" and "disruptive technologies" are translated literally as "undermining or subversive innovations/technologies" in Russian literature. Sometimes one can even find "destructive or revolutionary innovations or technologies". English-language economic publications have these terms in reference to innovations or new technologies that disrupt traditional markets, gradually replacing existing products or services with higher quality, more convenient, and efficient ones. In the authors' viewpoint, it is more logical to use the established Russian interpretation: "break-through technologies".

In 2024, there were nearly 150 million startups worldwide. According to statistics, 21 per cent of them collapse in the first year, 30 per cent within 2 years, 50 per cent by the 5th year, and 70 per cent within 10 years. Less than 1 per cent of them become "unicorns". It refers to the startups that have achieved a market valuation of 1 billion USD within less than 10 years of operation without launching its IPO and with at least 25 per cent ownership remained by their creators.

As of June 2024, there were registered 1,658 "unicorns" worldwide and their number has almost doubled since 2021.[4] At the beginning of 2025, there were 228 FinTech startups among them with a capitalisation totaling at $ 780 billion.[5] Russia has no such companies by now.

Among the reasons for the failure of startups are the following:
- cash flow problems (38 per cent);
- lack of funding or investor interest (27 per cent);
- lack of a business model (27 per cent);
- impact of the COVID-19 pandemic (18 per cent);
- loss of market demand (17 per cent);
- legal problems (16 per cent);
- lost competition to contenders (16 per cent);
- conflicts within the team or with investors (14 per cent);
- problems with pricing policy or costs (14 per cent);
- impractical product (13 per cent);
- problems with the team (13 per cent);
- delayed launch of the product to the market (11 per cent).

The launch of a startup is highly risky for both the founder and the investor. The first year is assessed as the most risky: the longer STC exist, the better the chances the will survive.

The startup ecosystem also includes supporting, advisory, and mentoring organisations: technoparks and co-working spaces, business incubators and startup studios, as well as business accelerators. In exchange for equity in STCs, they back up with marketing, education, communication, and necessary organisational assistance, for instance, providing premises and services of experts, innovation managers, accountants, lawyers, suppliers, etc.

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[4] URL: https://issek.hse.ru/news/951771910.html

[5] URL: https://www.cbinsights.com/research-unicorn-companies

SPECIFICS OF THE RUSSIAN VENTURE MARKET

The relatively immature FinTech market in Russia, experiencing lack of funding, is unevenly developing. As to the level of development of payment systems, digital banking, financial planning programmes, etc., Russia leads among many countries, however, at the same time it lags in the application of more upgraded technologies, for instance, AI and Big Data processing. Unlike in developed countries, "business angels"[6] were not popular here. However, they grew more noticeably here in 2023, when for the first time their share exceeded over a quarter of the total investment volume.

Startups are subject to heavy state regulation. For instance, in Russia, only banks can provide financial services to individual consumers, which strongly reduces the amount of FinTech companies interacting directly with clients.

Barriers to entry into the FinTech market for STCs are still high. In 2018, the Bank of Russia founded the regulatory "sandbox" for a fast and safe introduction of innovative products, services, and technologies on the Russian financial market, which requires compliance with bureaucratic and legal procedures, however, small technology entities lack the competencies and resources for that. The high level of regulation in the financial sector is one of the reasons for the relatively small amount of early-stage startups.

Banks operate in dual functions: as a considerable source of capital for FinTech startups and as their customers. That is why they develop the major part of FinTech fast-growing number of projects, particularly in the spheres of investment management, payments and transfers, loans and deposits. However, it also happens, that banks acquire small tech companies and later, for various reasons, they close or do not develop them, therefore impeding innovations.

Another specific aspect of Russian FinTech startups is that some of them modernise or simply copy technological solutions already successfully employed by specialists abroad. This may hinder their introduction into foreign markets or bring a civil action.

In the latest edition of the Global Innovation Index (GII),[7] issued in September 2024, Russia was rated 59th among 133 countries, compared to its 45th position held in 2021. Concurrently, Russia ranks 13th among 34 upper-middle-income countries and 33rd in Europe.

The UN World Intellectual Property Organization (WIPO) calculates the GII based on nearly 80 indicators as the average of two sub-indices:

• "Innovation input" evaluates elements of the economy that insure or facilitate innovative activities, grouped into five components: (1) Institutions, (2) Human capital and research, (3) Infrastructure, (4) Market maturity, and (5) Business development.

• "Innovation Output" reflects the actual results of innovative activity in the economy in two components: (6) Knowledge and technology outputs and (7) Creative outputs.

Russia took the 39th position in the area of human capital and scientific development, and the lowest, 126th place for the performance of institutions. However, experts from the Institute for Statistical Studies and Economics of Knowledge at the Higher School of Economics (an academic partner of the abovementioned ranking compilers) claim, that these listings provide inaccurate information: according to their own assessment, based on Rosstat data, Russia experiences boosting innovations.

Moreover, Russia fosters favourable conditions and infrastructure for developing innovations, primarily information and communication technologies. The gap between a low efficiency of innovation activity and its potential is due to a weak demand for innovations and lack of resources for the long payback period of venture investments.

The Ernst & Young's Global FinTech Adoption Index reflects the development of this industry in

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[6] Business Angels — Private venture capital investors operating at the early (seed) stage of startup development in exchange for a return on investment and a share in the capital, often holding a blocking stake rather than a controlling one.

[7] URL: https://www.wipo.int/publications/ru/details.jsp?id=4756&plang=RU

different countries. According to this indicator, in 2019, Russia ranked third worldwide and maintained this leadership for five consecutive years.

A large number of users of the digital infrastructure of FinTech services existing in Russia generated precisely the B 2C segment (business to consumer). In particular, there appears the possibility of obtaining financial services through remote channels, the share of cashless payments in retail is growing, and the digital divide is narrowing, as residents of rural areas and small towns, people with disabilities, and older age groups are mastering financial technologies.

Already in 2021, the Russian Federation outpaced G20 countries in terms of instant access to financial products: 76.2 vs. 60.7 per cent. In 2024, this indicator grew further, including among population groups most susceptible to the digital divide: by 7 per cent for rural residents, by 11 per cent among people with disabilities and by 16.7 per cent for elderly people. Russian payment services indicated the largest revenue in Q2 of 2024, however, then it decreased by 13 per cent, the growth rates have notably dropped and in 2024, it amounted to only 3 per cent compared to the same period in 2023.[8]

In 2023, Russia held the 29th place and Moscow lost one position, ranking 30th in the annual Global Startup Ecosystem Index report of the Swiss-Israeli research centre StartupBlink. The USA, the UK, Israel, Canada, and Sweden took the five top positions. Conducted since 2017, the research covers 100 countries and 1000 cities now.

Ranking stems from a general index consisting of three groups of indicators: quantitative (amount of startups, co-working spaces, accelerators, etc.), qualitative (volume of private investments, number and size of "unicorn" companies), and the business environment (internet speed and cost, R&D investments, etc.).

Moscow constantly hosts over half of the national venture market (both in volume and number of deals), as well as half of all startups. Besides, the capital is among traditional trio of leading regions together with Tatarstan and St. Petersburg.

In 2024, Moscow Innovation Agency analysts compiled a statistical portrait of over 5,500 Moscow's startups with an average age of 4.5 years. As to the number of STCs Moscow is comparable to such cities as Boston or Singapore, but slightly lags behind New York and London. Over a quarter of startups were launched within the last three years. The majority of them offer B 2B solutions, over 40 per cent operate for computer software development, and 20 per cent for scientific research and development in the natural and technical sciences.

As to investment volume, in 2024, the Russian market for investments in IT startups showed a lower level than in the crisis year 2022: venture funds and investors allocated only 91.7 million USD in total into small tech companies. The situation is expected to recover by no earlier than in 2027, if economic conditions potentially improve.

The statistical analysis of venture market and activities of large institutions for innovation development in Russia indicated lack of quality early-stage innovative projects. This primarily hinders efficiency of the abovementioned accelerators, incubators, and seed venture funds, as well as the activity of corporate venture investors and investment volumes.

To eliminate this problem, the innovation of infrastructure needs to be improved and stronger interaction between startups and the corporate sector is required. However, it is also vital to solve such problems as complexity and multi-stage nature of business processes in corporations, as well as cultural differences and a low level of knowledge about the specifics of joint work, which in part can be solved by organising corporate accelerators and educational programmes for all employees[9] [7]. Moreover, improving interaction is possible by applying the startup studio model, where a group of experienced entrepreneurs and hired managers create, test, and develop projects.

Such studios join in to the project at the stage of problem detection and help startups go through the scaling stage. They are called "startup factories", since, due to deeper involvement in the project process, they

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[8] URL: https://iidf.ru/upload/documents/corporate/research.ru.pdf

[9] URL: https://www.amazon.com/dp/B 07NVNYM4C

obtain greater profit. Accelerators provide instead a brief support to external companies and teams, usually for 3–6 months.

According to Russian government data at the end of 2021, there were about 25 per cent of startups created in universities worldwide, while only 3 per cent in Russia.[10] To get students involved extensively in technological entrepreneurship, in 2022, the Russian Ministry of Science and Higher Education launched the federal project "Platform for University Technological Entrepreneurship" (hereinafter referred to as the Platform).

Nowadays, the Platform is an ecosystem, which unites tools of state and investment support for budding entrepreneurs, scientists who try to commercialise their developments, private and institutional investors ready to allocate resources and competencies into creative ideas and domestic developments.[11] By January 2025, the Platform includes:

• 28,000 university startups and startup projects;

• 429 universities from 87 regions of Russia;

• 2.56 billion Rubles raised by support instruments;

• 4,500 university startups that received a million Rubles each through the "Student Startup" competition of the Foundation for Assistance to Innovation;

• a network of 21 university startup studios from the Northwestern to the Far Eastern federal districts;

• annual training for hundreds of thousands of participants in entrepreneurial competency;

• over 150 acceleration programmes in Russian universities annually;

• over 339 thousand participants in events of entrepreneurial communication platforms "Tochki Kipeniya" ("Boiling Points").[12]

A research of the Agency for Strategic Initiatives[13] states: "Innovative activity is related to uncertainty and risk, which is not typical for routine daily op-

erational activity. The implementation of innovations can be hindered under the circumstances of risk-minimising stance and the absence of processes adapted to innovative activity: employees will be unwilling to risk their reputation and career for the sake of no-guarantee long-term hopes… No tolerance for risk and mistakes is distinguished as one of the key barriers to innovation in large companies."

One of the problems in our country is that the authorities support only the development of new technologies, but neither tech commercialisation, nor implementation. This is due to an incompatibility of interests between science and business, high transaction costs, inadequate legislation, etc.

Besides, there is a lack of experts skilled and experienced in commercialising inventions and innovations, in addition to the unsolved brain-drain problem among Russian startups and well-trained mathematicians and programmers leaving to countries for more appealing conditions.

A rigid monetary policy regarding a sharp key rate increase, contributes to a decrease in investment volumes, including in innovations.

Dishonest competition methods strongly thwarts motivation for creating new products as well. In such circumstances, many strive not to win the consumer market, but gain access to state resources and restrict it for competitors.[14]

All the above mentioned factors testify the requirement of an all-round modernisation of the national innovation system. It is invaluably important to build a creative environment and a healthy working atmosphere in project teams at the micro-level.

PREDICTORS OF FINTECH PROJECT EFFECTIVENESS

Venture investments are among the most risky. This is why the percentage of FinTech project failures remains high. There are many reasons for this: rapid development of technology and slow growth of the financial sector, short-term business strategies, inertia from large players, underfunding, inadequate insight of client needs,

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[10] URL: https://tass.ru/ekonomika/12603543

[11] URL: https://univertechpred.ru/

[12] URL: https://vc.ru/u/1348105-liga-universitetskih-startapov/1772306-nas-bolee-742-tysyach-za-god-chislo-uchastnikov-platformy-vyroslo-vtroe

[13] URL: https://asi.ru/

[14] URL: https://cyberleninka.ru/article/n/sostoyanie-i-perspektivy-razvitiya-innovatsionnoy-deyatelnosti-v-rossiyskoy-federatsii-v-xxi-veke

fruitless sales strategy, lack of consideration of ecosystem specifics, regulatory problems, etc.

This article primarily discusses startups at their early pre-seed and seed stages, where about 90 per cent of STCs failed.

Startup founders need to be extremely flexible in decision-making to avoid falling into the trap of escalation of commitments, when managers face negative results of their decisions or activity, preserve the prior direction. This occurs particularly often in the scaling stage of startups.

This is indirectly related to the fact, that STCs headed by one individual founder significantly lag behind those with two or more founders. At least a duet of founders facilitates the chances of success: 30 per cent more investment, customer growth rates threefold faster, and a higher potential for optimal speed of scaling.

For several decades, scientific literature has been continuously publishing researches of factors and criteria for the success of business projects. In the early 1970s, it focused predominantly on operational aspects of projects, assessment of tools, and implementation methods. At the end of the 20th century, scholars suggested a popular criteria framework of project success known as the "iron triangle" involving time, cost and scope/quality [8].

Generally, a project is considered to be successful if it achieves the set goals, accomplished on time, does not exceed the budget estimate, meets the quality expectations, and brings profit to stakeholders. Furthermore, it must meet the requirements/expectations of the investor and other participants. However, there are no universal criteria determined here.

Bill Gross, who founded Idealab, the world's first business incubator in 1996, compared 100 successful and 100 failed startups. To everyone's surprise, it turned out that 42 per cent of success brings the choice of the right launch timing, 32 per cent from a cohesive and competent team, and the idea deserves only 28 per cent, although this scientist was convinced of the opposite. The business model contributes to getting the set goal by 24 per cent, and one can do without it and de-

velop it later in the subsequent stages of a project. Funding depends on success by only 14 per cent: it is not so difficult to find back up for a good idea.

Overall, these five factors are essential, but the most significant is timing, which can be determined by testing the consumer sector and its readiness for innovations.

The first descriptions of success factors of projects were not classified: no one considered behavioural aspects, for instance, stakeholder satisfaction [9]. Then a list of critical success factors (CSF) was developed, namely:
- project mission (strict definition of goals);
- support from top management;
- quality of project schedule/plan;
- coordination with the client/customer;
- personnel recruitment/selection/training;
- technical provision;
- client acceptance;
- monitoring and feedback;
- communication within the team/entity;
- searching-and-fixing problems [10].

However, the major attention was still focused on operational rather than strategic management. That is why, the perspective of interaction between internal and external stakeholders, as well as understanding and commitment of investors, prioritising the selection of a project manager with relevant experience and leadership qualities necessary for this role as well, became significant for the potential of success [11].

Modern scientific literature interprets a viewpoint that various stakeholders subjectively evaluate the project success, which should be calculated separately for each specific stage of the life cycle. Otherwise decision-making can be erroneous, which discourages employees and reduces work efficiency [12]. "Seven forces model of project success" by R. Turner is compelling, as it integrates external and internal influencing factors.

The initial forces are political, economic, social, technical, legal, and environmental ones, as well as owners and investors eager to get a quick return on resources invested in the project. It is also important to define correctly goals, mission, planning, and control.

The secondary forces include people with their knowledge, skills, team, leadership, and industrial relations, system configuration of management, work organisation, quality, risks, etc., as well as involved external parties with additional skills if they are not available within the entity [13].

The amount and types of success factors differ in the concepts of separate authors, however, there are some aspects in common: besides the presence of stakeholders, the clarity of defined project goals and mission are important, as well as investor support, staff composition and competencies, communication, monitoring, and feedback too. However, it is not fully clear, if success factors remain static or gradually change.

The perception of success factors has vastly deepened over several decades. In the 21st century, scholars attribute an increasingly essential role to stakeholders, including owners (investors) or sponsors (project curators from investors), as well as consumers, operators or users, suppliers, managers, teams, and the public. At the same time, the major stakeholders must agree on success criteria and act as partners to estimate work results throughout the entire project [12]. In the wider sense, they act as investors who contribute in one form or another to the development of innovative projects.

RESEARCH OF THE RUSSIAN STARTUPS PERFORMANCE

FinTech startups differ from traditional business projects in their high uncertainty, novelty, and process flexibility. One of the authors of this article, E.A. Plaksenkov, together with colleagues from the Moscow School of Management SKOLKOVO, made a research setting the following tasks, namely: to define the key stakeholders, criteria and factors of success and failure in the Russian venture market, as well as strategies for aligning stakeholder interests and survival of project [14, 15].

The authors have not planned to create a universal model for FinTech startup success, but the analysis of the criteria and factors of their effectiveness or failure will help to achieve the set goals and prevent casual repeated errors.

In the course of their research, the authors took 32 in-depth interviews with experts and entrepreneurs of the Russian FinTech market. The respondents were selected on the basis of the following criteria: they represent an entity potentially or actually keen in the development of the FinTech market in Russia, besides, their activities are related to innovative projects and their experience is linked to cooperation with entrepreneurs in the field of financial technologies.

Among the respondents were also "business angels", as well as representatives of 50 largest banks, venture funds, institutions supporting and developing startups, high-tech and consulting enterprises, sales and solution networks, regulatory bodies, etc.

The survey also included the leaders (owners and managers) developing a scalable and reproducible business model of 44 startups within the last five years. The sample included small tech entities at different stages of development: seed (commercial product not available yet), or formation and growth of the startup (commercial product available, first revenues), as well as expansion and strengthening of market positions.

The majority of the studied STCs were at the early seed stage, which involves a project idea or invention, formation of the team, determining business model and development of technology or a prototype continues. In the venture market, the stage is called a Minimal Viable Product (MVP) when projects experience the highest risk: less than 10 per cent of startups survive. Venture investors call this stage "a death valley".

Then follows the project launch and its formation, or the actual startup stage: the new company enters the market with a ready prototype, finds investors and clients. In case of success, the early growth stage begins. Startups in subsequent stages, involving expansion and exit in the sale of shares or initial public offering, were not involved in the research.

To develop questions for in-depth interviews and questionnaires, the authors used the R. Turner's approaches of the Seven Forces Model of Project Success modified and adapted

to knowledge-intensive and high-risk FinTech projects, which are often startups [13].

The authors developed a list of 30 hypothetically possible success factors, based on this model, each of the factors assessed by experts and entrepreneurs on the degree of its influence on the survival of FinTech project.

The obtained answers were elaborated with the Qualitative Comparative Analysis (QCA) method effective for comparison and assessment of small-sized samples (from 10 to 30 observations or objects).

The QCA method reveals various combinations of factors leading to a desired outcome, as well as identifies core factors (important in most combinations) and peripheral (less important) factors [16].

Quantitative research allowed for ranking the principal success criteria assessed by the owners and managers of the above forty-four FinTech startups (hereinafter referred to as startup members). Among the top positions were the following: revenues (65 per cent of respondents), net profit (49 per cent), and company capital value (30 per cent). At the same time, only 16 per cent noted investment volume, and 22 per cent mentioned the volume of website traffic and web search queries. Startup members also highlighted dynamics in foreign markets, attracting bank participation in the project, market entry, and presence abroad.

Analysis of the 32 in-depth interviews with experts and participants of the Russian FinTech market illustrates that they find a FinTech project successful due to the following:

• solution of a problem or saving clients' time;
• generating and implementing a new product/technology;
• forming a strong team;
• seizure of market share;
• obtaining the optimal volume of investments;
• successful competition at the local/global level;
• potential growth, or a business model.

Analysis of the obtained results allows for compiling a matrix with 16 success criteria for FinTech projects. Notably, unlike startup members, experts rank completely differently the criteria for driving forces of success. The former mainly concentrate on business and financial success, but the latter add to this also factors of influence on the client and human resources, as well as potential for future development.

Both startup members and experts of the Russian FinTech market noted two coinciding criteria: market share and involvement of a bank in the project. At the same time, the former do not take into account or ignore the factor of satisfying the needs of the bank operating as a client in B 2B projects. Besides, unlike venture market experts, managers of the majority of the studied early-stage STCs did not consider as a priority to focus on client expectations and preferences.

Such discrepancy explains to some extent the problem of the overall low success rate of Russian FinTech: most startup members choose from the too limited list of criteria, in many cases, not corresponding to the expectations of stakeholders, some of whom can become potential investors in these projects.

Most owners and managers of Russian FinTech startups do not understand or do not want to understand the interests and role of key stakeholders. Therefore, they cannot correctly determine their project's objectives and strategies essential for its survival and development. In some instances, they do not follow the recommendations of banks and other investors.

To eliminate this problem, market agents operating in the project ecosystem must determine unified criteria meeting the interests of all its stakeholders. As the research results indicate, one of such important and common to all criterion could be the satisfaction of the bank-investor, evaluated either by the volume of its investment in the project or by its acquisition of this STC.

Within the qualitative analysis, the authors identified 30 main success factors for FinTech projects and estimated the level of their influence on achieving a favourable outcome. In particular, seven equifinal patterns were determined, including factors that lead to success of the project; however, two of them are sporadic cases.

Since the research is focused on the early-stage projects, financing for product development is of paramount importance. Allocation of at least 25 per cent of the necessary funds means the participation of a serious investor. Incidentally, 25 out of the 44 studied startups won that grant, and 13 received 50 per cent. The latter include "business angels" and venture funds, which are attracted at the early stage of startup development, as well as banks, which prefer to buy mature STCs and/or "grow" them within the institution and large IT companies too.

The backup of a bank or corporation for necessary funding contributed to a positive outcome in 28 per cent of cases. A third of successful cases stems from the previous experience in FinTech projects of the founder or manager of the startup, as well as the available business plan, which increases the chance of subsidy. Another third of successful projects was due to the presence of marketing specialists and absence of financial experts. Thus, a correctly selected and motivated team is very important too.

Interestingly, the experience of project manager in the domain of finance is not a basic condition. On the contrary, in most cases, just the absence of finance professionals in key positions leads to a positive result. In a few projects, such a specialist plays a secondary role, for example, in developing software or a product of interest for the bank-investor.

However, all the mentioned above aspects do not imply, that there should be no financiers or marketers in the project. The key role should be given to IT specialists: their work and the combination of net profit, as the main indicator of success, with the creation of a B 2C product brings positive results in almost 24 per cent of cases.

During the analysis, it also became clear that the evaluation of the influence of some success factors changes depending on the stage of project development and its lifespan. Moreover, the significance of required competencies also changes: for example, at launch, software developers play a key role, while in startups over 5 years, usually the role increases of marketing, advertising, and public relations specialists.

The QCA method allows not only for modelling success but also for creating a model to test deficiencies leading to failure. Within the research, two main negative factors were revealed: the combined manifestation of which hinders project development. The chances for unsuccessful outcome of FinTech startup dramatically increases in the absence of banks and corporations as main investors, in addition to a project manager unexperienced in the market of financial services.

Furthermore, notably, 67 per cent of unsuccessful cases are caused by a lack of experience in the specified sphere, coupled with the absence of marketing experts in key positions and a shortage of bank or corporate investment. Still funding must remain a priority, even if a financial expert or IT specialist heads the project.

Another 35 per cent of fiascoes occur due to a lack of experience in the FinTech sphere, or not a strong team or marketing specialists, which refers to the vital essence of understanding the market and client needs by all team members, starting with the leader.

The importance of the latter factor is increasing: the trend of personalisation of client relations intensifies, that is why service providers will have to create and customise financial products in view of the interests of each individual consumer.

One of the major conclusions of the research work is that the interests of project stakeholders must be consistent with their goals. It is also important that all participants in the startup ecosystem demonstrate no discrepancies in determining the key success criteria. For this matter, it is necessary to identify the most significant stakeholders, understand their interests, expectations, and capabilities, and then establish partnership relations with them.

The strategy of startup projects wins success, particularly in the early stages, when a manager is understanding and considerate of investors' expectations, treats them as influential and experienced team members, sharing important decisions with them.

This factor has been manifested in the sphere of corporate governance: there occurred the transition to a stakeholder model from a shareholder model with predominantly needs of owners.

Within the framework of the stakeholder approach, interested parties determine coordinated operation to achieve potential benefits, and in case of disagreement, they find acceptable balanced solutions based on the win-win principle of mutual benefit.

CONCLUSIONS

The FinTech industry makes a significant impact on the development of the economy and the financial sector, which contributes to the implementation of a few UN Sustainable Development Goals.

FinTech startups have noticeably accelerated the process of democratisation of digital financial services: they are seizing this high-profit market, successfully ousting competitors by means of traditional technologies, thanks to more client-preferred solutions.

Innovation ecosystems generate the most favourable environment for startups with interests of all stakeholders born in mind, most of all, investors, innovators, and clients.

In terms of development level of FinTech, Russia surpasses many countries, however, due to insufficient funding, expensive credit and underdeveloped culture of innovation, it lags in the sphere of developing and applying AI, Big Data processing, etc.

The financing problem of technological innovations in Russia is aggravated by high credit rates, underdeveloped venture market, and a shortage of specialists, primarily in the sphere of commercialising inventions and innovations.

Our state supports only the development of new technologies, but not their commercialisation and implementation. This occurs due to incompatible interests between science and business, high transaction costs, imperfect legislation, etc.

The implementation of state strategies, concepts, programmes, and initiatives is focused to shape an effective national innovation system, uniting the efforts of science, business, and expert societies for developing high-potential technological markets and sectors, training specialists, etc.

We propose creating an institution of an ombudsman, an authorised representative for innovation development empowered with the main mission to enhance mutual interest, the level of trust, and the capacity for accord within the triangle "science-technology-production". This role could be entrusted to qualified intermediaries capable of performing the functions of translators, mediators, coordinators and also experts able to understand the interests of officials, businessmen, and innovators, as well as solve problems, including by means of shuttle diplomacy.

It is characteristic for Russia, that universities are extremely inactive in the innovation process, which partly explains the lack of quality innovative projects at the early stage of development. In 2022, to resolve this situation, the Russian Ministry of Science and Higher Education launched the federal project "Platform for University Technological Entrepreneurship",[15] which is under successful implementation, according to official reports.

It is necessary to continuously modernise innovation infrastructure, increase the role of corporate venture investors at all stages of startup development, and facilitate the entry into this market, primarily, through reducing bureaucratic procedures and restrictions, and decreasing the excessive regulation of the financial sector.

In medium and large companies, the key barrier to innovations remains the fear of inevitable errors and failures, which endangers careers and reputation that can lead to lawsuits. Therefore, the concept of entrepreneurial risk and the criteria for its admissibility should be defined under legislation.

Within the last quarter-century, the amount of criteria and factors for the success of FinTech startups has significantly expanded: the majority of authors, who rank lists of indicators for

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[15] URL: https://univertechpred.ru/

assessing results achieved at each project stage, recognises the important role of key stakeholders.

The given research of the authors identified the impact of the innovation ecosystem on project success (30 internal and external factors), as well as the reasons for failures. These results can be useful for venture investors, "business angels", accelerators, state organisations, commercial banks, etc. Startup founders are recommended to use them to increase the potential success at the early stages of projects.

Anti-Russian sanctions, despite their tangible damage, have contributed to the rejection of the policy aimed to "import technology in exchange for raw materials". The era of excessive consumption is about to wrap up: it is time to think, invent, and produce.

Potential venues for future research could be related to increasing the sample size of experts and startups, as well as the more detailed study of the role of team competencies, the organisation of business processes, and interaction with investors and clients. This will help for a significant enhancing the methodology for measuring the criteria and factors of success for FinTech projects, especially in the early stages of development.

REFERENCES

1. Wessner C. W. Entrepreneurship and the innovation ecosystem policy lessons from the United States. In: Local heroes in the global village. Boston, MA: Springer; 2005:67–89. (International Studies in Entrepreneurship. Vol. 7). DOI: 10.1007/0–387–23475–6_5

2. Adner R., Kapoor R. Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal.* 2010;31(3):306–333. DOI: 10.1002/smj.821

3. Proskurnin S. E. Creation of a self-organizing innovation ecosystems in zones of special territorial development. *Regional'naya ekonomika i upravlenie: elektronnyi nauchnyi zhurnal = Regional Economics and Management: Electronic Scientific Journal.* 2017;(4):6. (In Russ.). URL: https://eee-region.ru/article/5206/

4. Burdenko E. V. Creating an ecosystem for startup scalability. *Voprosy innovatsionnoi ekonomiki = Russian Journal of Innovation Economics.* 2023;13(4):2175–2186. (In Russ.). DOI: 10.18334/vinec. 13.4.120106

5. Barrehag L., Fornell A., Larsson G., et al. Accelerating success: A study of seed accelerators and their defining characteristics. Bachelor thesis. Gothenburg: Chalmers University of Technology; 2012. 77 p. URL: http://publications.lib.chalmers.se/records/fulltext/161790.pdf

6. Blank S., Dorf B. The startup owner's manual: The step-by-step guide for building a great company. Pescadero, CA: K&S Ranch Inc.; 2012. 1090 p. URL: https://smeportal.unescwa.org/sites/default/files/2019–12/The_Startup_Owner%20s_Manual-A%20step%20by%20step%20guide%20for%20building%20a%20great%20company.pdf

7. Popov A. N. Startup studio as promising model for developing innovations in the context of venture capital and corporate innovations in Russia. *Gosudarstvennoe upravlenie. Elektronnyi vestnik = Public Administration. E-Journal.* 2020;(80):256–281. (In Russ.). DOI: 10.24411/2070-1381-2020-10073

8. Atkinson R. Project management: Cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria. *International Journal of Project Management.* 1999;17(6):337–342. DOI: 10.1016/S 0263-7863(98)00069-6

9. Turner J. R., Müller R. The project manager's leadership style as a success factor on projects: A literature review. *Project Management Journal.* 2005;36(2):49–61. DOI: 10.1177/875697280503600206

10. Pinto J. K., Slevin D. P. Critical factors in successful project implementation. *IEEE Transactions on Engineering Management.* 1987; EM-34(1):22–27. DOI: 10.1109/TEM.1987.6498856

11. Freeman M., Beale P. Measuring project success. *Project Management Journal.* 1992;23(1):8–17. URL: https://www.wcu.edu/pmi/1996/J92MAR 08.PDF

12. Turner R., Zolin R. Forecasting success on large projects: Developing reliable scales to predict multiple perspectives by multiple stakeholders over multiple time frames. *Project Management Journal.* 2012;43(5):87–99. DOI: 10.1002/pmj.21289

13. Turner J.R. The handbook of project-based management: Leading strategic change in organizations. New York, NY: McGraw-Hill Professional; 2009. 452 p.

14. Kabakova O., Plaksenkov E., Korovkin V. Strategizing for financial technology platforms: Findings from four Russian case studies. *Psychology & Marketing.* 2016;33(12):1106–1111. DOI: 10.1002/mar.20945

15. Korovkin V., Plaksenkov E., Kabakova O. Digital platforms and the ecosystems of financial inclusion: The Russian experience. Skolkovo: The Moscow School of Management SKOLKOVO; 2015. 42 p. URL: https://embahs.skolkovo.ru/downloads/documents/FinChair/Research_Reports/SKOLKOVO_Digital_platforms_report_2015_v2_en.pdf

16. Ragin C.C. Set relations in social research: Evaluating their consistency and coverage. *Political Analysis.* 2006;14(03):291–310. DOI: 10.1093/pan/mpj019

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A Balanced System of Indicators for the Implementation of the Region's Strategy Based on Project Activities

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ABSTRACT

Relevance. In today's increasingly complex socio-economic landscape, the strategic planning of regions in the Russian Federation requires re-evaluation of traditional approaches to developing a system of indicators. **The objective** of the article is to adapt the Balanced Scorecard concept to create a balanced system of indicators that ensures the consistency and adaptability of regional strategy in the context of digital transformation. **Methods.** The study is based on a systems and interdisciplinary approach, which combines theoretical analysis, correlation of strategic models, and elements of applied design. **Scientific significance.** The article presents the structure and principles to create a model, which combines program-targeted and project-based approaches into a single hierarchical architecture for assessing the implementation of regional development strategies. The authors substantiated its effectiveness and practical implication for management flexibility and improved transparency. Special emphasis is focused on incorporating digital monitoring and visualization tools.
Keywords: strategic planning; regional development; system of indicators; project management; Balanced Scorecard; digital transformation; strategy monitoring

INTRODUCTION

The contemporary system of strategic planning, based on Federal Law No. 172-FZ of 28.06.2014 (amended on 13.07.2024) "On Strategic Planning in the Russian Federation",[1] requires the use of quantitative and qualitative indicators to reflect the goals of development. However, their coherence and comparability remain problematic: over 2,400 strategic documents contain hundreds of indicators, which makes their integration complicated.

Since 2018, national projects, based on the principles of project management, have become a key instrument for strategic planning. Nevertheless, growing uncertainty and digitalisation requires new approaches combining project-based and program-targeted methods, particularly at the regional level, where it is significant to adapt goals to local conditions.

ANALYSIS OF EXISTING APPROACHES TO STRATEGIC PLANNING OF REGIONS

In view of escalated socio-economic turbulence, strategic planning becomes of particular significance for ensuring a sustainable development of regions in the Russian Federation. Its effectiveness directly depends on its capabilities for coordinating national and regional priorities, adapting to changing conditions, and upgrading tools for strategy implementation [1].

Scientific literature defines several key approaches to the strategic planning of regional development:

The institutional approach, which according to research by V. L. Tambovtsev and I. A. Rozhdestvenskaya [2] focuses on the quality of the institutional environment as a critical factor for successful strategies. It allows identifying deep-rooted reasons of failures caused by administrative traditions, professional level of managers, and interdepartmental coordination [3]. However, a complicated formalising of institutional factors within a monitoring system hinders its practical implication.

2. The program-targeted approach used predominantly in Russia [4, 5] is implemented through a hierarchical system of state programmes. According to the studies, its main advantage is consistency with the budgetary process. However, superfluous centralisation generates formalism and a loss of regional specificity [6].

3. The project-oriented approach, extensively introduced since 2018, implies the use of strategies through specific projects with clear indicators. L. E. Ilicheva and A. V. Lapin [7] substantiate an effective adaptation of the Balanced Scorecard (BSC model) concept by Kaplan and Norton [8] involving four interconnected perspectives: financial, customer, internal processes, and innovations. As the authors point out, the key benefit of this approach is the ability to translate strategy into a set of measurable indicators and review them in real time [9].

4. The innovation-cluster approach, which, according to L. M. Gokhberg and T. E. Kuznetsova, is the most effective for regions with a developed scientific and production infrastructure; however, it requires significant starting conditions [10].

5. The spatial approach is relevant for territories with distinguished differentiation, such as the Far East or northern regions [11, 12].

As the analysis shows, contemporary practice of Russian strategic planning combines program-targeted and project-based approaches. The institutionalisation of the latter was started with the adoption of the Decree of the Government of the Russian Federation No. 1288 of 31.10.2018 "On the Organisation of Project Activities in the Government of the Russian Federation"[2] and it has developed within new standards for project activities, including the "New National Projects for the Period 2025–2030".[3] In the viewpoint of researchers, the key benefits of this approach are

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[1] URL: https://www.consultant.ru/document/cons_doc_LAW_164841/

[2] URL: https://www.consultant.ru/document/cons_doc_LAW_310151/

[3] URL: https://legalacts.ru/doc/novye-natsionalnye-proekty-na-period-2025–2030-godov/

the possibility of integration into digital platforms ("Electronic Budget", GAS "Upravleniye" [Management]) [13–15], the creation of transparent monitoring mechanisms, and the assessment of long-term effects through *ex-ante* and *ex-post* evaluations [16, 17].

Thus, combining project methodology with the principles of the Balanced Scorecard makes a promising basis for increasing the effectiveness of strategic planning, ensuring both strategic integrity and specifics of operation.

RESEARCH METHODOLOGY

The methodological foundation of the research includes a synthesis of the program-targeted and project approaches in managing social-economic development of regions with the subsequent adaptation of the Balanced Scorecard (BSC) concept to the conditions of regional strategic planning.

The authors employed in their research:

• content analysis method, used to explore regulatory legal acts, strategic documents of federal and regional levels (including state programmes and national projects), as well as official sources of statistical information;

• comparative analysis method, aimed at comparing the *pros* and *contras* of program-targeted and project-based approaches, as well as international and domestic experience of strategic management;

• system-structural method allowing to identify key components of the indicator system (high-level and project-based), their interrelation, and decomposition levels;

• methods of expert evaluation and deductive reasoning, employed in formulating the classification of indicators and creating the logic of a balanced monitoring system;

• project method, which provides specified detailing of strategic goals up to the level of specific projects, activities, and metrics, and enables to determine a logical hierarchy of performance indicators;

• methods of visual modelling, in particular creating a strategic alignment and indica-

tor scheme based on an adaptation of the BSC model, which allowed for substantiating the mechanism to integrate strategic and project levels of planning and monitoring.

The works of domestic and foreign scholars laid the theoretical foundation for this research in the domain of strategic management, institutional economics, project management, and regional planning, supported by methodological materials from federal executive authorities, GOST standards, and provisions of the Standard for New National Projects for 2025–2030.

The empirical base included official documents of strategic and programme planning for subjects of the Russian Federation, materials from the GAS "Upravleniye", the GIIS "Electronic Budget", data from Rosstat and analytical centres of monitoring national project implementation, open digital dashboards, and reports from regional project offices.

RESULTS

Creating an efficient indicator system is one of the most complicated methodological tasks of modern strategic planning. As scholars note, the existing practice of developing strategic documents in Russian regions encounters notable problems in reconciling quantitative and qualitative indicators, which hampers the evaluation of the real efficiency of management decisions [18, 19].

Several approaches to classify strategic development indicators have been established in the scientific literature. The most conventional one involves their differentiation by levels of management (federal, regional, or municipal), which allows for taking into account of the specifics of territorial development [20]. Concurrently, experts emphasise the particular significance of combination of quantitative and qualitative indicators, which provide a comprehensive evaluation of socio-economic processes [21]. Another important aspect is the time horizon of indicator measurement, since, according to a number of scholars, only analysis of long-term dynamics allows for an assessment of development sustain-

ability of a territory [22]. To form an indicator system, it is necessary to take into account the multifaceted feature of socio-economic development [33], including environmental aspects of sustainability [34].

Modern researchers point out considerable methodological problems in existing indicator systems [23]:

• extreme focus on process indicators counter to assessing final outcomes [24];

• insufficient adaptability to external changing conditions [25];

• lack of comprehensive consideration of social and environmental effects;

• limited opportunities for public control [26];

• gap between strategic goal setting and project management [27].

To overcome these limitations, experts suggest a number of solutions. Firstly, it is necessary to analyse indicator dynamics in retrospect and prospect, which helps to evaluate the real contribution of strategic measures [29]. Secondly, it is important to use benchmarking methods, when establishing target values for indicators, [30]. Thirdly, the indicators should be interpreted in the context of the overall logic of strategy, not in isolation [31]. Particular attention should be paid to developing forecast trajectories for the changes of key indicators [32] and adaptation of the indicator system to specific aspects of a particular territory [28].

Practical experience in forming indicator systems within national projects demonstrates the importance of a consistent methodological approach. Research works indicate that the process commences from formulating top-level strategic goals, which later go through in a multi-step decomposition and adaptation to regional conditions. Modern monitoring information systems, such as GAS "Upravleniye" are of particular significance in this context, since they guarantee transparency and swift evaluation of the achievement of strategic benchmarks.

Thus, sophistication of the indicator system for strategic planning necessitates comprehensive methodological approaches, which combine methodological accuracy, adaptability to changing circumstances, and a focus on reaching real, measurable effects of socio-economic development [35]. As international practice proves: only a balanced indicator system, that takes all aspects of regional development in consideration, can become a reliable instrument for making effective management decisions.

The program-targeted approach, institutionalised in law, is fundamental in the Russian managerial paradigm of strategic planning. However, the project method has a number of advantages (*Table 1*).

The program-targeted approach, based on state programmes and strategies, enables solving large-scale, long-lasting tasks. However, it is distinguished by insufficient flexibility and complex monitoring capacity due to lengthy implementation process. Conversely, the project-based approach is of high adaptability, distinctive goal measurement capacity, as well as efficient resource control, which ensures swift curbing of nascent risks [36].

The choice between these two options depends on the tasks of solution: operational solutions are perfectly fit for the project method, while the program-targeted approach is relevant for complex strategic directions, if monitoring mechanisms upgraded.

Modern technologies considerably expand the capabilities of strategic management. When indicators are visualised by means of strategy maps and dashboards (including the BSC model), it improves transparency and control efficiency. The integration of AI is of special interest, since it allows for the following activities:

• analysis of big data to forecast socio-economic fluctuations;

• optimisation of planning processes by means of modelling different scenarios;

• sophistication of strategic management at the corporate level [37–40].

Such innovative approaches lay the foundation for a radically new level of strategic

Table

Comparison of Approaches Towards the Formation of Indicators of Regional Development Strategies

Criterion	Program-targeted approach	Project-based approach
Formation of indicators	Established on the basis of long-term strategies and state programmes focused on general development goals	Defined for each project considering specific tasks, timelines, and resources, ensuring clarity and measurability of goals
Achievement of indicators	Accomplished through the implementation of programme activities, often with lengthy timelines and complex coordination	Achieved through project management with clear control over timelines, budget, and results, allowing for flexible response to changes
Flexibility and adaptability	Limited flexibility due to rigid programme structure and long implementation timelines	High flexibility, possibility to adapt projects to changing conditions and priorities
Stakeholder involvement	Limited involvement of stakeholders in the planning and implementation processes of programmes.	Active engagement of stakeholders at all project stages, enhancing its effectiveness and acceptance
Monitoring and evaluation	Challenges in monitoring due to generalised indicators and lengthy evaluation periods for results	Constant monitoring and evaluation of each project's results, allowing for timely adjustments
Transparency and accountability	Limited transparency due to programme complexity and insufficient public awareness	High transparency due to clear project structure and accessibility of information on their implementation
Risks and their management	High risks due to potential misalignment between programmes and real regional needs	Risk management at each project stage with the possibility of minimising risks

Source: compiled by the authors.

planning, including the elaboration of meta-strategies for regional development [41, 42].

The authors of this article have presented below (*Fig. 1*) their research-based scheme for the integration of program-targeted and project-based approaches into a balanced system of strategic indicators for regional development.

Two groups of indicators are identified:

1. High-level indicators (program-targeted approach involving hierarchical decomposition of goals and tasks), which reflect the region's long-lasting goals and objectives in coordination with
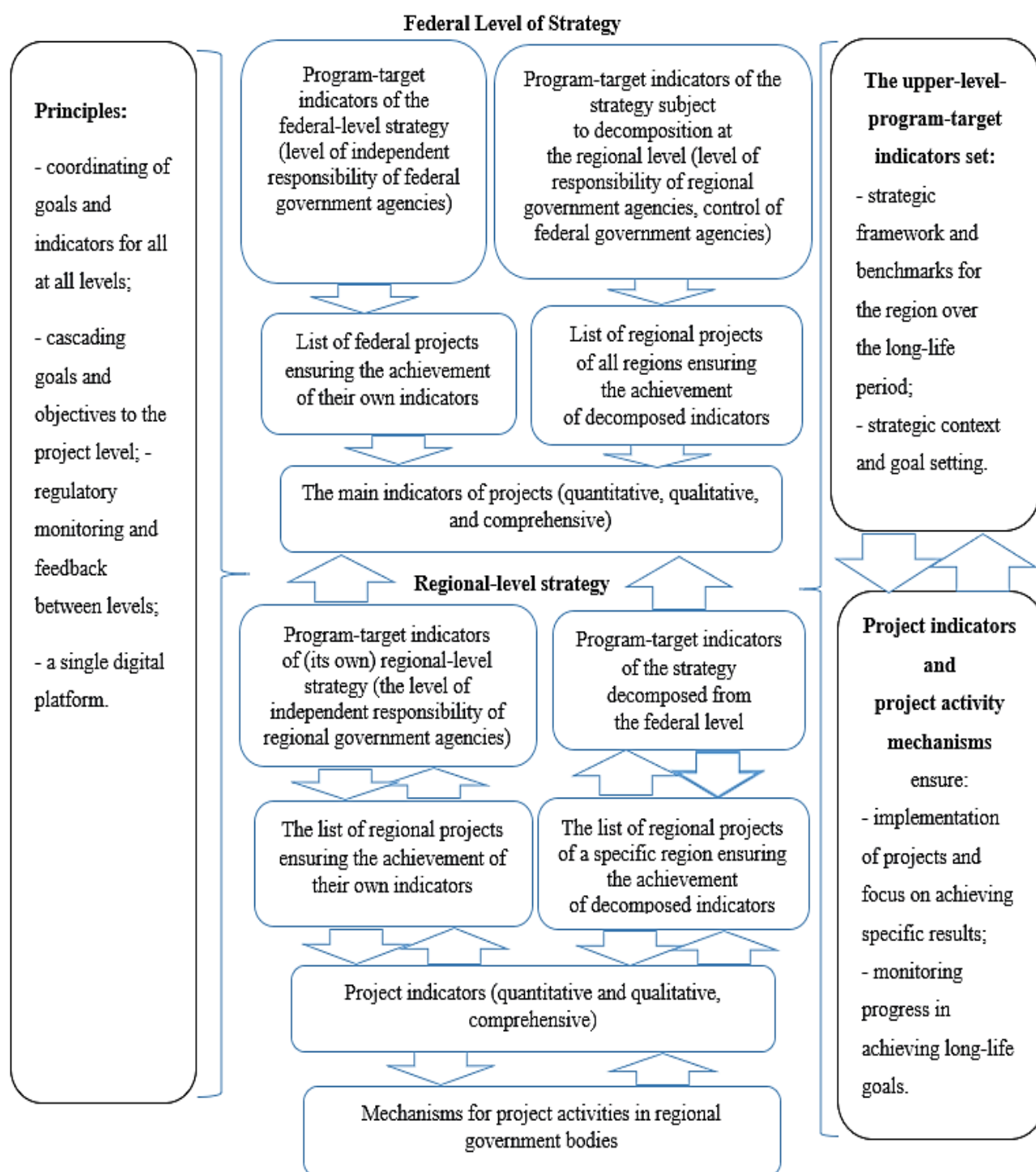
Fig. 1. **Scheme for Integrating Program-Oriented and Project-Based Approaches into a Balanced System of Strategic Indicators for the Development of the Region**

Source: compiled by the authors.

federal and municipal strategies. Hierarchically, they are interrelated and they cascade goals from the level of federal strategy breaking down them to municipal programmes and activities.

2. Indicators of the project-based approach, focused on operational management to achieve specific results. They distinguish short- or medium-term goals designed to fulfill separate projects

Economic and Financial Block (Successful results for the region)
- Gross Regional Project, Investment and financing volume
- Employment and income level
- Tax revenues

Resident's Satisfaction Block (Social and environmental aspects)
- Quality of life index,
- Availability of services (education, medicine, housing and utilities)
- Environmental index, social insurance

BALANCED SCORECARD FOR STRATEGY IMPLEMENTATION OF REGIONS

Block of internal processes of regional management
- Implementation of project programmes,
- Management transparency,
- Speed of management decisions,
- Efficiency of the budget spending

Education & innovations Block (Human capital and innovations)
- The share of high-tech enterprises
- Environment of retaining qualified personnel

Fig. 2a. **Pyramid Scheme of a Balanced System of Indicators for the Implementation of the Region's Strategy Based on the Adaptation of the BSC–Model (Pyramid Reversal)**

Source: compiled by the authors.

and initiatives.

The balanced system of indicators for the accomplishment of region's strategy implies the proposed approach, namely:

• high-level program-targeted indicators serve as a strategic framework and benchmarks for the regions over the long term, generating strategic frameworks and goal-setting;

• project indicators serve as operational and instrumental elements, enabling to control proceeding progress towards long-lasting goals by means of the fulfilment of specific projects.

The balanced system is generated by means of hierarchical arrangement: high-level indicators become key criteria for the choice and assessment of projects, while project indicators are used to

Economic and financial blocs
High-level program-target indicators of the region
(decomposed and own annual ones)
GRP growth: 1-2%   Investment volumes: 10-15%
Employment level 7-10%   Percent tax revenues: 12%

List of regional projects
Production of a new aircraft. Development of production
of high-speed electric trains. Construction of a world-level campus.

Indicators of regional projects
Production of at least 20 aircrafts per year. Production of at least 100
cars of high-speed electric train cars per year by 2030. Completion of
three educational buildings, five dormitories with 5,000 beds by
2035. The launch of IT technology park with 100 residents
mechanisms of project activities by 2030.

Mechanisms of project activities

Fig. 2b. **Pyramid Scheme of a Balanced System of Indicators for the Implementation
of the Region's Strategy Based on the Adaptation of the BSC–Model (Pyramid Side)**

Source: compiled by the authors.

monitor the operational achievement of goals and subsequently adjust high-level tasks.

The authors suggest the following principles for integrating indicators:

• coordination of goals at all levels: federal, regional, municipal;

• cascading of goals and tasks by decomposition of program-targeted indicators to the level of project goals;

• use of a unified information platform to ensure transparency and interconnection between types and levels of indicators

• systematic monitoring and feedback between the levels, so that the data from project indicators allows for the timely correction of program-targeted indicators.

As the outcome of the integration, the region obtains a unified, flexible, adaptive, and transparent indicator system, able to combine effectively long-lasting program-targeted tasks with operational project activity, which considerably enhances the quality of strategic management and the efficiencies of implemented regional strategies.

Program-targeted indicators determine the long-lasting vector of development (e.g., GRP, HDI, environmental indices, etc.), coordinated with federal and regional strategies. The integration mechanism generates hierarchical decomposition: every strategic target is disintegrated into specific indicators (timelines, budget, etc.) formulated for all projects and operating as an instrument to achieve strategic goals at the operational level. A unified digital platform facilitates monitoring, receiving feedback, collecting data on project indicators, analysing divergence, and adjusting both the projects and, when necessary, the program-targeted tasks. Thus, it is possible to combine the flexibility of project management with the integrity of program-targeted planning and ensure permanent alignment and adjustment, as well as facilitate an effective adaptation of the BSC model to the strategic development of regions.

The authors have developed a pyramidal scheme model of a balanced indicator system for the implementation of a region's strategy based on the adaptation of this model (Fig. 2a, 2b below), where each side represents a key direction of development.

In contrast to the corporate BSC model, related to the effectiveness of individual entities, this scheme accounts for the multi-level and multi-purpose nature of regional management: namely, the need to meet the interests of various actors (state, business and society), federal, regional, and municipal priorities, as well as integrate long-lasting goals with contemporary project actions.

Two groups of indicators are integrated, each related to different management levels and methodological foundations:

Program-targeted indicators constitute high-level indicators, established in the region's stra-

tegic documents (related to socio-economic development, environmental sustainability, life quality, digital transformation, etc.), mirroring long-lasting goals and relevant for evaluation of the general development of the territory's trajectory.

Project indicators constitute metrics at the level of specific management projects that implement corresponding components of the strategy, such as schedules, budget execution, specific results, and the outcomes of individual initiatives (e.g., new capacities put in operation, a specific digitalised industry, training of specialists, etc.).

It is necessary to integrate these groups of indicators in order to overcome the typical managerial gap between the strategic and operational levels in implementation of strategy. Specifically, it helps to trace back interdependence between strategic goals and project activities, and this generates a feedback mechanism as well, when the project indicators fulfilment is aggregated which impacts the achievement of programme goals. It also increases management flexibility, as project data allows for the dynamic correction of strategic plans, and it lays a foundation for digital monitoring and visualisation as instruments for management control and higher transparency.

Thus, the proposed scheme constitutes a hierarchical system of indicator with the project level, so-to-say, backs up the programme level, while generating an architecture equivalent to the Balanced Scorecard, which is adapted to the specific features of territorial management. This is not just a performance evaluation system, it is the core of a digital architecture for strategic regional management, as it generates a new type of managerial logic: from hierarchical reporting to adaptive goal-setting and constant self-renewed region's strategy able to resist external challenges.

All the four blocks jointly ensure a balanced and interrelated regional development. Each side of the pyramid is structured from top to bottom in accordance with the principle of hierarchical indicator decomposition (*Fig. 2b*).

High-level program-targeted indicators are on top, and they set strategic benchmarks and

priorities in the corresponding direction. A set of projects is in the middle level, it is structured by target benchmarks that specify the ways to achieve strategic goals. Project indicators are at the lower level, they reflect the measurable outcomes of implementation of projects. The mechanism contributing to the achievement of planned results makes the foundation level.

Such a structural-hierarchical approach enables to have direct and reverse links between goals and results. The effective implementation of projects based on the mechanisms of project activity facilitates achieving the stated indicators and subsequently, high-level strategic indicators. It makes a good basis for monitoring, correcting, and adapting the strategy based on empirical data as well.

The scheme of a balanced indicator system, which is designed to implement a region's strategy based on adapted BSC model, integrates social, economic, managerial, and innovative aspects into a single conceptual structure.

Thus, the given pyramid-like model demonstrates the hierarchy of strategic goals, programmes, projects, and management instruments, enabling to provide systematic, sequential, and target-managed development of the region.

DISCUSSION OF FINDINGS

The given research advances a fundamentally new method of strategic management, based on the organic synthesis of program-targeted and project-based approaches. The essence of the methodological innovation implies creating a system of integrated management for permanent transformation of strategic priorities into specific project initiatives with metrics of precise performance.

The central element of the given model is the bilateral integration mechanism. On one hand, it envisages the vertical alignment of indicators: from macroeconomic indicators of regional development (such as GRP, Human Development Index, or investment activity) to specific KPIs of separate projects. On the other

hand, the system facilitates horizontal coordination between various sectoral programmes and territorial initiatives, which is critically significant for the aggregated development of the region.

Particular scientific value of the developed mechanism is due to operational feedback, based on the principles of cybernetic management. Unlike traditional monitoring systems focused on *post factum* reporting, the proposed model functions as a "self-sustaining" organism. The digital platform not only aggregates data but also provides integrated analytics of strategic initiative implementation, prediction models of possible development scenarios, and automated correction of management decisions.

It is important to emphasise, that the model performs not only a managerial but also a significant socio-communicative function. In view of the multitude of participants in regional development (government bodies, business structures, civil institutions), the system creates a unified information space, that allows each stakeholder to clearly identify their contribution for achievement of strategic goals of the region. This helps to considerably reduce transaction costs of interaction and increase the efficiency of coordination between different sectors.

From a practical viewpoint, introduction of the proposed model facilitates to overcome key limitations in operating systems of strategic management by:
- eliminating traditional gap between strategic planning and practical implementation;
- operational monitoring and correction of strategy in real time;
- enhancing transparency and substantiation of management decisions;
- ensuring conditions for optimal project prioritisation and resource allocation.

Concurrently, it is important to understand, that a certain level of maturity in managerial infrastructure and digital competencies is required for successful implementation of the model [43]. It is advised to use a differenti-

ated approach for regions with varying levels of socio-economic development, ranging from comprehensive realisation in the most advanced subjects to pilot testing of separate elements under resource-constrained conditions.

Among the promising venues for further development, there appear the integration of AI instruments for predictive analytics, or development of adaptive methodologies for municipal bodies, as well as the regulatory consolidation of principles aimed to digitalise strategic management.

Hence, the proposed integrative model lays a methodological foundation capable to overcome fragmentation, as well as combine strategic perspective of the program-targeted approach with the operational flexibility of project management and technological potential of digital platforms.

CONCLUSIONS

The conducted research allows confirming the substantiated hypothesis that introduced systems of indicators based on project activity contribute to higher efficacy of implementing strategies for the socio-economic development of regions.

Within the authors' framework, they carried out the following:

• for the first time a hierarchy of indicators has been presented with strategic indicators of the upper level cascaded into project metrics with direct operational applicability;

• the concept of the Balanced Scorecard has been adapted to the tasks of territorial management with the four classical perspectives (financial, customer, internal processes, learning-and-growth) were transformed into blocks reflecting the specifics of regional development;

• principles for integrating indicators have been advanced, which enabled conjunction of digital management platforms (GAS "Upravleniye", GIIS "Electronic Budget") with the indicator monitoring system, ensuring profound transparency and swift feedback;

• practical relevance of the scheme for regions with different levels of institutional maturity has been substantiated, including implementation through pilot project offices.

The integration of program-targeted and project-based approaches into a unified balanced indicator system is a promising direction for development of strategic planning in the Russian Federation. It facilitates combining long-term goals with concrete results, increases flexibility and management potential, and ensures transparency and a success-driven activities. Its implementation requires normative, methodological, and institutional support, as well as adaptation to the environment and needs of specific regions.

REFERENCES

1. Idziev G.I. Development institutions as a tool for regional economic modernization. *Regional'nye problemy preobrazovaniya ekonomiki = Regional Problems of Economic Transformation*. 2021;(2):75–82. (In Russ.). DOI: 10.26726/1812-7096-2021-2-75-82
2. Tambovtsev V.L. Rozhdestvenskaya I.A. Strategic planning theory: An institutional perspective. *Terra Economicus*. 2020;18(2):22–48. (In Russ.). DOI: 10.18522/2073-6606-2020-18-2-22-48
3. Dovbiy I.P., Kalina E.S., Makovkina, S.A. Institutional and legal aspects of strategic planning at federal, regional and municipal levels. *Vestnik Chelyabinskogo gosudarstvennogo universiteta = Bulletin of Chelyabinsk State University*. 2018;(12):88–99. (In Russ.).

4. Khabriev B. R., Bakhtizina N. V. Improving the strategic planning system for the development of the oil and gas complex in Russia. *Ekonomicheskaya nauka sovremennoi Rossii = Economics of Contemporary Russia*. 2019;(4):85–99. (In Russ.). DOI: 10.33293/1609-1442-2019-4(87)-85-99

5. Malitskaya E. A. Program and target approach in project management for complex territory development. *Vestnik Instituta ekonomiki Rossiiskoi akademii nauk = Bulletin of the Institute of Economics of the Russian Academy of Sciences*. 2016;(2):56–68. (In Russ.).

6. Belyaevskaya-Plotnik L. A., Sorokina N. Yu. Synchronization of priorities of social and economic development of the Russian Federation and regions in strategic planning documents. *Regional'naya ekonomika: Yug Rossii = Regional Economy: The South of Russia*. 2022;10(1):16–26. (In Russ.). DOI: 10.15688/re.volsu.2022.1.2

7. Il'icheva L. E., Lapin A. V. The development of a regional strategy: New approaches and criteria. *Vlast' = The Authority*. 2019;(5):80–89. (In Russ.). DOI: 10.31171/vlast.v27i5.6723

8. Kaplan R. S., Norton D. P. The balanced scorecard: Translating strategy into action. Boston, MA: Harvard Business School Press; 1996. 336 p. (Russ. ed.: Kaplan R. S., Norton D. P. Sbalansirovannaya sistema pokazatelei: Ot strategii k deistviyu. Moscow: Olymp-Business; 2003. 320 p.).

9. Kaplan R. S., Norton D. P. Strategy maps: Converting intangible assets into tangible outcomes. Boston, MA: Harvard Business School Press; 2003. 454 p. (Russ. ed.: Kaplan R. S., Norton D. P. Strategicheskie karty: Transformatsiya nematerial'nykh aktivov v material'nye rezul'taty. Moscow: Olymp-Business; 2005. 512 p.).

10. Gokhberg L. M., Kuznetsova T. E. Innovations as the basis for economic growth and strengthening Russia's position in global economy. *Vestnik mezhdunarodnykh organizatsii: obrazovanie, nauka, novaya ekonomika = International Organisations Research Journal*. 2012;7(2):101–117. (In Russ.).

11. Antipin I. A., Vlasova N. Yu., Ivanova O. Yu. Strategic planning in Russian regions: Spatial development issues. *Upravlenets = The Manager*. 2023;14(6):50–62. (In Russ.). DOI: 10.29141/2218-5003-2023-14-6-4

12. Lazhentsev V. N. Territorial development (theory and methodology of economic relations). *Problemy razvitiya territorii = Problems of Territory's Development.* 2024;28(6);10–21. (In Russ.). DOI: 10.15838/ptd.2024.6.134.2

13. Ignashin O. V. Improving the effectiveness of managerial personnel training in a developing digital educational environment. *Teoriya i praktika obshchestvennogo razvitiya = Theory and Practice of Social Development.* 2025;(3):108–114. (In Russ.). DOI: 10.24158/tipor.2025.3.13

14. Romantseva E. E. Motivation of project teams: Toward a balanced approach. *Teoriya i praktika obshchestvennogo razvitiya = Theory and Practice of Social Development.* 2025;(2):68–73. (In Russ.). DOI: 10.24158/tipor.2025.2.8

15. Fedotova M. A., Shevyrev A. V., Shevyrev V. A. Project and team technologies as key concepts of the new methodology of social management. *Teoriya i praktika obshchestvennogo razvitiya = Theory and Practice of Social Development.* 2025;(2):49–61. (In Russ.). DOI: 10.24158/tipor.2025.2.6

16. Ramenskaya L. A., Savchenko Ya. V. Review of the best practices in the formation of management systems for state priority projects at the regional level. *Rossiiskoe predprinimatel'stvo = Russian Journal of Entrepreneurship*. 2018;19(12):3751–3766. (In Russ.). DOI: 10.18334/rp.19.12.39704

17. Ilin I. V., Polishchuchenko V. A. Modern aspects of project management in the region. *Ekonomicheskie nauki = Economic Sciences*. 2023;(219):66–74. (In Russ.). DOI: 10.14451/1.219.66

18. Archibugi F. Planning theory: From the political debate to the methodological reconstruction. Berlin: Springer; 2008. 138 p.

19. Shpakova R. N. Strategies for socio-economic development of regions: From assessment of achievement of goals to assessment of effectiveness. *Vestnik evraziiskoi nauki = The Eurasian Scientific Journal.* 2019;11(2):59. (In Russ.).

20. Danilova I.V., Savelieva I.P., Lapo A.S. Evaluation of the strategic social and economic policy of the region: Methodological approach. *Vestnik Yuzhno-Ural'skogo gosudarstvennogo universiteta. Seriya: Ekonomika i menedzhment = Bulletin of South Ural State University. Series: Economics and Management.* 2019;13(2):17–27. (In Russ.). DOI: 10.14529/em190202

21. Aganbegyan A.G. Russia's place among the leading countries of the world in the process of integration and competition in the future. *Ekonomicheskoe vozrozhdenie Rossii = Economic Revival of Russia.* 2024;(2):12–33. (In Russ.). DOI: 10.37930/1990-9780-2024-2-80-12-33

22. Novoselov A.S., Faleev A.V. Issues of estimating indicators of regional strategic planning of socio-economic development. *Regional'naya ekonomika i upravlenie: elektronnyi nauchnyi zhurnal = Regional Economy and Management: Electronic Scientific Journal.* 2020;(1):1. (In Russ.).

23. Zakharchuk E.A., Pasyunkov A.F., Trifonova P.S. Problems and prospects of strategic planning areas in the Russian Federation. *Nauka Krasnoyar'ya = Krasnoyarsk Science.* 2019;8(4):69–94. (In Russ.). DOI: 10.12731/2070-7568-2019-4-69-94

24. Bulochnikov P.A. Conceptual aspects of strategic regional development management. *Ekonomika i upravlenie = Economics and Management.* 2019;(10):50–56. (In Russ.). DOI: 10.35854/1998-1627-2019-10-50-56

25. Gilmundinov V.M., Pankova Yu.V. Spatial development of Russia under the conditions of external and internal challenges. *Studies on Russian Economic Development.* 2023;34(4):484–491. DOI: 10.1134/S 107570072304007X (In Russ.: *Problemy prognozirovaniya.* 2023;(4):82–93. DOI: 10.47711/0868-6351-199-82-93).

26. Belova S.N., Vladimirova O.N., Grishmanovskiy D. Yu. Electronic budget in the system of strategic planning and economic security. *Ekonomicheskaya bezopasnost' = Economic Security.* 2023;6(3):1175–1194. (In Russ.). DOI: 10.18334/ecsec.6.3.118635

27. Moisyak G. Yu., Darmilova Zh.D. Modern problems of project management in state authorities. *Estestvenno-gumanitarnye issledovaniya = Natural Humanitarian Studies.* 2022;(44):452–457. (In Russ.).

28. Kazantseva E.G. Problems of regional inequality in Russia. *Regional'naya ekonomika i upravlenie: elektronnyi nauchnyi zhurnal = Regional Economics and Management: Electronic Scientific Journal.* 2019;(2):4. (In Russ.).

29. Kotov A.V. Assessing the efficiency of regional policy tools. *Ekonomika regiona = Economy of Regions.* 2020;16(2):352–362. (In Russ.). DOI: 10.17059/2020-2-2

30. Dubrovskaya Yu.V., Kudryavtseva M.R., Kozonogova E.V. "Smart" benchmarking as a basis for strategic planning of regional development. *Economic and Social Changes: Facts, Trends, Forecast.* 2018;11(3):100–116. (In Russ.: *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz.* 2018;11(3):100–116. DOI: 10.15838/esc.2018.3.57.7).

31. Ivakhnenko T. Yu., Polbin A.V., Sinelnikov-Murylev S.G. Economic complexity and income inequality in Russian regions. *Voprosy ekonomiki.* 2024;(5):105–127. (In Russ.). DOI: 10.32609/0042-8736-2024-5-105-127

32. Smirnova O.O. Outlines of strategic planning transformation in Russia: From documents to strategic management. *MIR (Modernizatsiya. Innovatsii. Razvitie) = MIR (Modernization. Innovation. Research).* 2020;11(2):148–161. (In Russ.). DOI: 10.18184/2079–4665.2020.11.2.148–161

33. Adamov E.V. Study of the heterogeneity of the Russian economic space at the level of macro-regions. *Munitsipalitet: ekonomika i upravlenie = Municipality: Economics and Management.* 2024;(2):10–19. (In Russ.). DOI: 10.22394/2304-3385-2024-2-10-19

34. Khutorova N.A., Gazizova A.V., Gazizov D.N. ESG approaches in strategic management of economic systems at the federal and regional levels. *Natsional'nye interesy: prioritety i bezopasnost' = National Interests: Priorities and Security.* 2023;19(5):866–882. (In Russ.). DOI: 10.24891/ni.19.5.866

35. Dmitriev M. E., Krapil V. B. Strategic planning at the crossroads: Old challenges and new opportunities. *Voprosy teoreticheskoi ekonomiki = Theoretical Economics.* 2022;(2):39–59. (In Russ.). DOI: 10.52342/2587–7666VTE_2022_2_39_59

36. Semibratsky M. V. Visual management system in organization: Principles of construction and practical instruments of implementation. *Vestnik Astrakhanskogo gosudarstvennogo tekhnicheskogo universiteta. Seriya: Ekonomika = Vestnik of Astrakhan State Technical University. Series: Economics.* 2020;(3):19–26. (In Russ.). DOI: 10.24143/2073-5537-2020-3-19-26

37. Brycheev A. S. Application of artificial intelligence in government bodies: Challenges and prospects. *Vestnik evraziyskoi nauki = The Eurasian Scientific Journal.* 2024;16(S 6):11. (In Russ.).

38. Ransbotham S., Gerbert P., Reeves M., Kiron D., Spira M. Artificial intelligence in business gets real. MIT Sloan Management Review. Sep. 17, 2018. URL: https://sloanreview.mit.edu/projects/artificial-intelligence-in-business-gets-real/

39. Kudryashova E. V. Information technologies for strategic planning in Russia: Development stages and prospects. *Gosudarstvennaya vlast' i mestnoe samoupravlenie = State Power and Local Self-Government.* 2021;(2):36–40. (In Russ.). DOI: 10.18572/1813-1247-2021-2-36-40

40. Ostaltsev A. S. The use of digital technologies in strategic planning and sustainable development management of a diversified enterprise. *Industrial'naya ekonomika = Industrial Economics.* 2022;(4–3):222–228. (In Russ.). DOI: 10.47576/2712-7559_2022_4_3_222

41. Davenport T. H., Ronanki R. Artificial intelligence for the real world. *Harvard Business Review.* 2018;(Jan-Feb):108–116. URL: https://clck.ru/3PqzLF

42. Popov E. V., Chelak I. P., Vlasov S. V. Metastrategy is the key to a digital future. *Diskussiya = Discussion.* 2025;(2):202–210. (In Russ.). DOI: 10.46320/2077-7639-2025-02-135-202-210

43. Potapenko S. V., Goncharov V. V., Petrenko E. G., Pchelintsev A. S. Modern digital technologies in the management of the country's economy: Problems and prospects of development (legal and economic aspects). *Teoriya i praktika obshchestvennogo razvitiya = Theory and Practice of Social Development.* 2024;(9):38–46. (In Russ.). DOI: 10.24158/tipor.2024.9.4

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Decomposition Model for Intellectual Capital Assessment: Regional Perspective

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ABSTRACT

The relevance of the topic is determined by the growing role of intellectual capital as a key factor in the sustainable development of territorial socio-economic systems under the circumstances of digitalization and increasing interconnection of socio-economic processes. **The purpose** of this article is to develop a modified hierarchical model of intellectual capital reflecting the complex cause-effect relationships between its components and socio-economic indicators. **Methods of the research** include bibliographic analysis, systematization of indicators from regulatory documents, and synthesis of cognitive models. **Scientific novelty** lies in the integration of cognitive activity types into the structure of intellectual capital, including creative and innovative activity as a link between self-development and innovation. **The results of the study** indicate that intellectual capital should be viewed not as an isolated resource, but as a dynamic system capable of shaping development trajectories of territorial socio-economic systems. **Practical significance:** the findings can be used in decision-making processes related to regional development and in assessing the effectiveness of program tools. The model is universally applicable for economic analysis at both meso- and macroeconomic levels. Prospects for further research involve applied testing of the model in specific regions and refinement of the indicator set for different types of territorial socio-economic systems.

Keywords: intellectual capital; socio-economic development; cognitive activity; territorial socio-economic system; ecosystem approach; co-evolution; digital economy

INTRODUCTION

Domestic and foreign researchers have studied the phenomenon of intellectual capital (IC) relatively recently. The concept of "intellectual capital" was formulated in the late 1960s, and later in the 1990s, it became an independent theoretical field of knowledge. Since that time, it was manifested in economic science, but the growing number of publications on this topic covered primarily the micro-level of the economic system. As to the meso- and macro-levels, such researches explored the specifics of IC comparatively seldom, which is mainly due to the complexity of the object of study and its components. Moreover, its key features become more pronounced in the process of the shift towards the digital economy, because the IC's dynamic nature of interrelations between elements and tacit, indirect impact of some components on others.

Traditionally, intellectual capital is visualised in the post-industrial society as the main source of competitive benefits at the microeconomic level and a key factor of socio-economic development at the meso- and macro-levels. A considerable volume of research was devoted to confirm it. Nevertheless, contemporary science and practice encounter problems of ambiguity in the cause-effect relationship between the IC accumulation and the socio-economic development of entities at the meso- and macro-levels of economic systems. Is the latter process estimated as a natural consequence of the first phenomenon, or is it more appropriate and correct to visualise their complex interconnection and interdependence? This topic is significantly underestimated in the overall volume of publications. Researchers primarily study general directions of mutual influence between IC elements and indicators of socio-economic development of economic entities, ignoring specific quantitative elements. This makes it impossible to justify specific management operations. The abovementioned circumstances have determined the relevance of research of this topic.

IC AND ITS ROLE IN THE DEVELOPMENT OF TERRITORIAL SOCIO-ECONOMIC SYSTEMS

Prior to starting the research of the problem field, it is essential to define the gist and content of the subject: the IC bearer at the meso- and macro-levels of the economy. For this objective, it is recommended to use the generalised term "territorial socio-economic systems" (TSES), meaning a set of socio-economic entities grouped according to territorial criteria at various levels of the economy, together with the links between them and with the territory *per se* [1].

Foreign researchers also present a variety of approaches to interpret this concept, although with a slightly different terminology. For example, one of the research work points out, that any territorial formation combines three interconnected components: a part of a state's territory, the local population, and public authorities, which implement governance within the limits of delegated powers [2].

Another research work defines a socio-economic system enterpreted as a structured multiplicity including subjects (enterprises, entities and communities) and objects (natural environment, technologies and infrastructure) which interact within a specific geographical area: a country, region, or city [3]. Besides, TSES is viewed as a public territorial complex, an aggregate of interrelated forms of human life, which develops on the basis of organised production [4] or as a space-time related combination of socio-economic elements of human life engaged in the process of social reproduction based on geographical division of labour [5].

The given term was chosen in view of such factors as:
• a complicated and interrelated nature of various components of socio-economic development of entities (economy, population, infrastructure, governance);
• administrative (municipal formations, regions) and functional (agglomerations, economic clusters) boundaries;

• the possibility of its use in scientific discourse, which is due to its the systemic nature of interaction between various elements (human capital, infrastructure, innovations).

The traditional view of IC as a factor of economic growth is based on the concept that highly qualified personnel, sophisticated education system, and scientific-research base lay the foundation for a region's economy [6]. However, this approach does not account for the complicated nature of interaction within economic systems, that influences the IC level, which in turn, under the circumstances of globalisation and digitalisation, not only stimulates economic development but is also transformed by it [7].

The reason for this factor can be found within theoretical inquiry in the provisions of the eco-system approach, which is based on the concept of co-evolution. This concept rests on the allegation that the development of socio-economic systems occurs in interconnection and mutual conditioning, which stems from the complex dynamic interaction of their elements [8–11]. Joint development represents a particular case of co-evolution and occurs in case of conscious intervention in the formation of interconnections among objects of a complex socio-economic system [12].

The evidence for this thesis can be revealed in empirical studies that examine a group of indicators for assessing IC. Simultaneously, a large number of these indicators can be viewed in the context of socio-economic development of regional entities. For instance, foreign scholars apply the Empowered Life Years indicator for assessing sustainable urban development. It is aggregated on the basis of the life expectancy indicator and is supplemented by such additional metrics as health quality, literacy, happiness, and poverty eradication [13]. One can also distinguish the US Cities Sustainable Development Goals Index, developed in 2016. Its assessment methodology is based on the calculation procedure of 100 cities, inolving about 70 per cent of the country's population, [14] and it is used to monitor urban progress

achieving the sustainable development goals formulated by the UN. Another important assessment instrument is the integral City Prosperity Index, developed by UN-Habitat,[1] determined by involved components of productivity, life quality, infrastructure development, environmental sustainability, and social equity. Human Development Index[2] is of great importance too: many researchers interpret it as an integral indicator of the human capital of regional systems. Its calculation envisages the assessment of longevity, education level, and standard of living.

All the mentioned above indicators, on the one hand, present the sustainable socio-economic development of TSES, and on the other hand, indicate a growing satisfaction of population with living conditions in a given territory and the formation of a sense of commitment.

The Knowledge Economy Index, developed by a World Bank group in 2004 makes up the composition of four groups of indices related to economic and institutional regimes, education, innovation, as well as information and communication technologies.[3]

V. Yu. Ivanova recommends using a decomposition of regional IC assessment indicators within eight groups, which explicitly characterise the socio-economic development of the region [15]. The research work by I.F. Zhukovskaya and I.A. Orlov involves the assessment of investment attractiveness of a regional socio-economic system, foreign and domestic tourism, the number of business incubators, etc. [7]. D.I. Mashkina emphasises that the regional IC market has a specific internal structure, including such interconnected elements as the state, investment and infrastructure provision, knowledge, and intellectual property [16].

It is also worth noting the analysis by A.A. Chub and P. Yu. Makarov with a modified

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[1] URL: https://unhabitat.org/sites/default/files/download-manager-files/State%20of%20the%20World%20Cities%2020122013.pdf

[2] URL: https://hdr.undp.org/data-center/human-development-index#/indicies/HDI

[3] URL: https://estadisticas.pr/files/BibliotecaVirtual/estadisticas/biblioteca/BM/BM_KAM_2008.pdf

version of "intellectual capital monitor" model by D.J. Andriessen and C.D. Stam [17], accounting for such elements as expenditures on technological innovations, investment in fixed capital, and GRP per capita [18].

A.A. Maltseva considers IC an important resource that ensures the socio-economic development and competitive advantages of a territory [19], as it is the main performance indicator, transforming strategic priorities. The primary condition here is the developed social infrastructure of the region. The research work of I.N. Alexandrov and M. Yu. Fedorova describes the main objective of TSES development not as the growth in budget revenues, corporate profits, or gross regional product, but as a better quality of life, dependent on a number of factors including education, healthcare, culture, etc. [20]. V.E. Saktoev with co-authors recommend using a composite regional index (RI) of IC for assessing intellectual capital, determined by the method of weighted arithmetic average of intermediate indices: social well-being, scientific potential, and information-communication component [21]. L.S. Shakhovskaya and A. Yu. Kiryanova advise evaluating the sphere of science and education, the state of regional infrastructure, and investment in fixed capital [22]. In the same contest, T.V. Smetanina and O.V. Zhikina, spotlight the increase in gross domestic product, growth in investment in science, higher education, healthcare, culture and lower level of "brain drain" [23]. O.I. Rudaeva emphasises the requirement to determine the cause-and-effect relationship between IC indicators and the level of prosperity in a country, or region, in view that investment may be conditioned by economic growth, and not vice versa [24]. The scholar also suggests moving away from classical models where intellectual capital is considered a static variable. Instead, methods based on non-linear models and cognitive analysis become relevant, allowing for the consideration of feedback and the influence of multiple factors.

T.V. Ostashchenko and I.N. Dubina believe that the growing level of regional IC reinforces economic development indicators, which signifies the so-called "delayed effects" [25].

Thus, the contemporary research is changing the concept of IC as an autonomous factor: both IC and socio-economic development are now visualised as interconnected elements of a single system, where interaction has a co-evolutionary nature. This position is of important practical significance: the management of IC cannot be limited exclusively to its accumulation. This must account for measures for the sustainable economic development of the region, creation a favourable environment for efficient use of accumulated knowledge and skills [25, 26].

TARGET INDICATORS OF THE MODEL FOR ASSESSING IC OF TERRITORIAL SOCIO-ECONOMIC SYSTEM

Analysing a few domestic and foreign studies on the AI of TSES has led to the conclusion that the overwhelming majority of authors decompose it into three components: human, organisational, and relational, which are subsequently assessed by means of a combination of development indicators. However, the key problem of this approach is that such models do not account for the dynamic nature and complex, many-ways mutual influence of IC elements and socio-economic development indicators. Besides, a separate attention deserves the problem of lack of accounting for the normative component in regulating the strategic development of regional entities. The selection of assessment indicators should be carried out based on the data formulated at the macro- and meso-levels of economic systems. Thus, the combination of a programme-target approach with theoretical stakeholder's perspectives enables developing a fundamentally new model for assessing the IC of a TSES, the distinctive features of which will be the following:

• accounting for the dynamic interrelationship between components of intellectual capital and indicators of socio-economic development;

• accounting for the impact of implicit factors, whose influence on the dynamics of indicators is covert and indirect;

• reflecting the requirements of stakeholders, among the key ones become the state and the population of the TSES.

The proposed approach was tested on the basis of Presidential Decree No. 309 of 07.05.2024 "On the National Development Goals of the Russian Federation for the Period until 2030 and beyond to 2036".[4] From all target indicators in the given document, the *Table* presents those, which achievement reflects the dynamics of IC development and the general directions of socio-economic development of the region (or territory).

THE IC DECOMPOSITION MODEL OF A TERRITORIAL SOCIO-ECONOMIC SYSTEM BASED ON ASPECTS AND INDICATORS OF SOCIO-ECONOMIC DEVELOPMENT

The presented set of indicators can be further visualised as a hierarchical model, based on another model developed for the microeconomic level [27]. However, it is worth noting that in this

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[4] URL: http://kremlin.ru/events/president/news/73986

Table

Groups of Target Indicators in the Model for Assessing the Intellectual Capital of a Territorial Socio-Economic System

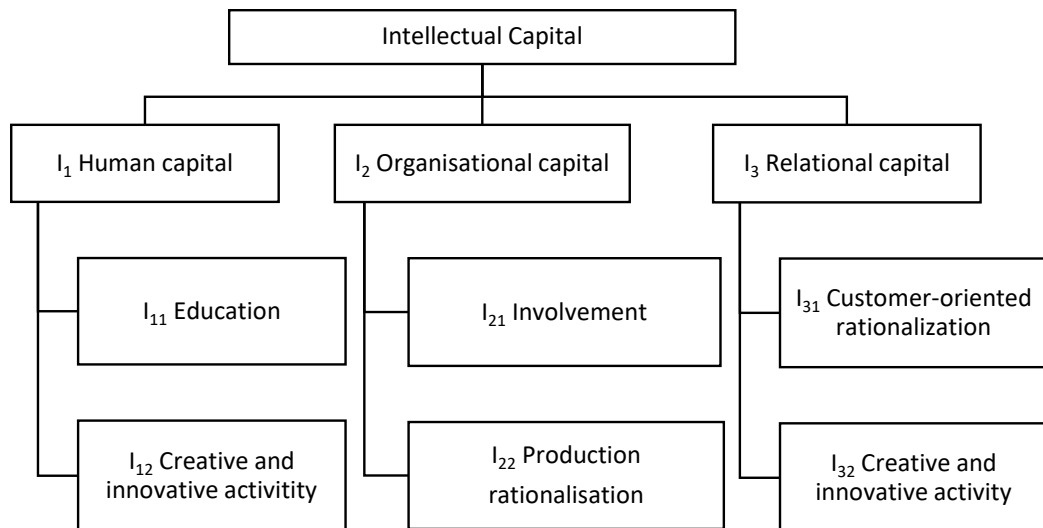| Indicators of IC Development	Indicators of Socio-Economic Development
2b) Increase in life expectancy to 78 years by 2030 and to 81 years by 2036, including an accelerated growth in healthy life expectancy indicators. 2g) By 2036, reduction of the differentiation in life expectancy indicators by at least 25 per cent compared to the level of 2023. 2i) By 2030, create and launch a digital platform promoting the formation, maintenance, and preservation of human health throughout life, based on the principle of data-driven management. 4a) Improvement in the quality of the living environment in core settlements by 30 per cent by 2030 and by 60 per cent by 2036. 6zh) By 2030, entry of the Russian Federation into the top 25 countries in the world in terms of robot density. 6z) By 2030, involvement of at least 40 per cent of medium and large enterprises in basic non-resource sectors of the economy and 100 per cent of state and municipal social sector entities in projects aimed at increasing labour productivity. 6i) By 2030, creation of an effective system for training, professional retraining, and advanced training of personnel for priority economic sectors, based on forecasted demand. 6k) By 2030, creation of conditions for the simultaneous acquisition of several qualifications by at least 30 per cent of students within vocational education. 6L) By 2030, creation of institutional conditions for continuous professional development of working citizens, incl. acquiring new professions and improving qualifications. 6c) Formation of a network of sustainable partnerships with foreign states and creation of the necessary infrastructure for foreign economic activity, technological and industrial cooperation, and development of new markets. 6f) Increase in the share of creative industries in the economy. 7a) Ensuring technological independence and forming new markets in areas such as bioeconomy, citizen health preservation, food security, unmanned aerial systems, production and automation equipment, transport mobility (including autonomous vehicles), data economy and digital transformation, artificial intelligence, new materials and chemistry, advanced space technologies and services, new energy technologies (including nuclear)	2k) Reduction of the poverty level to below 7 per cent by 2030 and below 5 per cent by 2036, incl. among large families to 12 per cent by 2030 and 8 per cent by 2036. 2-l) Reduction of the Gini coefficient (the index of income concentration) to 0.37 by 2030 and to 0.33 by 2036. 6a) Ensuring a national GDP growth rate above the world average and achieving 4th place in the world no later than 2030 in terms of GDP volume calculated by purchasing power parity, including through labour productivity growth, while maintaining macroeconomic stability, low unemployment, and reducing structural unemployment. 6g) Ensuring sustainable growth of population income and pension provision levels not lower than the inflation rate.

Indicators of IC Development	Indicators of Socio-Economic Development
7v) By 2030, ensuring the entry of the Russian Federation into the top 10 countries in the world in terms of the volume of scientific R&D. 7g) By 2030, increase in domestic expenditure on R&D to at least 2 per cent of GDP, including by means of at least a doubled of private business investment for these purposes. 7d) By 2030, increase in the share of domestic high-tech goods and services created on the basis of proprietary development lines by one and a half times compared to the 2023 level in the total consumption of such goods and services in the Russian Federation. 8a) By 2030, achieving digital maturity in state and municipal governance, key economic sectors and the social sphere, including healthcare and education, implying the automation of most transactions within unified sectoral digital platforms and a data-driven management model, considering the accelerated implementation of big data processing, machine learning, and artificial intelligence technologies. 8b) Formation of a data market, its active involvement in economic circulation, storage, exchange, and data protection. 8zh) By 2030, increase to 99 per cent of the share of providing socially significant state and municipal services in electronic form, including introduction of a decision support system within the framework of at least 100 mass socially significant state services in electronic form proactively or upon direct applicants request through the introduction of a unified digital platform in the activities of state authorities. 8i) By 2030, ensuring an increase in the level of citizen satisfaction with the quality of work of state and municipal employees and workers of social sector institutions by at least 50 per cent. 8L) Ensuring network sovereignty and information security on the Internet	6м) By 2036, reduction to no more, than twofold of the gap in budgetary provision levels between the 10 most affluent and the 10 least affluent subjects of the Russian Federation (taking into account financial support from the federal budget in the form of targeted interbudgetary transfers). 6u) By 2030 increase in the volume of transportation through international transport corridors by at least one and a half times compared to the 2021 level by raising global competitiveness of routes

Source: compiled by the author.
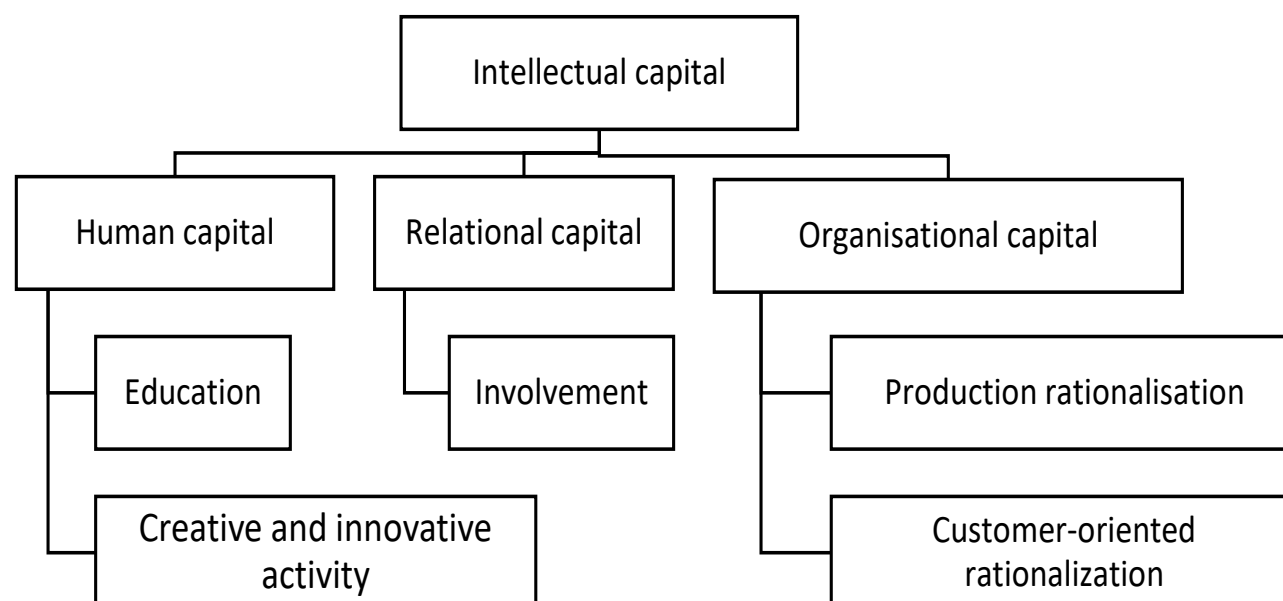
Fig. 1. Decomposition of the Intellectual Capital of a Territorial Socio-Economic System, in View of the Integration of Cognitive Activity Types "Self-Improvement" and "Innovation Activity"

Source: compiled by the author.

Intellectual Capital

I_1 Human capital

I_2 Organisational capital

I_3 Relational capital

I_{11} Education

I_{21} Involvement

I_{31} Customer-oriented rationalization

I_{12} Creative and innovative activitiy

I_{22} Production rationalisation

I_{32} Creative and innovative activity

a) The Top-three Levels of the Model

I_{12} Creative and innovative activity

I_{121} Research & development aspect

I_{122} Socio-economic aspect

I_{1211} - 7c

I_{1221} - 6a

I_{1212} - 7d

I_{1222} - 6l

I_{1213} - 7e

I_{1223} - 6t

I_{11} Education

I_{111} - 6l

I_{112} - 6j

I_{113} - 6k
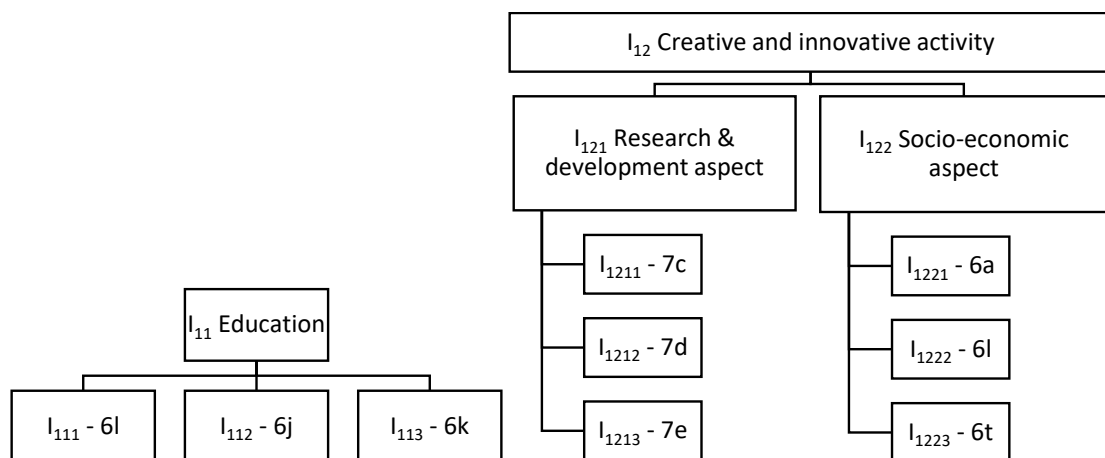
b) Types of cognitive activity "Education" and "Creative and Innovative Activity"

I_{21} Involvement

I_{211} Socio-psychological aspect

I_{212} Socio-economic aspect

I_{2111} - 2b

I_{2121} - 2j

I_{2112} - 2d

I_{2122} - 2k

I_{1213} - 2i

I_{2123} - 4a

I_{1214} - 8i

I_{2124} - 6d
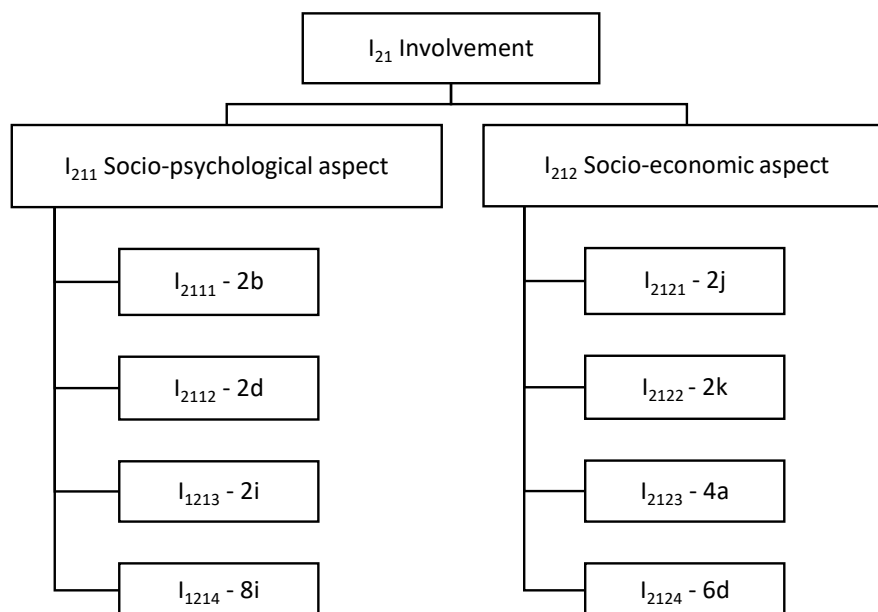
c) Type of cognitive activity "Engagement"

d) Type of cognitive activity "Production rationalisation"

e) Type of cognitive activity "Customer-Oriented Rationalisation"

f) Type of cognitive activity "Creative and Innovative Activity"
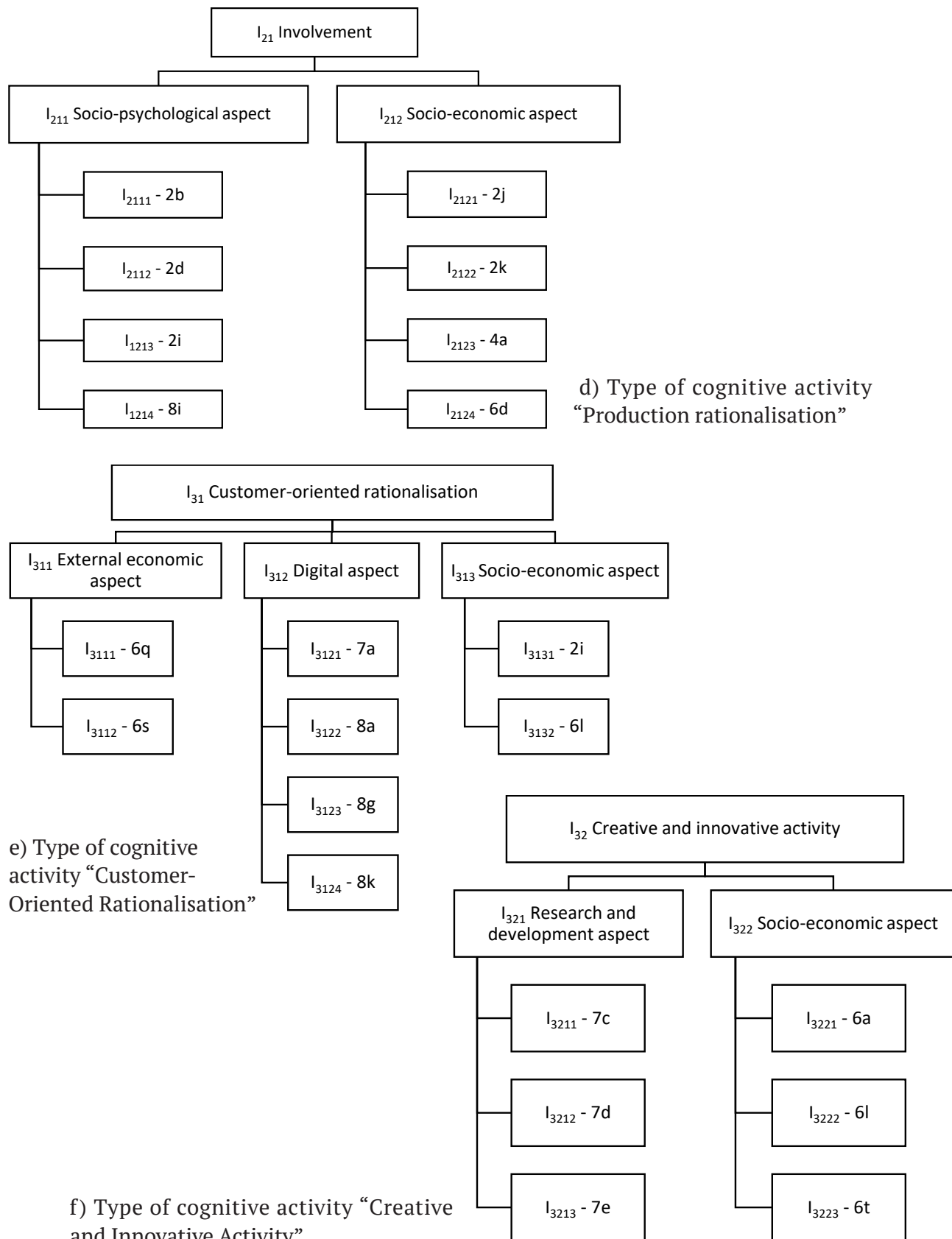
Fig. 2. **Hierarchical Model of Indicators for the Development of Intellectual Capital in a Territorial Socio-Economic System**

Source: compiled by the author.

structure, self-improvement is a type of cognitive activity, which occurs exclusively at the level of each individual and focused on setting fundamentally new strategic objectives at the level of separate individuals. The applicability of such approach at the regional level is still an open question, since in this case the formation of new strategic directions is expressed most often through innovative development, making it close to another form of cognitive activity, namely, innovation. In this regard, it seems to be worth enlarging the structure of IC for regions by integrating self-improvement and innovation within a single type of cognitive activity (*Fig. 1*).

The key components in the classical model of IC at the microeconomic level are human capital (knowledge contributed by personnel to the entity); organisational capital (knowledge available in the entity), and relational capital (knowledge generated by the entity in the context of its interaction with the external environment). At the meso- and macro-levels, the content of these concepts keeps changing. A human capital of regions is the population with abilities and skills used in economic activity. The organisational capital is distinguished by the level of development of modern, including digital technologies in the region's infrastructure. The relational capital is defined as the combination of economic ties with external stakeholders, including business partners and the state.

Further possibilities to specify the hierarchical structure imply correlating various capacities for cognitive activity, accomplished at the level of regional entities, with specific indicators of socio-economic development stipulated in strategic development programme documents. It is worth pointing out, that decomposition of IC components is of universal nature and the specific set of lower-level indicators in the hierarchical model is established in the list of those aspects regulated by the relevant programme document. The given research work chose The Presidential Decree No. 309 dated 07.05.2024 as an example of its applicability to entities at various levels of socio-economic systems.

The results of decomposition are illustrated in *Fig 2.*

Based on the data presented in the figures below are the following conclusions:

1. In general, the plurality of indicators is distributed evenly across types of cognitive activity, except its simplest type: "education". It corresponds to only three IC assessment indicators, and therefore, there is no need to identify intermediate aspects.

2. As creative-innovative activity is a type of cognitive activity aimed at building simultaneously human and relational capital, the set of indicators responsible for the implementation of activity are duplicated for each of the cited components.

3. IC indicators can be both qualitative and quantitative. However, the latter are often determined not as concrete values, but as a certain dynamic trend: for instance, "Increase in the total birth rate to 1.6 by 2030". This complicates the estimation of forecast values within the fulfilment of strategic programme activities. The specific nature of qualitative indicators is determined by the fact that they often take the form of a Boolean variable, for example: "By 2030, it is envisaged to create an efficient system for training, professional retraining, and advanced training of personnel in priority economic sectors based on forecasted demand". Concurrently, they can be evaluated in accordance with the scale with possible response options: 'very high probability', 'high probability', 'medium probability', 'low probability', and 'very low probability'.

4. As to other types of cognitive activity, the large number of lower-level IC indicators of assessment requires identifying intermediate aspects, and notably, one of them is, by and large, the socio-economic aspect.

5. The given set of indicators illustrates the interests of key TSES stakeholders, which becomes a fundamental principle of the programme-target approach to strategic planning for the development of such subjects.

6. The complicated nature of meso- and macro-level economic systems predetermines

the requirement of accounting for factors, which make a hidden, mediated impact on the processes of socio-economic development. The proposed model allows for considering these factors by means of methods and tools of fuzzy logic.

Therefore, in conclusion it is notable, that the decomposition model for IC assessment initially developed at the micro-level is universal and can be used at the meso- and macroeconomic levels.

achieved levels of socio-economic development, as well as forecasting the dynamics of these inter-related indicators.

2. A hallmark feature of the presented model is the capability to account for the complicated cause-and-effect relationship between IC elements at various hierarchical levels and its socio-economic development.

3. In perspective, the use of the given model will allow for the assessment of the efficiency of programme activities, and further research in this direction envisages its testing regarding some specific entity at the meso-level of the economic system.

CONCLUSIONS

1. The presented hierarchical model allows for evaluating the current level of intellectual capital of regional economic entities, in view of

REFERENCES

1. Baklanov P. Ya. Structuring of territorial socio-economic systems. *Vestnik Moskovskogo universiteta. Seriya 5. Geografiya = Moscow University Bulletin. Series 5: Geography*. 2013;(6):3–8. (In Russ.).
2. Arivazhagan D., Appal A. G., Gupta S. K. An assessment of challenges of digitalization of agrarian sector. In: Digitalisation: Opportunities and challenges for business (ICBT 2022). Cham: Springer. 2023:48–57. (Lecture Notes in Networks and Systems. Vol. 621). DOI: 10.1007/978-3-031-26956-1_5
3. Bruneckiene J., Pekarskiene I., Palekiene O., Simanaviciene Z. An assessment of socio-economic systems' resilience to economic shocks: The case of Lithuanian regions. *Sustainability*. 2019;11(3):566. DOI: 10.3390/su11030566
4. Swianiewicz P., Gendzwill A., Zardi A. Territorial reforms in Europe: Does size matter? Territorial Amalgamation Toolkit. Strasbourg: Centre of Expertise for Local Government Reform, Council of Europe; 2017:122 p. URL: https://rm.coe.int/territorial-reforms-in-europe-does-size-matter-territorial-amalgamatio/168076cf16 (accessed on 05.05.2025).
5. Zagorsky V., Rahimov F., Horbova N., et al. Socio-economic aspect of territorial organization of power. *Economic Affairs*. 2023;68(3):1555–1564. DOI: 10.46852/0424-2513.3.2023.22
6. Kuyantseva I. I., Kuyantseva M. I. Measurement of the intellectual capital in the region (as example — Rostov region). *Terra Economicus*. 2011;9(3–3):123–126. (In Russ.).
7. Zhuckovskaya I. F., Orlov I. A. About need of the assessment of the role of intellectual capital for ensuring efficiency of reproduction of regional social and economic systems. *Mnogourovnevoe obshchestvennoe vosproizvodstvo: voprosy teorii i praktiki = Multilevel Social Reproduction: Questions of Theory and Practice*. 2015;(9):153–173. (In Russ.).
8. Akerman E. N. Special features of regional policy organization on the principles of co-evolution. *Vestnik Tomskogo gosudarstvennogo universiteta = Tomsk State University Journal*. 2010;(330):115–120. (In Russ.).
9. Voron'ko E. N. The role of co-evolution of educational services and innovations in regional development. In: Sustainable economic development: International and national aspects. Proc. 2nd Int. sci.-pract. conference dedicated to the 50th anniversary of Polotsk State University (June 7–8, 2018). Novopolotsk: Polotsk State University; 2018:166–171. (In Russ.).
10. Burzalova A. A. Synergistic modeling of social-natural systems coevolution (on the example of the Baikal region). *Vestnik Buryatskogo gosudarstvennogo universiteta = The Buryat State University Bulletin*. 2014;(14–2):22–26. (In Russ.).

11. Kudryashev A. F. Development, evolution, co-evolution: Conceptual correlation. *Vestnik Bashkirskogo universiteta = Bulletin of the Bashkir University*. 2012;17(1–1):640–644. (In Russ.).

12. Vertinova A. A. Adaptive mechanism of co-development of a university and a region as an ecosystem. Cand. econ. sci. diss. Vladivostok: Vladivostok State University; 2021. 180 p. (In Russ.)

13. Lijadi A. A. Theoretical foundations to outline human well-being: Meta-analytic literature review for defining empowered life years. IIASA Working Paper. 2018;(002). URL: https://pure.iiasa.ac.at/id/eprint/15119/1/WP-18–002.pdf (accessed on 03.03.2025).

14. Prakash M., Teksoz K., Espey J., et al. Achieving a sustainable urban America. The U. S. Cities Sustainable Development Goals Index. New York, NY: Sustainable Development Solutions Network; 2017. 46 p. DOI: 10.13140/RG.2.2.25012.09601

15. Ivanova V. Yu. On the issue of modeling intellectual capital assessment at the regional level. *Sbornik nauchnykh trudov vuzov Rossii "Problemy ekonomiki, finansov i upravleniya proizvodstvom"*. 2013;(34):115–119. (In Russ.).

16. Mashkina D. I. Approach to evaluating the efficiency of the regional market of intellectual capital. *Ekonomika i upravlenie: problemy, resheniya = Economics and Management: Problems, Solutions*. 2017;5(12):201–206. (In Russ.).

17. Andriessen D. G., Stam C. D. Intellectual capital of the European Union 2008: Measuring the Lisbon strategy for growth and jobs. *Electronic Journal of Knowledge Management*. 2009;7(4):489–500.

18. Chub A. A., Makarov P. Yu. Intellectual capital as a factor of Russian regions' sustainable development. *Strategii biznesa = Business Strategies*. 2015;(6):24–32. (In Russ.)

19. Maltseva A. A. The role of intellectual capital in the regional development: The review of modern researches results. *Vestnik Tverskogo gosudarstvennogo universiteta. Seriya: Ekonomika i upravlenie = Herald of Tver State University. Series: Economics and Management*. 2018;(1):242–250. (In Russ.).

20. Aleksandrov I. N., Fedorova M. Yu. Assessment of intellectual capital in regions and territories. In: Strategic management of organizations: Modern technologies. Proc. sci.-pract. conf. (April 20–21, 2017). St. Petersburg: Peter the Great St. Petersburg Polytechnic University; 2017:308–312. URL: https://elibrary.ru/item.asp?id=29130473 (accessed on 31.01.2018). (In Russ.).

21. Saktoev V. E., Khaltaeva S. R., Tsyrenova A. A. Estimation of intellectual capital as a basis of management. *Vestnik VSGUTU = ESSUTM Bulletin*. 2018;(1):80–87. (In Russ.).

22. Shakhovskaya L. S., Kiryanova A. Yu. Assessment of the intellectual capital of the region. *Regional'naya ekonomika. Yug Rossii = Regional Economy. The South of Russia*. 2015;(3):36–43. (In Russ.).

23. Smetanina T. V., Zhikina O. V. Degree of development of the sovereign territory specified by the real value of intellectual capital. *Biznes. Obrazovanie. Pravo = Business. Education. Law*. 2015;(3):75–82. (In Russ.).

24. Rudaeva O. I. Intellectual capital of nations: Measurement approaches. *Vestnik RGGU. Seriya: Ekonomika. Upravlenie. Pravo = RSUH/RGGU Bulletin. Series Economics. Management. Law*. 2011;(10):150–156. (In Russ.).

25. Ostashchenko T. V., Dubina I. N. Assessment of regional intellectual capital and its correlation with the level of economic development of the Altai region and the Siberian Federal District. *Ekonomika. Professiya. Biznes = Economics. Profession. Business*. 2020;(4):98–107. (In Russ.). DOI: 10.14258/epb2019106

26. Pavlov Yu.V., Khmeleva G. A. Assessing the impact of agglomeration effects on the economic development of Samara region's urban districts. *Ekonomika, predprinimatel'stvo i pravo = Journal of Economics, Entrepreneurship and Law*. 2022;12(10):2773–2794. (In Russ.). DOI: 10.18334/epp.12.10.116416

27. Zavalin G. S., Nedoluzhko O. V., Solodukhin K. S. Formation of the causal field of indicators for an organization's intellectual capital development: A concept and a fuzzy economic and mathematical model. *Biznes-informatika = Business Informatics*. 2023;17(3):53–69. (In Russ.). DOI: 10.17323/2587–814X.2023.3.53.69

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Conflicts of Interest Statement: The author has no conflicts of interest to declare.

Purchasing Power of Employees as an Indicator of the Standard of Living and Economic (In)Stability of Their Households

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ABSTRACT

The object of the research is the living standard of population. **The purpose** of the article is to identify approaches to improve the purchasing power of employees as a key indicator of the living standard of the population and the quality of employment. **The objectives** include: (1) analysing the level and dynamics of purchasing power of employees based on wages (average and defined by the living standards); (2) determining the extent of employment that does not ensure the economic stability of households, as well as the average and higher living standard; (3) elaborating recommendations for improving the efficiency of state and internal corporate policies to increase employees' purchasing power based on wages. **Scientific novelty** lies in a comprehensive analysis of the employees' purchasing power as a systemic indicator of the quality of employment, in view of their differentiation by qualification groups and the presence of dependent burden. In addition, the authors provide solution to the problem of assessing the standard of living of households using the purchasing power indicator of the population.

Keywords: purchasing power of workers based on wages; wages; standard of living; employees; quality of employment; subsistence minimum; middle- and high-income population; economic sustainability of households; social policy

INTRODUCTION

One of the most salient characteristics of the labour market and the quality of employment is wages, which play a pivotal role in shaping the standard of living of the majority of households in Russia. This issue has been comprehensively studied in the academic literature. Russian scholars have conducted research of the interrelationship between wage indexation mechanisms [1]. Besides, they studied such issues as the link between wages and poverty [2], compliance with decent work standards [3], also in regards to the replenishment function [4], wage distribution inequality [5–8], problems of the "working poverty" [9], issues of the minimum wage and its correlation with the subsistence minimum for the working-age population [10–14] etc. A particular consideration is given to the adequacy of wages and professional requirements, qualifications, experience and quality of education of employees, etc. [15–17].

Foreign scholars analyse institutional barriers to wage growth and the impact of globalisation on wage levels [18–20], the socio-demographic determinants of remuneration and the influence of wages on household well-being, inequality, and social mobility. Foreign researchers explored institutional barriers to wage growth and the impact of globalisation on wage levels [18–20]. They also examined the socio-demographic determinants of remuneration and the influence of wages on household well-being, inequality, and social mobility. Among other concepts under consideration were the living wage[1] [21–23], the attractiveness of high-paying vacancies [24], skills and their utilization at work [25], the impact of employment assistance for low-skilled workers [26].

The 2024–2025 Global Wage Report of International Labour Organization (ILO)[2] examines the disproportionate effects of inflation on real wages. The Organisation for Economic Co-operation and Development (OECD) employs a systematic monitoring of wage dynamics using comparable indices of real wages adjusted for taxation and social protection.[3]

Russian and international publications employ indicators of nominal and real wages, as well as those of purchasing power of workers' wages. The latter indicator is defined as the ratio of the average monthly nominal accrued wage to the national or regional subsistence minimum for the working-age population. It facilitates the direct measurement of the level of consumption (in contrast to the average monthly nominal accrued wage, which merely determines the resources required to finance it).

The Federal Law No. 134-FZ dated October 24, 1997 "On the Subsistence Minimum in the Russian Federation",[4] establishes the regulatory role of the subsistence minimum in defining state guarantees of minimum monetary income and providing other social welfare measures for the Russian citizens. The poverty line (this term replaced subsistence minimum in 2021) is monitored on a quarterly basis by the state statistical authority in view of changes in consumer prices (the rate of consumer inflation).

The authors of the given article about living standards of population rely on the indicator of purchasing power (based on wages, per capita monetary income, consumer expenditure, etc.) use their own methodology calculated on the basis of the subsistence minimum. However, unlike other researchers who also use this indicator for assessment of living standards [27–29], the authors identify not only average purchasing power (PP), but also its differentiated value and dynamics corresponding to the living standard benchmarks of various social groups [30–34].

In this article, the authors substantiate standards of workers' purchasing power in view of the latter's qualifications and dependency

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[1] A salary that provides a basic standard of living with no need for government financial support.

[2] URL: https://www.ilo.org/publications/flagship-reports/global-wage-report-2024–25-wage-inequality-decreasing-globally

[3] OECD. Employment Outlook 2023: Real wages, living standards and inequality. Paris: OECD Publishing; 2023.

[4] URL: https://www.consultant.ru/document/cons_doc_LAW_491969/

burden, which are based on the need to ensure differentiated living standards for workers and their households. Concurrently, the focus of the study is the standard of a household's economic sustainability, defined as an achievement of an average (or above-average) level of living and purchasing power for family workers. Thus, the research hypothesis assumes that the key indicator enabling to assess the progress in resolving this issue is the purchasing power of workers' wages.

DATA AND METHODS

The study uses original methodological approaches [30, 33, 35–37] which make it possible to differentiate the population and its specific groups by levels of purchasing power based on the subsistence minimum[5] (SM) (*Table 1*).

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[5] To compare the variation series, the value of the subsistence minimum was calculated by the authors using the 2013–2020 methodology, based on the minimum consumer basket and shaped with a normative-statistical method, in view of changes in consumer prices (since 2021, the official methodology for determination of the subsistence minimum has been changed).

Table 1

Purchasing Power Limits and Population Groups Identified on Their Basis (2023)

PS boundaries based on wages	Groups of workers based on PS based on wages	PS boundaries of the population based on per capita cash income	Standards of living (SOL) based on PS based on per capita cash income
11.0 SMFWAP* and more	High-paid	11.0 PS and more	High-paid
3.5–11.0 SMFWAP	Average-paid. total	3.5–11.0 PS	Average-paid, total
	including:		including:
3.5–4.6 SMFWAP	Bottom tier	3.5–4.6 PS	Bottom tier
4.6–8.0 SMFWAP	Core	4.6–8.0 PS	Core
8.0–11.0 SMFWAP	Upper tier	8.0–11.0 PS	Upper tier
2.0–3.5 SMFWAP	Below-average-paid	2.0–3.5 PS	Below-average-paid
1.0–2.0 SMFWAP	Low-paid	1.0–2.0 PS	Low-paid
Less than 1.0 SMFWAP	Least-paid	Less than 1.0 PS	Least-paid (income poor)

Source: compiled by the authors.

Note: * SMFWAP means subsistence minimum for the working-age population.

Table 2

Lower Limits of Purchasing Power for Wages for Traditional Families with One or Two Kids, in Accordance with the Qualifications of Workers and the Standard of Living of Their Households

Standards of living (SOL)	Qualification groups of workers according to the All-Russian Classifier of Occupations (ARCO)*	Purchasing power of a worker for wages (PPW)*	
		Complete one-child family	Complete two-child family
Least income (Income poor)	Groups 9 and 3 (Unskilled)	1.3	1.6
Low-Income and Below-Middle-Income	Groups 4–8 (Low-Skilled)	2.6	3.3
Average SOL Standards (Lower Stratum)	Groups 3 и 02 (Middle-Skilled)	4.5	5.8
Average and Higher SOL Standards (Core of the Middle Stratum, High-Income)	Groups 1–2 и 01 (Highly Skilled)	≥ 5.9	≥ 7.6

Source: compiled by the authors.

Note: **The limits of an employee's purchasing power related to wages are specified taking in view of the equivalent scale, which takes into account savings of household expenses.

The purchasing power of workers in the absence of a dependency burden defines their living standard. Thus, it can be assessed by the number of subsistence minima (SM) for the working-age population (SMFWAP) and calculated in their average monthly nominal accrued wage.

If a worker has dependants, the purchasing power necessary to reach a given living standard must be higher and is differentiated by qualification level. The limits for complete one- and two-child households (two working adults with proportional burden) are listed in *Table 2*.

The purchasing power (PP) of the population based on per capita monetary income (due to the income redistribution from employment and other sources within households, in view of the ratio of workers to dependants) determines the classification of particular living standard groups (*Tables 1* and *2*).

In accordance with the authors' framework, the economic sustainability of a household (a stable financial position) manifests in the extended replication of its living standard and is determined by its inclusion in the medium- and high-income groups.

The information core for the study was obtained from the following sources: Rosstat, the Monitoring of Income and Living Standards of the Population of Russia [33], the Russian Longitudinal Monitoring Survey of the National Research University of the Higher School of Economics,[6] Forecast of the Socio-

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[6] URL: http://www.hse.ru/rlms

Economic Development of the Russian Federation for 2025 and for the Planning Period of 2026–2027.[7]
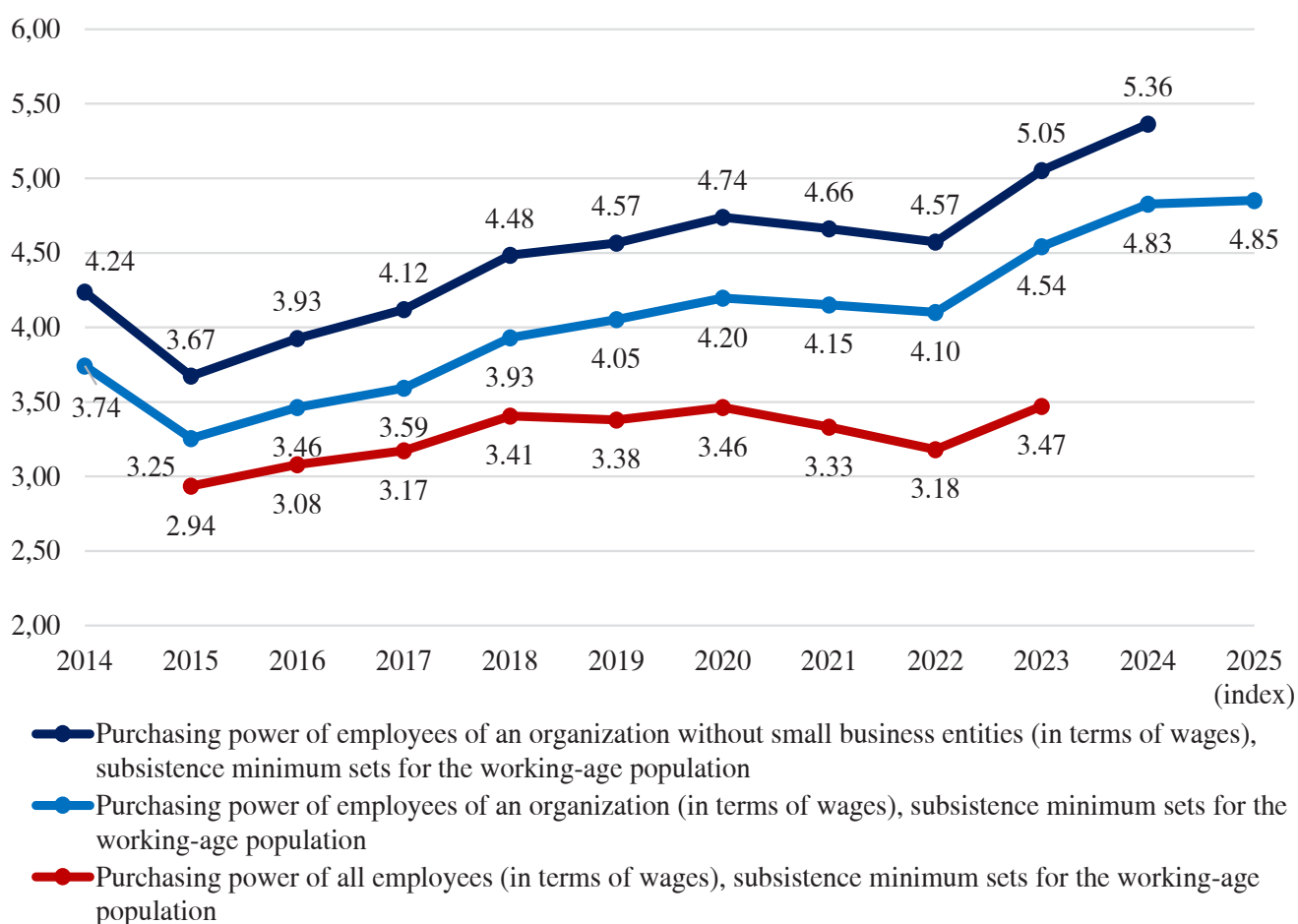
RESULTS OF THE FINDINGS

The research findings indicate that, employment in our country still prevalently does not ensure a sustainable financial position for households or facilitate their entry into the middle- and high-income groups. This occurs despite the

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[7] URL: https://www.economy.gov.ru/material/directions/makroec/ prognozy_socialno_ekonomicheskogo_razvitiya/prognoz_socialno_ ekonomicheskogo_razvitiya_rf_na_2025_god_i_na_planovyy_ period_2026_i_2027_godov.html

state policy of implementation of measures including increases in the minimum wage, wage indexation for public sector employees, and subsidies of employment for vulnerable groups etc., as well as various instruments used by economic entities, such as the stimulation of lending, grants and subsidies, and insurance, etc.[8]

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[8] Decree of the President of the Russian Federation of May 7, 2024 No. 309 "On the National Development Goals of the Russian Federation for the Period up to 2030 and up to 2036". URL: https://www.garant.ru/hotlaw/federal/1717715/; "Effective and Competitive Economy" URL: https:// xn—80aapampemcchfmo7a3c9ehj.xn — p1ai/new-projects/ effektivnaya-i-konkurentnaya-ekonomika/; National Project

Fig. 1. **Purchasing Power (PP) of Employees in Terms of Wages, in Sets of the PM of the Working-Age Population**

Source: compiled by the authors based on: URL: https://rosstat.gov.ru/labor_market_employment_salaries; https://rosstat.gov.ru/folder/13397; [33]; https://www.economy.gov.ru/material/directions/makroec/prognozy_socialno_ekonomicheskogo_razvitiya/prognoz_social

Note: index PM corresponds to the methodology of 2013–2020.
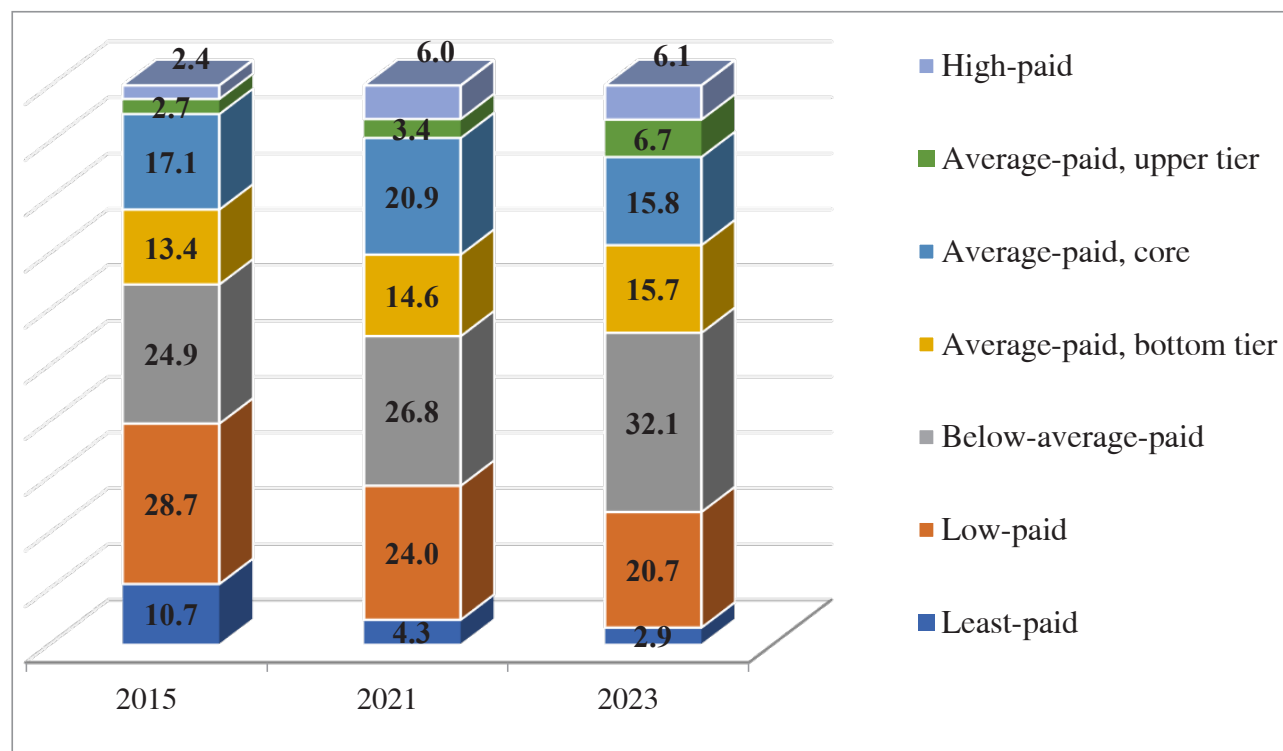
Fig. 2. **Classification of Entity's Employees by Purchasing Power Based on Average Monthly Nominal Accrued Wages, % of the Total Number of Employees of Organizations (Excluding Small Business Entities)**

Source: Authors' calculations based on: URL: https://rosstat.gov.ru/folder/13397; https://rosstat.gov.ru/labour_costs; [33]

By 2018, the purchasing power of workers' wages (excluding dependency burden) recovered *in the entities not classified as small businesses*, compared to a sharp decrease in 2015 (−13.3 per cent) due to the imposed anti-Russian sanctions (*Fig. 1*). Subsequently, purchasing power continued to grow, and in 2023, it exceeded previous figures. Concurrently, the economy overcome the two-year slump (−3.5 per cent) indicated in the post-COVID year of 2021 and in 2022, amid more severe anti-Russian economic sanctions related to the start of the Special Military Operation. Thus, in 2014–2024 *the average actual purchasing power of workers without dependants in companies not classified as small businesses increased* from 4.24 to 5.36 SMFWAP,

which approximately corresponds to the core indicator of its average.

The forecast estimate, based on the continued official growth rate of the subsistence minimum in 2025 relatively to 2024 and the Forecast of the Socio-Economic Development of the Russian Federation for 2025 and the Planning Period of 2026 and 2027, indicates, that in 2025, a slight increase to be expected in workers' average purchasing power: less than 1 per cent.

The purchasing power of employees without dependency burden in organisations as a whole, as well as of all employees (those employed in companies, by individual entrepreneurs, and by private employers), was lower than *in organisations excluding small businesses*, and its dynamics exhibited specific features (*Fig. 1*).

The lower level and weaker dynamics of purchasing power among all employees resulted in only 3.47 SM in 2023 (+18.3 per cent com-

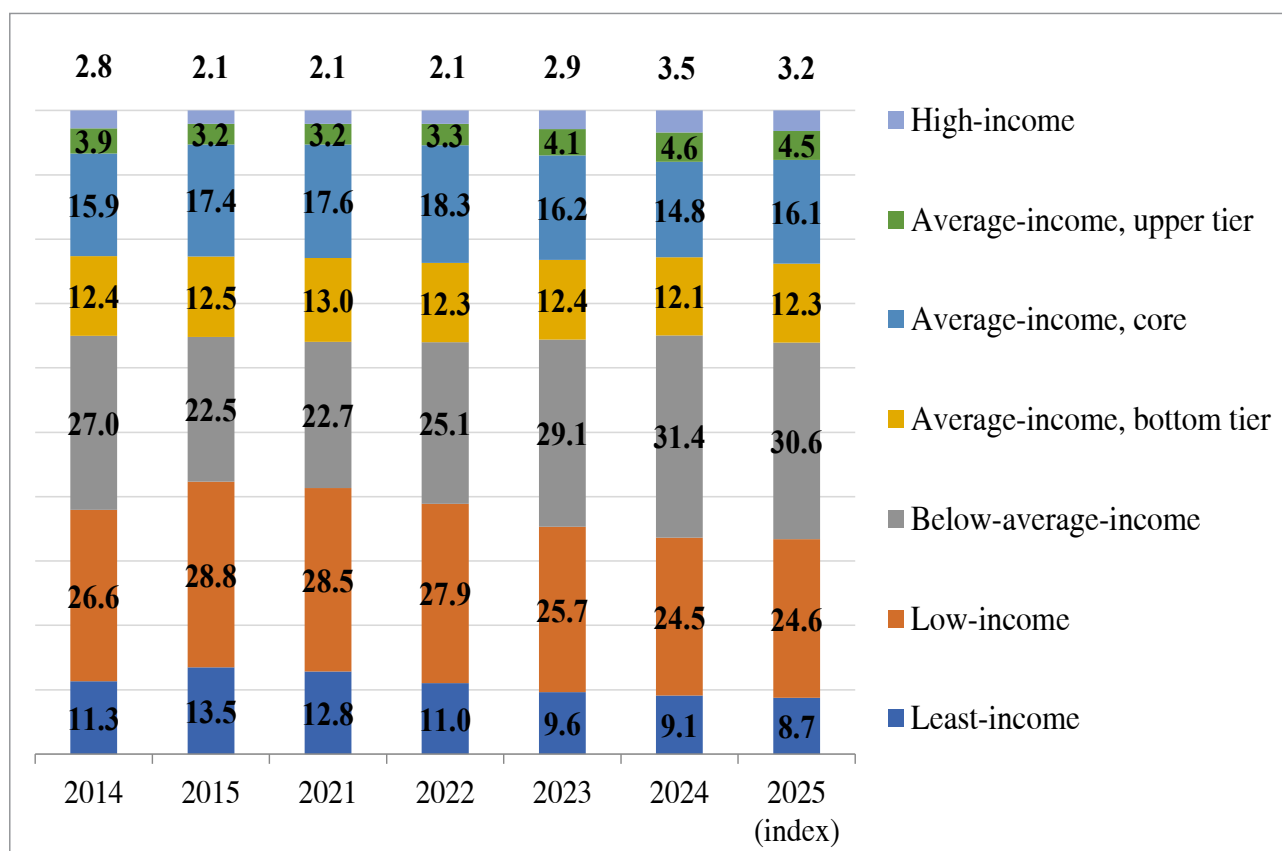"Effective and Competitive Economy" URL: https://www.economy.gov.ru/material/directions/np_effektivnaya_i_konkurentnaya_ekonomika/; Government of the Russian Federation. URL: http://government.ru/news/49414/ etc.

	2014	2015	2021	2022	2023	2024	2025 (index)
Total	2.8	2.1	2.1	2.1	2.9	3.5	3.2
Average-income, upper tier	3.9	3.2	3.2	3.3	4.1	4.6	4.5
Average-income, core	15.9	17.4	17.6	18.3	16.2	14.8	16.1
Average-income, bottom tier	12.4	12.5	13.0	12.3	12.4	12.1	12.3
Below-average-income	27.0	22.5	22.7	25.1	29.1	31.4	30.6
Low-income	26.6	28.8	28.5	27.9	25.7	24.5	24.6
Least-income	11.3	13.5	12.8	11.0	9.6	9.1	8.7

Fig. 3. **Distribution of Population by Standard of Living Based on Purchasing Power Per Capita Cash Income, % of the Total Population**

Source: authors' calculations based on: URL: https://rosstat.gov.ru/folder/13397; [33]; https://www.economy.gov.ru/material/directions/makroec/prognozy_socialno_ekonomicheskogo_razvitiya/prognoz_socialno_ekonomicheskogo_razvitiya_rf_na_2025_god_i_na_planovyy_period_2026_i_2027_godov.html

pared with 2015), which corresponded to the lower-middle level. The disparity between the purchasing power of workers in organisations excluding small businesses and all employees grew from 20 per cent in 2015 to 31 per cent in 2023.

The structure of wage distribution among workers without dependency burden makes it possible to examine purchasing power levels in more detail, from the lowest-paid to the highest-paid groups. As indicated by the data obtained, in 2015–2023[9] the distribution structure among organisational employees (except small businesses)[10] demonstrated an expansion of the upper groups and a contraction of the lower groups (*Fig. 2*). In 2023, the share of highly paid workers was 6.1 per cent, which is 2.5 times more than in 2015 (2.4 per cent). The purchasing power of this group is at least 11.0 SM.[11]

For medium-paid workers, purchasing power ranges from 3.5 to 11.0 SM. In 2023, the total share of medium-paid workers in entities except small businesses was 38.2 per cent. In comparison with 2021 (38.9 per cent), it slightly dropped (−0.7 per cent), while compared with 2015 (33.2 per cent) it grew (+5.0 per cent).

Among the workers employed in entities except small businesses, workers with lower

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[9] Rosstat conducts the survey every two years. The data was analysed from the most recent survey, conducted in April 2023.

[10] Rosstat does not provide data on wage distribution series for all employees. It only publishes data for employees of organizations,

except small businesses. Therefore, this study examines the situation only for this group of employees too.

[11] The figure of SMFWAP corresponds to the methodology of the years of 2013–2020.

purchasing power (below 3.5 SM) accounted for 55.7 per cent in 2023 (−8.6 percentage points. relative to 2015), including with the least-level wages and with purchasing power below 1.0 SM represented 2.9 per cent (−7.8 percentage points compared with 2015). These capacities of purchasing power did not permit the households of these workers, even in the absence of dependants, to join the middle- and high-income groups, which have economic sustainability. Moreover, their dependants can make the situation much worse. Thus, even in view of the minimum dependency scenario,[12] the share of workers whose wages do not allow their households to enter the above wealthier groups exceeds up to 80 per cent.[13]

Fig. 3 presents *the dynamics of distribution of the population by categories of living standard* (purchasing power based on per capita monetary income) in 2014–2024 and the forecast for 2025. As it is obvious, the overall share of population with medium and high living standards (at least 3.5 SM[14]) that indicates economic sustainability is approximately 35–36 per cent during the period under review. This is nearly twofold less than the share of those, whose purchasing power does not allow them to maintain comparable living standards and economic sustainability (64–65 per cent), including: the least paid workers living in poverty: below 1.0 SM; low-income is 1.0–2.0 SM and those with below-average income of 2.0–3.5 SM.

The abovementioned research indicates, the pivotal role in domestic policy aimed to facilitate employment quality and population's living standards should be assigned to increasing workers' purchasing power to a level that guarantees the economic sustainability of their households under varying dependency burdens, as well as ensuring the corresponding medium or higher living standards.

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[12] Proportional burden of two workers to maintain one child.

[13] Proportional burden of two workers to maintain one child.

[14] The SM corresponds to methodology of 2013–2020.

CONCLUSIONS AND RECOMMENDATIONS

The research hypothesis has been confirmed. Thus, within its framework, the authors advanced a comprehensive model for assessing workers' purchasing power based on wages in the context of implementing social policies of ensuring the households' economic sustainability and enabling them to enter the medium- and high-income population groups. Purchasing power is determined not only as a quantitative indicator, but also as a categorising instrument to determine workers and their households by living standard, in view of dependency burden and qualification group. This allows for setting target benchmarks for social policy and wage regulation.

Increasing the purchasing power of employees' wages should be correlated with their qualifications and dependency burden. In fact, medium- and high-income groups should include workers with upgrading qualifications and ensure them appropriate job opportunities.

The recommended ranges of wages for full households with two workers and one or two children, linked to qualification and living standard (*Table 2*) enable the achievement of extended reproduction of living standards for highly qualified workers by 2030 and 2036. This works out at no less than at the benchmark level of the core middle class and for medium-qualified workers at least at the average standard.

In our viewpoint, regrading low-skilled workers with families, the aim should be focused to overcome an absolute monetary poverty by raising wage-based purchasing power. In other words, to bring full households with two workers enough out of the category of social assistance recipients, namely: by 2030 for families with a child, and by 2036 for families with two children.

In light of the currently low average purchasing power of workers, it is necessary to implement gradually the employers obligations to meet the proposed thresholds by defining intermediate values relative to the normative

benchmarks of wages. This coordination activity should be entrusted to the Russian Trilateral Committee of the Regulation of Social and Labour Relations. As to the proposed standards and intermediate thresholds of workers' purchasing power, they should be included into general, sectoral, and regional social partnership agreements, as well as into collective agreements.

Funding for wage budgets *in the public sector* should meet qualification group standards for teachers, doctors, lecturers in secondary specialised and higher education institutions, employees in science and culture, etc.) in accordance with the Russian National Occupational Classificatory (RNOC) at the levels not below the intermediate, and in the long term, not below the normative lower thresholds of purchasing power established in sectoral agreements. Such funding should be provided from the state budget depending on the relevant ministry or department.

In the market sector of the economy, it is required to develop a motivational mechanism inspiring employers to implement the lower purchasing power standards and finance their achievement by qualification group in accordance with RNOC, specified in sectoral and regional social partnership agreements. It is also recommended to stimulate employers involved in the initiative to raise purchasing power with preferential taxation of profits, property, and other assets, as well as additional incentives.

For regulation of the growth of employees' purchasing power and their household living standards, it is advisable to:

• include the sufficient level of employees' wage-based purchasing power to ensure household economic sustainability among the principal indicators of employment quality;

• introduce a mechanism for assessing employees' purchasing power into social policy practice with implication of living standard benchmarks in the form of consumer budgets for different levels of material well-being;

• develop a targeted system of measures to regulate the purchasing power of workers employed by individual entrepreneurs and private persons, that contributes to overcome a major lag in their level compared to employees of organizations, which is currently increasing and leads to a growing inequality in the economic status of workers;

• as to the authors' viewpoint, the aforementioned thresholds of employees' wage-based purchasing power, linked to qualifications and household living standards, should be approved by a Resolution of the Government of the Russian Federation (Ministry of Labour of Russia).

REFERENCES

1. Arkin P. A., Plotnikov V. A., Borodina E. P. Wages indexing as an instrument of the Russian Federation socio-economic development stimulation: Methodical tools. *Izvestiya Sankt-Peterburgskogo gosudarstvennogo ekonomicheskogo universiteta.* 2020;(4):7–16. (In Russ.).

2. Kapelyuk S. D. Impact of minimum wage on poverty gap and severity of poverty in Russia. *Vestnik Sibirskogo universiteta potrebitel'skoy kooperatsii = Bulletin of the Siberian University of Consumer Cooperatives.* 2016;(3–4):36–49. (In Russ.).

3. Veredyuk O. V., Sychenko E. V. Mechanisms for achieving decent wages in the Russian economy. *Vestnik Sankt-Peterburgskogo universiteta. Ekonomika = St. Petersburg University Journal of Economic Studies.* 2024;40(1):36–57. (In Russ.). DOI: 10.21638/spbu05.2024.102

4. Soboleva I. V. Reproduction function of wages and work motivation in modern Russia. *Voprosy politicheskoi ekonomii = Problems in Political Economy.* 2019;(3):95–104. (In Russ.).

5. Vishnevskaya N. T., Zudina A. A., Kapelyushnikov R. I., et al. Wage inequality: Dynamics, main factors, regional differences, influence of labor market institutions: Analytical report. Moscow: National Research University Higher School of Economics; 2021. 100 p. (In Russ.). DOI: 10.17323/978-5-7598-2632-3

6. Vasina V.D., Danilovskih T.E. Wage trends in the economic crisis. *Fundamental'nye issledovaniya = Fundamental Research*. 2023;(7):72–77. (In Russ.). DOI: 10.17513/fr.43484

7. Toksanbaeva M.S. Factors of formation of high wage differentiation. *Mezhdunarodnyi zhurnal gumanitarnykh i estestvennykh nauk = International Journal of Humanities and Natural Sciences*. 2020;(10–2):184–191. (In Russ.). DOI: 10.24411/2500-1000-2020-11144

8. Lukyanova A.L. Decreasing earnings inequality in Russia: Trends and drivers from 2005 to 2023. *Zhurnal Novoi Ekonomicheskoi Assotsiatsii = Journal of the New Economic Association*. 2024;(4):267–275. (In Russ.). DOI: 10.31737/22212264_2024_4_267–275

9. Anikin V.A., Slobodenyuk E.D. In-work poverty in Russia: How determinants have changed over the 20 years? *Sotsiologicheskaya nauka i sotsial'naya praktika = Sociological Science and Social Practice*. 2021;9(4):23–41. (In Russ.). DOI: 10.19181/snsp.2021.9.4.8603

10. Gorina E.A., Ter-Akopov S.A., Chervyakova A.A., Biryukova S.S., Sinyavskaya O.V. Scenario modeling of increasing the minimum wage: Estimating impact on monetary poverty. *Voprosy ekonomiki*. 2024;(6):133–149. (In Russ.). DOI: 10.32609/0042-8736-2024-6-133-149

11. Toksanbaeva M.S. Minimum size of wage and its differentiation. *Narodonaselenie = Population*. 2020;23(4):40–49. (In Russ.). DOI: 10.19181/population.2020.23.4.4

12. Grishina E.E., Kuznetsova P.O. Minimum wage as a tool to reduce poverty: Expected consequences of the reform. *Zhurnal Novoi ekonomicheskoi assotsiatsii = Journal of the New Economic Association*. 2018;(4):137–156. (In Russ.). DOI: 10.31737/2221-2264-2018-40-4-6

13. Lukyanova A.L. Centralization and regionalization of minimum wages: Evidence from Russia. *Voprosy ekonomiki*. 2023;(1):86–104. (In Russ.). DOI: 10.32609/0042-8736-2023-1-86-104

14. Perekarenkova Yu.A., Kryshka V.I. Minimum wage and the subsistence level in the Russian economy: Theoretical and empirical analysis of the main trends. *Economic and Social Changes: Facts, Trends, Forecast*. 2019;12(2):210–224. (In Russ.: *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz*. 2019;12(2):210–224. DOI: 10.15838/esc.2019.2.62.13).

15. Kolosova A.I., Rudakov V.N., Roshchin S. Yu. The impact of job-education match on graduate salaries and job satisfaction. *Voprosy ekonomiki*. 2020;(11):113–132. (In Russ.). DOI: 10.32609/0042-8736-2020-11-113-132

16. Rozhkova K.V., Roshchin S. Yu., Solntsev S.A., Travkin P.V. The differentiation of quality in higher education and graduates' wages in Russia. *Voprosy obrazovaniya = Educational Studies Moscow*. 2023;(1):161–190. (In Russ.). DOI: 10.17323/1814-9545-2023-1-161-190

17. Gimpelson V., Chernina E. Do wages grow with experience? Deciphering the Russian puzzle. *Journal of Comparative Economics*. 2023;51(2):545–563. DOI: 10.1016/j.jce.2023.01.005

18. Piketty T. Capital and ideology. Cambridge, MA: The Belknap Press of Harvard University Press; 2020. 1104 p.

19. Atkinson A.B. Inequality: What can be done? Cambridge, MA: Harvard University Press; 2015. 400 p.

20. Stiglitz J.E. The price of inequality. New York, NY: W.W. Norton & Company; 2013. 560 p.

21. Autor D.H., et al. The work of the future: Building better jobs in an age of intelligent machines. Cambridge, MA: The MIT Press; 2022. 192 p.

22. Nunziata L. Institutions and Wage Determination: a Multi-country Approach. *Oxford Bulletin on Economics and Statistics*. 2005;67(4):435–466. DOI: 10.1111/j.1468–0084.2005.00127.x

23. Anker R., Anker M. Living wages around the world: Manual for measurement. Cheltenham: Edward Elgar Publishing; 2017. 392 p. DOI: 10.4337/9781786431462

24. Banfi S., Villena-Roldán B. Do high-wage jobs attract more applicants? Directed search evidence from the online labor market. *Journal of Labor Economics*. 2019;37(3):715–746. DOI: 10.1086/702627

25. Daly M., Groes F., Jensen M. F. Skill demand versus skill use: Comparing job posts with individual skill use on the job. *Labour Economics*. 2025;92:102661. DOI: 10.1016/j.labeco.2024.102661

26. Carrasco R., Gálvez-Iniesta I., Jerez B. Do temporary help agencies help? Employment transitions for low-skilled workers. *Labour Economics*. 2024;90:102586. DOI: 10.1016/j.labeco.2024.102586

27. Sinitsa A. L. The salaries as a factor of the family size of the pedagogical employees in general education. *Nauchnye trudy: Institut narodnokhozyaistvennogo prognozirovaniya RAN = Scientific Articles: Institute of Economic Forecasting. Russian Academy of Sciences*. 2019;17:415–435. (In Russ.). DOI: 10.29003/m828.sp_ief_ras2019/415–435

28. Migranova L. A., Popova R. I. Impact of the minimum wage on wages and wage inequality in 2019. *Uroven' zhizni naseleniya regionov Rossii = Living Standards of the Population in the Regions of Russia*. 2019;(4):21–35. (In Russ.). DOI: 10.24411/1999–9836–2019–10079

29. Tonkikh N. V., Kamarova T. A., Markova T. L. Sustainability of digital and non-digital forms of employment: Comparative assessments. *Economic and Social Changes: Facts, Trends, Forecast*. 2024;17(5):232–246. (In Russ.: *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz*. 2024;17(5):232–246. DOI: 10.15838/esc.2024.5.95.13).

30. Bobkov V. N., Kolmakov I. B. Identifying the social structure and the inequality in monetary income of Russian population. *Ekonomika regiona = Economy of Regions*. 2017;13(4):971–984. (In Russ.). DOI: 10.17059/2017–4–1

31. Bobkov V. N., Odintsova E. V. The impact of wage levels on the quality of employment and economic sustainability of households. *Federalizm = Federalism*. 2024;29(1):77–95. (In Russ.). DOI: 10.21686/2073-1051-2024-1-77-95

32. Gulyugina A. A. Purchasing power of monetary incomes of the population of Russia in the context of modern challenges. *Uroven' zhizni naseleniya regionov Rossii = Living Standards of the Population in the Regions of Russia*. 2023;19(3):395–406. (In Russ.). DOI: 10.52180/1999-9836_2023_19_3_7_395_406

33. Bobkov V. N., Gulyugina A. A., Odintsova E. V., et al. Monitoring the income and living standards of the population of Russia — 2024: Yearbook. 2025;(3):1–170 p. (In Russ.).

34. Odintsova E. V. Assessment of precarious employment in the Russian formal sector: From the level of workers to the level of households. *Obshchestvo i ekonomika = Society and Economy*. 2025;(8):18–32. (In Russ.). DOI: 10.31857/S 0207367625080022

35. Bobkov V. N., Gulyugina A. A., Odintsova E. V. About the risks in the sphere of living standards of the Russian population, opportunities and solutions to reduce them. *Uroven' zhizni naseleniya regionov Rossii = Living Standards of the Population in the Regions of Russia*. 2024;20(1):59–75. (In Russ.). DOI: 10.52180/1999-9836_2024_20_1_6_59_75

36. Bobkov V. N., Bobkova T. E., et al. The standard and quality of life of the population of Russia: From reality to designing the future. Moscow: Federal Scientific Center of the Russian Academy of Sciences; 2022. 274 p. (In Russ.). DOI: 10.19181/monogr.978-5-89697-388-1.2022

37. Bobkov V. N., Herrmann P., Kolmakov I. B., Odintsova E. V. Two-criterion model of the Russian society stratification by income and housing security. *Ekonomika regiona = Economy of Regions*. 2018;14(4):1061–1075. (In Russ.). DOI: 10.17059/2018-4-1

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Multi-dimensional Analysis of Medical and Wellness Tourism as a Sector of National Economy: Current Challenges, and Future Perspectives

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ABSTRACT

Relevance. Medical and wellness tourism plays a significant role in contemporary economics by shaping regional markets, attracting substantial financial resources, and fostering innovative developments in national healthcare systems. **The purpose** of the study is to reveal the mechanisms underlying the operation of medical tourism, and formulates practical recommendations for market participants. **Research Methods.** The author uses a combination of theoretical-analytic and empirical approaches: review of scientific literature and systematic analysis of publications and statistical materials; conceptual data modeling combined with exploration of raw data (ERD); use of Python programming tools for hypothesis testing, detecting trends and qualitative evaluation of prospective development of the industry. **Scientific Novelty.** The paper presents new definitions and detailed comparison of various stages of development of medical tourism, highlighting contemporary risk factors and approaches to the integration of technologies that shape the circumstances for increasing the competitiveness of countries in the medical tourism market. **Main Results.** Stages of transformation and dynamics of medical tourism's development were established including cross-cultural dimensions and digitalizing of medical tourism. **Practical Value.** The article provides recommendations on shaping an effective strategy for medical tourism, optimizing legislation, enhancing marketing strategies, among other aspects. The findings can be useful for government bodies, leaders of medical institutions, and professionals in the field of medical tourism.
Keywords: medical tourism; wellness tourism; economic impact of medical tourism; stakeholders of medical tourism; cross-cultural aspects of medical tourism; tourism economy; healthcare economics; digitalization in tourism; artificial intelligence in medicine

INTRODUCTION

Medical and wellness tourism has become an important component of the regional and sectoral economy of the Russian Federation. Since the mid-1950s, this industry has gone through revised requirements, which reflect society's perceptions of its positive and negative aspects. The concept of medical tourism has undergone significant transformations: new classes and forms have emerged, revealing challenges and defining roles of market participants influenced by cultural differences and specific economic conditions of various countries.

According to the data for 2024 of the International Medical Travel Association (IMTA), the annual growth rate of the industry is 15–25 per cent generated over USD 100 billion for the global economy.[1] Among the most popular destinations are Thailand, Mexico, India, Turkey, Malaysia, Costa Rica, and Singapore, with the majority of tourists coming from the USA, Canada, the UK, and Western European countries. Despite the active development and strengthening of the Russian Federation role in this segment, one cannot ignore the existence of a number of major problems, which impede its further effective growth.

CIS countries traditionally prevail with over 80 per cent of the total volume in the geographical structure of inbound medical tourist flows. The rest are the citizens of BRICS countries, Western Europe, Turkey, and the USA. Uzbekistan takes the leading positions: 5 million people, with China to follow up with 259 thousand people (*Fig. 1*).

According to official data from the Russian Ministry of Health, between 2021 and 2025, Russian medical institutions provided services to 21.5 million foreign citizens, with total revenues generated within the healthcare sector reaching 1.2 billion USD and an average transaction value of approximately 55.81 USD. This relatively low figure can be explained by several key factors:

• A diverse array of services being offered beyond standard treatment packages requested by patients seeking budget-friendly options.

• Numerous smaller transactions balancing out infrequent high-value payments for expensive surgical interventions or specialized treatments.

• Misleading statistical data arising from the classification of migrant workers as medical tourists, given that these individuals often benefit from free emergency care under Federal Law No. 323-FZ dated 21.11.2011 "On the Fundamentals of Protecting the Health of Citizens in the Russian Federation".[2]

Another factor impairing the accuracy of statistics concerns situations involving planned arrivals of citizens from CIS countries into the Russian Federation, particularly those traveling with children requiring emergency medical attention. These individuals intentionally seek help at reputable state-run medical institutions, confident in receiving guaranteed essential care based on Federal Law No. 323-FZ dated November 21, 2011 («On the Fundamentals of Protecting the Health of Citizens in the Russian Federation»). Given that commercial patients are not tracked separately, this creates significant obstacles to objectively assessing the genuine impact of the industry on Russia's economy.

Therefore, the present circumstances necessitate, first and foremost, rigorous tracking of the cumulative economic impact derived from treating medical tourists, encompassing associated offerings such as lodging accommodations, transportation, and touristic services. Secondly, it also requires a comprehensive approach, which implies the clarification and development of corresponding definitions and terminology both on an international and domestic scale, taking into account the multiple influence on the economy, infrastructure, and social sphere.

Within the scope of the research study, 1535 scientific articles indexed in the Scopus bibliographic database were analysed, which covered medical tourism for the period of 1952–2020 (prior to the COVID-19 pandemic). The author developed an ERD data model, conducted analysis, and

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[1] URL: https://www.medicaltourismassociation.com/

[2] URL: https://minzdrav.gov.ru/documents/7025-federalnyy-z%C 2%AD

Distribution of Inbound Medical Tourist Flows: the CIS

Distribution of Inbound Medical Tourist Flows: G20
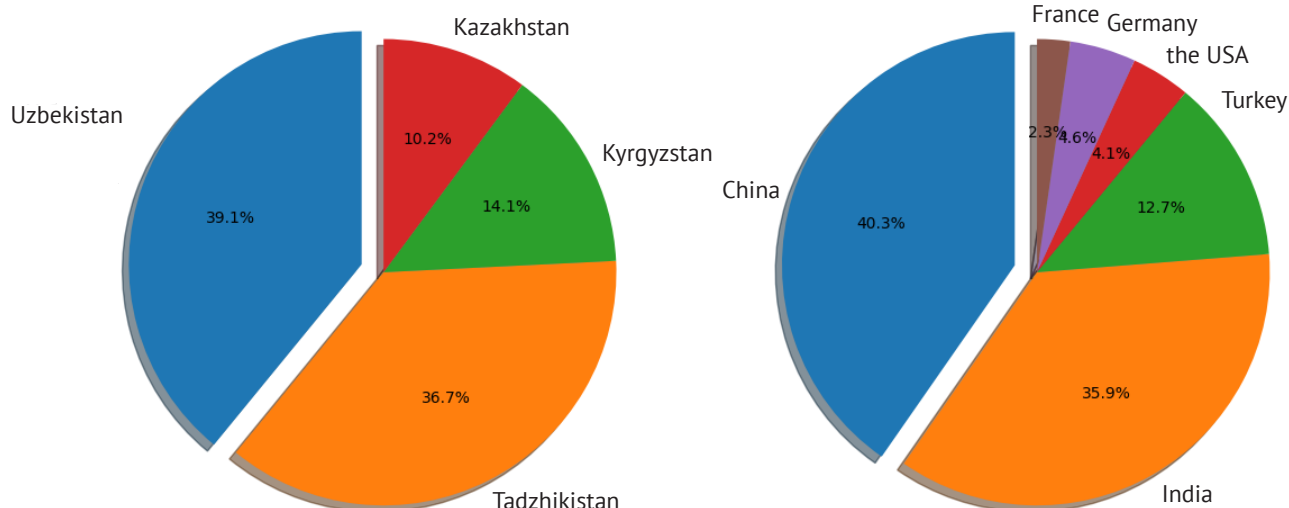
Fig. 1. **Distribution of Inbound Medical Tourist Flows**

Source: compiled by the author on URL: https://minzdrav.gov.ru

performed statistical hypothesis testing using the Python[3] programming language for data processing and visualization. Additionally, hypothesis testing using F-statistics in Analysis of Variance (ANOVA) was carried out to compare mean values across multiple data groups and identify any statistically significant differences between them. This step is crucial for validating conclusions regarding how specific factors influence observed phenomena.

In the course of the research work, a major increase was revealed in the number of publications on this topic from 2015 to 2018, reflecting growing interest in medical tourism and the emergence of a new paradigm for understanding such travel patterns (*Fig. 2*).

Consequently, the following hypotheses were formulated concerning the dependence between the frequency of mentions of various terms, which are characteristics of medical tourism (specifically, "sustainable"), and the publication years of the corresponding scientific articles:

Null Hypothesis (H0): The frequency of mentions of the term 'sustainable' in the sections

'Author Keyword' and 'Index Keywords' is independent of the article publication year.

Alternative Hypothesis (H1): There is a positive correlation between the frequency of mentions of the term 'medical tourism' in the sections 'Author Keyword' and 'Index Keywords', and the article publication year. Confirming H1 will indicate changes in the conceptualization of 'medical tourism' and shifts in the scientific research paradigm driven by advances in science and emerging trends in medical tourism.

The alternative hypothesis was confirmed as follows: the conducted ANOVA analysis (based on Fisher's F-test) showed that the computed F-statistic was 25,224.215 with a corresponding p-value below 0.001 (p < 0.001), indicating strong evidence against the null hypothesis (H0). Additionally, this finding was corroborated by another non-parametric test — the Kruskal-Wallis test — which yielded an H-statistic of 269.106 and a similarly negligible p-value (< 0.001). Both methods collectively establish a statistically significant association between the frequency of mentioning the term «sustainable» and the publication year of the articles. Essentially, a clear correlation exists between the chosen keywords and evolving

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[3] Python is used in science and research with libraries for data analysis (pandas, NumPy, SciPy, Matplotlib etc).
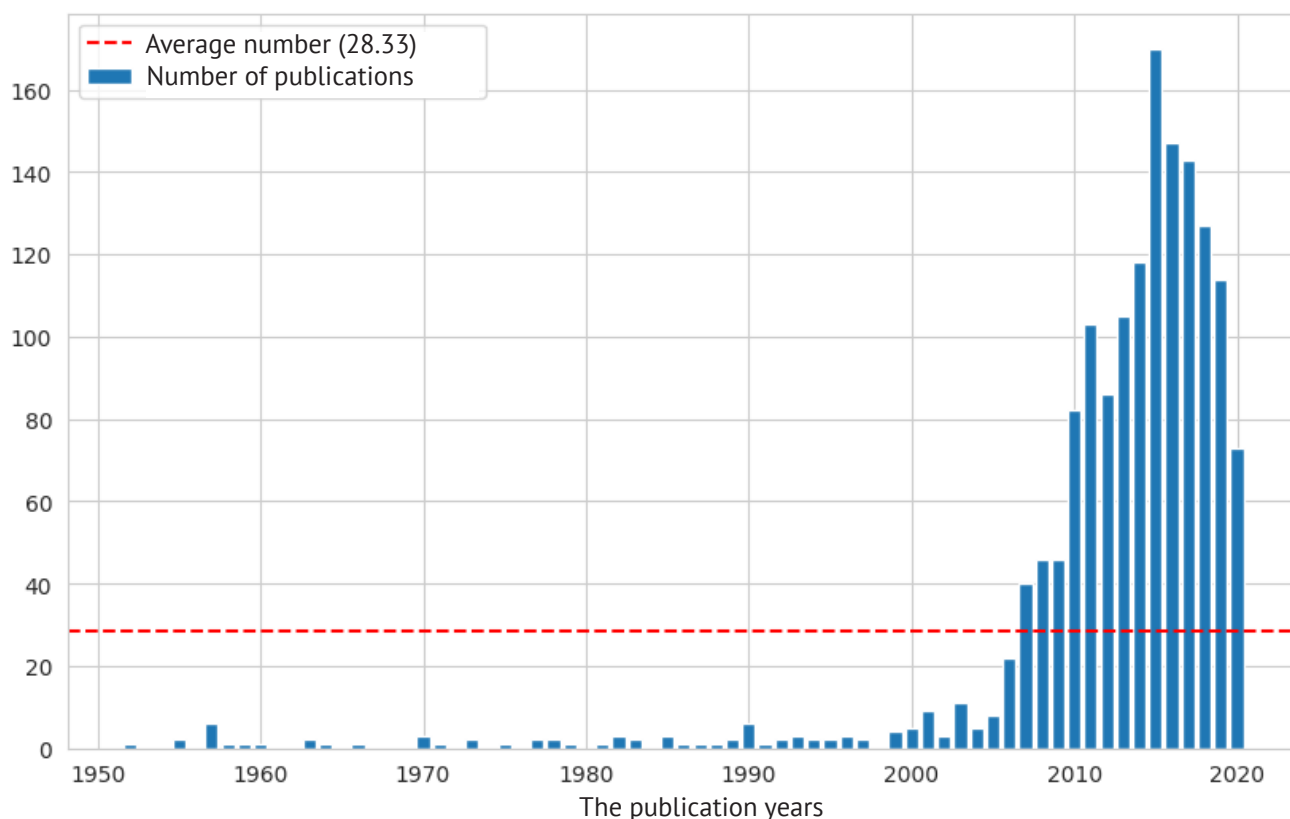
Fig. 2. **Number of Publications on Medical Tourism Indexed in the Scopus Database**
Source: compiled by the author using the Python programming language.

scientific interest in medical tourism venues.

Examining keywords popular in a specific period reveals shifting priorities and trends in this area. For instance, in 1952, prominent keywords included «medical tourism,» «stakeholder interaction,» «sustainable tourism,» «travel,» «USA,» «financial management,» «medical assistance,» «hospital management,» «human beings,» «international cooperation,» and «organization and administration,» highlighting early-stage research focuses.

Interestingly, the keyword «India» consistently ranked among the top ten most frequent terms throughout the period 1952–2020, illustrating robust growth in Indian medical and wellness tourism sectors. Since the 1950s, the USA remains a leading provider of medical services globally and a dominant source of outbound medical travelers, underscoring historic patterns: different countries emerge as focal points for medical tourists depending on changing economic landscapes and globalization demands.

Since 2015, there has been a noticeable rise in studies focusing on wellness tourism, signaling increased awareness of health-promoting lifestyles and preventative measures, especially post-COVID-19. This trend further reinforces the integration of wellness into broader discussions around medical tourism (see *Table*).

FREQUENCY OF KEY WORD USAGE BY YEARS

The transformation of the industry was visualised in view of the following aspects:
- participants or stakeholders (**medical tourism — stakeholders**);
- the separation of medical (health) and wellness (spa or wellness) tourism (**medical tourism — tourism segments**);
- cross-cultural evolution and national peculiarities of individual states, using examples of leading and developing countries, participants of the world market (**medical tourism — cross-cultural aspect**);

Table

Frequency of Key Word Usage by Years

Key words	Frequency of mentions	Year
In the authors' articles		
Medical tourism	1102	2011
Tourism	685	2012
Sustainable tourism	635	2009
Stakeholders networking	632	2009
Health tourism	131	2014
Medical travel	50	2015
Wellness travel	46	2015
Globalization	29	2013
India	28	2014
Healthcare	25	2013
In mass media publications		
Travel	1662	2013
United States	1558	2013
Human	1262	2012
Humans	1106	2013
Health care delivery	825	2013
International cooperation	788	2013
Medical tourism	778	2014
Delivery of healthcare	774	2013
Management	750	2013
Internationality	746	2013

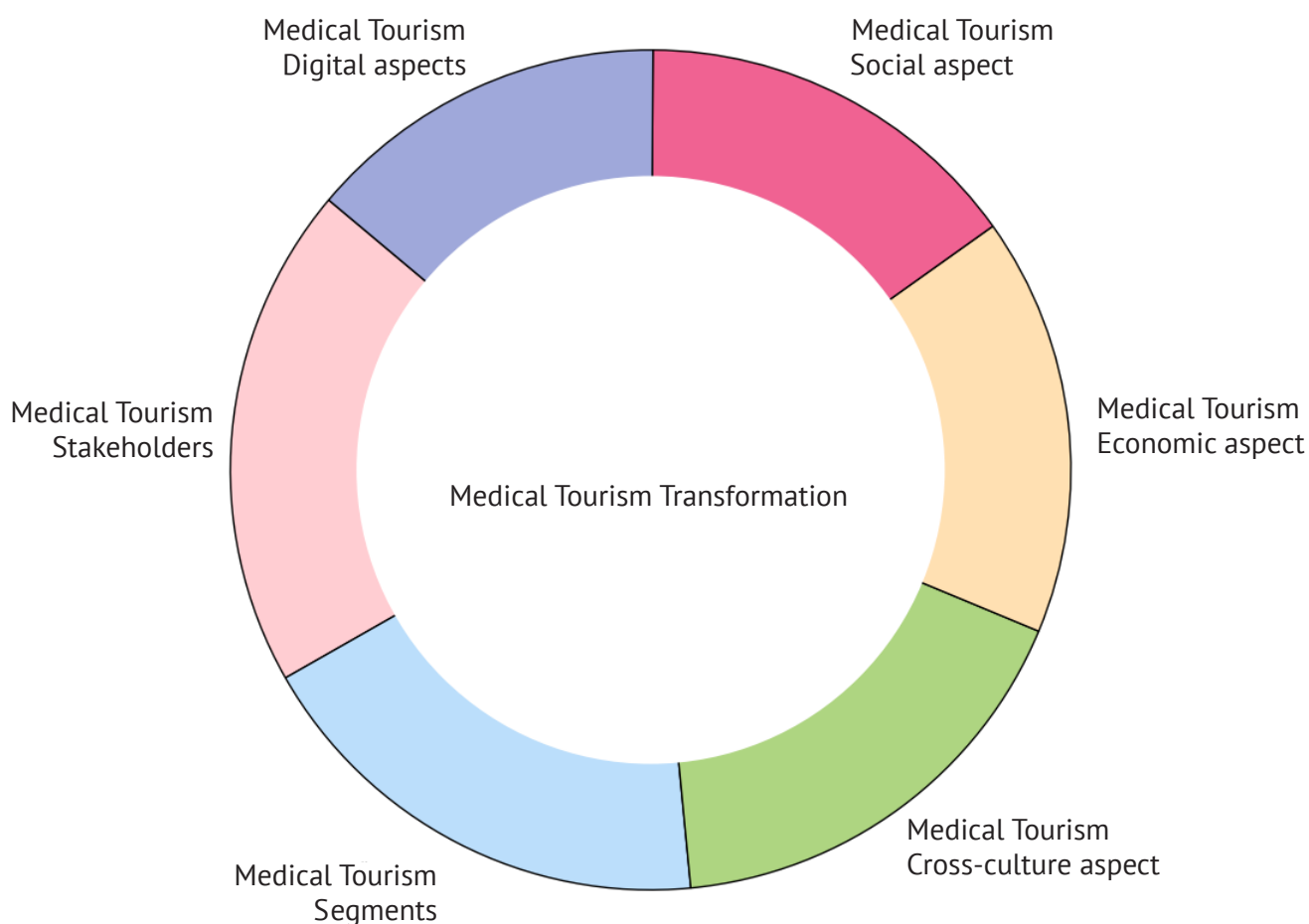*Source:* compiled by the author using the Python programming language.

Fig. 3. **Comprehensive Analysis of Medical Tourism Aspects**

Source: compiled by the author using the Python programming language.

• impact on economic indicators (revenues from international medical tourism, infrastructure and service costs, tax contributions, and contribution to GDP) (**medical tourism — economic aspect**);

• assessment of the influence on the healthcare system, the level of accessibility, and the quality of medical services rendered to medical tourists and local citizens (**medical tourism — social aspect**);

• digitalization in medical and tourist services, primarily the impact of AI (**medical tourism — digital aspect**) (*Fig. 3*).

RESULTS AND DISCUSSION

The abovementioned aspects of medical tourism were analysed in the context of three transformation stages: traditional and commercial stages, as well as the modern trend-stage determined by the strengthening role of technologies and the transition to a hybrid format.

Traditional Phase. Initially, medical tourism entailed journeys undertaken by physicians to impoverished or developing regions primarily for humanitarian missions (aid-based tourism). During this phase, doctors typically volunteered part-time at local clinics, conducting surgeries and offering consultation services. This stage predominantly reflected the mobility of medical practitioners: in the 1970s-1990s, teams from advanced economies traveled to other countries to provide medical expertise, conduct surgeries, and offer consultations to government leaders and affluent individuals.

Commercial Phase (from 1985 to the present time). Global political and macroeconomic shifts triggered the formation of medical tourism as an

independent industry, rendering diverse services for patients. A disintegration occurred within this sphere for inbound, outbound, and domestic tourism, which laid the foundation for shaping a new class of consumers of such services. From 2012–2015, wellness tourism acquired a synonymous meaning with health tourism and the closely related health-resort tourism (our research work does not examine in detail this direction).

Digital or Technological Phase (from 2019 to the present time). The role of technological solutions increased after the COVID-19 pandemic. Nowadays, patients have the opportunity to undergo consultations and diagnostics online, and doctors can perform surgeries with the AI assistance.

STAKEHOLDER AND SEGMENT ASPECTS OF MEDICAL TOURISM

Since 2020, a tendency has become apparent, that people travel beyond their country or region of residence to obtain medical care [1, 2]. There exist outbound, domestic, and inbound wellness tourism (therapeutic, or health resort-based and wellness tourism to improve health) [3, 4]. The author of the given article classifies two main categories: the first one travels to large cities to receive high-tech medical services, meanwhile the second one leaves metropolises seeking consultation with renowned medical specialists in regional locations or pursuing affordable therapeutic solutions. Medical tourism, often combined with wellness tourism, represents one of the fastest-growing segments in the global healthcare industry, valued at billions of US dollars annually. Patients go abroad for treatment "in search of added value" [5, 6].

The terms "medical tourism" and "healthcare tourism" are used interchangeably. The latter is rather a generalized concept, covering such areas as thermal wellness, spa-wellness tours, and tourism for the elderly and for disabled. Medical services within this domain encompass cardiovascular surgery, radiotherapy, organ transplantation, fertility treatments including IVF procedures, aesthetic and reconstructive surgeries, among others.

This type of tourism is in demand particularly among the patients who combine medical treatment with leisure during their vacation [7]. For instance, the Center for Fertility and IVF at Loma Linda University (LLU) in California, USA, offers high-quality reproductive health services.[4] The clients stay for an IVF cycle from 10 to 21 days depending on individual needs. Thus, female patients and their partners can combine treatment with leisure, taking excursions, etc.

After 2015, many researchers began to distinguish two main categories of wellness tourism: health restoration-oriented and medical ones. The first includes SPA procedures, yoga, Ayurveda, homeopathy, and naturopathy, while the second includes diagnostics, surgery, etc. The medical tourism industry has developed as a result of international collaboration and digital advancement, embodying a form of commerce linking the healthcare and tourism sectors. [8]. The phenomenon demonstrates "the global-scale economy in action", or the sale of health-related services: patients seek to obtain less expensive, high-quality medical care and/or access to healthcare technologies in another country [9, 10].

During the traditional phase outlined by the author, medical tourism referred to temporary assignments of clinicians from wealthier nations working in resource-poor settings. Today, medical students and healthcare professionals demonstrate increasing engagement in volunteer programs, expert consultancy, and emergency relief initiatives in developing countries. [11]. Currently, however, such outbound medical missions take place primarily within the realm of premium medical tourism, where clinics serving VIP clients invite world-class medical experts for telemedicine consultations and operation oversight utilizing robots and artificial intelligence.

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[4] URL: https://lomalindafertility.com/treatments/medical-tourism-in-vitro-fertilization/

Within the segmentation framework of medical tourism, treatment can be classified as elective, urgent, or emergency type, in accordance with a risk scale ranging from low to high level [7]. In the author's view, this classification could similarly employ a color-coding system akin to the three-level triage method used in medicine. Green indicates preventive measures associated with wellness tourism, yellow signifies intermediate conditions necessitating consultation with general practitioners, while red signals critical emergencies demanding immediate specialized medical interventions.

CROSS-CULTURAL ASPECTS

Over thirty countries worldwide have hospitals and clinics providing services to medical tourists [3]. The key countries in Asia are Thailand, India, Singapore, Malaysia, and the Philippines. The author examines South Korea [12] within the present research work, as an example of the fast-developing industry, which is attractive to foreign patients due to the cost-to-quality ratio of provided services, excellent care standards, and integrated healthcare and hospitality technologies [13].

In 2023, the number of Russians visitors to receive medical services in South Korea was 14,700, eightfold more than in 2009. This country serves as a benchmark for studying the organization of medical tourism. Hence, it is worth highlighting the following key points [13–15]:

History of legislative initiatives in the context of medical tourism. South Korea has

been promoting medical tourism since 2009 (as evidenced by the articles registered in scholarly databases): to attract foreign patients legislative initiatives were implemented. In 2016, the Korean Government adopted the "First Comprehensive Plan to Support the Expansion of Overseas Activities of the Healthcare System" as a stage in fulfilling the provisions of the (2016) "Act on Supporting the Expansion of Overseas Operations of the Healthcare System and Attracting International Patients".

Economic aspects. As per South Korean government assessments, the industry

revenues increase annually by 48.2 per cent. However, the growing number of tourists raises concerns due to a potential negative impact for the national healthcare system.

Problems and risks. The growth of private medical sector at the expense of the

state sector contributes to the generation of a two-tier healthcare system: high-quality services for foreigners and less accessible infrastructure for local residents. Another risk is the internal relocation of qualified doctors from public clinics to private ones.

Regional competition. South Korea competes with other Asian nations like Thailand, India, and Singapore, all striving to enhance their strategies for promoting medical tourism. Key initiatives include simplifying visa regulations, establishing medical hotels, and introducing medical care coordination services. Furthermore, in November 2013, according to a Presidential Decree adopted within the framework of the "Tourism Promotion Act", South Korea authorized medical hotels to host foreign tourists. They provided hospitality services (accommodation, meals, etc.) while simultaneously operating as medical institutions. Under this policy, such institutions will be registered by specialized entities or agencies dealing with medical tourism, and the new position of International Medical Tourism Coordinator (IMC) will be introduced to facilitate promotion of these services within the public healthcare sector.

One of the main competitors of South Korea is India. It made a part of its strategy the simplification of visa barriers and economic regulation. Specifically, India introduced M-visa (medical category visa), approved tax benefits for providers of medical tourism services, reduced customs duties, increased depreciation rates for certain types of medical equipment, and provided land for hospital construction at preferential prices.

The necessity of regulation. South Korea regulates the growth of the industry of medical

tourism and monitors resource distribution in order to prevent negative influence on the national healthcare system. The country demonstrated considerable industry growth: an annual revenue increased by 48.2 per cent, indicating the high efficiency of the implemented measures (however, it is important to consider the potential risks mentioned above). Similar policy, if waged in Russia, including the activities like chains of medical hotels and easier visa procedure, state support for the industry for conducting marketing campaigns, providing tax benefits, etc., could contribute to enhancing the competitiveness of the domestic medical tourism industry on the international arena.

SOCIO-ECONOMIC ASPECTS

According to Patients Beyond Borders data,[5] the global medical tourism market is estimated approximately from 65 to 87.5 billion USD [16]. The growth in the industry's popularity was generated by a number of factors: high healthcare costs in developed countries, easy travel accessibility, improved levels of medical care, and proven treatment safety in a number of states [17]. Medical tourism boosts a country's economy by providing more jobs, financial inflow, and attracting foreign investors. States secure advantages from the growing exchange of knowledge and experience, as a result of intercultural interaction of patients [18]. Entrepreneurs manage to fill market gaps in this sphere by improving the quality of services thanks to attraction of foreign clients and enhancing the image of the hosting country [19]. However, in some developed countries, cases have been reported, that tourists returned with infectious complications related to breaches of sanitary norms after surgical intervention [20].

The share of beds in public hospital is nearly 79 per cent in Asia, 84 per cent in Africa, and 71 per cent in Latin America. The main operators are non-profit social welfare-based entities. Such state of affairs leads to a high workload for the staff and low salaries, which prompts medical personnel to relocate abroad: Asians go to North America, Africans to the UK, and Eastern Europeans to Western Europe. However, high prices for such services in developed countries contribute to the appearance of medical tourism, thus, it helps reducing the leakage of medical staff abroad. Still, the absence of state regulation in this sphere generates social stratification, limiting the accessibility of high-tech medical care for the local residents.

DIGITAL TECHNOLOGICAL AND INNOVATION ASPECTS

The term "Industry 4.0" denotes the transition to a highly automated production based on the application of the Internet of Things (IoT), Big Data, cloud computing, Artificial Intelligence (AI), Augmented Reality (AR), additive technologies (3D printing, etc.). Integrating them into the field of medical tourism would enable remote delivery of basic services, thus minimizing patients' need for physical travel. The term 'Internet of Medical Things' (IoMT) related to this sphere was announced by the Abu Dhabi Health Department during the 12th Annual World Medical Tourism & Global Healthcare Congress in 2019.[6] The use of portable mini-devices and sensors, which are components of IoMT (fitness trackers, smartwatches, smart textiles), allows collecting patient health information and running real-time communication with medical specialists [21, 22].

As defined by the author of this article, hybrid medical tourism is a service, which allows persons, who stay in their permanent place of residence, remotely seek medical assistance from an institution where they had treatment previously. This can reduce the burden on healthcare facilities and provide residents with access (including at special discount prices or with medical insurance) to innovative technologies often available for premium medical tourists. The de-

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[5] URL: https://www.patientsbeyondborders.com/

[6] URL: https://www.doh.gov.ae/en/events/12th-World-Medical-Tourism-and-Global-Healthcare-Congress

velopment of hybrid medical and technological tourism enables solving the problem of two-tier healthcare, which was described earlier.

According to the author, the advancements in robotics and AI applications transform medical tourism into a part of the innovation economy: patients now travel overseas more for accessing cutting-edge technologies than for consulting well-known specialists. States unable to offer competitive developments risk losing leading positions in medical tourism in the coming decade.

The mobility restrictions imposed during the pandemic highlighted the importance of Industry 4.0 for advancing the medical industry. Digitalization and the integration of innovative solutions have given modern medical care a supranational dimension. [23]. Technological transformations can positively impact the increase in the average service costs per tourist since visitors will seek costly procedures conducted with innovative technologies available only in specific countries. For example, in 2017, the first-in-Russia Clinical Proton Beam Therapy Centre was opened in St. Petersburg on the basis of the Berezin Sergey Medical Institute (MIBS), which can annually treat over 800 patients from various regions of Russia and abroad.[7]

AI-based marketing technologies facilitate to identify more accurately potential patients, and predictive data analytics helps doctors understand their preferences [24]. However, this creates ethical concerns stemming from biases inherent in AI algorithms, potentially causing incorrect recommendations, faulty diagnoses, and improper formulations of treatment protocols due to flawed data processing during machine learning. [25].

Another trend in introducing new technologies involves transforming conventional catalog-based websites into intelligent platforms powered by AI-driven interactive services. For instance, under governmental initiative, South Korea established the national portal «Medical Korea,» designed to promote domestic medical services to an international audience. The platform features multilingual support, offering content localized into five major languages — English, Japanese, Chinese, Russian, and Arabic.

MasterCard entered into a strategic alliance with the Medical Tourism Association (MTA) in 2024 to streamline international payments for medical treatments. By introducing a virtual Mastercard option, the innovation addresses challenges linked to traditional cash transactions and bank wire transfers, simultaneously improving payment clarity and security.

MTA also created the "Better by MTA" platform, which combines medical and tourism services for booking and payment for the convenience of users.[8] Russian sector of medical tourism could introduce similar digital solutions, on the bases of the capabilities of the "Mir" payment system.

CONCLUSION

The criteria for assessment of medical tourism have transformed due to the evolution of societal views on its pros and cons, both for the global economy and for the economies of individual host countries.

The author suggests studying various aspects of medical tourism within the three phases of development: traditional, commercial, and digital (hybrid, technological) and determines its socio-economic aspects, namely:

• economic benefits for host countries: job creation, attraction of finance and foreign investments;

• risks and negative effects: lack of medical personnel in donor countries because of external relocation and intensification of social disparity due to limited accessibility of high-tech medical services for local residents in developing countries.

The article highlights how digital transformation and the adoption of new tech advancements bring numerous benefits to the industry. IoMT

[7] URL: https://protherapy.ru/about

[8] URL: https://www.mastercard.com/news/press/2024/july/mastercard-and-the-medical-tourism-association-join-forces-to-revolutionize-cross-border-health-care-payments/

ensures real-time interaction between doctors and patients, irrespectively of their location; AI and data analysis enhances marketing strategy: understanding patient preferences and increasing their satisfaction.

Technological shifts drive the evolution of hybrid medical tourism models, effectively lowering hospital occupancy levels and stabilizing prices for local populations. Advanced digital platforms also simplify bookings and payments, enhancing accessibility and safety. As emphasized by the author, competitive success in this dynamic landscape hinges upon possession of robust technology infrastructures.

For future research, several promising areas have been identified:

• Assessing the long-term socio-economic implications of medical tourism on national healthcare systems.

• Developing refined regulatory frameworks and informed state policies for managing medical tourism activities.

• Enhancing digital platforms and implementing advanced decision-support tools for stakeholders.

• Exploring potential scenarios for medical tourism resilience amidst large-scale events such as pandemics and other crises.

REFERENCES

1. Oborin M.S. Special types of tourism: Medical tourism. *Servis v Rossii i za rubezhom = Services in Russia and Abroad*. 2022;16(1):179-187. (In Russ.). DOI: 10.24412/1995-042X-2022-1-179-187

2. Nikol'skaya E.Yu., Ignat'ev A.A. Trends in the development and promotion of medical tourism in Russia. Moscow: KnoRus; 2023. 94 p. (In Russ.).

3. Ghasemi M., Nejad M.G., Aghaei I. Knowledge management orientation and operational performance relationship in medical tourism (overview of the model performance in the COVID-19 pandemic and post-pandemic era). *Health Services Management Research*. 2020;34(4):208-222. DOI: 10.1177/0951484820971438

4. Karadayi-Usta S., Asan S.S. A conceptual model of medical tourism service supply chain. *Journal of Industrial Engineering and Management*. 2020;13(2):246-265. DOI: 10.3926/jiem.3008

5. Crooks V.A., Ormond M., Jin K.N. Reflections on 'medical tourism' from the 2016 Global Healthcare Policy and Management Forum. *BMC Proceedings*. 2017;11(8):6. DOI: 10.1186/s12919-017-0075-8

6. Horowitz M.D., Rosensweig J.A. Medical tourism-health care in the global economy. *The Physician Executive*. 2007;33(6):24-31.

7. Mason A.M., Spencer E. Health communication: Insights for quality hospitality bridging healthcare delivery in medical tourism. In: DeMicco F.J., ed. Medical tourism and wellness: Hospitality bridging healthcare. Abingdon: Routledge; 2017:127-145.

8. Ghose K. Hospitality in and out of hospitals: Creating and maintaining brand equity for medical tourism destination brands (MTDs). *Romanian Journal of Marketing*. 2010;4:114-131.

9. Smith R.D., Chanda R., Tangcharoensathien V. Trade in health-related services. *The Lancet*. 2009;373(9663):593-601. DOI: 10.1016/S0140-6736(08)61778-X

10. Medhekar A. Government initiatives for developing medical tourism: India, Singapore, and Australia. In: Proc. 2nd Annu. int. conf. on tourism and hospitality research (THoR 2013). Singapore: Global Science and Technology Forum; 2013:7-16. DOI: 10.5176/2251-3426_THoR13.04

11. Chuang T.C., Liu J.S., Lu L.Y.Y., Lee Y. The main paths of medical tourism: From transplantation to beautification. *Tourism Management*. 2014;45:49-58. DOI: 10.1016/j.tourman.2014.03.016

12. Tarasenko E.V. The impact of the cross-cultural aspect on customer-centricity and competitiveness when working with "guest-patients" in the scope of medical tourism: Insights from international hotel groups. *RISK: resursy, informatsiya, snabzhenie, konkurentsiya = RISK: Resources, Information, Supply, Competition*. 2025;(1):129-135. (In Russ.). DOI: 10.56584/1560-8816-2025-1-129-135

13. Xu Q., Purushothaman V., Cuomo R.E., et al. A bilingual systematic review of South Korean medical tourism: A need to rethink policy and priorities for public health? *BMC Public Health*. 2021;21(1):658. DOI: 10.1186/s12889-021-10642-x

14. Semina L.I., Slobodyan D.E. The place of the Republic of Rorea in the international medical tourism market. *Koreevedenie = Koreanology*. 2024;(3):41-56. (In Russ.). DOI: 10.48647/ICCA.2024.47.42.005

15. Tastanbekova Sh.O. Global experience in the development and promotion of medical tourism: South Korea as an example. *Vestnik KazNMU*. 2016;(4):477-481. (In Russ.)

16. Hassan V., Noaman S. Relation between tourism and health: Case study AIDS in Lebanon. Atiner Conference Paper Series. 2017. TOU2017-2262. URL: https://www.researchgate.net/publication/340846049_Relation_between_Tourism_and_Health_Case_Study_AIDS_in_Lebanon

17. Horowitz M.D., Rosensweig J.A., Jones C.A. Medical tourism: Globalization of the healthcare marketplace. *MedGenMed*. 2007;9(4):33.

18. Pocock N.S., Phua K.H. Medical tourism and policy implications for health systems: A conceptual framework from a comparative study of Thailand, Singapore and Malaysia. *Globalization and Health*. 2011;7:12. DOI: 10.1186/1744-8603-7-12

19. Hopkins L., Labonté R., Runnels V., Packer C. Medical tourism today: What is the state of existing knowledge? *Journal of Public Health Policy*. 2010;31(2):185-198. DOI: 10.1057/jphp.2010.10

20. Menon K.V., Abdelmottaleb M., Al Ghafri K., Kumar R. An audit of surgical site infections among Omani travelers to India for spinal surgery. *Health Policy Open*. 2021;2:100049. DOI: 10.1016/j.hpopen.2021.100049

21. Junata M., Tong R. Wearable technology in medicine and health care: Introduction. In: Tong R., ed. Wearable technology in medicine and health care. London: Academic Press; 2018:1-5.

22. Wong B.K.M., Hazley S.A.S. The future of health tourism in the Industrial Revolution 4.0 era. *Journal of Tourism Futures*. 2021;7(2):267-272. DOI: 10.1108/JTF-01-2020-0006

23. Hassan V., Bellos G. COVID-19: Reshaping medical tourism through artificial intelligence (AI) and robotics. *Athens Journal of Tourism*. 2022;9(2):77-98. DOI: 10.30958/ajt.9-2-2

24. Reshadi M.S., Mohammadi Chehragh A. A review of medical tourism entrepreneurship and marketing at regional and global levels and a quick glance into the applications of artificial intelligence in medical tourism. *AI & Society*. 2025;40(5):4011-4027. DOI: 10.1007/s00146-024-02178-6

25. Shafik W. Artificial intelligence and the medical tourism. In: Examining tourist behaviors and community involvement in destination rejuvenation. Hershey, PA: IGI Global; 2024:207-233. DOI: 10.4018/979-8-3693-6819-0.ch016

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ORIGINAL PAPER

Implementation of Artificial Intelligence Tools in IT Companies: European Research 2023–2025

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ABSTRACT

The goal of the study is to assess the potential of AI tools in industrial software development. It is based on the analysis of the results of applied research of the main areas of AI application and the potential capabilities of AI in Europe in 2023-2025 were analyzed, and expert forecasts were compared with the actual state of affairs in the IT industry in mid-2025. **As a research hypothesis** the study suggests, that AI tools and their application techniques have reached the state of technological maturity to function as full-fledged tools for automating the work of virtually every member of a software development team. **The objective** includes determining the possibilities of practical application of AI tools in software development by mid-2025, taking into account a holistic analysis of the prospects of the industry's development. **Scientific novelty** of the research represents comparison of previous forecasts by industry experts with the current state of affairs in the European IT industry. Furthermore, the research provides specific recommendations for implementing AI tools in the process of software development.

Keywords: artificial intelligence; large language models; software engineering; digital transformation

For citation: **Pashchenko D.S. Implementation of artificial intelligence tools in IT companies: European research 2023–2025. The World of New Economy. 2025;19(4):114-122. DOI: 10.26794/2220-6469-2025-19-4-114-122**

INTRODUCTION
AND PROBLEM STATEMENT

The development of software by means of artificial intelligence tools has been a relevant scientific and practical objective for over the last 15 years. Numerous specialised and consulting entities tried to predict the future of software engineering with AI tools playing a key role [1, 2], and to present innovative production processes characterised by a high degree of automation and the application of "intelligent" technologies [3]. Nevertheless only by the fall of 2022, there occurred a significant shift in the organisational and production paradigms within the industry of software. This was facilitated by the evolution in the pertinent development of AI tools and their unparalleled access to millions of specialists worldwide.

Traditional software development centres pertinent in isolated offices are more commonly replaced by geographically remote teams [4, 5]. Within these new configurations, each key production function, like systems analysis, project management, design and development of software, is presided over by an expert efficient in automation tools that perform autonomously all routine tasks on their behalf. Notably, the transition from workplace-based work to hybrid and completely remote formats has also played a crucial role in this process: new models of organizational structures have significantly modified the fundamentals of team formation, recruitment strategies, and termination of employment in the IT industry [5].

Concurrently, the technologies based on the concept of using AI tools in software engineering (AI-augmented software engineering) are assuming growing importance [6]. The capacity of IT-companies to adapt effectively to such fast-changing consequences becomes vital for sustaining competitiveness [7]. Despite the industry's active ongoing changes, investments in its key areas require a well-balanced and prudent approach, which, in turn, determines the relevance of making corresponding research [8].

To accomplish the defined objective of evaluating the potential of AI tools in software develop-

ment, the findings of the author's earlier scientific studies were analysed in the articles "Early Formalisation of the Use of Large Language Models in Software Development" [9] and "AI Tools in Software Production: Demand and Barriers" [10]. These researches involved over 60 teams from IT companies, system integrators, and banks with high-level in-depth proficiency in software development, throughout a wide territory: from Russia and Kazakhstan to the UK and Spain. Participants were among representatives of various segments of the industry, such as the following:

• Independent software vendors, who accomplished both in-house and product development (Miro, Google, Finastra, Finshape, Sber, VTB, Playrix, OZON, PSB, Deutsche Bank);

• Companies of tailor-made software development and outsourcing entities (Atos, SOFTEC, First Line Software, EPAM);

• System integrators (ThoughtWorks и Auxo);

• Other IT companies with intricate corporate structures (Capgemini Engineering, ARM, ZEISS Digital, Ericsson).

The author applied a two-round methodological approach:

• Structured Google Forms surveys and video interviews;

• Unification of results and their discussion with experts (including feedback on preliminary findings).

Such a broad composition of experts (35 developer teams involved the first study and 27 teams in the second one), as well as the broad geographical representation (*Table 1*), has provided a strong evidence-based background, allowing for the expectation of a thorough reflection of advanced European experience.

The author's works [9, 10] comprised three sections, the last of which contained forecasts related to medium-term and long-term trends in the development of AI tools and the transformation of the IT industry. This article presents an interim analysis of the findings regarding the market outlook of the industry as of mid-2025, and assessing the possibilities for accomplishment of some ideas in the near future.

Table 1

Categories of Experts

Indicator	Characteristics of Experts		
Experience in software development	Less than 10 years	10–15 years	Over 15 years
Study 2024	22%	19%	59%
Study 2023	11%	22%	67%
Regions which have represented its experience in the study	Northern and Western Europe (Spain, Sweden, France, Germany, Switzerland, UK, etc.)	Central and Southern Europe (Poland, Czech Republic, Hungary, Serbia, Bulgaria, Cyprus, etc.)	Eastern Europe and CIS (Ukraine, Russia, Armenia, Turkey, Kazakhstan, Georgia, etc.)
Study 2024	11%	33%	56%
Study 2023	29%	20%	51%
Type of Business in the IT Industry	Software vendors, including in-house and product development	Software development services on order and outsourcing	Other type of IT business
Study 2024	56%	33%	11%
Study 2023	46%	29%	25%

Source: compiled by the author.

MAIN RESULTS OF APPLIED RESEARCH: 2023–2024

Both pan-European studies [9, 10] confirmed a sustained tendency of surging demand for software development with application of AI technologies, which fully corresponds with the theory of E. Rogers [13]:

• There exist groups of "innovators" and "early adopters" with project teams accomplishing corporate plans to integrate AI into software development processes, also applying integrated centralised policies and/or regulations.

• A category of "early majority" emerged by the late 2024, its participants have studied AI tools by means of pilot projects, individual and team experiments and have moved to their implementation in production processes, meanwhile the "late majority" and "laggards" groups are still emerging.

Besides, in accordance with the obtained findings, in mid-2023 nearly 20 per cent of teams and entities used AI tools in software development, and 43 per cent planned to do so in the near future [9], meanwhile by the end of 2024 these figures were 35 per cent and 48 per cent, correspondingly. The same applies to experts: in mid-2023, about 23 per cent of them used these tools in their professional operations on a regular basis and by late-2024, their number reached over 37 per cent. The experts found the impact of such technologies on the solution of daily tasks efficiently as significant, although 30 per cent of respondents still consider its significance as moderate but useful for performing specific tasks [10].

Both studies similarly identified the key advantages of using large language models (LLMs) in software development processes:

• Automation of routine operations and time saving;

• Intensifying the processes at the team and organisational level;

• Qualitative improvement of software product, including better user experience and documentation.

Besides, notably, although AI tools are not of high demand in business and systems analysis tasks, but they are assiduously applied in the following spheres:

• Encoding (including unit tests, stored procedures, etc.);

• For code reviewing (including its optimisation and refactoring);

• For accelerated prototyping of software solutions.

Approximately 63 per cent of experts applied them in code development and they were fully pleased with the results obtained [10].

The most common types of assignments with these technologies are the following:

• Writing automated tests;

• Fault management and reporting analysis;

• Identifying errors and vulnerabilities in code.

Still, approximately half of the teams have not used these advantages. Besides, experts pointed out the following:

• The influence of LLMs on the professional training of engineers is significant (41 per cent);

• LLMs are simply another useful tool (44 per cent).

Undoubtedly, the process of AI implication encounters the following snags:

• A high level of various risks — legal, ethical, etc. (44 per cent);

• Shortage of financial, time-based and human resources (30 per cent);

• Organisational resistance to innovations from engineers and managers (18 per cent).

Anyway, despite all of the above, the share of IT companies that basically apply these technologies with an official corporate policy for their use is 26 per cent, while only 30 per cent currently resort to it on a test-regime basis [10].

Thus, both studies come at the following results:

1. In Europe, there already exist "innovators" (pioneers), "early adopters", and the "early majority" groups.

2. The current use of AI tools is focused on working with program code, providing with software quality and automating documentation.

3. The need of IT companies is obvious for developing new skills for staff-AI dialogue: the earlier they start training, the more efficient will be the deployment of new systems.

In 2023, researchers studied the advantages of using the LLM Llama 2 and the tasks the model is most relevant. It turned out, that by the middle of the year it had already coped with the implementation of numerous tasks: from the common generation of required texts and program codes to the integration of solutions based on it into existing software products [11]. Thus, within a few weeks, European and the US developers generated dozens of free-for-all working projects, which exceeded most of their expectations, although this required knowledge and specific AI tools skills, as well as an advanced engineering culture in software development.

Regarding the level of demand in 2023–2024, for AI tools creating new IT products in Central Europe and the USA, it is worth noting that the abovementioned project was accomplished by the teams working in large corporations (General Electric, Nestle, Pfizer, Siemens), which are not software IT companies [12]. This is why, they lag behind in development of innovations rather than the enterprises mentioned earlier [10, 11]. However, the authors of the aforementioned researches have come to the common conclusions, namely:

• The demand for AI in software engineering is fast-growing for each year of observation;

• AI-powered tools reduce time-to-market manufacturing process of new products;

• Notable impediments to introducing AI systems in software development can be eliminated by involving top management in centralised innovation management, additional funding, and early training of employees.

Thus, describing new AI technologies, all specialists emphasise the timeliness of this trend for the IT industry, particularly for software development. The companies avoiding them risk losing ground to competitors and their market positions. However, notably, AI tools will not replace IT engineers not now or later, but serve only to automate routine tasks.

Research Objectives (by mid-2025)

Research questions	Comments
Current role of AI tools in a team of engineers developing software.	Potential options of solution: auxiliary or primary tool for the engineer, coordinator of team efforts, prospective replacement for a person, etc
Current impact of AI tools on the transformation of necessary engineer skills.	It is necessary to identify, which individual and team skills are required for the optimal use of AI tools, how they develop over time
Aggregated development of AI tools which meets the expectations of engineers.	Rapid progress of AI tools for software development continues in 2022–2025. We must understand, which vectors of this development have been already accomplished
Rapid regulation of AI tools and their application methods in Europe.	Ethics, intellectual property, and information security are only a few of the aspects, which predict rapid regulation of the AI sphere in Europe and the USA
Most significant and noticeable elements of the current IT industry transformation related to AI.	The IT industry is actively transforming, the development of AI has a quite definite impact on this process alongside other trends: general digitalisation of the industry, virtualisation of production processes, and fully remote work of employees

Source: compiled by the author.

In the light of the findings of the applied research, the following aspects should be pointed out:

1. It is worth starting the implementation of AI tools with the most suitable areas of engineering activity, namely, with the tasks related to writing program code and creating product documentation.

2. It is necessary to formalise and document the process of AI implementation, and secure official support from the company's top management.

3. Special attention to AI from regulators requires all-round risk management in the implementation of internal projects for its introduction.

The findings of the research described in the section allowed for creation of a few practical research questions (*Table 2*), which will help solving the posed scientific problem and test the proposed hypothesis.

REFLECTION OF EARLY EXPERT FORECASTS IN THE REAL PRACTICE OF THE IT INDUSTRY

Currently, regarding the development of AI tools and their implementation in the IT industry, we can distinguish the following time horizons:

- Short-term perspective: **3–7 years**;
- Medium-term perspective: **up to 10 years**.

This section presents a set of forecasts for both terms including analyses of the industry's highlights already achieved by mid-2025.

The experts among participants of the above-mentioned surveys [9, 10] assessed the promising directions for introduction of AI (including large language models) into the production processes of software development in the medium term.

1. AI will be used as an ordinary tool for software engineers in the work associated with software design and code creation, namely, as an assistant for a large number of tasks and in the rest as a consultant or mentor.

2. For software quality management, AI will become an ordinary tool for experts in charge of accepting and validating new releases.

Respondents decline the idea of complete replacement of people with AI tools in all areas of software engineering in any timeframe [9, 10, 12]. However, 21 per cent of them believe that in the future, widespread AI involvement will trigger grave professional risks for certain categories of IT specialists [10].

The required routine skills of developers will change, since software development transform

its production paradigms in the medium term. Thus, 46 per cent of experts expect high demand for special knowledge related to interaction with and management of AI. Still, 31 per cent of software engineers express their confidence in a further change in the very essence of their profession within the framework of projects [9]. In reference to several case studies, it becomes clear how fast developers are mastering new technologies and apply them in their own solutions [11]. This not only illustrates a rapid reaction of engineering communities to accessible innovations but also their high dynamics in all processes: from studying tools to their commercial use.

Although it is obvious that the drivers of global changes in the IT industry become the most innovative IT companies, however, sometimes, leading corporations from various sectors actively and in a coordinated way implement new technologies [12]. In the author's opinion and according to E. Rogers' classification, in 2025, this ongoing process represents the formation of the "late majority". Moreover, AI tools quickly turn into standard internal solutions for some leading corporations (from Russia's Sber to the US Amazon), which are not specialised in creating industrial software. This indicates a high demand for AI tools and rising competition.

Forecasts regarding a comprehensive AI tools development in the medium term are interrelated with solving typical tasks in software development, as well as the integration of AI into the most modern environments (code editors, build tools, documentation tools, etc.) and its implementation in project management systems (Trello, MS Project, Jira, etc.).

The directions most anticipated by development engineers by mid-2025 have been accomplished or ongoing in the final stages of implementation:

• Cursor AI (a contextual programming assistant) was integrated into the major part of standard software development environments and it fully supports high-level programming languages, so that, by mid-2025, more than half of the global corporations ranking in the Fortune top 1000 list use it on a regular basis[1];

• Full-fledged AI agents have already been implemented in all popular project management systems (Jira, Trello, etc.).

One more research question from *Table 2* is related to a rapid regulation of AI in Europe. Experts identified the following key problems in this domain [9, 10]:

• Information security: rapid development of AI implementation clearly may damage a comprehensive security management, both at the corporate and state levels.

• Implementation of AI tools for complex projects, a laborious high-risk process: data sources turn out to be increasingly specialised depending on the project type and the AI tool applied.

• Ethical aspects. The open data sources used for training global language models cannot be indefinitely available in public domain. Copyright and patent norms violation, as well as leakage of corporate secrets become severe problems in view of increasing demand for new technologies worldwide.

By mid-2025, a package of laws and acts regarding AI regulation were adopted:

• Since February 2, 2025, the AI Act[2] has been put in force in the European Union, which rather strictly regulates a large number of risks associated with the use of AI, including it in the IT domain.

• The Russian Federation legitimised a whole variety of by-laws and presidential directives in this area, which contain elements of sectoral regulation in view of the potential use of AI in the economy.[3]

In 2025, Kazakhstan, Turkey, Ukraine, the UK and some other countries adopted specialised laws regulating the use of AI in various sectors of the economy.

Finally, let us make an expert viewpoint analysis how the AI implementation in software engi-

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[1] URL: https://www.cursor.com/enterprise

[2] URL: https://artificialintelligenceact.eu/

[3] URL: https://ai.gov.ru/ai/regulatory

Table 3

Solutions of Scientific Research

Research Question	Summarised Answer (by mid-2025)
Current role of AI tools in a team of software engineers	Engineer's primary tool. In the future, all areas of activity will be automated by a set of AI tools integrated with each other. Replacing human interaction with AI is not regarded, but the role for each position of team members (e.g., developer, tester, etc.) is changing significantly
Current impact of AI tools on the change of required engineer skills	The transformation of personal skills has already begun. The efficiency of a software engineer's and manager's working with AI tools is their personal competitive advantage in the labour market. The changing role of human aspect in the project at the next stage of automation also substantially impacts the need of acquiring new skills
Comprehensive development of AI tools is meeting engineer expectations	AI tools rapidly expands for software development. Practically all production tools in the industry (from development or testing environments to product and project management) are either integrated with external AI agents or have acquired new functional capabilities similar to the operation of such agents
Rapid regulation of AI tools and methods of their application in Europe	The issues of ethics, intellectual property, and information security is still a hot discussion topic about AI. However, both Europe and Russia (unlike China and the USA) are striving for rapid and rather strict regulation of AI in the form of laws and by-laws
The most notable and noticeable elements of the ongoing IT industry transformation related to AI	Since 2019, the transformation of the IT industry has been actively proceeding. The impact of AI on simple production and management processes is most noticeable, namely, in automation and also reduction of the probability of human errors. However, inadequate tools and insufficient investment do not yet allow for a transition to the target scenario: create a comprehensive automated software development process with minimal need for human participation

Source: compiled by the author.

neering will progress in the long term (until 2030), including the following stages:

1. Integration of AI tools into all areas of software development processes.

2. Complete integration of all AI tools jointly and with other production means in IT.

3. Formation of a comprehensive automated software development process with minimal need for human interaction.

Although respondents decline any possibility of a complete replacement of human participation by AI tools, some of such predictions have already came true by mid-2025:

• standardised and simple operations (such as web development) require AI tools rather than junior specialists, which occurs more easily and quickly than in complex and specialised projects;

• AI is transforming traditional roles: software developers move from programming to co-ordinating AI tools, which increases productivity but requires new skills and non-stop professional self-development;

• brands of software developer are transformed into centres, which provide consulting services and comprehensive integrations of information systems.

Thus, the research hypothesis is true: there is a growing demand for AI tools, the dynamics of transformations in the IT industry remain extremely powerful, and expert predictions for the medium term have already come true. Solutions to the research questions provided in *Table 3* will demonstrate that AI tools have reached industrial maturity: they are intensively used in software cre-

ation processes and represent an obvious competitive advantage, both nowadays and in the future.

CONCLUSIONS

The conducted analysis allows for determining with a high degree of confidence about a stable trend towards the widespread implementation of artificial intelligence, particularly large language models, in the processes of industrial software development. The integration of research results proves that AI tools make a strong impact on the technological transformation of the IT industry, which is ongoing actively.

New technologies are extensively introduced in the key engineering processes of European IT companies. They are efficiently used in creating product documents and program code, and in quality management of software. AI tools have a strong impact on the process of professional training, providing a more personalised and contextually relevant approach to develop engineering competencies. Concurrently, the following basic obstacles persist: shortage of financial resources, legal and ethical risks, inertia resistance of team members. Most of such deficiencies are easy to surmount by means of centralised support for changes from the company's top management and the application of a consistent strategy of implementation. Let us emphasise it: AI does not displace human factor from the IT industry, but merely automates standard and routine tasks. However, in the long term, we expect transition to new software development paradigms with AI tools closely integrated with each other and with other IT systems to minimise human participation in all routine processes.

By mid-2025, regulatory acts governing the risks related to the use of AI in the spheres of information security, ethics, and intellectual property have been adopted in the EU and some other countries. For Russia, the issue of information security is of particular importance in the light of developing national IT industry and building digital economy. Obviously, this aspect will be regulated in the near future.

The introduction of AI tools in software development processes has become an important and stable trend, which received institutional consolidation in leading corporations. It rapidly modifies the IT industry and accelerates the overall dynamics of its transformation.

Effective application of AI requires a centralised approach supported by the autonomy of developers and the transformation of organisational structures. Otherwise, enterprises may lose their competitive position. It is advisable for Russian IT companies to start promptly the use of such tools at the corporate level with formalised support of top management. In the short term, it is also advisable to commence with production processes related to code and documentation creation, gradually applying AI throughout all production areas, from project and product management to operations related to quality control and user support.

AI tools are not a replacement for people, but a means of enhancing their productivity, quality, and speed of implementation of software solutions. The introduction of AI tools is combined with a revision of staff training models and the development of new engineering competencies.

It is recommended to make investments not only in the purchase of new AI technologies (basically, by recurring payments per workstation), but first of all, in training for engineers, by means of providing new opportunities for them to use AI effectively in their activity.

Thus, the given research proves that the potential of AI tools is sufficient for the comprehensive automation of every process in software development. Moreover, it is already apparent, that these technologies become an integral part of modern engineering practice, defining a new vector for the development of the IT industry within the framework of its transformation, which began at the end of the last decade.

REFERENCES

1. Gorban A., Grechuk B., Tyukin I. Augmented artificial intelligence: A conceptual framework. URL: https://www.researchgate.net/publication/323003938_Augmented_Artificial_Intelligence_a_Conceptual_Framework

2. Kästner Ch., Kang E. Teaching software engineering for AI-enabled systems. In: Proc. ACM/IEEE 42nd Int. conf. on software engineering: Software engineering education and training (Seoul, June 27 — July 19, 2020). New York, NY: Association for Computing Machinery; 2020:45–48. DOI: 10.1145/3377814.3381714

3. Barenkamp M., Rebstadt J., Thomas O. Applications of AI in classical software engineering. *AI Perspectives*. 2020;2(1):1. DOI: 10.1186/s42467–020–00005–4

4. Boyko O., Holoborodko Y. Distributed software development in 2025: All you should know. SPD Technology. Jul. 23, 2024. URL: https://spd.tech/dedicated-development-teams/distributed-software-development-team/

5. Pashchenko D. S. Consolidation of a new organizational and production paradigm in software development projects. *Informatsionnye tekhnologii = Information Technologies*. 2024;30(3):150–158. (In Russ.). DOI: 10.17587/it.30.150–158

6. Panetta K., Set up now for AI to augment software development. Gartner. Sep. 21, 2023. URL: https://www.gartner.com/en/articles/set-up-now-for-ai-to-augment-software-development

7. Cakmak Z. Adapting to environmental change: The importance of organizational agility in the business landscape. *Florya Chronicles of Political Economy*. 2023;9(1):42–53. DOI: 10.17932/IAU.FCPE.2015.010/fcpe_v09i1004

8. Pashchenko D.S. Change of organizational and production paradigms in the IT industry: Research 2020–2023. *Mir novoi ekonomiki = The World of New Economy*. 2023;17(3):83–90. (In Russ.). DOI: 10.26794/2220-6469-2023-17-3-83-90

9. Pashchenko D. S. Early formalization of AI-tools usage in software engineering in Europe: Study of 2023. *International Journal of Information Technology and Computer Science (IJITCS)*. 2023;15(6):29–36. DOI: 10.5815/ijitcs.2023.06.03

10. Pashchenko D. S. Crecimiento en la demanda de herramientas de inteligencia artificial en ingeniería de software: Resultados de un estudio paneuropeo 2024. *Revista de Investigación en Tecnologías de la Información*. 2025;13(29):82–91. DOI: 10.36825/RITI.13.29.008

11. Roumeliotis K. I., Tselikas N. D., Nasiopoulos D. K. Llama 2: Early adopters' utilization of Meta's new open-source pretrained model. Preprints.org. Aug. 01, 2023. DOI: 10.20944/PREPRINTS 202307.2142.V2

12. Cooper R. G., Brem A. M. The adoption of AI in new product development: Results of a multi-firm study in the US and Europe. *Research-Technology Management*. 2024;67(3):44–53. DOI: 10.1080/08956308.2024.2324241

13. Rogers E. M. Diffusion of innovations. New York, NY: Free Press; 2003. 576 p.

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Conflicts of Interest Statement: The author has no conflicts of interest to declare.

The article was received on 30.06.2025; revised on 09.07.2025 and accepted for publication on 21.08.2025. The author read and approved the final version of the manuscript.