



2021

MANAGERIAL SCIENCES IN THE MODERN WORLD

IX INTERNATIONAL SCIENTIFIC-PRACTICAL CONFERENCE “MANAGERIAL SCIENCES IN THE MODERN WORLD”

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2022, EurAsian Scientific Editions SA, Geneva, Switzerland /

2022, EurAsian Scientific Editions Ltd, Hong Kong /

2022, EurAsian Scientific Editions OÜ, Tallinn, Estonia

www.eurasian-scientific-editions.org

ISBN 978-9916-9745-5-1

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PREFACE

On 9 November 2021, 9th International Scientific-Practical Conference “Managerial Sciences in the Modern World” was opened. This year, the event took place in the online format because of the strained epidemiological situation. A total of about 450 specialists took part in the conference.

“Managerial Sciences” has already become a kind of brand, with more than half a dozen different round table discussions, sections”, said Arkady Trachuk, Dean of the Faculty “Higher School of Management” at the Financial University under the Government of the Russian Federation, who moderated the plenary session.

He said that the 2021 conference participants included representatives from Latvia, Republic of Fiji, Kuwait, India, Uzbekistan, and Russia. Russia was represented by seven regions: Moscow and Moscow Region, Bryansk-, Tver-, Saratov-, Arkhangelsk regions, Republic of Tatarstan and Krasnodar Territory. Delegates from 25 universities, including 6 foreign higher educational establishments, took part in the sections’ work.

The central event of the first day of the conference was a plenary session during which presentations were delivered by representatives of Germany, Slovenia, Uzbekistan and Russia. The plenary session was opened by Arkady Trachuk. His presentation focused on the goals of introducing digital technologies in the Russian industry. The speaker presented the results of the research implemented by a team of scholars from the Department of Management and Innovation at the Faculty “Higher School of Management”.

Alexander Brem, Head of Technological Entrepreneurship and Digitalisation at Stifterverband Consulting Company funded by Daimler Foundation (Germany), talked about artificial intelligence as an innovation management technology. The expert is convinced that artificial intelligence will become the core technology to drive the technological development in the 21st century.

Jörg Geisler, head of Finance and Risk Management at S-Kreditpartner GmbH, expert on consumer lending at savings banks (Germany), dwelled on an important subject – “Risk management at times of digital innovation” by the example of the banking industry.

Samo Bobek, Dean of the Faculty of Economics and Business (FEB) at the University of Maribor, Professor of e-business and information management (Slovenia), delivered a presentation on “Digital transformation impact on business models”. His presentation dealt with digital transformation of business models.

Azizjon Bobojonov, Head of International Project Office, Associate Professor of the Department “Digital Economy and Information Technologies” at Tashkent State University of Economics (Republic of Uzbekistan), talked in his presentation “Reinventing the services in the digital age” about new discoveries in the service industry in the epoch of digital transformation.

The plenary session was followed by thematic sessions in the following areas:

- Change management and leadership
- Business strategies and sustainable development
- International management and business
- Theoretical issues of management
- Theory and practice of project management
- Corporate governance and corporate social responsibility
- Operations and business process management
- Strategic financial management
- Public sector management and efficiency problems
- Major cities and urban agglomerations management
- Real sector investment management
- Crisis and business continuity management
- Systems analysis in management
- Knowledge and talent management
- Sports digitalisation management
- Digital marketing and marketing communications
- Shaping innovation strategy in the conditions of the fourth industrial revolution.

Systematic analysis of the reputation capital impact on the region economic activity boost

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Abstract. The issues of searching for factors triggering the mechanisms of economic dynamics are still debatable, generating contradictions between various economic schools and trends. This is caused by both differences in fundamental approaches and conjunctural transformations that launch new forms and tools for activating economic growth in modern reality. In this regard, an extremely important methodological aspect in the study of regional development is the use of approaches based on the reputation economics principles, which studies reproduction processes through the prism of reputation capital. Taking into account the relevance of this issue, this study attempts to systematically analyze the impact of the region's reputational capital (classified as intangible assets) on the growth of economic agent's business activity. Methods of constructing recursive equations system had identified key regularities of reputation influence on the region economic activity boost and had substantiated key directions of state regional policy implementation through the prism of reputation economics theory. The interpretation proposed in this study disclosing the priorities and features of regional development today in the era of the Fourth Industrial Revolution and shows the specifics of territorial strategic management.

Keyword: reputation capital, reputation economy, business activity, adaptive regional policy

1 Introduction

The quality and effectiveness of development today should be evaluated through the prism of the analysis of socio-economic system "external" potential and not only the "internal" one, as it is traditionally considered and postulated by economic schools. While in the conditions of the administrative and distributive management system, the effectiveness of territorial development was determined mainly by the presence of compliance of actual

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indicators with planned ones, then as economic relations evolved, other priorities began to come to the fore, regulating the efficiency and potential of future growth [1-3].

In this regard, in the study of regional development it becomes extremely important to rely on the principles and methodological approaches of the reputation economy, which is proposed to be understood as “the distribution, exchange and consumption of goods and services as a result of positive reputation formation of economic agents in the global information space, ensuring the “attraction” of economic entities to the region” [4].

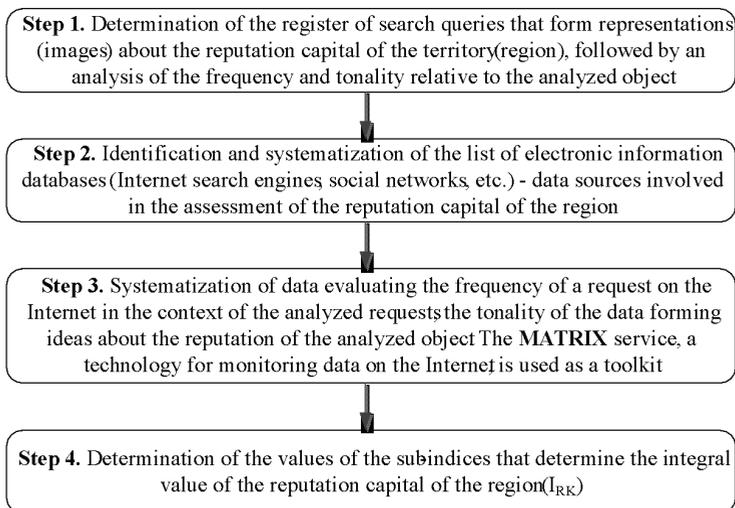
2 Materials and methods

Based on the presented provisions and postulates, the study attempts, using the methods of a formalized assessment of the phenomena and processes, to carry out an empirical assessment of the region’s reputation capital influence on its business and economic activity.

Methodically, the problem is solved based on the construction of an econometric model, where the analyzed factors are:

- dynamics of the region’s reputation capital index, IRC;
- dynamics of the region’s business activity index (BAI);
- and other traditional macroeconomic indicators.

Methodological support of the algorithm of region’s reputation capital formalized assessment is described in the previously published works of the authors [1-3] and presented in a concentrated form in Figure 1.



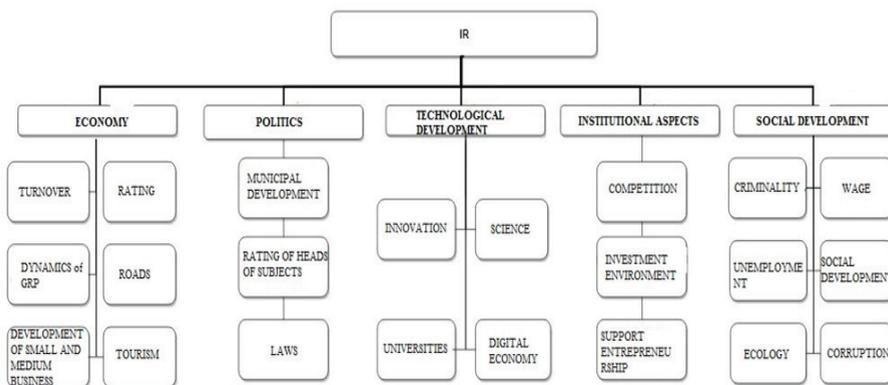


Fig. 1. Study algorithm. Source: Compiled by the author.

Figure 2 shows the dynamics of the region’s reputation capital index (IRC) for the Republic of Tatarstan, based on the algorithm proposed above.

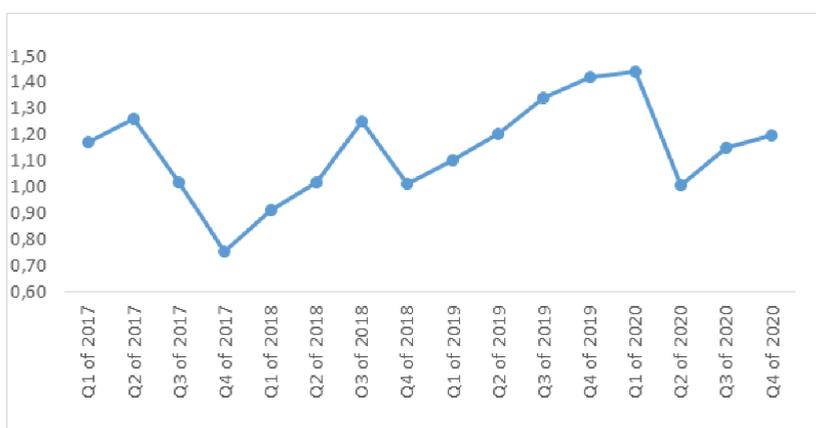


Fig. 2. Dynamics of the reputation capital index IRC of the Republic of Tatarstan for the period from 2017 to 2020. Source: Compiled by the author.

It is important to emphasize that the business activity index of the region acts as an endogenous factor of the proposed model (BAI). This is due to the fact that the business activity of economic agents determines not only the future trajectories of their development based on current business models, which, in their opinion, adequately correspond to the emerging situation in the economy, but also, as a consequence, the dynamics of key macroeconomic parameters. In this regard, an extremely important and urgent task is not only the search for new and optimization of existing algorithms for the empirical assessment of business activity transformation but also the identification of aggregated factors influencing the indicator under consideration. There is a very wide range of scientific papers revealing the features of the formalized assessment and measurement of business activity in the context of issue’s first aspect [5-9]. In the context of issue’s second part, there are number of aspects requiring clarification and additions in terms of studying it through the prism of assessing the influence of non-traditional factors. Those ones must include, for instance, the reputation capital of the region, acting as the most important

generator of business activity in the economy, according to the previously forwarded hypothesis.

The algorithm for constructing the business activity index of the region (on the example of the Republic of Tatarstan) is implemented in 4 stages.

Step 1. Selection and justification of sub-indices which are composite indicators determining the value of a composite indicator BAI. Relying on the previously stated approaches of the authors [10] and also in solidarity with the approaches of a number of Russian researchers [11-13] BAI of the region includes:

- subindex characterizing changes in the capital market (oil price on the world market; Eurozone consumer price index; refinancing rate of the Central Bank of the Russian Federation, etc.);

- subindex revealing the peculiarities of the stock market development (RTSI);

- resource sub-index;

- subindex demonstrating the industrial and production potential of the region (industrial production index, inventories in organizations).

The analyzed indicators values used in the calculation were normalized (standardized) in order to comply with the comparability principle of the factors involved in determining the quantitative parameters of subindexes.

In a formalized form, the business activity index of the region is presented as multiplication of subindexes values by the values of the weighting coefficients obtained on the basis of the above proposed approach (Table 1).

Table 1. Subindexes weight coefficients values obtained by taxonomic analysis methods

Subindex title	Weight coefficients value
Subindex characterizing changes in the capital market	0.11
Subindex revealing the peculiarities of the stock market development	0.31
Subindex demonstrating the industrial and production potential of the region	0.26
Subindex determining the parameters of the region's resource potential development	0.33

Source: Compiled by the author

The calculated dynamics of the region's business activity index (BAI) (on the example of the Republic of Tatarstan) is presented in Figure 3 based on the values obtained, as well as on the methodological tools proposed above.

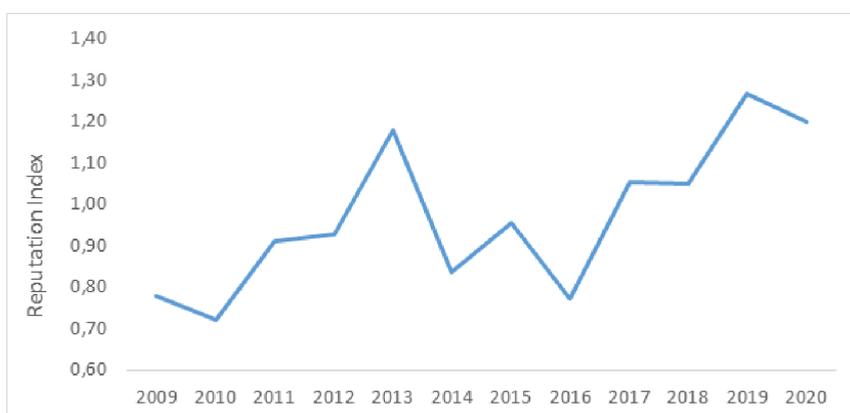


Fig. 3. Values of business activity change coefficients for the Republic of Tatarstan (BAI). *Source:* Compiled by the author.

The obtained values revealing the features of the dynamics of the obtained time series allowed us to move on to solving a very important (both for science and practice) question focused on finding patterns characterizing the degree of influence of the region's reputation capital on its business activity. It is extremely important to understand how strong reputation affects the parameters of BAI formation, given that reputation is "an intangible institutional resource (asset) of an economic agent that provides its competitive advantages in the market by generating a variety of signals for consumers that characterize its qualitative and quantitative development parameters and ensure productivity and efficiency" [5].

At the same time, it is important to emphasize that the solution of the task in no way can be attributed to the category of trivial. This is due to the fact that not always complex socio-economic processes and patterns can be described using a single equation. System analysis is required. In addition, there may be cases when the mutual influence of factors makes it impossible to determine the nature of the variable: exogenous or endogenous [14, 15]. Therefore, a system of econometric equations is used to model such processes. In the present study, the dependent variable of one equation is the independent variable in the other equation. Accordingly, a system of recursive equations can be constructed to simulate such processes.

In general, the system of recursive equations is presented in the following form:

$$\begin{cases} y_1 = a_{11}x_1 + a_{12}x_2 + \dots + a_{1m}x_m + u_1 \\ y_2 = b_{21}y_1 + a_{21}x_1 + a_{22}x_2 + \dots + a_{2m}x_m + u_2 \\ y_3 = b_{31}y_1 + b_{32}y_2 + a_{31}x_1 + a_{32}x_2 + \dots + a_{3m}x_m + u_3 \\ \dots \\ y_k = b_{k1}y_1 + b_{k2}y_2 + \dots + b_{kk-1}y_{k-1} + a_{k1}x_1 + a_{k2}x_2 + \dots + a_{km}x_m + u_k \end{cases}$$

3 Results

To solve systems of simultaneous equations, the two-step least squares (TSLS) method is used to estimate the parameters of structural equations, since the latter involves endogenous model variables as factors and the use of the usual TSLS method leads to biased and untenable estimates.

The solution of the problem posed in this paper consists of two stages (steps). Each of those stages uses the least-squares method.

Equation 1: Assessment of the combination of external and internal factors impact on the region's business activity.

The choice of exogenous factors is determined based on the analysis of multicollinearity of such important parameters that trigger the mechanisms of business activity intensification in the economy as "Gross domestic product", "Official exchange rate of the US dollar against the ruble", "Investments in fixed assets", "Index of the region's reputation capital", "Balanced financial result of organizations".

The final parameters of the resulting equation are presented in Table 2.

Table 2. Statistical estimates and parameters of the resulting equation

R2 = 0.84

	Coefficients	Standard error	t-statistics	P-Value
Y-intersection	-0.034	0.141	-0.243	0.811
Reputation	0.309	0.132	2.328	0.036
GDP in constant prices	0.313	0.086	3.625	0.003

Equation 2: Recursive assessment of the region’s business activity impact on the formation of its reputation capital.

Unlike the first equation, IRC acts as an endogenous parameter here. And exogenous parameters are set of factors previously proposed for consideration by such a leading indicator as the “Index of business activity of the Russian Federation industrial sector” (Fig. 3).

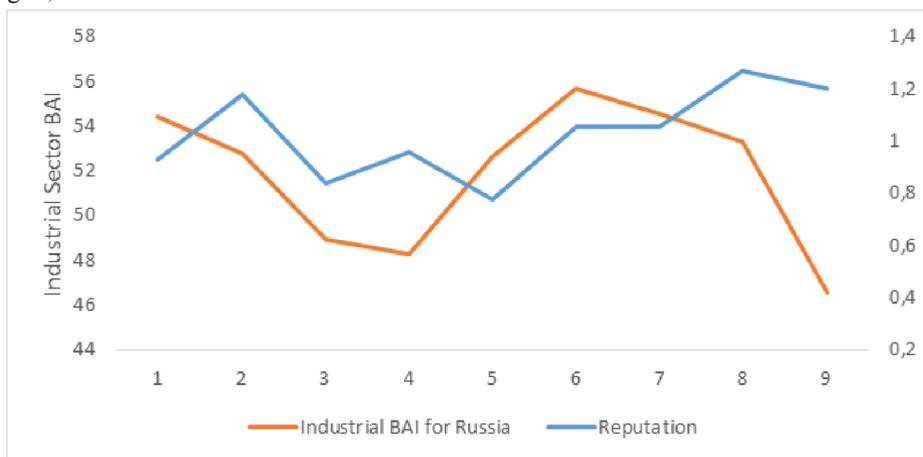


Fig. 4. Dynamics of changes in indicators "Index of business activity of the industrial sector of the Russian Federation" and "Index of reputational capital"

Table 4. Statistical estimates and parameters of the resulting equation

$R^2=0.72$				
	Coefficients	Standard error	t-statistics	P-Value
Y-intersection	-1.163	1.063	-1.09	0.323
GDP	0.263	0.295	2.89	0.007
BAI* of Russia Industrial Sector	0.038	0.021	2.26	0.046

*Business Activity Index

Final system of equations:

$$\begin{cases} y_1 = 0.309y_2 + 0.313x_1 - 0.034; \\ y_2 = 0.263x_1 + 0.038x_2, \end{cases}$$

where y_1 – Business Activity Index for the Republic of Tatarstan;

y_2 – Reputation Index for the Republic of Tatarstan;

x_1 – Gross domestic product;

x_2 – Business Activity Index of Russian Industrial Sector.

Elementary process of the resulting equations system transformation leads to the following representation of the analyzed factors:

$$y_1 = 0.394x_1 + 0.0112x_2$$

4 Discussion

Relying on the results obtained, it can be reasonably stated that the reputation capital of the region has a very noticeable level of impact on the boost of business activity. Undoubtedly, the level of reputation capital impact is not as obvious as, for example, the dynamics of regional socio-economic development which triggers and boosts the processes of economic agents' activity. However, despite the non-dominant role of the factor under consideration (IRC) its contribution to the formation of the BAI growth trajectory is obvious as the show estimates.

This conclusion largely confirms the hypothesis forwarded earlier about the expediency of revising methods evaluating the effectiveness of socio-economic development.

5 Conclusion

Today the activation of processes aimed at the growth of reputational capital becomes an extremely important element which forms the territories development strategy in accordance with the presented paradigm revealing the features and priorities of regional/national development effectiveness.

The proposed interpretation disclosing the priorities and features of regional development today in the era of the Fourth Industrial Revolution and shows the specifics of territories strategic management. If earlier the key IRC indicators assessing the effectiveness of the region's development were indicators characterizing, for example, GDP growth, employment growth, taxes, activation of investment processes, etc., today, despite the importance of these macroeconomic factors that set the dynamics of regional development, the following factors are becoming the most important IRC indicators:

- reputation capital;
- inclusion of economic dynamics, etc.

The publication was prepared within the framework of the scientific project No. 19-010-0021 supported by the Russian Foundation for Basic Research. Authors express their gratitude to the State Budgetary Institution "Center for Advanced Economic Research of the Academy of Sciences of the Republic of Tatarstan" for assistance in publishing the study.

References

1. A.S. Grunichev, L.A. Elshin, Reg. Econ. Theory and Pract., **17(9)**, 1709-1722 (2019). <https://doi.org/10.24891/re.17.9.1709>
2. O.V. Ibraeva, Upravlenie effektivnostyu regionalnykh sotsialno-ekonomicheskikh [Managing the effectiveness of regional socio-economic], PhD thesis in Economics (Moscow, 2013)
3. A.S. Grunichev, M.R. Safiullin, L.A. Elshin, A.A. Abdukaeva, Republic Tatarstan Econ. Bul., **3**, 14-19 (2020)
4. M.L. Arslan, S.E. Seker, Int. J. e-Edu., e-Bus., e-Manag. e-Learn., **4(3)**, 197-203 (2014)

5. Y.G. Ji, C. Li, M. Northc, J. Liu, *Pub. Rel. Rev.*, **43**, 201-210 (2017)
6. P. Dorčák, P. Markovič, F. Pollák, *Procedia Eng.*, **192**, 719-724 (2017)
7. B.K. Boyd, D.D. Bergh, D.J. Ketchen, *J. Manag.*, **36(3)**, 588-609 (2010).
<https://doi.org/10.1177/0149206308328507>
8. I.S. Vazhenina, *Reg. Econ. Theory and Prac.*, **23**, 2-12 (2010)
9. I.I. Reshetnikova, *Reputatsionnyi kapital kak faktor obespecheniya konkurentosposobnosti rossiiskogo biznesa: teoriya, metodologiya, issledovaniya, problemy formirovaniya i upravleniya v usloviyakh globalizirovannykh rynkov* [Reputation capital as a factor of ensuring the competitiveness of Russian business: theory, methodology, research, problems of formation and management in the context of globalized markets], Doctoral thesis in Economics (Volgograd, 2011)
10. A.P. Pankrukhin, *Corpor. Imageology*, **23**, 12-15 (2008)
11. H.Sh. Manaman, Sh. Jamali, A.A. Ahmad, *Comp. Human Behav.*, **54**, 94-100 (2016).
<https://doi.org/10.1016/j.chb.2015.07.061>
12. J. Klein, *The rise of the reputation economy* (2014). Accessed on: February 16, 2022. [Online]. Available:
<https://www.weforum.org/agenda/2014/01/the-rise-of-the-reputation-economy/>
13. M.R. Safiullin, A.S. Grunichev, L.A. Elshin, D.L. Kurbangalieva, *Econ., Entrepr. Law*, **10(7)**, 1989-2004 (2020). <https://doi.org/10.18334/epp.10.7.110654>
14. M. Aisenegger, *Domestic Notes*, **1(58)**, 26-34 (2014)
15. G. Bente, T. Dratsch, K. Kaspar, A. Al-Issa, *PLoS One*, **9** (2014).
<https://doi.org/10.1371/journal.pone.0098297>

Financial independence strengthening perspectives for regional budget of the budgetary system of the Russian Federation

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Abstract. The article considers the problem of financing the subjects of the Russian Federation from the higher federal budget, by providing financial support in the form of grants and subventions. The main attention is paid to the insolvency of the regional budgets of the Russian Federation subjects and the identification of such insolvency reasons. The authors also propose solutions for finding reserves for the budget of the Russian Federation subject's revenue growth in order to increase the efficiency of financial activities within budget formation. The developed approaches are designed on the example of the Republic of North Ossetia-Alania budget. The analysis revealed that currently only 13 regions out of 85 are donor regions and the other 72 regions of the Russian Federation need financial support from a higher budget. The list of ten regions receiving the largest amount of financial support from the higher budget does not change for a long period of time which indicates the inefficiency of federal assistance form. Thus, the budget of the Republic of North Ossetia-Alania is characterized by its imbalance. As a result of the research work, the authors propose to implement the solutions which allow increasing the independence of republican budget in order to improve its revenue side.

Keywords: budget, subsidies, subventions, region, tax revenues, financial assistance

1 Introduction

An important point of the Russian Federation modern budget system is the fact that the number of subsidized regions significantly exceeds the number of donor regions.

At the same time, the financial support received by regional budgets does not have a positive impact on the regions at all, as it forms an easy attitude to receiving federal

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assistance and reduces the level of region's independence. Therefore, it can be stated that the reform of generating incomes process is needed for the majority of Russian Federation subjects [1].

This fact determines the need to search for additional sources of budget revenues for Russian Federation subject in order to increase the stability of regional budgets and to provide authorities of the appropriate level with the necessary finances to implement the solutions of state socio-economic policy.

The working hypothesis of the study is the statement that in order to achieve the balance and increase the stability of the budgets for the Russian Federation subjects it is necessary to search for regional budgets revenue growth reserves.

The relevance of the research for science consists in identifying the causes of the regional budgets insolvency and developing solutions with a set of measures which will increase the independence and improve the revenue part of the republican budget for the Russian Federation subjects [2].

Russian scientists pay a lot of attention in their research to the following issues:

- Formation of budget's revenue was investigated in the works of Gryaznov A.G., Kovalev A.M., Panskov V.G., Sabanti B.M.;
- Problems of budget formation at the regional and municipal levels are considered by authors: Artemyeva S.A., Vrublevskaya O.V., Kovaleva T.M., Polyak G.B., Sabitova N.M., Sazonov S.P., Solyannikova S.P., Khursevich S.N.;
- Budget formation at the expense of the tax component has been studied by Barulin S.V., Penkov B.E., Sidorova N.I., Chernik D.G. et al.

The purpose of the research is to study the possibility of using the revenue growth reserves for the budgets of the Russian Federation subjects in order to increase the efficiency of financial activities within budget formation (on the example of the Republic of North Ossetia-Alania).

The purpose of the study is to solve the following tasks:

- Identification of the regional budget financial insolvency reasons in the budgetary system of the Russian Federation [3];
- Identification of the opportunities to strengthen the budget's revenue for the Russian Federation subjects.

2 Materials and methods

Since 2011 The Republic of North Ossetia-Alania is characterized as a region with a difficult debt situation. The budget of the Republic faced a deficit and, as a result, an increase in the debt burden on the budget sector.

The implementation of an integrated approach is needed in order to eliminate the imbalance. This involves measures aimed at increasing the revenue component of the budget, measures aimed at reducing unjustified expenditure obligations, improving the efficiency of expenditures, as well as optimizing the debt burden on the region's economy.

1. Improving inter-budgetary relations.

The implementation of the following measures is proposed as part of the work on expanding the tax potential from the payment of tax and non-tax revenues of the Republic's budget and optimizing rates and benefits:

1. Carrying out analytical work on the establishment and accounting of the tax base of the main budget-forming taxes in the context of types, as well as the size of the tax burden for certain sectors of the economy of the Republic of North Ossetia-Alania

2. Establishing contacts and constant work with large taxpayers that are legal entities of the Republic.

3. Expansion of the tax potential for property tax and as a result the growth of income on it. Appropriate regional law regulating the specifics of organization's property taxation was passed in the territory of the Republic on the basis of the object's cadastral value. This law applies exclusively to retail facilities with the total area over 250 square meters. This measure was taken in order to increase the number of taxable objects and the growth of income from the payment of corporate property tax [4].

4. The application of cadastral value in relation to taxable objects when calculating the amount of property tax should be an event systematically implemented in the territory of the Republic.

5. Revision of the rates and the list of benefits provided for regional and local taxes.

To implement the second solution aimed at increasing budget revenues of the Republic of North Ossetia–Alania, the following measures are proposed:

1. Stimulating the growth of corporate income tax revenues as well as reducing the number of enterprises with negative financial results and low-profit economic entities. The normative legal acts of the Republic provide for the activities of the interdepartmental commissions regarding this issue [5].

2. Increase of personal income tax revenues and elimination of illegal employment. Implementation of this measure needed interdepartmental cooperation in order to eliminate fishy type of wages when paying employees cash "under the table" for tax evasion purposes [6].

3. Legalize alcohol production, establish contacts and joint work of the state authorities of the Republic of the North Ossetia-Alania to ensure the sustainability of the alcohol industry and look for new markets and excise stamps for labeling products [7].

4. The growth of revenue from the transport tax. To implement this measure and transfer relevant data it is proposed to establish cooperation between State Traffic Safety Inspectorate and the Federal Tax Service Administration in the Republic of the North Ossetia-Alania [8].

5. The growth of revenues from the payment of the mineral extraction tax. Illegal mining must be not possible.

6. Compulsory collection of existing debts from taxpayers by the tax authorities of the Republic [9].

In order to maximize economic effect from the administration of a non-tax income group the following set of measures is needed:

1. Sale of shares owned by the Republic.

2. Conducting analytical work in the field of state or municipal property.

3. Work with rent arrears. Minimizing or reducing to zero the amount of overdue payments.

4. Analysis of financial and economic activities of municipal or state enterprises. [10].

The fourth solution is an improvement of inter-budgetary relations in the Republic.

3 Results

Dagestan takes the first place among the Russian Federation subjects receiving the largest amount of financial support from the federal budget (72 billion rubles). Second place takes Sakha (Yakutia) – (72 billion rubles); third one is Kamchatka and the Republic of Chechnya takes fourth place. In 2019 Altay has got financial support from higher budget in the amount of 26 billion rubles etc. [11].

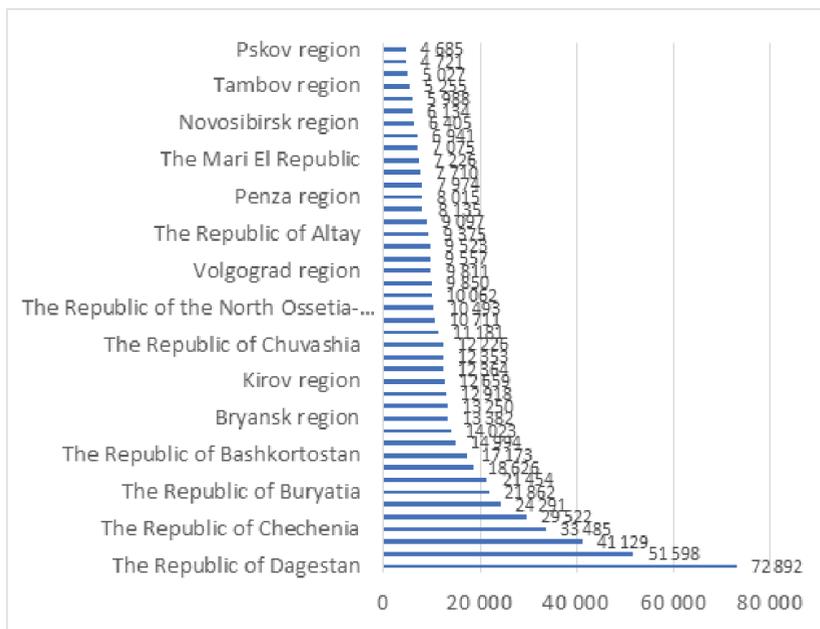


Fig. 1. Subsidies for Russian regions in 2020, billion rubles. *Source:* (Rating of subsidized regions in Russia. URL: <https://rosinfostat.ru/dotatsionnye-regiony/> (application date: April 09, 2021).

The situation is not static. Year by year the list of regions, the position they taking and the amount received undergo changes (Table 1).

Table 1. Russian Federation subjects having the largest subsidies in 2017-2018, billion rubles.

№	State structural subject	in 2018	in 2017
1.	Dagestan	59,06	+6,65
2.	Yakutia (Sakha)	43,95	+7,32
3.	Kamchatka	39,36	+2,2
4.	Altay	27,1	+4,5
5.	Chechenia	27,08	+3,07
6.	Stavropol	19,2	+1,83
7.	Buryatia	18,3	+0,39
8.	Crimea	17,71	-0,77
9.	Bashkortostan	16,43	+0,64
10.	Tyva	15,73	+1,18

Source: Rating of subsidized regions in Russia. URL: <https://rosinfostat.ru/dotatsionnye-regiony/> (application date: April 09, 2021)

Having considered the data for three years it can be noted that the list of ten regions most in need for financial support from higher budget has no drastic changes. This fact proves a lack of progress in these regions and an inefficient system of providing financial support in currently existing form [12].

On the basis of above, proposals were formed to improve the system of encouraging regions:

- Increase in the importance of dynamics indicators as well as an increase in their share in their final assessment to 60%;

– When calculating the amount of subsidies, public authorities should take into account all the regions and not only those ones with no direct impact of authorities or those depending on macroeconomic situations [13].

The measures proposed will not only stimulate dynamically developing regions but also provide an opportunity to conduct an objective assessment of regional measures aimed at increase the revenue component of budget.

4 Discussion

There is a situation in modern Russian economy where only 13 regions out of 85 are donor regions and the other 72 regions of the Russian Federation need financial support from a higher budget. At the same time the gratuitous transfers provided from the federal budget do not stimulate the regions to carry out work in order to increase their independence. And overall picture is characterized by a decrease in the number of donor subjects.

Co-financing mechanism has undergone major changes within its implementation process:

- Distribution of subsidies is regulated by approved rules;
- Regulatory legal acts approving the distribution are either Federal laws or acts of the Government of the Russian Federation.
- Distribution of subsidies and the calculation of the amount for co-financing are taking into account the capabilities of the regional budget for the Russian Federation subject;
- Directions of co-financing are monitored due to the approved control values and the results achieved.

5 Conclusion

Summing up we would like to note the following:

1. There is a situation in modern Russian economy where only 13 regions out of 85 are donor regions and the other 72 regions of the Russian Federation need financial support from a higher budget.

2. From year by year the list of 10 regions getting the largest amount of financial support from higher budget has no drastic changes. This fact proves inefficiency of financial support system in currently existing form.

3. The budget of the Republic of North Ossetia-Alania is characterized by imbalance. As the most significant reasons we have noted the following:

- Series of crises that affected the country's economy, oil price drop in 2020 and the declaration of pandemic by the World Health Organization;
- Emergence of previously unplanned expenditure commitments aimed at maintaining socio-economic stability as well as anti-pandemic measures [14];
- Need to form a road fund.

4. In order to increase the revenue side of the republican budget the following set of measures is proposed:

- Expansion of tax potential as well as work on optimization of tax benefits and the amount of tax rates.
- Increase in the amount of income from the payment of tax and non-tax revenues of republican budget, implementation of measures within the framework of reducing arrears and suppression of tax payment evasion [15].
- Increase the economic effect of state property use in the Republic.
- Improving inter-budgetary relations.

References

1. M.Sh. Basnukaev, I.V. Sugarova, I.T. Bataev, I.Ya. Elzhurkaev, E.A. Abdulazizova, *Planning and forecasting in the public tax management*, in The European Proceedings of Social & Behavioural Sciences EpSBS, 265-269 (2019)
2. S.A. Shanin, G.N. Kutsuri, S.V. Frumina, T. Gardapkhadze, E.V. Ivanova, J. App. Econ. Sci., **13(3(57))**, 711-719 (2018)
3. E.S. Kovanova, A.E. Kolieva, R.F. Mustafin, Z.B. Tedeeva, Strategy of highly efficient decision making in modern business systems, in The Leading Practice of Decision Making in Modern Business Systems: Innovative Technologies and Perspectives of Optimization, 123-131 (Emerald Publishing Limited, Bingley, West Yorkshire, 2019)
4. Zakon Respubliki Severnaya Osetiya-Alaniya ot 28 noyabrya 2014 goda №44-RZ “O vnesenii izmenenii v Zakon Respubliki Severnaya Osetiya-Alaniya “O naloge na imushchestvo organizatsii” [The Law of the Republic of North Ossetia-Alania dated November 28, 2014 No. 44-RZ “On Amendments to the Law of the Republic of North Ossetia-Alania on the Property Tax for Organizations”]. Accessed on: February 16, 2022. [Online]. Available: https://www.nalog.gov.ru/rn15/about_fts/docs/5083301/
5. Postanovlenie Pravitelstva Respubliki Severnaya Osetiya-Alaniya ot 26.04.2016 № 152 “O vnesenii izmenenii v postanovlenie Pravitelstva Respubliki Severnaya Osetiya-Alaniya ot 15 dekabrya 2015 g. № 321 “O sostave Mezhhvedomstvennoi komissii Respubliki Severnaya Osetiya-Alaniya po organizatsii meropriyatii, napravlennykh na snizhenie neformalnoi zanyatosti” [Resolution of the Government of the Republic of North Ossetia -Alania dated 26.04.2016 No. 152 “On Amendments to the Resolution of the Government of the Republic of North Ossetia-Alania dated December 15, 2015 No. 321 “On the Composition of the Interdepartmental Commission of the Republic of North Ossetia-Alania on the organization of measures aimed at reducing informal employment”]. Accessed on: February 16, 2022. [Online]. Available: <http://publication.pravo.gov.ru/Document/View/1500201604290006?index=1&rangeSize=1>
6. Z. Tavasieva, A. Pozmogov, B. Kallagov, Z. Tedeyeva, M. Kreer, *Knowledge management as a matter of vital importance for a modern organization*, in Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019, Education Excellence and Innovation Management through Vision 2020, 4001-4007 (2020)
7. Ukaz Glavy Respubliki Severnaya Osetiya-Alaniya ot 26 yanvarya 2016 goda N 11 “O rabochei gruppe po voprosam realizatsii gosudarstvennoi politiki v sfere proizvodstva i oborota etilovogo spirita, alkogolnoi i spirtosoderzhashchei produktsii v Respublike Severnaya Osetiya-Alaniya” [Decree of the Head of the Republic of North Ossetia-Alania dated January 26, 2016 No. 11 “On the working group on the implementation of state policy in the field of production and distribution of ethyl alcohol, alcoholic and alcohol-containing products in the Republic of North Ossetia-Alania”]. <https://docs.cntd.ru/document/432896050?marker>The Law of the Republic of North Ossetia-Alania dated November 25, 2017 No. 60-RZ “On Amendments to the Law of the Republic of North Ossetia-Alania on the Transport Tax in the Republic of North Ossetia-Alania”. Accessed on: February 16, 2022. [Online]. Available: <https://docs.cntd.ru/document/450383867?marker> (application date: April 13, 2021).

8. Z.B. Tedeeva, *Analysis of public procurement mechanism when implementing financial policy of state*, in The European Proceedings of Social & Behavioural Sciences EpSBS, Social and Cultural Transformations in the Context of Modern Globalism, 1166-1174 (2019)
9. G.Kh. Batov, B.R. Kallagov, Z.B. Tedeeva, L.M. Fidarova, M.V. Tsutsieva, *Indo Amer. J. Pharm. Sci.*, **6(3)**, 6839-6842 (2019)
10. Subsidized regions of Russia and their rating. Accessed on: February 16, 2022. [Online]. Available: <https://rosinfostat.ru/dotatsionnye-regiony/>
11. M.Sh. Basnukaev, L.V. Popova, B.G. Maslov, I.V. Sugarova, I.T. Bataev, *The controlling function paradigm for tax authorities*, in European Proceedings of Social and Behavioural Sciences EpSBS, International Scientific Conference dedicated to the 80th anniversary of H.V. Turkayev, 140-144 (2020)
12. E.O. Mirgorodskaya, L.Y. Andreeva, I.V. Sugarova, R.A. Sichev, *Europ. Res. Stud. J.*, **20(3B)**, 300-319 (2017)
13. Z.B. Tedeeva, Z.G. Chshiev, *Econ. Entrepr.*, **11(112)**, 417-420 (2019)
14. A.K. Gergaeva, Z.B. Tedeeva, I.S. Gudieva, *Econ. Manag.: Probl., Solut.*, **5(12)**, 117-122 (2018)

The role of high-growth small and medium-sized companies in employment

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Abstract. High-growth companies (hereinafter referred to as HGCs) remain a popular subject for various studies both in Russia and abroad. Their ability to disproportionately participate in creating jobs and income becomes more relevant than ever in the context of the need for economic recovery and employment. The study aims to improve the HGC identification and classification mechanism to identify their focus on long-term socio-economic results. First of all, it is about providing employment and creating new jobs. The hypothesis is that the future sustainability of companies' growth depends not so much on its speed in the past but on the balance of this growth and its focus on (at least) the medium term. Complementing the existing approaches to identifying the balanced scorecard concept (hereinafter – BSC) allowed to distinguish four types of HGCs, different in their importance in the formation of employment and job creation, having different development targets, and requiring different approaches to their support and stimulation. The paper shows that not only achieving high growth rates but also changing the type of this growth affects the ability of such companies to more actively create new jobs and provide employment. The presented study results may be of practical interest from the point of view of improving the targeting and development of specific measures to support different HGC types among small and medium-sized businesses.

Keywords: small and medium-sized businesses, high-growth companies, growth indicators, entrepreneurship support

1 Introduction

The relevance of the study of high-growth companies (hereinafter - HGC) in providing employment and job creation is determined by the need to solve the problem of economic recovery and income growth of the population. The segment of small and medium-sized businesses is of particular importance as the most flexible and active part of the entrepreneurial community. Interest in the HGC study can also be traced to international studies. According to the Scopus database, the number of publications with the "high growth firm" keyword increased from 1-3 in the early 2000s to 30-35 at the turn of the

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2020s. Most of these publications are authors from developed countries, such as the United States, the United Kingdom, Sweden, Spain, and Australia.

Systematization of the available publications shows that they can be divided into several groups.

The first group are publications containing a discussion of the HGC's role in the economy. The publications of the author of the term "gazelles" D. Birch, who discussed the role of HGC in US job creation as early as the 1980s [1-3]. During the same years, similar problems were investigated in [4]. Over the past two decades, as noted earlier, interest in analyzing the role of HGCs in shaping jobs [5, 6], economic growth, and productivity [7-9] has only grown. Most authors conclude that HGC's contribution to job creation remains disproportionately large and often exceeds the Pareto 20/80 principle [5, 6, 10]. In addition to their positive impact on jobs and employment, HGCs contribute significantly to income generation within their industry and inter-industry value chains [8].

The second group of publications contains studies related to evaluating the influence of various factors on the results of HGC identification. Such factors may include the criteria and measures of company growth [10-12], industry affiliation [13, 14], size and age of companies, and their level of innovation [10, 15]. As the results show, the choice of the growth criterion and measure can significantly affect both the number and the composition of the identified HGCs. For example, an increase in the number of HGCs, an increase in the share of small businesses, and a decrease in the impact of HGCs on the overall economic performance of an industry, region, or country [10]. At the same time, almost all variants of the HGC sample show their concentration among young companies under 5-10 years. And the widespread perception of a higher concentration of HGCs in developed countries and high-tech industries is not unequivocally confirmed [10, 16].

Another area of research on HGC features is the typology of growth sources, distinguishing organic (through internal improvements) and acquired (through external factors) growth [17, 18]. Research results show that the proportion of HGCs using external growth factors is quite substantial. However, this does not exceed the percentage of non-HGC affiliates and has no noticeable effect on growth intensity [18].

Finally, the third group of publications focuses on one of the most important problems of HGC - the problem of the sustainability and periodic nature of their growth. While early HGC studies were based on the view that successful companies gained a competitive advantage by achieving high growth rates in the present and scaling up in the future, this has been changing in recent years [19, 20]. Moreover, more and more researchers conclude that current and future growth rates are negatively correlated [13]. And the decrease in the scale of HGC in the future is not just temporary due to the need to adapt and scale up the business but indicates the episodic and non-recurring nature of periods of high growth rates, regardless of the criteria and measures of measurement [16].

Thus, the review of the study's theoretical basis shows that the disproportionate contribution of the HGC to the formation of jobs, employment, and other important socio-economic indicators is undeniable. However, the multivariate process of their identification and the problem of volatility of high growth rates leads to difficulties in using this category in practical activities, for example, in implementing programs to support small and medium-sized enterprises (hereinafter - SME). Solving the problem of identifying different types of HGCs, in our view, can help clarify their role in shaping employment and other development indicators and ensure the development of specific support measures to maintain the potential for further growth of these companies.

The hypothesis that there are several types of HGCs among SMEs having different functioning goals and, consequently, showing different activity results, which determine

their role in the formation of jobs and other socio-economic indicators, is considered the main hypothesis in the study. The future sustainability of companies' growth depends not so much on its speed in the past (i.e., the identification of the SME subject as an HGC), but on the balance of this growth and its focus on the (at least) medium term.

The study aims to develop a mechanism for identifying HGCs among SMEs, ensuring their classification in terms of orientation towards balanced goals of functioning as a necessary (but not sufficient) condition for the long-term sustainability of development.

To achieve this goal, the study solved the following tasks:

1. clarify the set of growth indicators from the perspective of assessing its balance;
2. develop an algorithm for the joint use of different growth indicators, providing a classification of identified HGCs depending on their focus on long-term development;
3. identify HGCs according to the developed mechanism and evaluate the role of different types of HGCs in the formation of employment and other socio-economic indicators.

2 Methods

To test the hypothesis formulated above, the study uses the concept of a balanced scorecard (hereinafter - BSC) to order and cascade the strategic objectives of corporate development. Remaining one of the most popular and widespread concepts of strategic management BSC has many different interpretations, from the author's [21] to various interpretations in foreign and domestic studies [22-24]. As applied to this study, the BSC allows supplementing and streamlining the main indicators used to identify HGC. Thus, traditionally used indicators in the number of employees and sales revenue can be identified with the two BSC perspectives - "learning and growth" and "customers." For a balanced HGC assessment, it is possible to additionally formulate indicators relating to the prospects of finance and internal business processes following the classical BSC representation (more details in [25]).

The general conditions for the HGC identification used in the study are presented in Table 1.

Table 1. Conditions of the HGC identification process

Name of the attribute	Value
Growth Indicator	1) number of staff; 2) revenue from the sale of goods (works, services) 3) added value 4) net assets
Growth rate	Compound annual growth rate (CAGR) (OECD criterion) Birch Index
Regularity of growth	Growth of indicators for 2016-2018
Threshold value of the growth rate	For the OECD criterion – at least 20% for the main and additional indicators For the Birch index – 90 % of the sample
Growth process	Organic and acquired
Company demographics	Size of companies - SMEs as of December 31, 2018, with 5 to 250 people and revenues - up to 2 RUB bln. Life of companies - registered no later than 01.01.2016. Territorial affiliation - registered on the territory of the Republic of Bashkortostan Status - active

	Form of ownership - private ownership and ownership of consumer cooperatives Industry affiliation - without exception
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As a result of the consistent identification of HGC using the growth indicators proposed in the study, it is possible to classify them following the order presented in Table 2.

Table 2. Description of the types of identifiable HGC

Type	Compliance with the criteria	Brief description	Designation
I	The threshold value on the growth criterion of the number of employees is fulfilled.	Companies are scaling up their workforce but cannot commercialize in their market segment.	Resource-oriented HGC
II	The threshold for employee and revenue growth criteria is met	Companies increase the use of labor resources and get the commercial result in the form of sales growth but do not show the necessary dynamics of socio-economic results	Market-oriented HGC
III	The threshold on the growth criteria in the number of employees, revenue, and value added is met.	Companies are scaling up their workforce and sales growth and are demonstrating dynamic improvements in social and economic outcomes. However, the results are used mainly for current needs, not for development.	Focused on the current results of HGC
IV	The threshold on the growth criteria in the number of employees, revenue, return on sales, and net assets is met.	Companies are focused on achieving strategic goals, which is evident in the reinvestment of the economic results and speaks to the long-term intentions of the owners and management.	Development-oriented HGC

3 Results

Using the Spark-Interfax database, a sample of SMEs was formed for subsequent HGC identification from among them. A total of 7162 companies were included in the sample, taking into account the conditions on the demographics of companies. The results of the HGC identification and their main characteristics are presented in Tables 3 and 4.

Table 3. Identification results using the OECD criterion

Sign	Value of the trait by HGC type			
	Type I	Type II	Type III	Type IV
Qty	642	199	287	393
Size, %				
micro	58	53	52	50
small	38	42	43	45
medium	4	5	5	5
Number of years, %				
3-5	39	43	43	47
6-10	33	31	31	30
11-15	18	16	16	17
16-20	6	6	6	4
more than 20	4	4	4	2

Sign	Value of the trait by HGC type			
	Type I	Type II	Type III	Type IV
Number of employees	22	24	24	23
Revenue, RUB mln. (average values)	92.0	115.7	112.8	130.3
Added value, RUB mln. (average values)	19.1	24.6	25.5	29.5
Net assets, RUB mln. (average values)	10.6	10.5	9.7	16.4

As shown in Table 3 in the structure of the identified HGCs of all types, micro and small companies prevail, mostly from 3 to 10 years old. The mean values of the main indicators used in the study did not vary significantly with changes in the HGC types, although there was a tendency for them to increase in the transition from Type I to Type IV HGC.

Table 4. Identification results using the Birch Index

Sign	Value of the trait by HGC type			
	Type I	Type II	Type III	Type IV
Qty	462	108	81	66
Size, %				
micro	30	19	14	11
small	58	63	64	62
medium	12	18	22	27
Number of years, %				
3-5	37	43	39	43
6-10	31	30	33	30
11-15	20	15	16	21
16-20	7	8	8	3
more than 20	5	4	4	3
Number of employees	45	54	60	56
Revenue, RUB mln. (average values)	166.9	296.3	321.5	369.1
Added value, RUB mln. (average values)	40.0	61.5	80.4	83.1
Net assets, RUB mln. (average values)	21.5	21.5	22.4	49.4

The data presented in Table 4 demonstrate that using a relative growth rate in the form of the Birch index leads to an increase in the importance of small and medium-sized companies in the HGC structure. There is also a significant increase in the average values of the indicators compared to the sample based on the OECD criterion.

The study also analyzed the impact of the identified HGCs on the formation of employment and job creation by SMEs. Figure 1 shows a comparison of the HGC share in the total number of selected SMEs and the total number of employees in them.

Figure 1 shows that HGCs selected according to the OECD criterion on average employ the level of companies that are not among the high growth ones. Type I HGCs with a share in the total number of SMEs of about 9% employ less than 7% of the total number of employees of all companies. This indicates that the contribution to employment of this HGC type is lower than the average for all SMEs sampled in the study. By comparison, HGCs identified using the Birch index, regardless of their types, show markedly greater importance in forming employment than other SMEs. Thus, Type I HGCs, according to the Birch Index, with a share in the total number of companies less than 6.5%, form about 11% of employment.

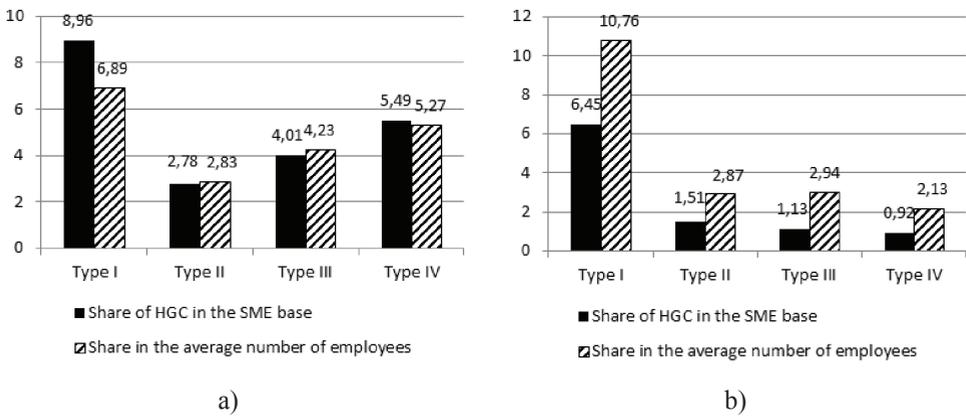
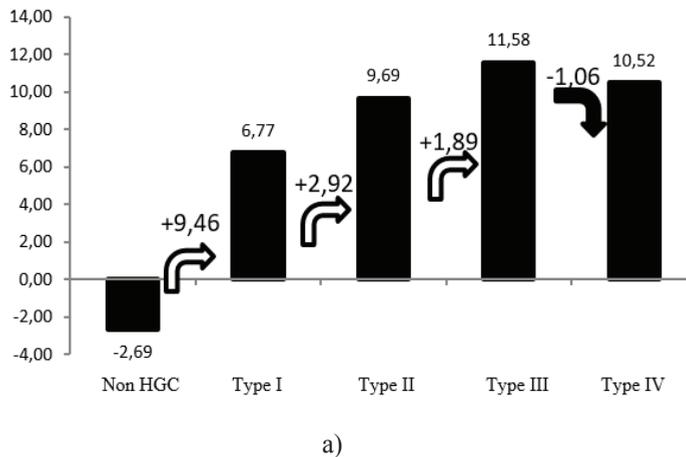
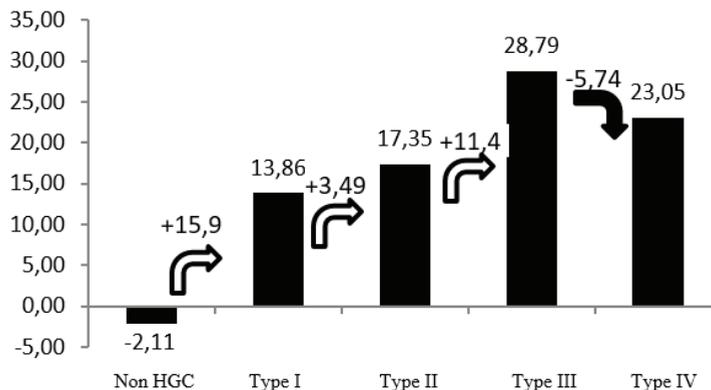


Fig. 1. The role of HGC in employment formation: a) based on the OECD criterion; b) based on the Birch index.

Below are the results of the analysis of the creation of new jobs by the identified HGCs (see Fig. 2).





b)

Fig. 2. Dynamics of job creation per company, people: a) based on the OECD criterion; b) based on the Birch index.

As can be seen from Figure 2a), all the HGC types identified by the OECD criterion provide job growth, while companies not included in the number of HGCs - on the contrary - reduce the number of jobs on average by 2.69 people per company. In this case, the transition from Type I HGC to the subsequent types increases the intensity of job creation to a maximum value of 11.58 people in the Type III HGC. And only the last HGC type reduces activity in job creation by 1.06 people compared to Type III HGC. Similar dynamics in job creation are observed for HGCs identified using the Birch Index. However, the level of job creation in this sample of HGCs is markedly higher and reaches 28.79 in Type III HGCs.

4 Discussion

The study results generally confirm the conclusions of other researchers in the part that:

1. the use of absolute growth rates such as the OECD criterion leads to an increase in the number of selected HGCs with a shift in the sample in favor of micro and small companies, which generally leads to a decrease in their importance in the formation of socio-economic indicators, such as employment;
2. the use of relative growth rates, such as the Birch Index, reduces the sample of HGCs, but increases the share of small and medium-sized companies and reinforces the importance of HGCs in employment and job creation.
3. Regardless of the chosen growth measure, the identified HGCs contribute to job creation by generating net job gains, while all other companies (non-HGCs) generate net job losses.
4. The HGC structure in terms of their time of existence ("age") is practically independent of the variant of the growth measure used. It is dominated by companies no older than 10 years, with a share reaching 77% of the total number of HGCs of the relevant type.
5. The industry affiliation of the identified HGCs does not allow confirming their higher concentration in knowledge-intensive industries. On the contrary, the main share of such companies, regardless of the growth measure used, is concentrated in trade, construction, and manufacturing.

The proposed HGC classification, using the BSC concept and aimed at identifying long-term priorities for the development of companies, allowed to obtain additional results, which are as follows:

1. the allocated HGC types provide a different level of socio-economic performance, which in general tends to increase as moving from the Type I HGCs to the subsequent ones;
2. the intensity of the positive impact on the growth of socio-economic indicators (e.g., the dynamics of job creation) is also increasing;
3. it becomes possible to use the principle of specialization in the analysis of different HGC types using basic socio-economic indicators, such as employment, the formation of industry income and value added, as well as the size of net assets;
4. it forms the basis for using specific support measures that differ for HGCs of different types and support the target development path of such companies "Non-HGC → Type I HGC → Type II HGC → Type III HGC → Type IV HGC," thereby maximizing their contribution to employment and other socio-economic results.

5 Conclusion

The study showed the possibility of improving the procedure for identifying HGCs using a mechanism ensuring their classification in terms of orientation to the balanced goals of functioning as a necessary (but not sufficient) condition for the long-term sustainability of development. The proposed mechanism allows identifying four HGC types, which differ in their goals and results of activity and, as a consequence, require different approaches to providing measures of support. The study results will provide more flexibility in the choice of tools and measures to support HGCs and strengthen their contribution to employment generation and job creation.

Further research areas include testing the sustainability of the resulting HGC samples, analyzing the impact of negative effects of COVID-19, and assessing the HGC significance on other socio-economic indicators (other than employment and job creation).

References

1. D. Birch, *The Job Generation Process*. MIT Program on Neighborhood and Regional Change (Cambridge, 1979)
2. D. Birch, Who creates jobs? *Public Interest*, **65**, 3-14 (1981)
3. D. Birch, *Job creation in America: How our smallest companies put the most people to work* (Free Press, New York, 1987). <https://doi.org/10.1002/pam.4050080226>
4. C. Armington, M. Odle, *Brookings Rev.*, **1(2)**, 14-17 (1982). <https://doi.org/10.2307/20079774>
5. S. Davis, J. Haltiwanger, S. Schuh, *Job creation and destruction* (MIT Press, Cambridge, 1996)
6. R. Decker, J. Haltiwanger, R. Jarmin, J. Miranda, *J. Econ. Persp.*, **28(3)**, 3-24 (2014). <https://doi.org/10.1257/jep.28.3.3>
7. F. Delmar, A. McKelvie, K. Wennberg, *Technovation*, **33(8)**, 276-291 (2013). <https://doi.org/10.1016/j.technovation.2013.02.003>
8. F. De Nicola, B. Murakozy, Sh.W. Tan, *Small Bus Econ*, **57**, 127-150 (2021). <https://doi.org/10.1007/s11187-019-00296-w>

9. J. Haltiwanger, R. S. Jarmin, R. Kulick, J. Miranda, High-growth firms: contribution to job, output and productivity growth, in J. Haltiwanger, E. Hurst, J. Miranda, A. Schoar (eds.), *Measuring entrepreneurial businesses: current knowledge and challenges*, 11-62 (University of Chicago Press, Chicago 2017)
10. A.G. Goswami, D. Medvedev, E. Olafsen, High-growth firms: facts, fiction, and policy options for emerging economies. The World Bank Productivity Project (2019), Accessed on: February 16, 2022. [Online]. Available: <https://openknowledge.worldbank.org/handle/10986/30800>
11. D. Halvarsson, Identifying high-growth firms. Working Paper 215 (Ratio Institute, Stockholm, 2013)
12. E.I. Baranova, *World New Econ.*, **4**, 98-104 (2016)
13. S.-O. Daunfeldt, N. Elert, D. Johansson, *Ind. Corpor. Change*, **25(1)**, 1-21 (2016). <https://doi.org/10.1093/icc/dtv035>
14. V.M. Juha, S.Yu. Sementsov, *Fin. Res.*, **4(57)**, 127-132 (2017)
15. D.S. Medovnikov, S.D. Rozmirovich, *World New Econ.*, **2**, 6-22 (2019). <https://doi.org/10.26794/2220-6469-2019-13-2-6-22>
16. S.-O. Daunfeldt, D. Halvarsson, *Small Bus. Econ.*, **44**, 361-383 (2015). <https://doi.org/10.1007/s11187-014-9599-8>
17. M.C. Kaya, L. Persson, *North Amer. J. Econ. Fin.*, **50**, 101019 (2019). <https://doi.org/10.1016/j.najef.2019.101019>
18. A.V. Zhiganov, A.Yu. Yudanov, *Rus. J. Manag.*, **17(3)**, 287-308 (2019)
19. M. Capasso, E. Cefis, K. Frenken, Do some firms persistently outperform? Utrecht University discussion paper series, 09-28 (2009)
20. A. Coad, W. Holzl, *J. Ind., Compet. Trade*, **9(2)**, 139-166 (2009). <https://doi.org/10.1007/s10842-009-0048-3>
21. R.S. Kaplan, D.P. Norton, Sbalansirovannaya sistema pokazatelei. Ot strategii k deistviyu [A balanced scorecard. From strategy to action] (Olymp-Business, Moscow, 2013)
22. N.D. Bublik, U.R. Urmantsev, E.R. Akhmerova, R.G. Ibulaev, D.V. Chuvilin, Sbalansirovannoe innovatsionnoe razvitie neftyanykh kompanii: finansy, proizvodstvo, issledovaniya [Balanced innovative development of oil companies: finance, production, research] (BiblioGlobus Publishing house, Moscow, 2018). <https://doi.org/10.18334/9785912922343>
23. M. Brown, Pomimo sbalansirovannoi sistemy pokazatelei: uluchshenie biznes-analitiki s pomoshch'yu analitiki [Beyond the balanced scorecard: improving business intelligence with analytics] (Productivity Press, 2007). <https://doi.org/10.5860/choice.44-6320>
24. P. Niven, *Balanced scorecard evolution: a dynamic approach to strategy execution* (Wiley corporate F&A series, 2014)
25. I.A. Beloliptsev, D.V. Chuvilin, I.I. Beloliptsev, I.I. Lukina, R.F. Yunusova, Izuchenie fenomena bystrorastushchikh kompanii Respubliki Bashkortostan na primere malogo i srednego biznesa [Study of the phenomenon of fast-growing companies of the Republic of Bashkortostan on the example of small and medium-sized businesses] (Prometheus, Moscow, 2021)

Management of the student research project campus of a technical university

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Abstract. Based on the analysis of published works, the relevance of the following aspects is determined: management of scientific campuses of universities, building the organizational structure of student scientific project campus management, pedagogical management through project technologies, professional development of students through research work. The study aims to develop a system and mechanisms for the management of the student research campus of a technical university to instill sustainable skills of independent research work and develop students' skills to apply theoretical knowledge and modern methods of scientific research in professional activities. During the study, the following methods were used: general logical (analysis and synthesis); theoretical (hypothetical, generalization, method of system analysis); empirical (questioning); method of statistical data processing. The article presents the developed system of students' research work management on the example of the student scientific society of Penza State Technological University "Student Scientific and Project Campus". The Campus's goal, objectives, and activities are disclosed, and a binary model of Campus management and the regulatory framework for its operation are presented. The activities within the functions of pedagogical management are described. The results of a survey of students to identify the motivation for research work are presented. According to the study results, it was found that the management of the student research project campus of a technical university will be effective if the choice of methodology, the development of its system, the development of structure, and technology implementation in practice are carried out correctly.

Keywords: research project campus, management, educational environment, students' research work, project activities

1 Introduction

The result of quality training, capable of independent research and innovation activities, is directly dependent on the choice of methodology, system development, development of

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structure and technology of students' research work management (SRWM) in the university, one form of which is the activity of student scientific associations (SSA) [1]. Today, it is carried out in the university's innovative scientific and educational environment, where in the interests of consumer demand, the functions of scientific, educational, and production enterprises are combined [2].

Review of the theoretical basis of the study. The study's theoretical basis was the works of Russian and foreign scientists on the SRWM management and organization. Analysis of scientific and pedagogical literature has shown that the management of educational institutions and pedagogical management has been studied as part of the ongoing innovation (Bradlow [3], Galimullina [10], Kozlova [4], Tsarapkina [5], et al.), building the innovative infrastructure of the university (Sobolewski, Czajka [6]), management of scientific campuses of universities (Fedotova [7], Soluyanov [8]), including through the use of design technologies and the SRWM organization (Saratovtseva [9], Golubchikova [11]). Modern studies reveal the essence of the "management" concept, which is understood as an activity aimed at decision-making, organization, control, regulation of the object of management following a given goal, analysis, and summarizing based on reliable information (Sitarov, Slastenin, Isaev, et al.); management functions are defined, including pedagogical management (planning, organization of implementation of decisions and plans, motivation, control, improvement) (Goncharov, Simonov) [12, 13].

The novelty of the study. A list of local normative acts regulating and governing the activities of the student research project campus (SRPC) is proposed; the organizational structure of SRPC management, the relationship of SRPC subjects during making and implementing decisions taken by the management team is developed; the tasks, directions, and mechanisms of SRPC implementation are formulated.

Hypothesis. The SRPC management of a technical university will be effective if a set of local normative acts regulating the SRPC activity is developed; the structure, tasks, directions, and mechanisms of realization of the SRPC activity are developed.

The objective of the study. To develop a system and mechanisms to manage SRPC of a technical university to instill sustainable skills of independent research work and develop students' skills to apply theoretical knowledge and modern scientific research methods in professional activities.

The systemic and environmental approaches are the basis for implementing the study's objective.

Tasks of the study. To offer a list of local normative acts regulating the SRPC activities as a managed object following the goals and plans of the educational organization; to develop the organizational structure of SRPC management, the relationship of SRPC subjects with managers in the adoption and implementation of decisions made by the management team; to formulate objectives, identify areas and mechanisms of SRPC activities in practice.

2 Materials and methods

General logical (analysis and synthesis); theoretical (hypothetical, generalization, system analysis method); empirical (questioning); method of statistical data processing.

3 Results

From 2013 to the present time in Penza State Technical University, research of the SRWM management problem and search for optimal mechanisms of its solution in the conditions of

the technical university is carried out. At the first stage, scientific and pedagogical literature was analyzed, the problem was formulated, pilot information to identify the state of the studied problem was collected, the initial positions and methodological characteristics of the work were formulated. Different models of SRWM organization and the experience of SSA management in a technical university were studied. At the next stage, the following was developed: local normative acts regulating and governing the SRPC activities; the structure of its management; the tasks, directions, and mechanisms of the SRPC implementation in practice were determined.

SRPC at Penza State Technical University is a voluntary non-profit association of students engaged in research and project activities in various areas, created based on common interests.

The aim of the SNPK activity is focused on active independent research and project activities of students, its popularization, development of skills to apply theoretical knowledge and modern methods of scientific research in professional activities, development of the intellectual potential of Penza State Technical University.

Summarizing the data obtained in the study, it can be argued that a number of management mechanisms based on the functions of pedagogical management are effective. Their interrelation provides stability and productivity of the scientific and educational environment of the university, making the university more competitive and attractive for applicants [7].

Planning. Each year a plan of SRPC activities is drawn up, considering the connection with the social and industrial partners. Along with traditional events (conferences, competitions for the best R&D, seminars, etc.), there are new formats (gas pedals, hackathons, intensive courses with the direct participation of partners potential employers). Close cooperation between the subjects of the SRPC and teachers of Penza State Technical University departments with partners creates the necessary theoretical, and practical basis for the development of innovative projects develops skills for managing the process of development and commercialization of knowledge-intensive innovations [10].

Organization. The functioning of SNPC is based on the developed in the process of research work intra-university regulations: “On the research work of students”, “On student scientific associations”, “On student scientific society”, “Student Scientific Project Campus”, on student laboratories, circles and clubs.

To ensure the effectiveness of SRPC management, Penza State Technical University has developed an organizational structure based on the binary model [2] (Figure 1).

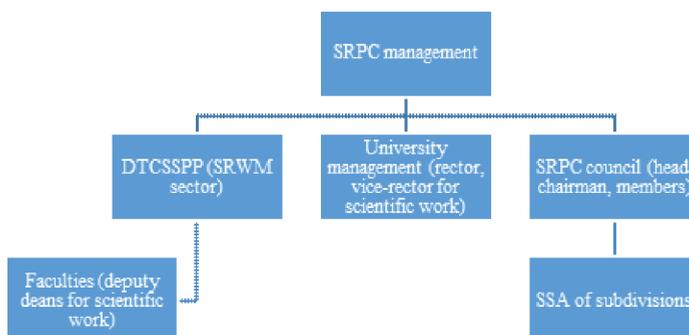


Fig. 1. SRPC management structure.

On the one hand, it is the traditional vertical management: rector, vice-rector for scientific work, the head of the department of training and certification of scientific and scientific-pedagogical personnel (DTCSSPP), the sector of SRWM, and deputy deans for scientific work. On the other hand, this is the activity of student self-government – SRPC.

A project mentor is appointed to carry out the management of scientific activities, organization, and planning of the SRPC from among the employees of Penza State Technical University who have experience in the direction of the Campus.

The scientific-educational program of SRPC Penza State Technical University works on the model of project mentoring [14].

Directions of SRPC activities:

- assistance in organizing new and coordinating the activities of existing SSA in Penza State Technical University departments;
- participation in the organization of student scientific events aimed at identifying talented and enterprising young people who are ready to work in the scientific field;
- assistance in the publication and implementation of the SRWM results, etc.

These directions are determined by the state, regional, and university policy in science, engineering, and technology.

The basis of SRPC activity is a personality-oriented pedagogical technology, providing the student's full development, helping to reveal his research potential, leadership abilities, and other professional competencies necessary for the successful formation of the future specialist [15].

During work in the SRPC, the participant gets skills in conducting research projects, modeling, prototyping, project development, and management.

Motivation. Creating work motivation is an important part of SRPC management. The objects of management receive offers of appropriate rewards in exchange for intellectual labor.

To determine the motives for participation in the SRPC, students participate in a questionnaire each year, which later allows them to plan the work of the SRPC. So, in the 2020-2021 academic year, 75 first-year students interested in SRWM and project activities took part in the traditionally conducted questionnaire. Questioning is conducted based on the methodology of motives of scientific activity, proposed by researchers Laptev, Kornilova [16].

According to the results of the study: 39% of respondents identify motives for professional growth (the desire to obtain the skills necessary for future professional activity); 27% – communicative (desire to interesting communication, establishment or maintenance of satisfying relationships with other people); 20% – material (activity of the subject aimed at obtaining material compensation for scientific work); 9% – personal growth motives (desire to make yourself the subject of transformation and self-improvement); 5% – cooperative (desire to cooperate for the sake of obtaining a useful result for society through research and the development of innovative products). When planning the work of the SRPC for the next year, along with the reporting documents of the previous year and the plan of the university SRWM, the results of the survey are taken into account.

The motivation of scientific leaders of Penza State Technical University participating in the SRWM organization is carried out within the monitoring of the effectiveness of pedagogical and scientific staff, the results of which are followed by financial incentives.

Control. The control function of SRPC management includes observation, study, analysis, diagnosis, and evaluation of the performers' activities.

Every year Penza State Technical University departments provide a journal of SRWM, which includes a report and a plan of SRWM for the next calendar year.

SRPC participants form a portfolio of achievements and present it in the annual competition of leaders of research and project activity "Triumph".

Improvement. Based on the analysis and evaluation of the SRPC effectiveness, opportunities for improvement are identified and reflected in the SRWM plan. Taking measures to improve student projects, taking into account the comments and suggestions of experts in scientific competitions, allows bringing SRWM to a higher level of scientific activities.

Thus, the interaction of the traditional vertical management of SRWM and SRPC will create favorable conditions for the operational consideration of the interests and needs of students in the organization of SRWM in the university.

Thanks to this interaction, the positive dynamics of student science performance can be observed. So comparing the indicators of 2019 and 2020, there is an increase of 44% in the number of scientific publications of students, by 50% in applications for intellectual property received by students.

4 Discussion

Analysis of the obtained results of the research question revealed the relationship between management functions and the quality of SRWM. The complex functions reflect the course and sequence of certain management impacts and their completed cycle.

The developed list of local normative acts promotes regulation of SRPC activity in university; the offered organizational structure of SRPC management promotes successful decision of SRWM problems; directions and mechanisms of SRWM activity realization fully contribute to instilling of sustainable skills of independent SRWM, and also the development of abilities at students to apply theoretical knowledge and modern methods of scientific researches in professional activity.

5 Conclusion

In improving the SRPC management of the technical university, we consider promising to continue to use the mechanisms of pedagogical management: planning, organization, motivation, control, and measures aimed at continuous improvement.

A qualitatively built system of management of student research at the university allows replenishing the reserve to form a reserve of personnel, including future managers teacher-researchers.

References

1. S.V. Novoselov, L.A. Mayurnikova, M.N. Klishina, A.S. Novoselov, Nauchno-innovatsionnaya deyatelnost na osnove innovatsionnoi sredy [Scientific-innovation activity based on innovation environment] (Kemerovo Technological Institute of Food Industry, Kemerovo, 2016)
2. V.Yu. Stromov, P.V. Sysoev, Higher Edu. Rus., **10(216)**, 75-82 (2017)
3. D.D. Bradlow, Int. Organ. Res. J., **13(4)**, 213-236 (2018)
4. N.V. Kozlova, Revista Inclusiones, **7**, 583-608 (2020)

5. J.M. Tsarapkina, E.M. Voronova, D.V. Efimova, N.V. Malysheva, N.E. Zhitnikova, Eduweb-Revista Tecnol. Inf. Comun. Edu., **14(2)**, 207-215 (2020)
6. A. Sobolewski, R. Czajka, *Campus of Wroclaw university of science and technology – a case study of contemporary creation of academic architecture*, in Conference Proceedings, 6th International multidisciplinary scientific conference on social sciences and arts sgem, 435-442, Poland (2019).
<https://doi.org/10.5593/sgemsocial2019V/6.1/S17.051>
7. M.A. Fedotova, I.Yu. Belyaeva, O.V. Loseva, et al., *Razvitie sistemy upravleniya imushchestvom universitetskogo gorodka: luchshie rossiiskie i zarubezhnye praktiki* [Development of university campus property management system: best Russian and foreign practices] (Rusains Publishing House, Moscow, 2017)
8. O.N. Soluyanov, E.M. Voronova, S.V. Sergeeva, Z.V. Smirnova, A.K. Milyaeva, J. Edu. Psych., **9(1)**, 922 (2021)
9. N.V. Saratovtseva, O.E.mKozlova, O.I. Vaganova, O.T. Chernei, Z.V. Smirnova, J. Edu. Psych., **9(1)**, 807 (2021). <http://dx.doi.org/10.20511/pyr2021.v9nSPE1.807>
10. N.M. Galimullina, O.A. Vagaeva, D.E. Lomakin, T.E. Melnik, A.V. Novakovskaya, J. Physics: Conf. Ser., **1515(2)** (2020)
11. M.G. Golubchikova, Sci. Person: Human. Res., **14(2)**, 113-117 (2020).
<https://doi.org/10.17238/issn1998-5320.2020.14.2.19>
12. M.A. Goncharov, *Osnovy menedzhmenta v obrazovanii* [Fundamentals of Management in Education] (KnoRus, Moscow, 2006)
13. V.P. Simonov, *Pedagogicheskii menedzhment. Nou-khau v oblasti obrazovaniya* [Pedagogical management. Know-how in education] (Higher Education, Moscow, 2009)
14. O.V. Glazunova, *Researcher*, **1(29)**, 104-134 (2020)
15. I.R. Savchukova, *Lichnostno-orientirovannaya tekhnologiya kak osnova upravleniya studencheskim nauchnym soobshchestvom v universitete* [Personality-oriented technology as the basis for managing student scientific society in the university], in Youth of Russia in the 21st century, Materials of student scientific-practical conference of the 6th All-Russian student forum “Russia – our common home”, 221-224, Grozny State Petroleum Technical University named after Academician M. D. Millionshchikov (2019)
16. O.I. Lapteva, A.G. Kornilova, *Pedag. Psych.*, **8(6)**, 7 (2020)

On the effectiveness of project financing of higher education in Russia

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Abstract. In the difficult post-pandemic conditions, the sustainable functioning of higher education in Russia is largely determined by the state budget and investment policy in this area and requires new scientific research to find the best ways to assess the effectiveness and efficiency of educational expenditures. This problem is largely due to the need to increase the efficiency of public spending and the responsibility of education and finance management bodies for the effectiveness of their use. One of its solutions is to find methodological tools and science-based approaches to assess the effectiveness of project financing of higher education. The article substantiates the practical significance of using modern theoretical and methodological approaches to evaluate the effectiveness and productivity of financial support in the process of gradual transition from program financing to project one in the field of higher education and allowing to update the current evaluation tools. The proposed structural and logical model of the Concept of evaluation of the efficiency of project financing of higher education in Russia, being a part of the basic Concept of state support for projects and programs in education, describes the sequence of forming the empirical basis necessary for making effective managerial decisions on the choice of options and volumes of financing of projects and programs.

Keywords: national projects and federal programs, project financing, efficiency assessment, structural-logical model

1 Introduction

The first studies on the efficiency of the public sector were conducted by Armstrong, Baron, Musgrave, Musgrave, and Stiglitz [1-3]. The problems of project financing and attracting sources of financing, including the social sphere, were studied by Delmon [4]. Domestic economists (Sigova, Kruglova, Vlasova) developed the principles of responsible financing of a limited number of priority projects [5]. The basic methodological approaches to the state support of education, including the analysis of the “cost-benefit” ratio (Cost-Benefit-Analysis, CBA), were laid down in the works of foreign researchers: Gittinger [6], Harberger [7], and Mirreless. Practices and procedures of budgeting by results are presented in the works of Schick, Show [8, 9], Tregubova considers necessary “the

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convergence of project performance indicators and performance indicators of target programs of country budgets” [10]. Today, in education, the assessment of the project financial efficiency, based on the key provisions of the foreign concept of CBA assessment, is provided only for public-private partnership projects and does not fully comply with modern methodological approaches to assess the performance of projects and programs in higher education [11]. In this regard, there is a need to form the Concept of optimal allocation of state financial resources for programs and projects in higher education (HE) with a preliminary and subsequent assessment of their effectiveness. One of the new solutions to this problem is developing a structural and logical model of the Concept of the effectiveness evaluation of project financing in Russia. The study hypothesizes that the practical application of the developed Concept model will allow the most optimal allocation and efficient use of financial resources for the implementation of projects (programs) in higher education. The study aims to consistently build a structural and logical model of the concept of assessing the effectiveness of HE project finance. To achieve it, it is necessary to conduct a retrospective analysis of state programs and national projects, express analysis of their financial support, develop a structural and logical Concept model.

2 Materials and methods

The basis of the study methodology was general scientific methods (analysis and synthesis, grouping and measurement, logic and comparison) and special methods, including retrospective, system, and factor analysis of the empirical base and practical tools to assess the effectiveness of public expenditure. Along with this, we used expert-analytical methods that systematize the sources of program and project financing in education and establish the relationship between the components of the structural-logical model of the Concept of the effectiveness evaluation of HE project financing.

The information base of the study includes expert and analytical reports and releases of the Government of the Russian Federation, analytical materials of the Accounts Chamber of the Russian Federation, methodological recommendations of the Ministry of Science and Higher Education of the Russian Federation.

3 Results

The policy of state support for Russian universities is formulated in the national projects “Science and Universities”, “Education”, “International Cooperation and Export”, and “Digital Economy”. Its key trend is to strengthen the competitiveness of domestic higher education, including through diversification and increasing the sustainability of the structure of funding sources. The range of financial support sources for the national projects includes direct expenditure obligations of the federal budget (stipulated in 60 of 76 design certificates), interbudgetary transfers in the form of subsidies to the budgets of the RF subjects (36); subsidies to legal entities (15); subsidies to non-profit organizations (11) and budget investments in state (municipal) property (10) [12].

A retrospective analysis of RF HE programs and projects shows that the program-targeted management of financial resources became most widespread in 2009-2019. In the pre-crisis period, the state supported the most effective universities: Lomonosov Moscow State University, St. Petersburg State University, Federal and National Research Universities, and the supporting regional and sectoral universities. The most significant of all the state support programs of universities was the “Project 5-100”, designed to strengthen their research potential and competitive position in the global market

of educational services. The total Project funding over four years was 607,920 RUB mln. The main funding source throughout the Project 5-100 remained the federal budget – 55% (Fig. 1). The share of actual costs of the Project in the budget expenditures for the entire period of its implementation did not exceed 22% and was steadily decreasing by the time of its completion (Table 1).

In 2020 the program “Priority 2030” was adopted. One hundred six universities participating in the program received in 2021 the basic part of the grant of 100 RUB mln., another 54 universities will receive a special part of the grant in the amount up to 1 billion a year [13]. A total of 1.7 RUB trillion was allocated for the national projects in 2019, and in 2021 already 2.2 RUB trillion, which is more than 1/10th of the country’s budget, which must be used with maximum efficiency. In this regard, in our opinion, it is advisable to build a structural and logical model of the concept of assessing the effectiveness of HE project financing as a tool for monitoring the effectiveness of public spending in this area.

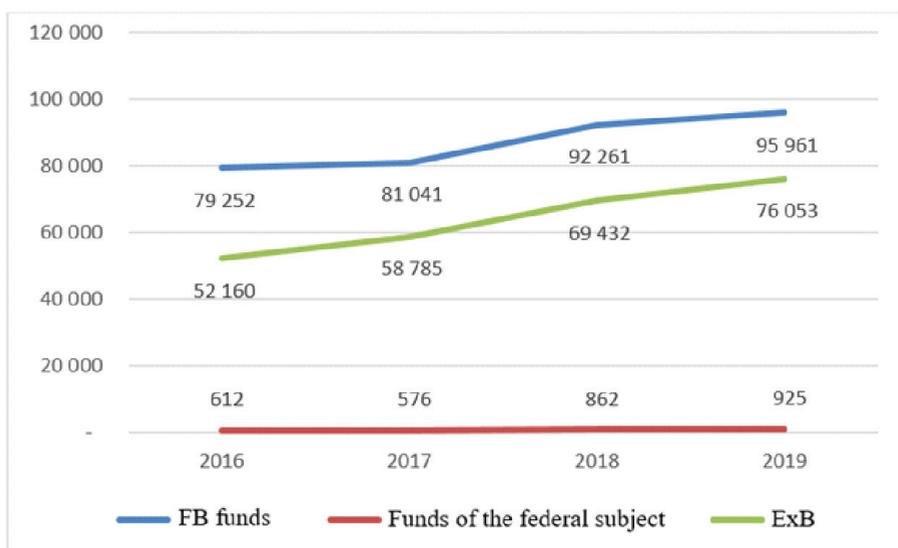


Fig. 1. Dynamics of financial support of higher education institutions – participants of Project 5-100 from 2016 to 2019, RUB mln. [14].

Table 1. Information on the actual costs of universities participating in the Project 5-100

Indicators	2014	2014	2014	2014
Consolidated budget of the Russian Federation, RUB mln.	132,023	140,402	162,555	172,939
Actual budget expenditures, RUB mln.	112,675	118,218	134,813	146,386
Actual expenses of the “Project 5-100” (all sources), RUB mln.	24,455	24,267	23,177	23,485
Share of actual costs of the Project in budget expenditures, %	21.7	20.53	17.19	16.04

Source: [14].

In our opinion, the basic Concept of the system of state support of national projects should be based on the formation of a projects portfolio balanced by efficiency and risk, including the following components: preliminary and subsequent assessment of the project

effectiveness and the effectiveness of their financing, risk assessment, performance and effectiveness monitoring procedures, integral evaluation of the portfolio effectiveness. In turn, the structural-logical model of the Concept of effectiveness evaluation of HE project financing, being a part of the basic Concept, describes the sequence of formation of the empirical basis necessary for making effective managerial decisions on the choice of options and volumes of financing of projects and programs in higher education (Fig. 2). The model, based on the relevant requirements, principles, and rules, establishes a logical connection between its components: the adjustment of the planned volume of budget allocations based on the results of the evaluation of the financing effectiveness of the previous period; monitoring and analysis of actual costs in the context of individual subprojects and subprograms; integral evaluation of HE program and project financing. The general (established by the national standard of the Russian Federation [3]) and specific requirements for the formation of the project portfolio must be considered:

- providing reliable information for determining the structure and composition of the project portfolio, as well as defining the principles of portfolio management;
- priority of budget allocations and additional revenues of the federal budget generated during its implementation; online monitoring of operational information on the progress of projects and programs;

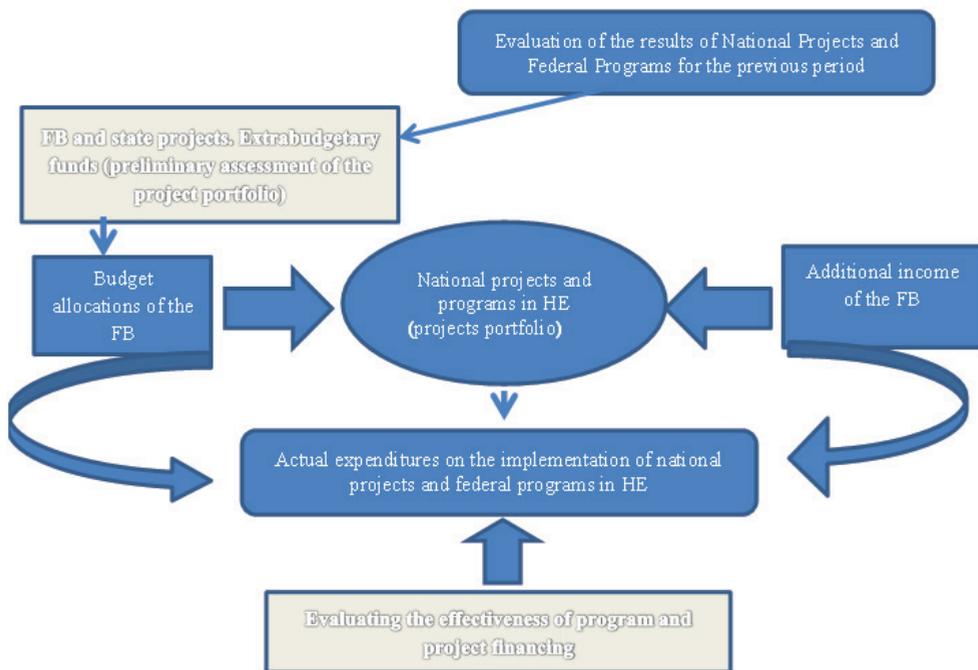


Fig. 2. Structural and logical model of the Concept for evaluating the effectiveness of project financing in higher education in Russia.

The structural and logical model of the Concept of evaluating the effectiveness of HE project financing is also based on the established legislative principles of financing national projects and programs. In our opinion, since the largest share of their financial support in the HE is budget funds, the key should be an assessment of the financing effectiveness, which should be the basis for the formation of rules for their provision, adjusted by the assessment results.

4 Discussion

Practice shows that at this stage, the effectiveness of project financing in the RF HE is negatively affected by the lack of a holistic mechanism for the effective management of financial resources of national projects and federal programs, which is noted in the scientific publications of a number of Russian authors (E. M. Buchwald, R. R. Gumerov et al.) [15, 16]. In this regard, our proposed structural and logical model of the Concept of assessing the effectiveness of HE project financing allows structuring the projects portfolio into sub-projects and sub-programs. The former should be projected in the programs of strategic development of universities; the latter should remain under the jurisdiction of the federal bodies of education management. The effectiveness assessment of participants and managers of projects (programs) envisaged by the Concept is fully consistent with one of its principles – responsibility for achieving the planned results, “rather than assessing the completeness and timeliness of the development (use) of allocated funds” (Kudelich [12]). At the same time, however, we should agree with the opinion of Kogan that in some cases in the modern system of making financial and investment decisions, it is necessary to assess the sectoral efficiency, carried out based on the methodology of intersectoral analysis [17]. In our opinion, the same approach is appropriate for the integral effectiveness assessment of the portfolio of projects and programs implemented in HE, as it fully corresponds to the functional role of public finance.

5 Conclusion

The Concept of efficiency evaluation of HE project financing, based on the expert and analytical information, as well as on the results of independent expertise and monitoring of their actual implementation, allows making timely and reasonable managerial decisions on the choice of options and amounts of financing of national projects, federal programs and strategic programs of HE development, on their adjustment with the possible risks of not achieving key indicators. One of the directions for further research in the stated problem could be the development of an algorithm for the practical implementation of the Concept and the methodology for assessing the quality of financial management of the portfolio of projects and programs, based on an integral assessment of the impact of project funding efficiency to address the tasks set in the national projects and federal programs in education.

References

1. M. Armstrong, A. Baron, *Upravlenie proizvoditelnostyu. Sistema otsenki rezultatov v deistvii* [Performance management. Results evaluation system in action] (Alpina Publisher, Moscow, 2012)
2. R.A. Musgrave, P.B. Musgrave, *Public finance in theory and practice* (McGraw-Hill, New York, 1989)
3. D. Stiglits, *Soc. Rew.*, **3(2)**, 35-43 (2021)
4. J. Delmon, *Public-private partnership in infrastructure* (Cambridge University Press, 2011)
5. M.V. Sigova, I.A. Kruglova, M.S. Vlasova, *Econ. Manag.*, **5(127)**, 21-29 (2016)
6. J.P. Gittinger, *Analyse economique des projets agricoles* (Economica, Paris, 1985)
7. A.C. Harberger, *Amer. Econ. Ass., Papers a Proc.*, **44(2)**, 77-87 (1954)

8. A. Schick, OECD J. Budget., **13(2)** (2013).
<https://doi.org/10.1787/budget-13-5jz2jw9szgs8>
9. T. Show, OECD J. Budget., **13(2)** (2015).
<https://doi.org/10.1787/budget-15-5j1z6rhqdvhh>
10. D.D. Tregubova, Young Scientist, **17**, 386-389 (2017)
11. V.A. Slepov, T.N. Rodenkova, E.I. Gromova, Z.I. Gerzelieva, D.A. Pokamestov, Revista Tempos E Espaços Em Educação, **14(33)**, e15928 (2021).
<https://doi.org/10.20952/revtee.v14i33.15928>
12. M.I. Kudelich, Fin. J., **4**, 36-49 (2019)
13. Obyavleny vuzy, kotorye poluchat spetsgranty programmy “Prioritet-2030” [Universities that were in the “Priority 2030” Program have been announced]. [Electronic resource]. Accessed on: February 16, 2022. [Online]. Available: <https://skillbox.ru/media/education/obyavleny-vuzy-kotorye-poluchat-spetsgranty-programmy-prioritet2030/>
14. Otchet Schetnoi palaty Rossiiskoi Federatsii [Report of the Accounts Chamber of the Russian Federation]. Accessed on: February 16, 2022. [Online]. Available: <https://ach.gov.ru/upload/iblock/ab8/ab8e9ce46a64ed39020ff200d407dde1.pdf>
15. E.M. Buchwald, Theory Pract. Soc. Devel., **2**, 50-54 (2019)
16. R.R. Gumerov, N.V. Guseva, A.A. Lysenko, All-Rus. Acad. Foreign Trade Ministry Econ. Devel. Rus., **2**, 35-47 (2021). <https://doi.org/10.33983/2075-1826-2021-2-35-47>
17. A.B. Kogan, Optimizatsiya byudzhethnogo i korporativnogo finansirovaniya investitsionnykh protsessov [Optimization of budget and corporate financing of investment processes] (Novosibirsk State University of Economics and Management, 2017)

Quality management: the view on perceived product quality

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Abstract. Perceived quality of products is considered in the fields of computer sciences, engineering, and marketing. The paper aims at studying how perceived quality is presented in quality management research. The issues of journals dedicated to quality (n=23) were subjected to an integrative literature review. The results showed that the number of publications on customer perceived quality is growing as we move towards the new era of Quality 4.0., which takes into account data of different types and from various sources. Just a few articles consider perceived quality analysis as a part of the quality management system. The main research areas are the study of perceived service quality; development of models and frameworks for various products; designing new valid methods of perceived quality analysis with a trend towards data mining, and mixed qualitative and quantitative methods; applying perceived quality analysis as a part of the quality management system and new product development; cross-cultural features of quality perception.

Keywords: product quality, perceived quality, quality management

1. Introduction

The next normal of production will be characterised by a significant influence of sustainability and product quality on purchase decisions [1]. Many enterprises around the world have already adopted quality management systems and certified their products to sustain competitive advantage [2, 3]. Still, there are some product features, e.g. design that refer to quality but are difficult to be assessed using the parameters stated in standards.

The phenomenon of perceived quality has been traditionally analysed from the positions of marketing, brand management, and consumer behaviour [4]. The development of E-commerce brought computer science researchers to this field as perceived quality became a recognised influential part of online purchase intent [5]. A number of scholars propose frameworks of quality that include subjective (based on consumer perceptions) and objective (based on the requirements of standards) components [6]. The model of quality developed by Golder et al. includes quality production and quality experience (perceived attributes) [7]. Aakko et al. created the conceptual map of perceived quality comprising the relevant aspects of product expectations, usage experience and multiple personal factors [8]. Styliadis et al. put the perceived quality domain into the engineering context by defining it as '*product meaning, form,*

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sensorial properties, and their execution intersecting with human experience driven by the interplay between product quality and its context' and making it a valuable tool in engineering design and managing the quality of products in general [9]. Thus, research on perceived quality is relevant, and the results can be further used by enterprises to enhance their products.

Every manufactured product must comply with particular objective standards. ISO 9001:2015 Quality Management Systems states the key concepts of quality management and does not mention perceived quality but states that it is '*universally applicable*' for '*customers seeking confidence in .. products .. conforming to their requirements*' and '*organisations*' willing to meet these requirements [10]. That implies both extrinsic and intrinsic requirements, i.e. the essence of customer perceived quality. ISO 56002:2019 Innovation Management System sets the standard for innovation and new product development processes at an organisation that include getting '*customer insights and knowledge*' on their '*stated*' (extrinsic) and '*non-stated*' (extrinsic) needs and expectations [11]. Studies show that the adoption of quality management systems at organisations contributes substantially to perceived quality. However, the customer perceived quality seems not to be a part of regular quality management processes. The current paper aims at investigating the view on perceived quality that exists in scientific journals dedicated to quality management.

2. Methods and materials

The present paper attempts to find the place of perceived quality in quality management research. For this purpose, an integrated literature review was conducted. There are 1105 journal articles cited in the Scopus reference and citation database published in English from 1986 to 2021 that deal with perceived quality. Among them, 29 articles were selected as touching on the phenomenon of perceived quality within the quality management framework in journals that are not utterly dedicated to quality management. To examine the views on perceived quality and related issues that encompass customer expectations and experiences, the publications in 23 scientific journals disseminating new knowledge on quality and quality management were explored (Table 1).

Table 1. Journals on Quality Issues. Source: developed by authors.

Name	Number of Publications
Quality – Access to Success	929
Quality and Reliability Engineering International	502
Quality Progress	356
International Journal of Quality and Reliability Management	338
Total Quality Management and Business Excellence	320
BMJ Open Quality	294
International Journal of Productivity and Quality Management	232
Quality Engineering	221
International Journal for Quality Research	183
Zywnosc. Nauka. Technologia. Jakosc/Food. Science Technology. Quality	153

Software Quality Journal	152
Accreditation and Quality Assurance	144
Journal of Quality in Maintenance Engineering	122
Quality Technology and Quantitative Management	116
International Journal of Quality and Service Sciences	99
Journal of Quality Technology	95
International Journal of Reliability, Quality and Safety Engineering	94
Quality Innovation Prosperity	77
Journal of Quality	76
International Journal of Metrology and Quality Engineering	65
Quality Management Journal	49
Stochastics and Quality Control	29
International Journal of Quality Engineering and Technology	29

3. Results

Research on customer perceived quality of products presents only 1.2 % of the scientific field of quality management. Although perceived quality is mentioned under the topics of customer satisfaction, customer needs and requirements, their amount was not taken into account, as the examined phenomenon was not the subject of those studies.

Perceived quality of products is considered in five major perspectives (Fig.1). The largest of which touches on the methods of perceived quality evaluation and methods of data analysis. The proposed methods vary from attribute rating and importance- performance analysis to laboratory experiments and focus groups. The current research directions feature the development of mixed qualitative and quantitative methods [12] and methods that use neural networks or big data mining to assess customers' perceptions of quality [13]. Other perspectives are the studies of models and frameworks designed for different products and customer perceptions dependence on cultural background represented in several studies.

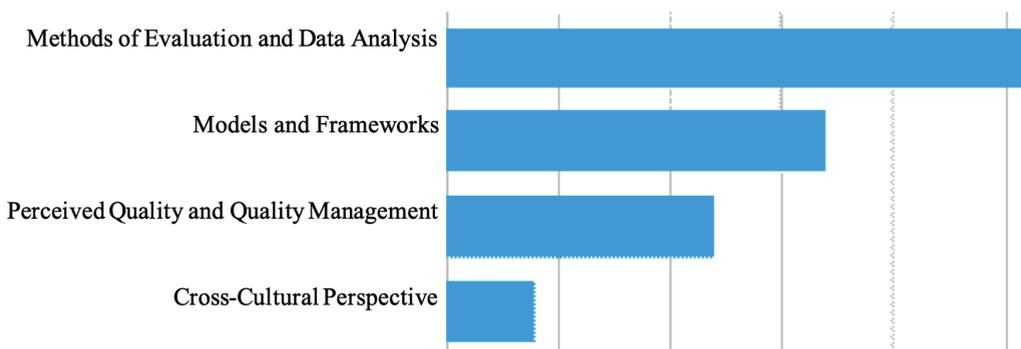


Fig. 1. Perceived Quality Research Areas Dominating in Scientific Journals on Quality Issues. Source: developed by authors.

The research directions that link perceived quality analysis to quality management is of particular interest in the current literature review. It is represented with the studies on the positive influence of quality management systems and ISO certification on customer perceptions of products quality; perceived quality analysis as an essential part of requirements analysis and a source of valuable data for the enterprise in terms of new product development, customer-driven innovations and quality management in general (Fig. 2).



Fig. 2. Perceived Quality in Quality Management Research. Source: developed by authors.

4. Discussion

Analysis showed that the number of articles on perceived quality is constantly growing. And this tendency seems to remain because the next era of quality is Quality 4.0, the era of big data mining, the era of a deeper analysis of customers intrinsic needs and perceptions. The fast changes of the world influence perceptions on quality, and thus, it is crucially important for an enterprise to make customer perceived quality analysis a part of their regular quality management processes.

Perceived quality is viewed in quality management research in three main dimensions. The majority of studies suggest the Kano model for customer perceived quality analysis. Kirgizov and Kwak integrated the model into the Quality Function Deployment matrix [14]. Rejikumar et al. consider perceived quality analysis an essential part of data-driven quality management and decision making [15]. All studies investigating the perceived quality as a part of requirements analysis emphasised its importance because the quality perceptions of engineers and experts differ from those of customers. Koka et al. emphasised the need for studying user perceptions on quality at an early stage of product development and the relevance of studying perceived quality regularly because of the dynamic changes of the external environment of an enterprise [16].

Research indicates that it can be recommended for enterprises to conduct customer perceived quality analysis to increase customer satisfaction and meet their requirements which

is the particular goal of quality management capable of giving a company a source of competitive advantage and leading to profit.

5. Conclusion

Perceived quality is a subject that is analysed in quality management research. Customer perceived quality analysis provides relevant data for production companies. The number of models and valid methods developed in the examined publications on customer perception and product quality allows enterprises to implement perceived quality analysis as an instrument within their quality management and innovation systems. Companies can achieve almost any level of product quality. However, the goal of an effective enterprise is profit generation which requires finding a reasonable balance by searching for the optimal level of perceived quality and costs. Perceived quality analysis makes this possible and can be considered as an obligatory element nowadays. The present research demonstrated that with the help of the conducted literature review.

To sum up, it is worth mentioning that there are particular limitations in the current research. First of all, only articles from scientific journals cited in the Scopus database were analysed. We do not argue that feasible models of perceived quality might not be found in other sources. At the moment, more than 1400 conference proceedings explore the customer quality perception issues and are worth being examined. The future research agenda will consider them and further focus on putting the perceived quality analysis into the quality management system of a light industry enterprise and then proving its efficiency for the maximisation of profit.

References

1. Sporting Goods 2021. The Next Normal for an Industry in Flux. McKinsey Report. Accessed on: March 07, 2022. [Online]. Available: <https://www.mckinsey.com/industries/retail/our-insights/sporting-goods-2021-the-next-normal-for-an-industry-in-flux#>
2. N. Towers, J. McLoughlin, J. Textile Inst., **96**, 87-92 (2005). <https://doi.org/10.1533/joti.2004.0058>
3. E. Marnitcyna, K. Kaisheva, SHS Web Conf., **125**, 05012 (2021). <https://doi.org/10.1051/shsconf/202112505012>
4. M. Gill, J. Dawra, J Target Meas. Anal. Mark., **18**, 189-198 (2010). <https://doi.org/10.1057/jt.2010.11>
5. J.D. Wells, J.S. Valacich, T.J. Hess, MIS Quart., **35(2)**, 373-396 (2011). <https://doi.org/10.2307/23044048>
6. V.A. Zeithaml, J. Market., **52**, 2-22 (1988)
7. P.N. Golder, D. Mitra, C. Moorman, J. Market., **76**, 1-23 (2012). <https://doi.org/10.1509/jm.09.0416>
8. M. Aakko, K. Niinimäki, J. Fashion Market. Manag., **26(1)**, 107-125 (2021). <https://doi.org/10.1108/JFMM-09-2020-0192>
9. K. Stylidis, C. Wickman, R. Söderberg, J. Eng. Design, **31(1)**, 37-67 (2020). <https://doi.org/10.1080/09544828.2019.1669769>
10. ISO 9001:2015 Quality management systems – Requirements (ISO Standard No. 9001:2015). Accessed on: March 07, 2022. [Online]. Available: <https://www.iso.org/standard/62085.html>

11. ISO 56002:2019 Innovation management – Innovation management system – Guidance (ISO Standard No. 56002:2019). Accessed on: March 07, 2022. [Online]. Available: <https://www.iso.org/ru/standard/68221.html>
12. Q. Liang, K. Wang, J. Qual. Techn., (2020) <https://doi.org/10.1080/00224065.2020.1829216>
13. L. Mastrogiacomio, F. Barravecchia, F. Franceschini, F. Marimon, Qual. Eng., **33(3)**, 425-442 (2021). <https://doi.org/10.1080/08982112.2021.1877305>
14. U.A. Kirgizov, Ch. Kwak, Qual. Techn. Quant. Manag., **19(1)**, 95-112 (2021). <https://doi.org/10.1080/16843703.2021.1992070>
15. G. Rejikumar, A.A. Asokan, V.R. Sreedharan, Total Qual. Manag. Bus. Excel., **31(3-4)**, 279-296 (2020). <https://doi.org/10.1080/14783363.2018.1426452>
16. A. Koca, M. Funk, E. Karapanos, A. Rozinat, W.M.P. van der Aalst, H. Corporaal, J.B.O.S. Martens, P.H.A. van der Putten, A.J.M.M. Weijters, A.C. Brombacher, Qual. Reliab. Eng., **25(1)**, 3-20 (2009). <https://doi.org/10.1002/qre.937>

The influence of personal characteristics on the success of managerial activities of personnel officers

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Abstract. From relevance point of view in the Practical Psychology for Law Enforcement, attention is mostly focused on the study of internal affairs employees who directly perform the functions to ensure and protect public order and security. No studies have been conducted on the relationship between the personal characteristics of those internal affairs bodies employees, who are involved into Human Resources operations and do not directly perform the functions of ensuring security, and the success of the implementation of professional and service activities. The purpose of the study: to determine the relationship between the personal characteristics of Human Resources employees of internal affairs bodies and the level of success of their professional activities. The study used a questionnaire, a multifactorial personality questionnaire FPI (Form B), as well as statistical methods of data processing. The study involved 80 employees from among the middle and senior management personnel belonging to the internal service, namely Human Resources departments. Socio-demographic and service status factors do not affect the success/failure of the professional activities of internal service employees. Employees of Human Resources services successfully performing their professional duties have higher level of sociability and lower spontaneous aggressiveness, irritability and neuroticism than employees who have committed violations.

Keywords: personality, individual differences, professional psychology of labor, labor

1 Introduction

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The specifics of the operational activities of internal affairs bodies employees (hereinafter referred to as Police) are requirement of individual approach in each case [1-5]. Here the achievements of psychological science are actualized. The application of those can lead to an increase in the success of professional and service activities of police officers [6-11].

The purpose of the study: to determine the relationship between the personal characteristics of Human Resources employees of internal affairs bodies and the level of success of their professional activities. Objectives of the study: to analyze the personal characteristics of Human Resources employees of the Department of Internal Affairs, as well as to identify the features of the link between these characteristics and the success of their professional and service activities.

The authors of the article suggest that the personal characteristics of Human Resources employees of the Department of Internal Affairs have an impact on the effectiveness of their professional and service activities.

Vakhnina V.V., Ulyanina O.A., Kotenev I. O., Gizdatov T. Yu., Maryin M.I., Kuznetsova O.V., Pozdnyakov V.M., Maltseva T.V., Burtsev A.O., Porshukov A. S., Sharanov Y. A. and others addressed the study of the psychological characteristics of the personality of police officers, their formation and the link with the level of success in performing professional and official activities in their works [12-16].

This work is of scientific interest due to the fact that no studies have been conducted on the relationship between the personal characteristics of those internal affairs bodies employees, who are involved into Human Resources operations and do not directly perform the functions of ensuring security, and the success of the implementation of professional and service activities. From relevance point of view in the Practical Psychology for Law Enforcement the attention is mostly focused on the study of internal affairs employees who directly perform the functions to ensure and protect public order and security.

2 Materials and methods

The study used a questionnaire, a multifactorial personality questionnaire FPI (Form B), as well as statistical methods of data processing [17-21].

The study was conducted on the basis of municipal departments of the Ministry of Internal Affairs of Russia in the Tver region (hereinafter referred to as institutions). It was attended by 80 employees from among the middle and senior commanding staff related to the internal service, namely the Human Resources units.

The sample consisted of men and women: 48% of respondents are female employees, 42% are male employees. The average age of experiment participants is 35. The length of service varies from 5 to 15 years.

The questionnaire was aimed at studying the existence of a disciplinary penalty, which was an objective criterion of their professional activity success /failure.

The analysis of questionnaires revealed 38 disciplinary penalties for 2020. Respondents in the questionnaires indicated the reasons for the imposition of penalties, expressed in violations of the Orders of the Ministry of Internal Affairs of Russia and official regulations.

Empirical data processing and validation of the results obtained were carried out using the application programs Microsoft Excel and Statistika 10. In the course of the study, average indicators were calculated, correlation matrices were constructed, the proposals put forward were checked using the T-test (Student's test). Psychological diagnostics was carried out in accordance with the systems of calculation of specific types of testing. The data obtained by all methods were processed using methods of mathematical statistics.

3 Results

Let us consider a qualitative and quantitative analysis of the selected groups of respondents. For the convenience of the description, we conditionally designate the samples “B+” (having penalties) and “B-” (no penalties). With the help of mathematical statistics, the average indicators of age and service experience were calculated.

The average age of respondents in the “B+” group is 34.1 and in the “B-” group is 33.9. At the same time, the average length of service in the “B+” is 10.1 years, in the “B-” sample is 10.5 years. The Student’s T-test was used to calculate the significance of the differences. When calculating the empirical value for the compared parameters $t_{emp} = 0.3$; $t_{emp} = 0.4$, which are in the zone of insignificance.

The analysis of the results obtained on the basis of the Multifactorial Personality Questionnaire FPI (Fig. 1) was carried out on scales where the significant differences in indicators obtained in employee samples were observed.

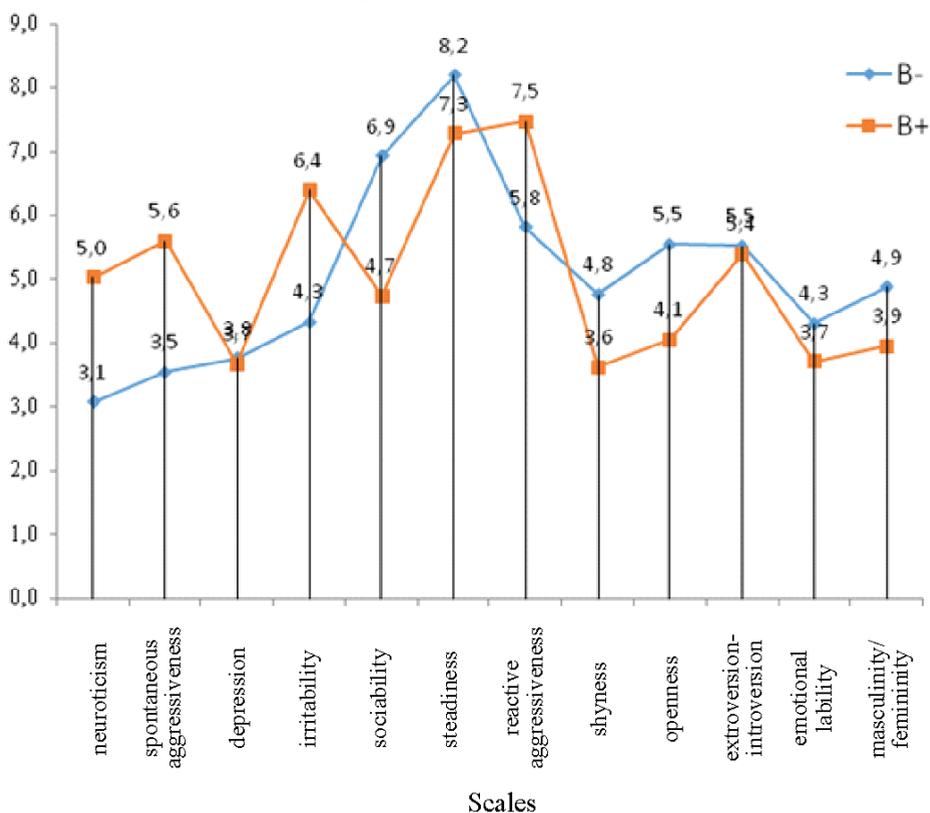


Fig. 1. Comparative analysis of samples by averaged values of scales FPI (compiled by the authors).

To calculate the significance of the differences in the obtained values, the Student’s T-test was used. When calculating the empirical value for the compared samples $t_{emp} = 0.1$, according to most scales of the methodology, the values are in the zone of insignificance (Table 1). However, according to scale No. 1 “Neuroticism”, scale No. 2 “Spontaneous aggressiveness”, scale No. 4 “Irritability”, scale No. 5 “Sociability”, the values obtained are in the zone of significance, since $t_{emp}=3.61$, $t_{emp}=4.41$, $t_{emp}=4.41$, $t_{emp}=4.84$, respectively. Let us consider the differences in details.

Table 1. Empirical values of the T-Student criterion for samples according to the FPI method (compiled by the authors)

No.	Sample 1 (B-)	Sample 2 (B+)	Deviation (B.1-B.2)	Deviation squares (B.1-B.2) ²
1	3.1	5.0	-1.9	3.61
2	3.5	5.6	-2.1	4.41
3	3.8	3.7	0.1	0.01
4	4.3	6.4	-2.1	4.41
5	6.9	4.7	2.2	4.84
6	8.2	7.3	0.9	0.81
7	5.8	7.5	-1.7	2.89
8	4.8	3.6	1.2	1.44
9	5.5	4.1	1.4	1.96
10	5.5	5.4	0.1	0.01
11	4.3	3.7	0.6	0.36
12	4.9	3.9	1	1
Values:	60.6	60.9	-0.3	25.75

Result: $t_{emp} = 0.1$

Table 2. Critical values

t_{kp}	
$p \leq 0.05$	$p \leq 0.01$
2.2	3.11

4 Discussion

Summing up, we note that the sample participants do not differ significantly in age, length of service, thus these factors probably do not affect the success/failure of professional activity.

The data obtained allow us to conclude that some individual and personal characteristics of Human Resources employees of the Department of Internal Affairs have an impact on the success of their official duties performance.

According to the empirical data obtained, employees from the “B-” group (3.1) have a lower level of neuroticism than respondents from the “B+” group (5). At the same time, in both cases, this level is average or below average. Neuroticism is usually expressed as a special form of behavior and self-feeling which arises due to the influence of some circumstances of insignificant force, which however may cause a stress reaction in the body. Since t_{emp} is in the zone of significance when assessing differences according to this criterion, it can be concluded that such a personal quality as neuroticism can influence the success of employees’ professional activities.

Empirical research also revealed the presence of significant differences on the scale of “spontaneous aggressiveness”. Spontaneous aggressiveness of employees having penalties is rated higher than employees having no penalties. This indicates that the respondents from the “B+” group have a higher level of psychopathization, which, accordingly, is a prerequisite for a higher level of impulsivity of behavior than the respondents of the “B-” group. Thus, it is confirmed that a higher level of spontaneous aggressiveness is found among the employees who commit violations of official activity than among the employees of second group.

According to the data obtained during the empirical study, significant differences in the assessment of personal characteristics are observed on the “irritability” scale. This characteristic is lower for employees who successfully cope with official tasks than for employees of another group. This suggests that employees who commit violations are less emotionally stable and more prone to an affective response to the situation than employees who successfully cope with official duties. The data obtained allow us to conclude that employees who have penalties have a higher level of irritability than the respondents of the second sample.

As can be seen from the chart (Fig. 1), employees with no penalties have a higher level of sociability (6.9) than employees who have committed violations (4.7). This indicates that the potential opportunities and real manifestations of social activity among employees who are characterized by success in their official activities are higher than in the second group. This data also allow us to talk about high level of interaction need as well as readiness to meet this need. The data obtained shows that employees who successfully cope with official duties have a more pronounced personal quality of “sociability” than employees who less successfully cope with official duties.

5 Conclusion

The empirical study shows that socio-demographic (age, marital status, number of children) and service status (length of service, special rank) factors do not affect the success/failure of the professional activities of internal service employees.

Employees of the Human Resource services of the Department of Internal Affairs who successfully cope with the performance of professional duties have a more developed level of sociability, less pronounced spontaneous aggressiveness, irritability and neuroticism than employees who have committed violations.

References

1. S.G. Eremeev, N.A. Tyufyakov, A.V. Shakhmatov, *Psychopedag. Law Enforc. Agencies*, **25(4(83))**, 383-389 (2020). <https://doi.org/10.24411/1999-6241-2020-14003>
2. L.Z. Karavanova, R.I. Kachaev, *App. Psych. Pedag.*, **2**, 125-140 (2021). <https://doi.org/10.12737/2500-0543-2021-6-2-125-140>
3. E. Knies, P. Boselie, J. Goud-Williams, W. Vandenabeele, *Int. J. Human Resource Manag.*, (2018). <https://doi.org/10.1080/09585192.2017.1407088>
4. T.S. Nikitina, *App. Psych. Pedag.*, **3**, 20-31 (2019). https://doi.org/10.12737/article_5d87a947cef6a1.59104987
5. E.V. Samal, *Human Psych. Edu.*, **2(3)**, 236-246 (2020). <https://doi.org/10.33910/2686-9527-2020-2-3-236-246>
6. J.S. Zhimirikina, *App. Psych. Pedag.*, **3**, 44-60 (2019). https://doi.org/10.12737/article_5d87ae98a9ddf1.79150111
7. M.A. Kononova, E.G. Ichitovkina, A.G. Soloviev, M.V. Zlokazova, N.N. Smirnova, *Psychopedag. Law Enforc. Agencies*, **24(2(77))**, 195-200 (2019). <https://doi.org/10.24411/1999-6241-2019-12010>
8. T.V. Maltseva, A.A. Kuptsov, *Psychopedag. Law Enforc. Agencies*, **24(1(76))**, 74-79 (2019). <https://doi.org/10.24411/1999-6241-2019-11011>

9. G. Matthews et al., *Person. Individ. Differ.*, **169**, 109969 (2021).
<https://doi.org/10.1016/j.paid.2020.109969>
10. Y.Y. Tarasov, V.V. Vakhnina, T.V. Maltseva, O.A. Ulyanina, *Psikhologicheskaya rabota v sisteme moralno-psikhologicheskogo obespecheniya operativno-sluzhebnoi deyatel'nosti sotrudnikov* [Psychological work in the system of moral and psychological support of employees operational and service activities] (Moscow, 2018)
11. E.G. Chernikova, S.S. Chernikova, *Health, Edu. Security*, **1(9)**, 104-109 (2017)
12. I. O. Kotenev, T. Yu. Gizdatov. Psychological problems of regulation of official behavior of employees of internal affairs bodies // *Psychology and pedagogy of official activity*. 2017. no. 4. P. 58. (Moscow, 2017)
13. M.I. Maryin, O.V. Kuznetsova Woman-leader in the internal affairs bodies: issues of women's leadership in the police department // *National Association of Scientists*. 2020. No. **53-3 (53)**. pp. 38-41. (Moscow, 2020)
14. A. S. Porshukov *National Psychological Journal*. no. **1 (37)**. (2020).
<https://doi.org/10.11621/npj.2020.0110>
15. V.M. Pozdnyakov, T.V. Maltseva, A.O. Burtsev. *Psychology and Law*, **Vol. 10, no. 4**, pp. 33–50. (2020). <https://doi.org/10.17759/psylaw.2020100403>.
16. Yu. A. Sharanov Implicit postulates of the concept of formation and development of subjectivity / in the Collection of Acmeological problems of subjectivity: interpretation and diagnostics: Materials of the scientific and practical conference. p. 4. (Sankt-Petersburg, 2009).
17. R.F. Bornstein, *J. Person. Assessment*, **97(5)**, 446-455, (2015).
<https://doi.org/10.1080/00223891.2015.1027346>
18. M. Guillot-Valdés, A. Guillén-Riquelme, G. Buela-Casal, *Int. J. Clin. Health Psych.*, **19(3)**, 243-250 (2019). <https://doi.org/10.1016/j.ijchp.2019.07.002>
19. J.K. Flake, J. Pek, E. Hehman, *Soc. Psych. Person. Sci.*, **8(4)**, 370-378 (2017).
<https://doi.org/10.1177/1948550617693063>
20. Y. Wang, J. Fang, *Sci. Soc. Res.*, **2(2)** (2020). <https://doi.org/10.36922/ssr.v2i2.953>
21. S.L. Evenko, A.S. Polyakov, *Diagnostika i profilaktika deviantnogo povedeniya sredi sotrudnikov organizatsii s zhestkoi ierarkhicheskoi sistemoi upravleniya* [Diagnostics and prevention of deviant behavior among employees of an organization with a rigid hierarchical management system] (Moscow, 2020).

Digitalization of banking business – actual development strategies

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Abstract. Nowadays in Russia there is an active process of digitalization in all economic sectors, especially in banking industry. The relevance of using new digital instruments is due to the fact that it increases the accessibility of banking resources and, in addition, makes the banking market more competitive. In modern conditions of digitalization of the economy, the goal of a commercial bank is to maximize profits and minimize costs, as well as to provide the full satisfaction of customer needs in banking services which leads to an improve in the financial stability of the banking sector. The active use of innovations in the banking sector completely transforms banking products and technologies, allows to engage more efficiently the financial resources of commercial banks. This research describes the characteristics of remote banking services of modern Russian banks ecosystems in terms of digitization based on economic analysis. The main goal of the article is to analyze the effectiveness of the remote banking system and its impact on increasing the income of commercial banks. The research identifies promising avenues for the development of digital banking, and also considers the issue of improving the system for protecting personal data of customers.

Keywords: banking systems, commercial banks, digitalization of banking systems, financial resources, remote banking services

1 Introduction

According to the Bank of Russia data, about 97% of all credit institutions operating in the Russian Federation provide services using Internet technologies [1, 2]. The fact of almost full digitalization of banking sector in Russia is explained by the convenience of use for both sides of the business – individuals and legal entities. Current economic conditions call the banking business for being based on terms of Remote Banking. The research, as well as the active implementation of innovative financial technologies and products is an integral part of banking revenue growth. Thus, the problem of the development of a commercial bank by improving remote banking services is relevant topic for study. As a part of the

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digital transformation development strategy, commercial banks are deliberately transferring services for its corporate clients to remote channels: via Internet and mobile banking, using remote identification and biometrics, chat bots and digital platforms for business [3]. Statistics funds that the protracted period of lock-down has become a sort of a catalyst for remote services. From March to June 2020, the number of customers who wished to be registered in the unified biometric database increased from 55% to 70%. Such a remarkable growth could be explained by the high level of development of the digital banking sector, which in turn indicates the maximum security of banking operations carried out through remote service channels. Today biometrics is the most efficient tool to protect consumers of remote banking products from dishonest actions [4]. Thus, during an economic crisis commercial banks choose for a development strategy of technological solutions that will optimize costs, increase competitiveness, attract more customers, and, as a result, increase interest income.

2 Materials and methods

The methodological basis of this research is a systematic approach to the problems of improving remote banking services. The secondary methods are a method of comparative and structural analysis, as well as the analytical and predictive methods. This study analyzes the level of development of infrastructure, technologies, and organizational principles, which are fundamental for the functioning of the remote banking system. The significance of the obtained research results lies in the possibility of increasing the efficiency of remote services because of applying the principles set out in the article. Among the priority tasks of the remote banking system, the effective implementation of innovative solutions could be singled out. The successful implementation of innovation enables the banking environment to increase customers' flows, manage financial resources more efficiently, cut down risks and maximize profits. The automatization of banking sector allows banks to significantly increase the loyalty of their clients through round-the-clock customer service, and, as a result, develop new sources of profit.

3 Results

Today, in the period of general digitalization commercial banks can be identified as the most stress-resistant professional players in the financial system. The past few years commercial banks have steadfastly resisted the economic crises and constantly hardens the requirements from the side of a mega-regulator. Among other external factors significantly affecting the state of banking system the following could be mentioned:

- strengthening of numerous laws that substantially reduce the risk of illegal transactions and at the same time increase the penalties imposed on banks;
- reduction in real incomes of the population;
- decrease in investment activity of large business-players;
- increase in the number of insolvent clients, which contributes to the deterioration of credit portfolios of commercial banks and increases the share of overdue debt [5].

The crisis in the banking system and the conditions of the pandemic forced a significant increase in the share of services received through remote services. Last year particularly emphasized the attractiveness of online customer service. On the one hand, remote service is a link between a credit institution and customers, and on the other hand, it is an effective tool of interbank competition.

The remote banking services considerably reduces the administrative and economic costs of commercial banks, especially, the costs of the office rent, the utilities costs and, of courses, it cuts employee payroll costs. The online banking demonstrates a low level of overhead costs compared to the classic bank offices [6]. An important factor in the competitiveness of a bank is its ability to effectively manage costs and the ability to reduce them through the implementation of new technologies and methods of customer service. In addition to reducing administrative costs, online banking is an advanced technology to optimize operating costs [7]. The system makes adjustments to the activities of the operating personnel, partially shifting their work to clients. However, by working with less workload, employees minimize the likelihood of their mistakes, thus the bank's operational risks are also reduced.

While choosing a bank, one of the main requirements that business makes nowadays is an availability of remote service. In recent years, the number of credit institutions that do not offer the remote banking services has practically been reduced to zero. This is confirmed by statistical data, for example, Figure 1 shows that the number of RBS (Remote Banking Services) accounts opened over the past 4 years has increased by more than 2.5 times.

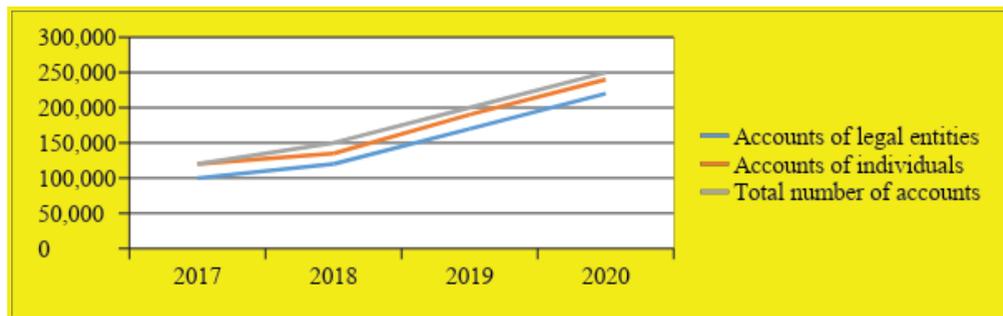


Fig. 1. Client accounts opened with credit institutions using RBS (Source: authors).

2020 was a turning point in the banking business. At the end of the 3rd quarter of 2020, a number of leading banks (Raiffeisen, Uralsib, Otrkytie) recorded 90% of the indicators for using remotely such services as: making payments on loans, opening savings accounts, transfers from card to card, as well as obtaining a loan. It is worth noting figures in similar transactions did not exceed 65% at the end of 2019 [8]. Analyzing the statistics, the following could be concluded that remote service significantly increases the availability of banking services. The priority areas of the Bank of Russia in financial sector are: increasing the level of accessibility and quality of financial services for consumers. The remote banking allows customers to make transactions 24/7, bypassing a personal visit to the bank's office, but this does not mean that banks adhere to the tendency to withdraw from customers. The interfaces of modern e-banking systems built tips for customers, so-called, an intuitive menu that allows banks to minimize errors. All this significantly affects the increase in the speed and quality of customer service. The analysis of the average monthly flow of customers to traditional offices showed a decrease of more than 20%, while the growth of customer flow through remote service channels was 15%.

Remote banking is currently the most stable source of commission revenue, which is less affected by market conditions. Unlike other bank revenues, commission revenues are more predictable, since they do not depend so much on market and credit risks. At the end of 2020, the indicators of net commission income on the total profit of commercial banks were in second place after lending operations, the data are shown in Figure 2. At the same

time, digital technologies are increasingly influencing product development. They allow banks to automatically process large amounts of data, assess risks and make decisions faster. All this allows you to increase the sale of commission products and at the same time reduce the expenses of their development and maintenance.

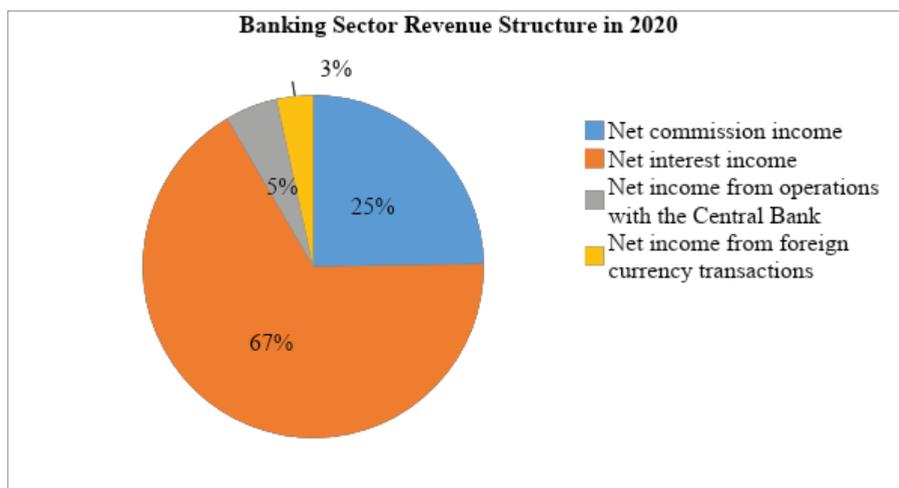


Fig. 2. Revenue structure of the banking sector in 2020 (Source: authors).

Every year, banks increase investments in technological transformation and business automation, which, of course, affects the structure of expenses. So, for example, the leading leaders in the field of online banking Sberbank and Tinkoff spent more than 500 billion rubles on the digitalization of banking services over the period from 2017 to 2020. The average volume of sales through remote channels in these banks increased from 15% in 2018, to 35% in 2020. Over the period from 2017 to 2020, online banking technologies have significantly improved, now customers prefer to make transactions through a mobile application to previously common SMS banking. There is a logical explanation for this: banks have upgraded their applications, maximizing the level of personalization, and practically minimized the risk of fraudulent transactions. Thus, online technologies allow commercial banks to minimize the human factor of errors in operational work, optimally use financial resources and increase the number of active customers and interest income [9].

4 Discussion

Modern Russian banks are at a high level of digitalization, bypassing such countries as Great Britain and France in terms of popularity. Russian commercial banks currently play the role of powerful catalysts in the development of fintech products. Of particular interest, of course, are the large banks that are part of the TOP10 in Russia, most of which have their own programs for the development of digital technologies. All commercial banks note a 100% positive result from the introduction of products such as: big data, artificial intelligence, blockchain and others [10]. Summarizing the data, Table 1 shows the impact each product has on the improvement of the banking system. The main effect of technology adoption is to reduce transaction expenses, which in turn increases the profits of commercial banks, allowing them to use the generated financial resources more optimally and efficiently.

Table 1. Influence of phytotechnology on banking sector development

Banking Technologies	Level of development	Impact on the banking sector
Big Data	Average	Above the average
Artificial Intelligence	High	High
Blockchain	Above the average	High
Robotizing Processes	Average	Average
Fast Payment System	High	High
Platform Marketplace	High	High

Source: authors.

If we talk about the cost of services provided through online banking, then customers benefit from the fact that banks reduce the commission for a number of transactions, such as transfers or conversions [11]. Fintech technologies, artificial intelligence positively affect not only the development of the banking sector, but also customers, freeing up more and more time resources. If previously it was difficult to imagine a solution to the issue, without visiting the bank's office, now robots bots in most cases can professionally answer customer questions. It is also important that due to digitalization, the banking sector has ceased to provide exclusively financial services. Commercial banks, through the development of remote service channels, have the opportunity to monitor customer needs, develop and offer customers more personalized products and services, which in turn increases the segment of loyal customers. Thus, the constantly changing interests of customers stimulate commercial banks to constantly develop, which increases their competitiveness among non-bank companies (fintech companies) [12, 13]. The competition between banks and fintech companies is moving banks into the field of active development of online technologies, stimulating the introduction of new banking products and forms of customer service in the field of digital business. Competition is developing in the field of the quality of these systems, the range of services provided with their help, as well as the prices for these services. Automation of banking services allows you to extend personal services to all bank customers at once and reduce the impact of the human factor, while the cost of automation does not depend much on the size of the customer base [14]. Also, another factor in improving banking competitiveness and financial sustainability is the expansion of channels of communication with customers. Banks, with a wide customer base, have a significant competitive advantage, since Internet banking platforms become for banks an independent commercial product that can be offered to advertisers to promote goods and services. Despite the undeniable advantages of the introduction of remote services in the banking sector, the issue of the security of personal data of customers remains relevant. It should be noted that today there is no single universal way to ensure the reliability of computerized banking. Among the most common shortcomings of online banking, (based on the analysis of banks included in TOP-10 in Russia) we can distinguish unsafe data transfer and storage (28%), detected vulnerabilities in application code (40%), incorrect session completion (9%) [15]. However, the last year showed that the main fraudulent scheme was the psychological way of influencing customers. In this case, commercial banks use various methods to prevent illegal transactions, including improving the financial and digital literacy of customers, additional methods of authenticating payments, using electronic digital signature, data encryption using the SSL protocol.

5 Conclusion

Summing up, it is worth saying, in order to withstand competition, commercial banks are building new effective business models, while taking into account changing customer

preferences and expectations. Remote banking is today one of the mandatory attributes of modern banking, almost all banking operations can be carried out remotely today, including customer identification. Among the factors of expanding the field of remote banking can be distinguished: the need for commercial banks to be competitive among fintech companies, increasing the availability of banking services, increasing customer loyalty, creating additional channels of communication with customers, as well as reducing operating costs. The development of Internet banking increases the financial stability of commercial banks, since the one-time costs of developing remote channels of interaction with the bank pay off, administrative and transaction expenses are reduced. In addition, remote banking helps increase the commission income of commercial banks. As banks use less and less human resources in their operations, they reduce the cost of client fees, which encourages customers to purchase more quantity banking products and services. Commercial banks continue to remain competitive among fintech companies. Commercial banks continue to improve the banking security system; they cooperate with a large number of services that significantly improve the protection of client data from fraudulent transactions. However, improving the financial and digital literacy of banking clients is still a key condition for ensuring the security of banking operations. The higher the level of digital literacy of banking customers, the more they pay attention to the protection of data, and analyze possible risks. The maximum level of security of remote banking services, the regular increase in costs for the development of advanced digital technologies are factors of increasing the business reputation of a commercial bank, and increasing its financial stability.

References

1. O. Niconec, S. Belikov, *Povyshenie effektivnosti infrastruktury bankovskoi sistemy Rossii v sovremennykh usloviyakh* [Improving the efficiency of the infrastructure of the banking system of Russia in modern conditions], in Proc. International Scientific-Practical Conference, Trends and prospect for the development of the banking system of the modern economic conditions, 111-114, December, 25, Bryansk (2018)
2. O. Niconec, K. Popova, *Bul. Volga Univ. V.M. Tatischev*, **2(1)**, 280-292 (2020)
3. M. Brei, P. von Goetzvov, *J. Int. Money Fin.*, **81**, 116-137 (2018).
<https://doi.org/10.1016/j.jimonfin.2017.10.002>
4. O. Altunkılıç, V. Balashov, R. Khansen, *J. Account. Econ.*, **67(1)**, 98-119 (2018).
<https://doi.org/10.1016/j.jacceco.2018.08.016>
5. C.A. Panayiotis, S. Anyfantaki, *Europ. Manag. J.*, **39(5)**, 658-674 (2021).
<https://doi.org/10.1016/j.emj.2020.12.001>
6. J.N. Loktionova, O.N. Yanina, E.N. Egorova, *Bul. Ekaterin. Instit.*, **3(51)**, 66-72 (2020)
7. A. Geebren, A. Jabbar, L. Ming, *Comp. Human Behav.*, **114**, 106584 (2021).
<https://doi.org/10.1016/j.chb.2020.106584>
8. S.S. Matveevskiy, N.N. Agafonova, *Univ. Bul.*, **4**, 47-53 (2020).
<https://doi.org/10.26425/1816-4277-2020-4-47-53>
9. A.A. Kairbekov, *Econ.: Yesterday, Today, Tomorrow*, **11(3-1)**, 34-41 (2021).
<https://doi.org/10.34670/AR.2021.82.60.003>
10. H. Wang, Sh. Ma, Hong-Ning Dai, M. Imran, T. Wang, *Future Gen. Comp. Syst.*, **110**, 812-823 (2020). <https://doi.org/10.1016/j.future.2019.09.010>

11. E. Hernández-Nieves G. Hernández, *Exp. Syst. Appl.*, **140** (2020).
<https://doi.org/10.1016/j.eswa.2019.112900>
12. M. Matsuo, Ch. Minam, T. Matsuyama, *J. Retail. Cons. Serv.*, **45**, 48-51 (2018).
<https://doi.org/10.1016/j.jretconser.2018.08.005>
13. A.A. Kulagina, A.M. Avtushenko, O.S Nadezhina, *Bul. Altai Acad. Econ. Law*, **1(1)**, 66-71 (2021). <https://doi.org/10.17513/vaael.1571>
14. S. Kiljan, H. Vranken, M. van Eekelen, *Future Gen. Comp. Syst.*, **80**, 430-447 (2018).
<https://doi.org/10.1016/j.future.2016.05.024>
15. N. Lashkevich, O. Niconec, *Econ. Soc. Right*, **2(14)**, 51-56 (2019)

The attitude of modern students towards the “digital” touristic cluster as one of the promising priorities for the synergetic development of the Yaroslavl region

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Abstract. The wide spread of modern computer technologies concerns the touristic branch. It obviously that the digital tourism has appeared. Nowadays researchers distinguishes at least two types of modern “digital touristic products”. The first one is based on on-line activities while the consumer is sitting at the computer during consumption. The second one is based on wide usage of augmented reality during classic excursions with the presence of consumer at the touristic object. Authors assumes that both types of digital tourism will raise next few years, and the main consuming group will be made up of higher school students. To prove this hypothesis an research has been kept. The research results are expectable: students are ready for tourism transformation towards its digitalization. Authors suspect that the transformation will be performed in few next years. The company that releases the first popular digital touristic product will perform a flanking attack to the market and will gain a leadership position. Public administrations of cities and regions will obtain specific benefits such as increasing tax flows to budgets and strengthening positions of city and regional brands.

Keywords: tourism, touristic market, digital technologies, augmented reality, flanking attack, marketing strategy, regional development

1 Introduction

The modern regional cluster is the result of objective (and partly subjective) investment selection and design. The integrability of the regional cluster is in many ways a guarantee of successful economic development. However, the profitability of a territorial economic cluster is influenced by macro and micro economic factors. So, the pandemic factor, for example, seriously corrected the segment of tourism, which before the onset of this phenomenon was considered one of the most profitable and attractive [1-4]

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At the same time, looking from the position of strategic analysis it is clear that tourism is transforming and adapting to the current situation. Consequently, it is already necessary to investigate possible directions for the development of modern tourism in terms of adapting it to the current situation, searching for new forms, techniques and technologies. One of the modern approaches to solving the problem of transformation is the so-called “combined” tourism. It is based on a combination of digital technology and modern visual tourism.

Digital tourism assumes the collaboration of professionals of the tourism cluster, global and local historians and specialists in the field of modern computer technologies.

Historians and ethnographers investigate the historical sources (such as paintings, photos, models) preserved in the central and regional archival collections and reconstruct the authentic appearance of the transformed and rebuilt, but still existing historical regional buildings and objects, recreate their “conditionally historical” appearance. Specialists in the field of computer technology create a digital model of city environment. To do this the modern technologies of visualization and conditionally subject structuring are widely used.

The true initiators of such processes are always representatives of touristic cluster. Since they have deep knowledges about existing and most demanded touristic projects and routes they can make the perfect suggestions related to integration of traditional and digital elements of touristic projects.

Projects of this kind are currently rare. Thus, some projects of digital reconstructions of a limited number of Moscow and St. Petersburg districts have recently successfully completed. Similar projects of “historical digitalization” of some Russian provincial cities have been started recently, but they are still unknown among mass consumers of cognitive tours. By the way such projects bring up the discussions among scientists regarding their authenticity and quality.

The new touristic trend has been originated by L. I. Borodkin, Grand PhD., Prof. of Lomonosov Moscow State University, Corresponding Member of the Russian Academy of Sciences. For a long time the author researched the challenges facing modern historical science. The fact is that under the conditions of digitizing archival historical sources, a new “version” of traditional science has emerged, which is commonly called “electronic history”, “digital history”, “history 2.0”, etc.

The new science direction has adepts as well as opponents. However, the opponents support the conception in general but they are standing against usage “digital history” for touristic purposes.

The same attitude to digital touristic products can be found in educational branch. Some universities disallow new technologies in educational programs for guides, managers in tourism etc. [5]. Proponents of such approaches note that new technologies and virtualization replace the real teaching; graduates have less knowledge and skills rather than traditionally-educated ones [6].

On the other hand after closure of national borders the video products about world-known touristic objects will be more demanded as well as movies about travelling in Russia. So the increasing the number of released travelling videos and digital touristic products can be recognized as a new way of tourism and the only way of branch development in pandemic era. It obviously that the current situation will attract investments both to private and state-supported projects and organizations.

2 Methods

We have decided to discover attitudes of modern student towards usage of new digital technologies in touristic branch, primarily towards digital touristic programs. To keep the research we have suggested the following hypothesis. We suppose that younger generations are more loyal to new computer technologies and spend more time with modern gadgets rather older generations. So the consumption of digital touristic products by younger will be greater than older generations' one.

But to prove or deny our hypothesis we have to specify the concept of digital touristic product first. But to prove or deny our hypothesis we have to specify the concept of digital touristic product first. Since the concept is specified we have to make a framework that binds digital technologies, benefits of touristic product consumption and profits can be obtained by independent organization involved in tourism and region at all.

We suppose that making movies about city and regional remarkable objects and places is enough profitable business, but the competition in this area is unbelievable high. Any new project related to "travelling video" will be faced to the large amount of similar videos released by professional studios and TV channels as well as independent YouTube and Facebook video bloggers. We suspect that return on investments in such project is pretty low (and in some cases is negative).

As an additional contra for forcing the development of digital touristic products in such manner we can suggest the unclear future of territorial brands.

However, according to the authors' opinion, it is much more promising to develop "hybrid touristic projects" that are based on a combination of traditional forms of tourism with new technological additional options. For example, visiting the city of Yaroslavl (in terms of preserved architectural monuments and memorial sites), tourists will be offered as additional options the opportunity to make a historical excursion "to the past times". It allows using a special game console (helmet) to get acquainted with the objects that were at this location in different historical epochs. Thus, the new "digital" tourism of augmented reality will be an additional option, that does not replace the traditional tourist routes, but complements it and expands their possibilities [7].

Basing on such understanding of modern digital touristic technologies we have kept an sociological research at autumn of 2021 in Yaroslavl city. The main goal of the research was to prove or deny the hypothesis mentioned above.

To discover young students' opinion, we have developed a questionnaire. The questionnaire was made up of the following questions with closed set of answers for each one:

1. What is your attitude to tourism in general? (Positive / Negative)
2. How often do you travel somewhere? (Never / One time a more than a year / Every year / Every quarter / Every months / Every weekend)
3. What kind of tourism do you prefer? (Cognitive and culture-oriented / Recreational / Sport-type / Religious / Educational / Entertainment-oriented / Other) (More than single answer were allowed for this question)
4. Have you ever heard (read) about "digital tourism"? (Yes / No)
5. Are you ready to take part in on-line excursion? (Yes / No)
6. Are you ready to take part in excursion using augmented reality? (Yes / No)
7. Are you agree that modern digital technologies could be implemented into classic (traditional) touristic products? (Yes / No)

It has been surveyed 192 persons in age between 17 and 21, both male and female. Due to the last census results the population of Yaroslavl region of age 17 – 21 is 49370 persons. Assuming them as the universe we conclude that our survey has ± 7.06 % error with 95.4 %

trust probability. We recognize that our sample had required and sufficient size and our survey is statistically justified

3 Results

The following results have been obtained after processing the survey data.

As for the first question, the majority of respondents (87%) has the positive attitude to the tourism at all. It gives us a hope the touristic branch will recover after the COVID pandemic. Probably some of business will be shut down, but there are lot of chances that the demand will return to pre-pandemic values and new businesses will be started to satisfy the increased number of consumers.

As for the second question, less of half of surveyed students prefer to travel once a year (43 %, see Fig. 1). More frequent travelling is affordable to 20% of students only. So 37 % of students travels very rare or does not travel at all. This value is close to 87% of students who has the positive attitude to the tourism. We suppose that the 24% gap can be explained by the low level of students' incomes that makes every-year travelling unaffordable.

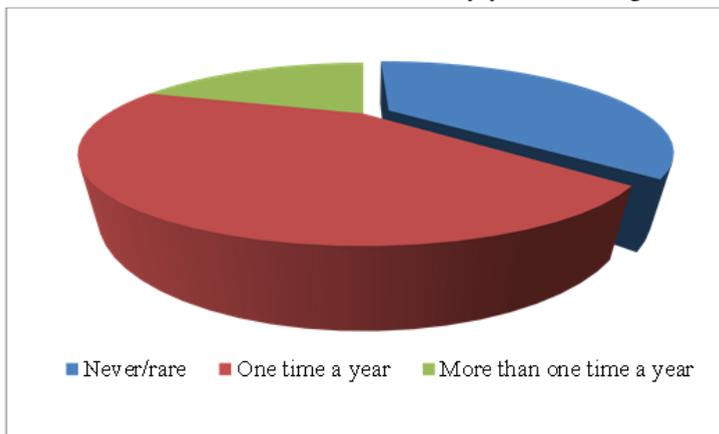


Fig. 1. The distribution of answers for the second question of the survey questionnaire (“How often do you travel somewhere?”). Source: compiled by the authors.

The third question gave us some information about preferred touristic products (Fig. 2.)

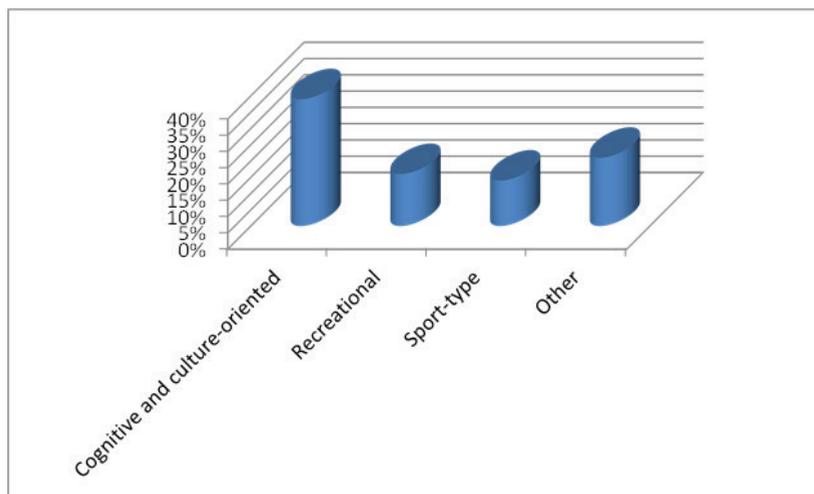


Fig. 2. The distribution of answers for the second question of the survey questionnaire (“What kind of tourism do you prefer?”). Source: compiled by the authors.

Cognitive and culture-oriented tourism is preferred by 39% of respondents. Recreational and sport-oriented kinds of tourism have been chosen by 16% and 14% of students respectively. Other kinds of touristic products have been chosen by approximately 20%. The pretty high value of students who prefer culture- and cognitive-oriented touristic products should force the branch to make giant efforts to develop new products to satisfy this category of consumers.

At the same time only quarter or surveyed persons declared that they have ever heard about “digital tourism” (see question number four in the questionnaire). Such low value could be explained the term “digital tourism” itself is not widely spread in Russia. We suspect that persons who answered “Yes” still have not deeply understand the essence of modern digital touristic technologies, they just approximate their experience in “digital world” to the tourism. It is obviously that modern students are forced to use “digital education”, “digital public administration”, etc., so they can imagine that some touristic products could be “digital” too nowadays, but they cannot imagine the real product and cannot specify their consumer preferences to such products.

Answers we have got on the last three questions looks promising for the future of touristic branch. 59% of modern students are ready to take part in on-line excursions (see question number five). It is most probably this value have been achieved under strong impact of the COVID pandemic. Traditional excursions have been prohibited so respondents had been forced to watch excursions taped before pandemic on YouTube and other video web-services. 69% of respondents declared that they are ready to use technologies of augmented reality in off-line excursions (see question number six). This could be explained the wide spread of AR in modern mobile games (including the top game of 2018 “Pockemon” fully based on AR). So we can suppose that modern students are ready to expand their game experience to real life and convert the pure culture-oriented tourism to edutainment one.

Finalizing the description of our survey’s results we have to note that 88% of students are agree to implementation of any modern digital technologies to classic touristic products. It could be looked strange if we got another result for such question. Younger generations are more familiar to “digital” life and expect of digitalization of all life processes around them.

The main goal of the research was checking the hypothesis about readiness of younger generations for the digital tourism and wide usage of digital technologies in classic touristic projects. After analyzing the results of the survey it has to be admitted that the hypothesis is true. We have not got any facts to deny our assumptions.

4 Discussion

Results we have got after our research give us no doubts that modern digital technologies in tourism are highly demanded in Russia. It is obviously that the main consumer of new touristic product is 17 to 21 years old, male or female, and gets higher education. He or she is familiar to modern computer technologies and wants to use them everywhere. What should other market participant do and what can society get since this fact became clear?

We suppose that current situation is perfectly describer by Trout and Ries as a possibility for a flanking attack [8]. While other competitors try to win each other using non-significant modifications of classic products a new company can suggest to consumer a brand new product based on brand new principles for satisfying the old needs. A company suggests such brand new product splits the old market into two parts and becomes (sometime for a while, sometimes forever) the leader of one of the two parts. Leading market positions bring significant benefits, first of all dramatically raised return-on-investment values and ability to prevent appearing of new competitors at the market [9-11].

Applying Trout and Ries's theory to tourism we may expect the real splitting of traditional culture-oriented and cognitive touristic market into "strict traditional" and "high-tech edutainment" markets. The expected division proportion is 95% to 5% due to the share of young "digital" generation in total population of Russia. The 5% share looks too small but it should be remembered that the new market probably will be monopolized by the single company [12].

What company could it be? We really do not know. There are some promising city projects that could be expanded to regional or national markets.

The first remarkable project was pure on-line collection "Alexaner Lyapunov" dedicated to famous mathematician that was born in Yaroslavl. The project has been launched in 2013 but currently it has not got national-wide recognition. The second one was "Yaroslavl at the border of centuries: XIX to XX" made by Yaroslavl State Museum-Preservation in 2009. It was on-line only project too. If pandemic still be with us next years these projects can take significant market share as on-line edutainment touristic products.

Next two projects use AR as killing fature. They are virtual excursion on Yaroslavl city (made by N. Pashkina, E. Kosolapova and N. Gurlova in 2015) and on Nizhny Novgorod city (made by D. Shmakov and N. Pakshina). Both project are tide by development team, technological base and history of these two cities (in early XVII Century Kuzma Minin and Dmitry Pozharsky gathered militia in Nizhny Novgorod to fight against Polish annexation, the temporary militia base before main battles was organized in Yaroslavl). The project has real chances to grow from local level up to meta-regional next years. The flanking attack of the projects could be successful if pandemic restrictions will be reduced by government.

No matter how pandemic situation develops the Yaroslavl region will gain two benefits. First one is increasing tax flow to regional and municipal budgets. It is visible part of the future touristic market transformation. The second one is raising the knowledge of Yaroslavl and Yaroslavl region as territorial brands that will turn out the increasing of amount of "classic" tourist visiting the city and the region. The same benefits could be obtained by other cities included in "Golden Ring of Russia" touristic route.

5 Conclusion

After summarizing the study results we can conclude that COVID pandemic gave a chance to transform touristic markets. It is probably that next few years we will see the split of tourism into “classic” and “digital” branches. One of companies implementing new digital technologies into classic touristic products will perform a flanking attack to existing competitors and take a leadership on a new market branch.

The market split will be supported by the new generation of consumers. Due to our survey young students (17 to 21 years old) are ready to consume new digital tourism. They recognize the digitalization of tourism and natural process like digitalization of education, shopping, etc.

Public administration of cities and regions will take benefits in short- and long-term periods after the market split is complete. The benefits will concern both increasing a tax payments as well as increasing of tourists flow due to strengthening of positions of city and region brands.

References

1. M.C. Carrol, M.C. Zeller, Urbani Izziv, **23**, S53-S62 (2012).
<https://doi.org/10.5379/urbani-izziv-en-2012-23-supplement-1-005>
2. S. Kamath, J. Agrawal, K. Chase, Amer. J. Econ. Soc., **71(1)**, 184-214 (2012)
3. X. Luo, J. Coast. Res., **94**, 828-832 (2019)
4. Q. Yang, M. Su, Y. Wu, X. Wang, J. Coast. Res., **93**, 836-842 (2019)
5. T.F. Kryaklina, Econ. Profes. Bus., **2(2)**, 77-82 (2016)
6. N.P. Kiselev, Young Sci., **4(346)**, 34-344 (2021)
7. E.A. Shefer, Young Sci., **16(358)**, 22-25 (2021)
8. A. Ries, D. Trout, Marketing Warfare (McGraw Hill, New York, 1997)
9. W.R. Smith, J. Market., **21(1)**, 3-8 (1956). <https://doi.org/10.2307/1247695>
10. P.R. Dickson, J.L. Ginter, J. Market., **51(2)**, 1-10 (1987).
<https://doi.org/10.2307/1251125>
11. J.C. Narver, S.F. Slater, J. Market., **54(4)**, 20-35 (1990).
<https://doi.org/10.2307/1251757>
12. D.B. Audretsch, A. Coad, A. Segarra, Small Bus. Econ., **43(4)**, 743-749 (2014)

Digitalization trends in higher economic education

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Abstract. This article shows that in the modern period, under the influence of the digitalization of the world economy, serious qualitative changes are taking place, which are reflected in the development of all sectors and spheres of the economy, including the system of higher economic education. The authors of the article concluded that education is not just a way of transferring knowledge; it accumulates the cultural heritage of the nation, contributes to the expansion of a person's capabilities, and forms his moral ideals. Education is one of the conditions for economic growth, improving the material well-being of the country's population. The level of education has a significant impact on various aspects of human life: health, perception of culture and art, professional and political mobility. The article states that digital technologies make it possible to perform many diverse tasks in the shortest possible time. It is the speed and versatility that made IT technologies so popular. In addition, the authors of the article have proven that modern digital learning technologies are: a toolkit for the optimal delivery of information data to students, a set of tools that allows you to create various educational materials, a toolkit that optimizes teaching methods. The authors concluded that digital technologies, despite the many difficulties and risks of their use, contribute to the quality of highly qualified specialists.

Keywords: quality of education, efficiency, optimization, accounting, control

1 Introduction

In the context of the formation of the digital economy on a global scale, the effective use of digital technological solutions in order to train specialists with higher economic education is of great importance.

As practice shows, successful digitalization of education and higher economic education in particular requires the simultaneous fulfillment of three main conditions:

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- technological (availability, reliability and ease of use of digital technologies, as well as well-established support for the technological infrastructure of the digital educational environment);

- organizational and methodological (the presence of obvious expediency and organizational conditions for the use of digital technologies in the educational process, as well as the availability and quality of digital educational resources – digital sources, tools and services);

- personnel (the willingness and ability of teachers to work effectively in a digital educational environment using new methods and forms of educational work, as well as the availability of support for such teachers from the administration, parents and the surrounding community).

The authors' own research has shown that the use of digital technologies has contributed to the improvement of educational results, but it is not enough to have computers, software, digital educational resources. It is necessary to complete a full cycle of work on the dissemination of relevant innovations, including: updating the content of educational work, mastering new methods and forms of educational work, the transition to authentic methods and assessment tools that demonstrate the effectiveness of educational work.

For this, each educational organization requires a clear strategy and development plan, the implementation of which will lead to the creation of the necessary conditions.

The use of digital technologies is especially relevant in connection with the spread of cloud computing, public high-speed Internet, with the widespread introduction of smart digital tools, the use of artificial intelligence methods and the widespread adoption of virtual reality technologies.

2 Methods

When writing the article, the methods of system analysis, methods of working with digital technological solutions, methods of synthesis of scientific research were used.

3 Results

Today, the development of digital technologies has led to the transition from mass production of standardized products to flexible production of publicly available personalized products in developed countries. At the same time, in the field of education, work began on the transition to a result-oriented and personality-oriented organization of the educational process. Each student receives a thorough natural science and humanitarian training and modern competencies are formed.

The situation with the problems arising in the learning process is being remotely resolved gradually and not yet in full, but this is not the most important, it is necessary to continue to develop and master various forms of education during the period of digital transformation and to actively use digital technologies in the educational process.

The analysis of the organization of the scientific process, carried out by the authors of the article at the Tashkent State Economic University and the Financial University under the Government of the Russian Federation, showed that digital technologies are increasingly used in classroom and independent work.

Artificial intelligence technologies are becoming widespread. Artificial intelligence (AI) is one of the areas of computer science, the purpose of which is to develop hardware and software tools that allow a non-programmer user to set and solve their own, traditionally

considered intellectual, tasks, communicating with a computer in a limited subset of natural language [1].

In recent years, in the system of higher economic education in both Russia and Uzbekistan, work has been carried out to integrate digital technologies, scientific and methodological support of the educational process and scientific research in order to combine the developments of the education system with intelligent systems, which is caused by the desire to form an open educational space accessible to broad sections of the population

Intelligent system (IS) is an automated information system based on knowledge, or a complex of software, linguistic and logical-mathematical means for the implementation of the main task – to support human activities and search for information in the advanced dialogue mode in natural language [2].

The main emphasis is placed on the creation of a technically equipped, unified information educational environment, which should have a flexible and easily adaptable organizational structure, optimal for use in the educational process.

In Fig. 1. the main software products are presented, which are used by the teacher in the educational process of higher educational institutions in the modern period.



Fig. 1. The main software products used by the teacher in the educational process. Source: Developed by the authors.

As seen from Fig. 1. Pedagogical software is a holistic didactic system based on the use of computer technology and the Internet, with the aim of providing training according to individual and optimal curricula with the management of the learning process.

Pedagogical software is a modern highly effective teaching tool designed to facilitate the process of education and perception of the material. This is realized through the presentation of information using pictures, video, audio fragments, animation, etc. [3].

The use of pedagogical software helps to increase interest in educational material as a way of obtaining information, raises the educational process to the level of achievements of modern science, and improves the visibility of educational material. The combination of pedagogical software and traditional methods of teaching the subject gives the desired result: a high level of mastering of fundamental issues and awareness of their practical application.

4 Discussion

Such foreign scientists as N. Winner, K.S. Loudon, O. Machlup, J. F. Neumann, M. Hammer, K. Shannon, W. Ashby, Sony M., Naik S. (2019) [4], Bordeleau F.E., Mosconi E., de Santa-Eulalia L.A. (2020) [5], Meski O., Belkadi F., Laroche F., Ladj A., Furet B. (2019) [6], Khan Z., Vorley T. (2017) [7], Fakhar Manesh M., Pellegrini M.M., Marzi G., Dabic M. (2020) [8] et al.

In the work of N. Couldry and A. Powell, a multifaceted analysis of the concept of "large databases" is carried out, as well as the historical chronology of the emergence of this concept in scientific research is presented. Scientists B. Hesse, R. Moser and W. Riley consider the opportunities, threats and technologies for implementing big data in the modernization of social processes.

J. Frith emphasizes that when using big data, it is important to remember about its interpretation and communication for more optimal information processing.

The work of many Russian scientists is devoted to the study of the use of digital technologies for the effective functioning of organizations in the economic market. These include researchers such as G.N. Andreeva, Balatsky E.V., Ekimova N.A. (2019) [3], V.M. Bondarenko, A.M. Venderov, S.Yu. Glazyev, V.M. Glushkov, A.I., Dmitruk I.K. (2020) [8], Dolzhenko, V.E. [9], Kosarev, S.P. Kutsenko, A.N. Romanov, Yu.F. Telnov, G.A. Titorenko, N.P. Tikhomirov, V.V. Trofimov, E.V. Shkarupeta, Proshkina S.I. (2019) [10], etc.

A whole range of scientific research by domestic specialists is devoted to solving the issues of the effective use of ICT in the sectors and spheres of the national economy of the Republic of Uzbekistan in the context of the formation of the digital economy. These are, in particular, the work of such scientists as A.M. Abduvohidov, A.S. Abdugaffarov, R.Kh. Alimov [10], R.Kh. Ayupov, B.A. Begalov, T.F. Bekmuratov, S.S. Gulyamov [11], A.A. Abidov, R.A. Dadabaeva, I.E. Zhukovskaya (2021) [13], V.K. Kabulov, A.T. Kenzhabayev, T.S. Kuchkarov, A.A. Musaliev, T.Sh. Shodiev, A.T. Shermukhamedov and others.

5 Conclusion

With the development of the processes of digitalization and the internationalization of the economy, higher education faced new goals – the training of professional personnel able to work effectively in the changed conditions of the global market.

In the conditions of the formation of the digital economy, education must meet the following criteria: quality; expansion of curricula and training of their students in the context of a more complete application of information and communication technologies; expansion of the regional network of the university for the effective use of its resources and research through the participation of students and teachers in the international process of exchange of knowledge, diversification and growth of financial receipts through attracting investors interested in the professional staff of the university [10].

The introduction of an intellectual system in a university will gradually lead to the formation of such organizational and management structures and methods of interaction between them, the functioning of which will avoid duplication of processes, documents and significantly accelerate the adoption of operational and adequate decisions. Ultimately, this makes it possible to realize goals that contribute to improving the quality of education, democratizing university management, reducing the costs of organizing and managing the educational process, creating regional and interuniversity information systems that provide a more intensive exchange of information resources in the region and industry [12].

Therefore, for a higher educational institution, the tasks of creating, on the basis of generalizations and the development of the achieved results of using research and development in the educational process, a single concept of building an information and

educational environment, as well as developing methods for designing and introducing an information educational environment into the educational process, with the aim of further increasing the efficiency of training, expanding the export of educational services and an adequate response to the increasing dynamics of knowledge change.

Research has shown that digital technologies in education have many functions. But, the most basic of them are:

- educational;
- managerial.

The educational function is manifested in the organization of e-learning based on cloud technologies, identifying, summarizing and broadcasting best practices, remote training and retraining of various categories of education workers.

The management function based on the use of digital technologies consists in managing the educational process online, monitoring and reporting on progress (charts, ratings), methodological support, development and examination of digital educational materials and control and assessment tools [13].

The introduction of technologies is impossible without the development of innovations in education. These technologies are based on high performance computing. Therefore, the massive use of such technologies is feasible only with the latest digital devices and public broadband Internet [14].

Speaking about the introduction of digital technologies in higher education in economics, it should be noted that there is a whole range of risks.

The concept of «risk» in relation to the educational environment can denote the potential (danger) of the occurrence of a probable event or a set of events that cause certain negative consequences for a student, a group of students, a teacher, school management, and the school as a whole [15].

The study of risks in education is interdisciplinary in nature. This is due to the fact that the scientific understanding of the category of risk is being actively developed in economic science, where most of the research on risk management is concentrated. The market economy and business are inseparable from the danger of losses, since entrepreneurs make decisions in conditions of uncertainty, when it is necessary to choose a course of action from several possible options, the implementation of which is difficult to predict. Therefore, in economics, the study of risks has significant historical and methodological experience.

Monitoring and timely neutralization of risks contributes to the efficiency of the organization's information system and the achievement of high results in the economic market.

Summing up the above, it should be noted that the research of scientists and the experience of the practical application of digital technologies in education shows that digital technologies contribute to the effectiveness of the educational process, as well as the integrated development of the education sector in the single economic space of the country.

References

1. L.V. Lapidus, Tsifrovaya ekonomika upravlenie elektronnyh biznesom i elektronnoi kommertsiei [Digital economy e-business and e-commerce management] (INFRA-M, Moscow, 2018)
2. E.V. Balatsky, N.A. Ekimova, *Manager*, **10(5)**, 9-19 (2019).
<https://doi.org/10.29141/2218-5003-2019-10-52>
3. M. Sony, S. Naik, *Prod. Plan. Control*, **31(10)**, 799-815 (2019).
<https://doi.org/10.1080/09537287.2019.1691278>

4. F.E. Bordeleau, E. Mosconi, L.A. de Santa-Eulalia, *Prod. Plan. Control*, **31(2-3)**, 173-185 (2020). <https://doi.org/10.1080/09537287.2019.1631458>
5. O. Meski, F. Belkadi, F. Laroche, A. Ladj, B. Furet, *IEEE Eng. Manag. Rev.*, **47(4)**, 94-100 (2019). <https://doi.org/10.1109/EMR.2019.2948589>
6. Z. Khan, T. Vorley, *J. Knowl. Manag.*, **21(1)**, 18-34 (2017). <https://doi.org/10.1108/JKM-06-2015-0238>
7. M.F. Manesh, M.M. Pellegrini, G. Marzi, M. Dabic, *IEEE Transact. Eng. Manag.*, **68(1)**, 289-300 (2020). <https://doi.org/10.1109/TEM.2019.2963489>
8. I.K. Dmitruk, Realizatsiya mezhpredmetnykh svyazei predmetov estestvennonauchnogo tsikla, matematiki i informatiki [Realization of intersubject connections of subjects of natural science cycle, mathematics and informatics]. Accessed on: March 07, 2022. [Online]. Available: <https://refdb.ru/look/1876453.html>
9. A.I. Dolzhenko, I.Yu. Shpolyanskaya, S.A. Glushenko, *Appl. Inf.*, **5(83)** (2019)
10. R.Kh. Alimov, U.T. Hayitmatov, *O'zbekistonda raqamli iqtisodiyotni rivojlantirish istiqbollari* [Prospects for the development of the digital economy in Uzbekistan], in Collection of articles and abstracts of the Republican scientific-practical conference, Digital economy: modeling of economic development trends and prospects for the introduction of modern information and communication technologies, 12-20, December 2, 2019 Tashkent (2019)
11. S.S. Gulyamov, M.Kh. Saidov, A.M. Khakimov, *Sovremennye aspekty povysheniya kachestva obrazovaniya v Respublike Uzbekistan v kontekste ispol'zovaniya peredovykh informatsionno-kommunikatsionnykh tekhnologii* [Modern aspects of improving the quality of education in the Republic of Uzbekistan in the context of the use of advanced information and communication technologies], in Modern information and communication technologies and IT education, 217-227 (Moscow State University, Moscow, 2016)
12. I.E. Zhukovskaya, S.V. Begicheva, D.M. Nazarov, *E3S Web of Conf.*, **208**, 09018 (2020). <https://doi.org/10.1051/e3sconf/202020809018>.
13. Zhukovskaya I.E., The Main Trends in Improving the Activities of a Higher Educational Institution in the Context of Digital Transformation. *Open Education*. 2021;25(3):15-25. (In Russ.) <https://doi.org/10.21686/1818-4243-2021-3-15-25>, (2021).
14. A.D. Zhukovskyi, *Stat. Econ.*, **18(3)**, 56-64 (2021). <https://doi.org/10.21686/2500-3925-2021-3-56-64>.
15. M.V. Noskov, V.V. Popova, *Bul. KSPU V.P. Astafiev*, **1(31)**, 65-68 (2015).

High-tech companies – an incentive for quality education

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Abstract. This article examines the current trends in the influence of the placement of high-tech companies in the economic market on the improvement of the training system for specialists with higher education. The authors emphasize that modern digital technologies have many positive effects both on the system of training qualified specialists with higher education, and on the system of advanced training of the teaching staff and the acquisition of knowledge in the field of digital technologies by employees of high-tech enterprises. The aim of the work is to analyze and study the impact of the activities of high-tech companies operating in the economic market on improving the system of training specialists with higher education using advanced technological solutions. Based on the study of world practice, the authors revealed that high-tech companies, along with the provision of reserves for labor resources in the regions where they operate, make serious demands on the quality of training of specialists, which each university decides by introducing advanced pedagogical and digital technologies. The author's methodology is based on constant monitoring of the functioning of high-tech enterprises and analysis of the developed and functioning projects. The following main characteristics are used to assess performance: innovative technologies, economic security, intellectual potential, social factors. In addition, the article shows that high-tech companies serve as a link between large corporations, industrial enterprises, scientific and educational organizations, business representatives and special services for the development of urban infrastructure, which in turn requires new approaches to training highly qualified personnel.

Keywords: high-tech companies, optimization, digital technologies, highly qualified specialists, economic effect

1 Introduction

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Currently, almost all sectors and spheres of the world economic system are undergoing changes. Digital transformation has a great impact not only on the technical and technological components of economic processes, but also on social ones. Great changes are also taking place in the field of higher education. The purpose of this article is to show that at present it is necessary to comprehensively interact with high-tech companies operating in the region, creating a system of material and non-material conditions that stimulate cooperation between universities and high-tech companies in educational and research areas with maximum involving researchers, theoretical teachers and practitioners in the activities to form models of knowledge individualization and their effective application in practice.

2 Methods

When working on this article, the authors used the methods of system and statistical analysis, decomposition and scientific generalization, monographic research, and work with Internet sources.

3 Results

In the Russian Federation, a whole range of measures is being taken to introduce digital technological solutions in the industry and the economy. In addition, high-tech companies are becoming more and more widespread in the economic market, which in turn contribute to the optimization of higher education. This fact is explained by the fact that high-tech enterprises focus on the implementation of advanced technological solutions and custom services. Digital technologies such as cloud computing, blockchain, mobile Internet have a great influence on the development of high-tech companies themselves, robotics, geonomy, new means of energy storage are actively developing, digital platforms, web services, processing technologies and big data analytics are becoming widespread, and etc. As practice shows, digital transformation is not just an investment in the digital infrastructure of an organization and the search for optimal volumes of these investments, it is the choice of a reasonable and effective development strategy, it is the use of tools and technologies of the digital economy in the best possible way. The digital transformation of the economy is based on the following technologies:

- data mining;
- business intelligence (eng. Business intelligence);
- machine learning (eng. Machine learning);
- Artificial Intelligence;
- Big Data technologies;
- Internet of Things;
- blockchain. Let us consider the specifics of each of these technologies.

As practice shows, the use of digital technologies in the activities of high-tech companies contributes to the following advantages:

- a significant reduction in the time for analyzing business process data. This allows you to get a high-quality digital portrait of an organization in fairly short periods of time and make management decisions in a short time;

- simplification of tools (from programming languages to visual data analysis tools). This makes it possible to reduce the requirements for the instrumental component of the employee's qualifications and expand the range of his professional competencies [1];

- a significant reduction in the need for a high-quality expert assessment of the activities of organizations to solve typical business problems;
- a sharp reduction in the cost of the process of collecting, preparing data, their intellectual analysis and implementation of the results into real business processes;
- digital transformation of the organization.

High-tech companies in the regions of the Russian Federation provide the following benefits: - contribute to the creation of an innovative ecosystem for organizing and running a business; - ensure the relationship between science, business and urban infrastructure; - contribute to the development of the production of innovative goods and services; - serve as a link between large corporations, industrial enterprises, scientific and educational organizations, business representatives and special services for the development of urban infrastructure [2].

.Summing up the above, it can be noted that high-tech companies are guides in the economic market, which allow interaction through digital platforms and other technological solutions in order to develop and bring to the market a new product or service, cooperation of partners, manufacturers, customers, etc. [3].

All these processes are reflected in the development of higher education. Practice shows that digital technologies greatly transform the content of the taught disciplines in higher educational institutions and the form of their presentation. This is not only electronic presentations or the use of video, but also direct connections to electronic databases, news, ongoing forums, video broadcasts. In modern higher education, virtual (VR) and augmented reality (AR) systems are increasingly used. VR and AR technologies are used in immersive education (IE) programs. Such programs include the use of modern information technology in the learning process, which takes place inside various virtual worlds and simulations, often in a playful way. This type of training helps to increase engagement, communication between students and interest in the subject, as well as the implementation of projects for real enterprises and organizations [4].

The world of education and science is becoming global, the development of digital technologies leads to the removal of language barriers. Universities and individual teachers are actively entering the MOOC market (MOOC – Massive on-line open course) – an already established form of distance learning with open access on the Internet. The number of students who study remotely is increasing, since traditional educational programs often do not keep pace with the dynamics of technology development [5].

The digitalization of education makes it possible to gain access to information that was previously available only to experts and scientists. Most publishing houses specializing in educational literature have switched to electronic versions of textbooks and manuals.

Thus, there is a transformation of education: students have the opportunity to study disciplines in any sequence, on any platforms, with the help of technical means and technologies convenient for them, and the task of the teacher is to help students navigate the vast amounts of information. Thus, it can be noted that the transformation of higher education ensures the achievement of the necessary educational results by each student through an individualized educational process, which in turn implies the use of a full range of digital technological solutions.

So, during the quarantine period caused by the pandemic, the educational activities of universities were carried out using digital platforms, on which teaching materials were placed by the teaching staff. Students studied educational resources displayed on the platform and submitted completed assignments for verification. The work of digital platforms allowed students to successfully pass tests in the studied disciplines at the end of the semester.

World practice shows that the improvement of the technical base of universities, the use of artificial intelligence methods, the development of a digital educational environment, the use of electronic scientific publications in various foreign languages of libraries around the world contribute to the achievement of high results in the preparation of competitive specialists [6].

However, it should be noted that with the many possibilities of digital technologies in the field of improving the educational process at a university, their integration into the educational process also causes certain problems [23,24].

First of all, these are the problems associated with technical equipment and the ability of each teacher and student to access the unified educational environment of the university from remote regions of the country.

The second problem is that it is necessary to constantly retrain the teaching staff of the university in accordance with the requirements of digitalization [25].

In the context of the development of the digital economy, each teacher needs to improve their knowledge and skills in the field of digitization of educational and methodological material, the development of electronic educational publications, the creation of open educational courses, conduct online classes with constant improvement of communication skills.

I would also like to note that the digital economy contributes to the development of interaction between the university and employers. Digital technologies help identify promising professions, form the competencies of graduates based on the requirements of the economic market.

4 Discussion

In the modern scientific literature devoted to the modernization of the higher education system, there is a number of works by scientists such as D. Denisova [7], T. Klyachko, E. Mantaev, N. Pashkus, etc. At the same time, the authors rather study individual aspects of modernization of these spheres, such as financial relations, education management systems, rather than an integral mechanism for the modernization of higher education according to certain parameters. The development of general concepts of economic, economic, institutional, information mechanisms and their special aspects are reflected in the works of L. Abalkin, V. Bondarenko [8], L. Voronina, I. Kudinova [9], O. Derevianko, S. Gulyamov [10], Kalinina, Y. Kronrod, N. Lebedeva, E. Maskin, M. Mizintseva, E. Petrova and others. In the modern period, a number of scientists such as V. Afanasyev, A. Dyachenko, M. Kagan, V. Kartashov, G. Kleiner, G. Collins, V. Novoseltsev, E. Russkova, etc., argue that the optimization of the system higher education needs to be approached systematically. The works of U. Beck, V. Polterovich, L. Rudolph and others are devoted to the study and analysis of general concepts of reform and modernization. Higher education as a branch of the economy and related issues of state regulation of the education system, the market for educational services, education as an economic benefit are presented in the studies of S. Belyakov, B. Begalov [11], Dolzhenko [12], I. Zhukovskaya [5], L. Leslie, S. Smirnov, V. Tarakanov, A. Hilman, L. Yakobson, Sh. Nick., F. Bruno [13] and others. The institutional components of the higher education management system are considered in the works of S. Barabanova, A. Kirillov, A. Kozyrin; optimization of the structure of the education system is represented by the research of V. Dudnikov, B. Zhelezov, G. Keisling, L. Fishman, E. Hanushek; questions of theory and practice of financing higher education are disclosed in the works of N. Barr, V. Vakhshstein, J. Rennstich [14]. H. Christie, T. Meshkova, N. Monroe, H. Rolf, Sohn H.K., Lee T.J., Yoon Y.S. [15], Stańczyk S. [16], I.K. Dmitruk [17],

T.-H. Liu [18], T.N. Savina [19], M. Swan [20], M. Tang, C.H. Werner [21], K. Turvey, N. Pachler [22] and others.

5 Conclusion

To achieve high results in the preparation of qualified specialists, it is necessary not only to increase the technical capacity of the university, but also to constantly improve the teaching methodology in the context of the digitalization of the economy. As well as research on the effectiveness of methods, forms, teaching aids in an open educational space; their methodological substantiation, including the ratio of traditional and e-learning, contact and independent work of students; methods of monitoring progress and the formation of educational results in the context of the transfer of the educational process to the global network.

Thus, the transformation of the global space in the context of the digitalization of the economy has a great impact on higher education, contributes to the solution of problems in improving the qualifications of personnel, personalization of education, and also makes it possible to integrate into the global educational space using the methods and means of digital technologies and take high steps in the international ranking of universities.

References

1. A.D. Zhukovsky, Stat. Econ., **18(3)**, 56-64 (2021).
<https://doi.org/10.21686/2500-3925-2021-3-56-64>
2. V.M. Svistunov, I.N. Golyshkova, V.I. Aleshnikova, Innov. Invest., **1**, 297-300 (2020)
3. M. Kosacka-Olejnik, R. Pitakaso, Logforum, **15(4)**, 475-485 (2019).
<https://doi.org/10.17270/J.LOG.2019.363>
4. H. Eren, S. Karaca, A. Kılıç, J. Manag. Econ. Res., **13(3)**, 157-179 (2015).
<http://dx.doi.org/10.11611/JMER635>
5. I.E. Zhukovskaya, Open Edu., **25(3)**, 15-25 (2021).
<https://doi.org/10.21686/1818-4243-2021-3-15-258>
6. Ş. Zlate, C. Enache, Proc. – Soc. Behav. Sci., **180**, 136-143 (2015).
<https://doi.org/10.1016/j.sbspro.2015.02.096>
7. O.V. Denisova, Bul. Volgograd State Univ. Ser. 3. Econ. Ecol., **1(20)**, 39-44 (2012)
8. V.M. Bondarenko, Modern. Innov. Devel., **9(2)**, 172-191 (2018)
9. L.A. Voronina, I.S. Kudinova, Innovations, **5**, 67 (2007)
10. S.S. Gulyamov, A.T. Shermukhamedov, *Development of digital economy in the republic of Uzbekistan*, in VII Uzbek-Indonesian Joint international scientific and practical conference “Innovative development of entrepreneurship” with the framework of scientific and research project “Global economic challenges and national economy development”, 180-183, Tashkent-Jakarta (2018)
11. B.A. Begalov, I.E. Zhukovskaya, Metodologicheskie osnovy vliyaniya informatsionno-kommunikatsionnykh tekhnologii na razvitie natsionalnoi ekonomiki [Methodological aspects of the influence of the information society on the innovative development of the economy] (IQTISODIYOT, Tashkent, 2018)
12. A.I. Dolzhenko, I.Yu. Shpolyanskaya, S.A. Glushenko, Appl. Inf., **5(83)** 2019
13. N. Shannon., F. Bruno. Structural Thinking, in Metathinking. Management for Professionals (Springer, 2020). https://doi.org/10.1007/978-3-030-41064-3_3

14. J. Rennstich, E-Portfolio (2019). <https://doi.org/10.17605/OSF.IO/X6BN8>
15. H.K. Sohn, T.J. Lee, Y.S. Yoon, J. Travel Tour. Market., **33(5)**, 597-612 (2016).
<https://doi.org/10.1080/10548408.2016.1167348>
16. S. Stańczyk, Management, **21(1)**, 40-57 (2017).
<https://doi.org/10.1515/manment-2015-0079>.
17. I.K. Dmitruk, Realizatsiya mezhpredmetnykh svyazei predmetov estestvennonauchnogo tsikla, matematiki i informatiki [Realization of intersubject connections of subjects of natural science cycle, mathematics and informatics]. Accessed on: March 07, 2022. [Online]. Available: <https://refdb.ru/look/1876453.html>.
18. T.-H. Liu, Asia Pacific Manag. Rev., **24(4)**, 291-297 (2019).
<https://doi.org/10.1016/apmrv.2018.10.003>
19. T.N. Savina, Fin. Credit, **3(771)** (2018)
20. M. Swan, Blokchein. Skhema novoi ekonomiki [Blockchain. Scheme of the new economy] (Publishing house “Olimp – Business”, Moscow, 2017)
21. M. Tang, C.H. Werner, Think.Skills Creat., **24**, 268-278 (2017).
<https://doi.org/10.1016/j.tsc.2017.04.001>
22. K. Turvey, N. Pachler, Comp. Edu., **146**, 103736 (2020).
<https://doi.org/10.1016/j.compedu.2019.103736>
23. Gosuslugi [Public services]. Accessed on: March 07, 2022. [Online]. Available: <https://gosuslugi.ru>.
24. Ministerstvo ekonomicheskogo razvitiya Rossiiskoi Federatsii [Ministry of Economic Development of the Russian Federation]. Accessed on: March 07, 2022. [Online]. Available: <https://economy.gov.ru>
25. Obrazovanie i obshchestvo: gotova li Rossiya investirovat v svoe budushchee? [Education and society: is Russia ready to invest in the future? (Publishin House GU VShE, Moscow, 2007).

Aspects of risk management for digital innovation ecosystems at Russia

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Abstract. The growing dynamics of international and domestic markets, the increasing intensity of competition for resources, the aggravation of geopolitical and geo-economic conflicts translated in a widespread use of various economic and competition restrictions as well as the reduced product life cycles are forcing Russian companies in various industries to intensify their processes to create new value through introducing advanced innovative approaches to management and production. In this regard, it is evident that clearly de-fined and implemented strategies for creating and developing innovation ecosystems as well as considering in these strategies the new types of risks that are the results of the economy digitalization can help Russian companies to enter new markets and explore business opportunities more effectively based on the development and implementation of the new types of innovations and to promote their business growth. The purpose of this paper is a theoretical study of the ways to build up a strategy for creating and developing innovation ecosystems at Russian companies, as well as the place given in this strategy to the tools for managing risks associated with the transformation of socio-economic relations. Based on our analysis, the paper proposes the author's approaches to developing a conceptual basis for building up strategies to create and develop innovation ecosystems at Russian companies in the modern environment.

Keywords: innovative activities, companies, conditions, digitalization

1 Introduction

During the 20th and two decades of the 21st century, the sectoral structure of the economy both in Russia and in the leading industrial countries of the world could be generally represented as linear value creation chains. This structure of building up industries and their functioning led to the emergence of vertically integrated companies, which were able to control in this way the entire value creation chain and achieve economies of scale, which, in

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turn, provided additional competitive advantages. However, in the modern environment, digital technology, penetrating ever deeper into all economic activities, gives rise to new ways of managing value creation processes. On the one hand, this transformation marks a gradual replacement of traditional value creation chain formats with digital ecosystems. On the other hand, it paves the way for creating new industry giants that rely on the power of their digital ecosystems to achieve dominance in the market. At the same time, the Russian and foreign management science has still no common understanding of the essence and significance of digital ecosystems: how they are created, how they work and, importantly, how organizations that are only at the stage of creating and implementing digital management systems can approach the creation of digital innovation ecosystems in the process of their development. Based on literature reviews, expert surveys, and interviews, this paper proposes a practical framework for both existing organizations and businesspersons to better understand, plan, and explore the new paradigm of digital innovation ecosystems.

In the context of building up a new knowledge-intensive economic space, Russian companies need to get access to external sources of knowledge because of the inability to create the entire scope of necessary knowledge within one organization. At the same time, strengthening interaction with external sources of knowledge, on the one hand, and creating conditions for building up and developing an innovative exchange on the scale of the national and global economic systems, on the other hand, lead to a situation where companies find themselves dependent on decisions and actions taken by their business partners and other external political and economic actors, which creates new types of risks that need to be analyzed and managed efficiently to ensure the company's sustainability.

It is also important to note that one of the positive aspects of the innovative inter-action between companies in the modern environment is building up innovation networks. These networks can be considered as innovation ecosystems, where commercial companies and non-profit organizations interact with each other and work together to create and to reap value. In the modern context, it is obvious that a company's ability to successfully commercialize a new product or service depends not only on the quality of its own technology strategy but also on its ability to manage the innovation ecosystem strategy.

The ability to create new innovations is essential for both large- and small-sized Russian companies as a factor of accelerating their business growth. To achieve this goal, an organization should have:

- 1) deep understanding of the innovation dynamics.
- 2) well thought out innovation strategy.
- 3) well thought out innovation processes; and
- 4) innovation economy and external partners that will allow to bring additional assets to the innovation process [1-3].

1.1 Theoretical discussion

To jointly develop opportunities, to implement innovations, and to meet changing customer needs, many Russian companies have started looking for new business opportunities in building up qualitatively new forms of interaction with other key market players. This paper focuses on the issues of creating and developing innovation ecosystems, which can be defined as a network of interconnected organizations united around a core firm or platform and including both manufacturers and users of final products or services, focusing on the creation and distribution of new value through introducing innovations in management and

production. Another important research object in this paper is studying the features of analysis and risk management within the framework of innovation ecosystems.

According to the author, the above definition of the term “innovation ecosystem” allows us to take a fresh look at the problems of creating and developing innovation ecosystems at organizations in general and at Russian companies, including accounting and analysis of risks and opportunities arising from digitalization, new advances in information and communication technology, and new resources such as big data.

In the modern environment, it is evident that expanding the range of interaction with other stakeholders in the economic system, such as private and public organizations as well as consumers, provides Russian companies with new methods to take advantage of other organizations’ technology, business processes, and brands [4-6]. Involving consumers as full-fledged subjects of innovative interaction creates a new type of system dynamics in the existing models of the organization’s ecosystems. In the foreign management science, studying the features of building up and developing the organization’s ecosystems are largely reduced to comparing the logics of ongoing processes with their counterparts that exist in nature or searching for differences in the dynamics of network structures [7-12].

However, along with new opportunities, the emerging network of dependencies between different aspects of innovation ecosystems also poses a new set of risks and uncertainties that should be considered when creating, developing, and managing innovation ecosystems at Russian companies. In this case, it is clear that in the modern context a systematic approach to the development of management systems, the creation and development of ecosystems, and the digitalization of socio-economic relations are becoming key elements in the development of the Russian national economy and the tools based on which new ways of accelerating economic growth may be found.

The main risk for Russian companies that still have no strategy for developing digital innovation ecosystems or, in general, no strategy for developing a digital ecosystem, is the risk of lagging both in terms of developing management systems and in terms of production and technology. With the intensification of the processes for creating digital ecosystems in general and digital innovation ecosystems in particular, it becomes more and more difficult for individual companies to compete in the main markets for goods and services with such associations.

In addition, innovation ecosystems tend to expand the scope of their business operations by including new industries and activities in their orbit. It means that entering a new market may occur not through the sales of products and services by individual teams of innovators or individual businesses, but as part of a single digital innovation ecosystem that uses its existing market power, technology, and goodwill to enter and to gain a foothold in a new segment or even in a market as a whole.

It is evident that the main trend of the Russia’s economic development in the next decade will be the processes of creating and developing digital ecosystems in general and digital innovation ecosystems in particular in all sectors of the national economy. Therefore, organizations whose owners and top managers strive to maintain and strengthen their position previously gained will be forced to either create their own digital innovation ecosystem or to become part of a similar ecosystem of a larger player. It is important to note that in the coming decades ecosystems will become a kind of competitive unit where competition for a market share occurs between associations, rather than between individual companies. On the global economy scale, the process of creating digital innovation ecosystems can lead to the emergence of many interconnected ecosystems, or “ecosystems of ecosystems” [13]. It means that in the foreseeable future every organization and businessperson both in Russia and worldwide will face the need to develop their own

understanding of and their own approaches to the creation and development of digital ecosystems in general and digital innovation ecosystems.

It is important to note that the transition to a new model of the national and global economy based on digital ecosystems can be especially difficult for existing business entities with a well-established structure of business processes and business operations. Transforming a traditional business model into a digital ecosystem model implies a different approach to the creation and implementation of a set of business strategies, business processes, competencies, and technological assets.

Obviously, in both Russian and Western management science, the issues of creating and developing digital ecosystems in general and digital innovation ecosystems remain poorly explored. However, we find it necessary to note a recent study by Senyo et al. (2019), where the authors described possible areas of research as part of creating and developing digital business ecosystems [14]. In this paper, we have identified some gaps in the analysis of structures and other parameters of digital ecosystems in general and digital innovation ecosystems in particular. In addition, the analyzed study describes the papers by other Western researchers in this field, who focus on such topics as ecosystem compatibility and integration, the business flexibility, self-organization, the impact of ecosystems on the availability of financial resources in the economy as a whole, and the general development indicators of technical and technological innovation platforms. Among the most significant studies in the world management science devoted to the development of digital innovation ecosystems, we should highlight the research by Gawer (2021) that focuses on the problem of determining the standards and rules for the functioning of digital ecosystems in general and digital innovation ecosystems [15]. In this paper, much attention is paid to the integration of economic and technological views on the problems of digitalization of national economic systems. According to the authors of this study, no less significant is the research by Jacobides et al. (2018) that focuses on the analysis of various structures of digital innovation ecosystems based on various types of organizational complementarity [16].

However, it is important to note that both in the Russian and international management science and practice, there are generally no single interpretations and provisions that could be a basis for organization owners and top managers in the process of developing their own orientation in the paradigm of digital ecosystems in general and digital innovation ecosystems. This determines the urgency and relevance of the analysis of efficiency in respect of creating and developing digital innovation ecosystems at Russian companies and the risk management tools operating as part of the same, as presented in this paper.

2 Methods

As a methodological tool for analyzing the efficiency when creating and developing digital innovation ecosystems at Russian companies and the quality of risk management tools operating as part of the same, the author uses process matrices that allow for quantitative assessment of process parameters and the quality analysis of software and technological equipment development. The development process includes various stages, such as requirements analysis, designing, coding, integrating, and testing. For the analysis of each stage, we have formulated assessment criteria, as presented below, detailing the described stages of the project implementation. Their designations and attributions to specific stages are given below.

Requirements: ambiguity, completeness, intelligibility, and traceability.

Designing: module architecture and the degree of its interconnection with other modules. Coding: maintainability and reusability. Testing: correctness and reliability.

The process indicators at each stage of the development cycle measure the level of productivity, the amount of costs, the resource requirements, the quality of system elements, the impact of the development methods and tools on the system efficiency.

To assess the technology efficiency, the author has also applied a matrix approach. The resulting matrix reflects the efficiency of technology used in the framework of methods and tools for managing innovation ecosystems based on the quality analysis of the software technical parameters, the software compliance with the user needs, the software flexibility in supporting management systems and in responding to changing user needs. The quality of methods used in management systems is assessed against system requirements specifications, including the existing standards and the ease of use. As factors affecting the quality of software, the author has used accuracy, reliability, usability, integrity, stability, prevalence, reusability, compatibility, maintainability, flexibility, and testability.

The collection of data for this paper has been carried out using a questionnaire developed by the author based on the results of an analysis of the studies by Russian and foreign researchers devoted to the issues of creating and introduction innovation digital ecosystems. The questionnaire was sent to the CEOs of fifty Russian companies implementing innovative digital ecosystem projects. The questionnaire includes three main sections.

In the first section, respondents were asked questions based on which the author could form an idea of the essence and main characteristics of projects for creating and developing innovative digital ecosystems being implemented at Russian companies.

In the second section, they were asked questions that made it possible to collect a set of data to assess the project risks and efficiency. The respondents were invited to specify the degree of their agreement/disagreement on a seven-point Likert scale, which ranged from complete disagreement to full agreement (strongly disagree, disagree, partially disagree, difficult to answer, partially agree, agree, and strongly agree). In the third section, the questions focused on collecting personal information about the respondents, such as name (optional), job title, name of the organization, age, and work experience. At the end of the survey period, we received a total of 15 responses, where only half of the questions were answered; therefore, data from this questionnaire have been excluded from our further analysis. The remaining 35 answers were filled in completely and included in the study with a response rate of 29.08 percent. It should be noted that the above frequency can be recognized as normal from the point of view of statistical analysis. The survey involved an analysis of several indicators for each of the five groups of digital risks and two performance factors. The validity of our conclusions has been evaluated using a factor analysis, and the reliability of the scales has been assessed using the Cronbach's alpha coefficient.

3 Results

As stated above, to check the validity of conclusions made, the author has used the traditional factor analysis method. As a measure of the sample selection adequacy, we have adopted the following values: value of 0.80 and higher is acceptable for including in the analysis process; values of 0.60 to 0.80 are below the acceptable, but admissible for including in the analysis process; and values below 0.50 are significantly below the acceptable and non-admissible for including in the analysis process.

During the analysis of innovation ecosystem risks at Russian companies, the author assumed that such risks are hidden variables, and that the implementation of their impact can lead to a significant reduction in the efficiency of or refusal from creating an ecosystem. The process of measuring the elements considered for building up a risk impact model, as part of the Bartlett's test of sphericity, has demonstrated the possibility of abandoning the hypothesis about the existence of a zero independence of variables at the significance level equal to 0.000. The sample selection adequacy indicator has been calculated as 0.815, presuming that these elements were suitable for a factor analysis. To check the validity of building up a risk impact model, a factor analysis has been carried out for key risk types using the varimax rotation method. As the result of this analysis, seven factors were identified. Upon excluding elements with a factor weight below 0.50 from the analysis, we have identified four key risk types that influence the creation and development of innovation ecosystems at Russian companies. All these four factors in total explain 72.160% of dispersion. Table 1 presents summary results of the factor analysis by the types of risks analyzed.

Table 1. Results of the factor analysis of risks associated with creating and developing digital innovation ecosystems at Russian companies.

Risk factor group name	Number of indicators	Initial value	Dispersion coefficient	Factor weight
Risks associated with features of specifications of innovation ecosystem management systems	10	7.900	11.250	0.870
Risks associated with innovation ecosystem arrangement processes	14	11.386	15.890	0.760
Technological and technical risks of creating and developing innovation ecosystems	12	12.400	13.445	0.684
Risks associated with the stakeholders' influence	18	13.590	18.960	0.576

To assess the elements that reflect the efficiency when creating and developing innovative ecosystems at Russian companies, the authors have also used the factor analysis method. As in the case of the factor analysis of the risks associated with the creation and development of innovation ecosystems, because of the Bartlett's test of sphericity, we have rejected the zero hypothesis of the variable's independence at a significance level of 0.000. The sample selection adequacy indicator has been calculated as 0.768, making it possible to include the elements selected in the process of the factor analysis. To verify the validity of statements about the effective implementation of e-government, like in the case of risk assessment, we have conducted a key component analysis using the varimax rotation method. As a result of this analysis, we have obtained two factors with proper values of > 1.0, which accounted for 58.647% of the total dispersion. Table 2 presents the summary results of the factor analysis to assess the efficiency when implementing e-governance in the strategic management systems at Russian companies.

Table 2. Results of the factor analysis to assess the efficiency when creating and developing digital innovation ecosystems at Russian companies.

Efficiency factor group name	Number of indicators	Initial value	Dispersion coefficient	Factor weight
Efficiency when developing technology for creating and developing innovation ecosystems	5	3.589	37.680	0.968
Efficiency when applying technology for creating and developing innovation ecosystems	3	4.329	25.784	0.856

4 Conclusion

Based on the results of our analysis, we can conclude that creating and developing digital innovation ecosystems at Russian companies allows the latter to benefit from three essential competitive advantages becoming decisive in the modern environment: the access to a wide range of opportunities related to the digital transformation of the economy; the ability to quickly scale up business processes; the ability to analyze the flexibility and sustainability of businesses using their digital counterparts. Thus, at the new product launch stage, a digital innovation ecosystem can provide a quick access to external sources of finance and development that could be too costly or time-consuming to create within an individual organization.

An important advantage that can be used by Russian companies but remains out of sight of their owners and top managers, is that, once launched, digital innovation ecosystems can be scaled up much faster than other management models. Their modular structure with clearly defined interfaces makes it easy to add new participants, whereas new kinds of asset-sharing business models that are basis for many digital platforms can drive high growth rates for all participant companies of an eco-system.

It is obvious that in the context of digital transformation of economic systems, digital innovation ecosystems will become in the future the main basis to provide the flexibility and sustainability for the operations of companies of all sizes and forms of ownership. This is since a digital ecosystem is based on a modular structure with a stable core or platform, assuming the use of stable interfaces for the interaction of its participants. At the same time, ecosystem components are not static and can be easily added or excluded, which provides both for high diversity and high development capacity.

Therefore, digital innovation ecosystems are especially attractive for companies operating in markets where consumer needs and tastes are heterogeneous or unpredictable, and technological requirements for production feature a high dynamism or uncertainty.

As stated above, the process of creating and developing digital innovation ecosystems brings not only benefits but also new types of risks. According to the definition given in this paper, an ecosystem consists mainly of independent participants who enter the process of interaction on a mutually beneficial basis, which implies only a limited tool of control over the entire system by each participant. The company that organizes the ecosystem has very limited means to enforce or to control its partners' behavior, as compared to a hierarchical supply chain or an integrated model.

The purpose of tools for managing a digital innovation ecosystem is to embed external partners into the business process structure without building any patterns of complete hierarchical subordination or control. Such an ecosystem governance can be achieved

through the risk management tools of a digital innovation ecosystem that are based on clear rules, standards, and norms, which are set in a transparent, equitable, and fair manner and adjusted as the ecosystem develops. In turn, certain restrictions imposed on participants by a risk management system are the price that each participant must pay for its access to innovation, and flexibility and sustainability tools; therefore, the governance of digital innovation ecosystems must be accurately balanced.

In the modern environment, it is obvious that an individual company's business performance and its ability to capture the value of innovation are increasingly dependent on its ability to manage assets and resources outside of its controls; therefore, especially important is the company's ability to create and develop strategies as part of an innovation ecosystem based on such tools as joint production, creating networks, and interaction with innovation ecosystem partners. However, it is evident that the companies' involvement into innovation ecosystems brings not only positive aspects that expand opportunities for exchanging knowledge, skills, and technological solutions, but also new types of risks. Therefore, no less important is the need to supplement innovation ecosystem management systems with integrated tools for identification, analysis, assessment, and management of risks accompanying the functioning of such ecosystems and affecting their efficiency.

The analysis of features and results of supplementing innovation ecosystem management systems with integrated tools for identification, analysis, assessment, and management of risks accompanying the functioning of such ecosystems and affecting their efficiency will be continued as part of further research by the authors. In the future, the authors plan to expand the range of organizations analyzed by involving data from Chinese companies and comparing this data with that of Russian companies.

References

1. J.L. Aarikka-Stenroos, P. Ritala, *Ind. Market. Manag.*, **67**, 23-36 (2017).
<http://dx.doi.org/10.1016/j.indmarman.2017.08.010>
2. R. Adner, *J. Manag.*, **43(1)**, 39-58 (2017). <https://doi.org/10.1177/0149206316678451>
3. D.B. Audretsch, A.N.Link, *Small Bus. Econ.*, **52(2)**, 429-436 (2019).
<https://doi.org/10.1007/s11187-017-9953-8>
4. E. Autio, L.D.W. Thomas, Value co-creation in ecosystems: Insights and research promise from three disciplinary perspectives, in S. Nambisan, K. Lyytinen, Y. Yoo (eds.), *Handbook of digital innovation* (Edward Elgar, Cheltenham, 2019).
<https://doi.org/10.4337/9781788119986.00017>
5. E. Autio, J. Levie, Management of entrepreneurial ecosystems, in G. Ahmetoglu, T. Chamorro-Premuzic, B. Klinger, T. Karcisky (eds.), *Wiley handbook of entrepreneurship*, 423-449 (John Wiley & Sons, Chichester, 2017).
<https://doi.org/10.1002/9781118970812.ch19>
6. E. Autio, L.D.W.Thomas, Tilting the playing field: Towards an endogenous strategic action theory of ecosystem creation, in S. Nambisan (ed.), *Open innovation, ecosystems and entrepreneurship: Issues and perspectives*, 111-140 (World Scientific Publishing, New Jersey, 2018). https://doi.org/10.1142/9789813149083_0005
7. C. Cennamo, J. Santaló, *Org. Sci.*, **30(3)**, 617-641 (2019).
<https://doi.org/10.1287/orsc.2018.1270>
8. A. Colombelli, E. Paolucci, E. Ughetto, *Small Bus. Econ.*, **52(2)**, 505-521 (2019).
<https://doi.org/10.1007/s11187-017-9957-4>

9. D. Cumming, J.C. Werth, Y. Zhang, *Small Bus. Econ.*, **52(2)**, 455-484 (2019).
<https://doi.org/10.1007/s11187-017-9955-6>
10. J.A. Cunningham, M. Menter, K. Wirsching, *Small Bus. Econ.*, **52(2)**, 545-562 (2019).
<https://doi.org/10.1007/s11187-017-9959-2>
11. S. Esposito De Falco, A. Renzi, B. Orlando, N. Cucari, *Prod. Plan. Contr.*, **28**, 1344-1353 (2017). <https://doi.org/10.1080/09537287.2017.1375143>
12. K. Kapoor, A.Z. Bigdeli, Y.K. Dwivedi, A. Schroeder, A. Beltagui, T. Baines, *J. Bus. Res.*, **128**, 94-108 (2021). <https://doi.org/10.1016/j.jbusres.2021.01.060>
13. O. Valdez-de-Leon, *IEEE Internet of Things Newsletter* (2017)
14. P.K. Senyo, K. Liu, J. Effah, *Int. J. Inf. Manag.*, **47**, 52-64 (2019).
<https://doi.org/10.1016/j.ijinfomgt.2019.01.002>
15. A. Gawer, *Long Range Plan.*, **54(5)**, 102045 (2021).
<https://doi.org/10.1016/j.lrp.2020.102045>
16. M.G. Jacobides, C. Cennamo, A. Gawer, *Strat. Manag. J.*, **39(8)**, 2255-2276 (2018).
<https://doi.org/10.1002/smj.2904>

Bitcoin as a legal tender: market reaction to the announcement

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Abstract. Cryptocurrencies are entering people's lives and are starting to play an increasingly significant role in the economy. Salvador has become the first country to adopt Bitcoin as a legal tender. The purpose is to find out how the cryptocurrency market has reacted to the announcement of Bitcoin adoption as a legal payment instrument. The main research method is the event study analysis. Five event windows around the announcement date are employed to estimate the market reaction. The event study methodology implies calculation of abnormal returns within each event window as a difference between expected and real returns and estimation of the significance of abnormal returns using t-statistics. The novelty of results is ensured by the fact that the crypto market is a new phenomenon, and its behaviour has not been thoroughly explored yet. This market is volatile and its reaction to shocks is hardly predictable. The analysis indicates that abnormal returns in all five event windows are insignificant. However, the graphical analysis demonstrates that significant changes in Bitcoin price occurred in about three months after the announcement which was outside of the proposed event windows. This confirms the suggestion of cryptomarket unpredictability and leaves room for further research.

Keywords: bitcoin, cryptocurrency, event study, market reaction, legal tender

1 Introduction

1.1 Background

Cryptocurrencies are entering people's lives and are starting to play an increasingly significant role in the economy. However, they have not been accepted as a tender yet. In June 2021 Salvador became the first state to adopt Bitcoin, the most popular cryptocurrency, as a legal tender [1]. On 8 June 2021, Bitcoin legal tender bill passed the country's Congress which can be considered as a date of the first enactment of cryptocurrencies at the state level [2].

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The aim of the paper is to analyse how the currency market has reacted to this announcement. Since the decision to adopt a cryptocurrency as a legal tender may have far-reaching consequences, it can be expected that the reaction of the currency markets to this news could be significant. The analysis is conducted using a quantitative methodology, namely the event study strategy.

1.2 Literature review

The development of Bitcoin ecosystem may have long-lasting consequences for numerous various fields. Four main directions of the research connected with Bitcoin can be named. The first one explores mainly technological aspects of cryptocurrencies including cryptographic problems, security of chains and susceptibility to potential attacks [3]. Such literature mostly explored transaction record using the blockchain technology [4]. The second stream examines legal aspects of cryptocurrencies, namely how laws in different jurisdictions interpret and treat their use and how transactions should be considered from the viewpoint of tax and anti-money laundering regulation [5]. The decentralised nature of Bitcoin turnover creates great opportunities for tax evasion and corruption because of difficulty and almost total impossibility to control such transactions. These concerns have been raised by official financial organisations such as central banks [6]. The issues of practical use of cryptocurrencies and Bitcoin in particular have not been appropriately developed yet [7].

The third area explores broader implications of Bitcoin use including political, sociological and ethical [8] issues connected with the emergence of Bitcoin and alternative cryptocurrencies. The fourth dimension of research investigates the economic nature of Bitcoin. In particular, there is still a question whether Bitcoin and other cryptocurrencies should be considered as a payment means with functions of fiat money, instrument of wealth accumulation or an independent asset. The decision on the nature of cryptocurrencies significantly affects the aspects of money supply and deflation [9] and its investment potential [10].

Glaser, Zimmermann, Haferkorn, Weber and Siering (2014) [11] explore whether Bitcoin should be considered as an asset or as money using a broad range of secondary data from the media, search history and market transactions. They revealed that most users were purchasing Bitcoin for market speculation rather than for accumulating them. What is important, Bitcoin was used not to pay for goods and services but within cryptocurrency exchanges only. Also, similar to assets such as company stock and commodities, Bitcoin tended to react to news significantly. This allowed the authors to conclude that Bitcoin was mostly used as an asset rather than a currency.

Dyrberg (2016) [12] supported these considerations by comparing the Bitcoin behaviour to that of gold and US dollar. Using GARCH analysis, the researcher indicated that Bitcoin had features of both. The finding of the study was that Bitcoin had more features of gold, that is a commodity or an asset, rather than a currency. Meanwhile, Pagano & Sedunov (2020) [13] did not fully agree with the previous two papers. They divided all Bitcoin users into three categories, namely transactional, precautionary and speculative. The first category captures money features of Bitcoin whereas the latter two mostly describe it as an asset. While a strong speculative component in the use of Bitcoin was revealed, the authors also suggested that it was also used as a transaction means which underlines Bitcoin's dual nature.

The debates around the potential of cryptocurrencies as legal tenders have been tough in the recent years. Shovkhalov and Idrisov (2021) [14] underlined a number of issues that

have to be addressed prior to adoption of cryptocurrencies. First, the authors argued that since cryptoassets have a decentralized character, their broad use would contribute to the development of the shadow economy and stimulate tax evasion that is not controlled by the state authorities. Second, most cryptocurrencies are not liabilities of any economic agent which means that they are unsecured and are not backed by any physical assets [15]. Third, anonymity of actors in cryptocurrency transactions makes them a perfect means for financing illegal activities such as terrorism, drug trafficking and money laundering. Fourth, high volatility of cryptoassets make them an instrument of financial speculations but an inappropriate means for maintaining stability of state payments. Besides, the official status of cryptocurrencies has not been established and confirmed in legal regulations of almost all world countries which leaves a lot of work to do before such assets can be utilised as payment means in practice [16]. Gorjon (2021) [17] concludes that the experiment in Salvador should provide abundant food for thought in the applicability of cryptocurrencies as a tender at the state level.

2 Methods

2.1 Data

The data for the analysis is taken from Yahoo Finance [18, 19]. Two time series are employed, namely the Bitcoin to USD exchange rate (BTC/USD) and the US Dollar Index (USD/USDX). As Bitcoin remains the most widely used and most capitalised cryptocurrency, the first time series represents its dynamics relative to the US dollar. The second time series is a measure of the value of the US dollar relative to the basket of currencies of the US' main trading partners including Euro, Swiss Franc, Japanese Yen, Canadian dollar, British pound, and Swedish Krona.

The period of analysis is 17.09.2014 – 17.09.2021. The former date is the first day for which the Bitcoin exchange rate is available while the latter date represents the last day of the largest event window. Daily values are taken to increase the number of observations and enhance the accuracy of the estimations. The analysis is conducted for five event windows including [-5;5], [-1;1], [0;1], [0;10], [0;100]. This is done to estimate the market reaction at different time horizons.

2.2 Methodology

The event study methodology for estimating the significance of market reaction to events includes the following steps. First, the actual returns are calculated. The actual returns are calculated using the natural logarithm transformation:

$$R = \ln \ln \left(\frac{P_t}{P_{t-1}} \right),$$

where P_t is the bidder's share price at time t ; P_{t-1} is the bidder's share price at time $t-1$. The employment of natural logarithm instead of discrete returns enables cumulation and aggregation them across time periods.

Next, the expected, or normal, returns are estimated. The study employs the market model to estimate the expected returns of the bidders [20]. According to this model, normal or expected returns are calculated using the following equation:

$$E_r = \alpha + \beta R_m$$

where E_r are normal returns; α is the intercept; R_m is the rate of the return on the market index represented by the basket of currencies; β is the slope coefficient.

These are returns that would be normally anticipated in the absence of the news [21]. When both actual returns and expected returns are estimated, the abnormal returns are calculated as the difference between actual and expected returns:

$$AR = R - E_r$$

where AR is abnormal return; R is actual return; E_r is expected return.

For each particular deal, the sum of abnormal returns composes the cumulative abnormal returns (CARs) that express the overall response of the currency exchange to the announcement of the Bitcoin by Salvador. The cumulative returns are calculated in line with the following formula:

$$CAR = \sum_{i=1}^n AR_i$$

After that, statistical significance of CAR for each deal is estimated using the t-statistic:

$$t = \frac{AAR\sqrt{n}}{\sigma}$$

where AAR is average abnormal return; n is the number of observations in the event window; σ is standard deviation of abnormal returns. The t-statistic and its p-value are then estimated to determine whether the reaction of the currency market was significant.

3 Results and discussion

Prior to estimating the significance of returns within the explored event windows, it is feasible to analyse the Bitcoin behaviour graphically. Figure 1 presents BTC/USD exchange rate around the event date.

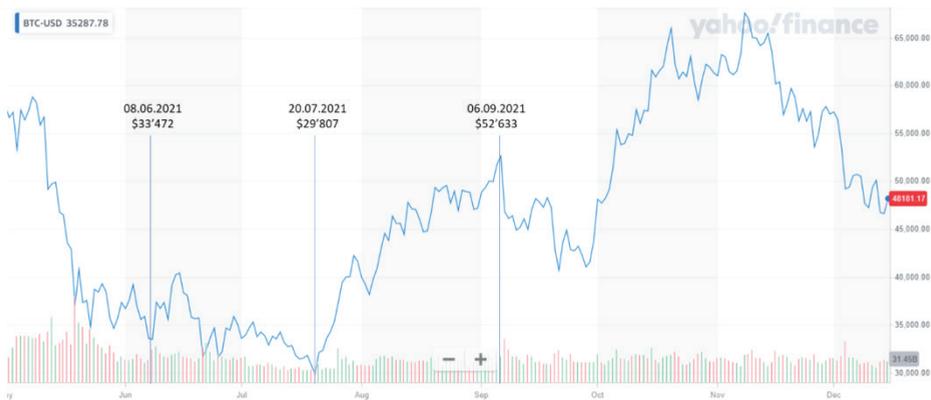


Fig. 1. BTC/USD Exchange Rate. Source: Yahoo Finance (2021a).

The graph shows that the event date occurred during the local downward movement which started in May 2021. At the moment of announcement, the Bitcoin exchange rate was £33.472 while the lowest local price of \$29.807 was observed on July 20, 2021. After that, a significant growth up to \$52.633 on September 6, 2021, was observed. Overall, graphical analysis indicates that the Bitcoin behaviour has not been influenced significantly by the

announcement. However, it is not always possible to estimate the significance of market reaction graphically.

Therefore, the next step of the exploration is the event study analysis. Its outcomes are provided in Table 1.

Table 1. Event Study Outcomes.

Indicator	[-5; 5]	[-1; 1]	[0; 1]	[0; 10]	[0; 100]
intercept	0.0020	0.0020	0.0020	0.0020	0.0020
slope	-0.0108	-0.0114	-0.0114	-0.0114	-0.0114
AAR	-0.0020	-0.0335	-0.0308	0.0049	0.0008
St.Dev	0.0498	0.0378	0.0531	0.0562	0.0390
t-stat	-0.1319	-1.5362	-0.8202	0.2918	0.2118
p-value	0.8977	0.2643	0.5627	0.7764	0.8327
CAR	-0.0218	-0.1006	-0.0615	0.0543	0.0829

Table 1 indicates that in the symmetric windows that captured both dates before and after that announcement such as [-5;5], [-1;1] and the first day after the announcement [0;1], the reaction of the market to the news announcement was negative which is demonstrated by the negative cumulative abnormal returns (CARs) equal to -2.18%, -10.6% and -6.15%, respectively. Meanwhile, the windows that captured only the periods after the announcement, namely, [0;10] and [0;100], demonstrated positive market reaction to the announcement providing returns of 5.43% and 8.29%, respectively.

However, the outcomes of t-tests that estimated the statistical significance of the market reaction showed that p-values of the test statistics were higher than the threshold level 0.05 for all the explored windows. This means that the null hypothesis on the insignificant market reaction to the announcement has been confirmed for all the windows.

4 Conclusion

The aim of the study was to quantitatively assess the market reaction to the announcement on the adoption of Bitcoin as a legal tender in Salvador. The event study strategy was employed to estimate whether this reaction was significant. The evaluation of the reaction was conducted for five event windows including [-5;5], [-1;1], [0;1], [0;10] and [0;100]. The analysis showed that the cumulative returns were negative for the first three of these windows but positive for the latter two. As for the statistical significance, it was indicated that the market reaction on the announcement has been insignificant for all of the windows.

References

1. M. Sigalos, World's first country to adopt bitcoin as legal tender (2021). Accessed on: March 07, 2022. [Online]. Available: <https://www.cnn.com/2021/06/05/el-salvador-becomes-the-first-country-to-adopt-bitcoin-as-legal-tender.html>
2. N. Renteria, T. Wilson, K. Strohecker, In a world first, El Salvador makes bitcoin legal tender (2021). Accessed on: March 07, 2022. [Online]. Available: <https://www.reuters.com/world/americas/el-salvador-approves-first-law-bitcoin-legal-tender-2021-06-09/>

3. A. Mikhaylov, J. Open Innov.: Techn., Market, Compl., **6(4)**, 197-216 (2020).
<https://doi.org/10.3390/joitmc6040197>
4. D.B. Rawat, V. Chaudhary, R. Doku, J. Cybersec. Priv., **1(1)**, 4-18 (2021).
<http://dx.doi.org/10.3390/jcp1010002>
5. L. Novoselova, E. Grin, MATEC Web of Conf., **170**, 01085 (2018).
<https://doi.org/10.1051/mateconf/201817001085>
6. R. Auer, J. Frost, L. Gambacorta, C. Monnet, T. Rice, H.S. Shin, Central bank digital currencies: motives, economic implications and the research frontier. BIS Working Papers No 976 (Bank for International Settlements 2021)
7. L. Schilling, H. Uhlig, J. Monetary Econ., **106(3)**, 16-26 (2019).
<https://doi.org/10.1016/j.jmoneco.2019.07.002>
8. H. Karlstrom, Scand. J. Soc Theory, **15(1)**, 23-36 (2014).
<https://doi.org/10.1080/1600910X.2013.870083>
9. E. Levy-Yeyati, Financial dollarization and de-dollarization in the new millennium, FLAR Working Papers (2021)
10. J. Fernandez-Villaverde, D. Sanches, L. Schilling, H. Uhlig, Rev. Econ. Dynam., **41(3)**, 225-242 (2021). <https://doi.org/10.1016/j.red.2020.12.004>
11. F. Glaser, K. Zimmermann, M. Haferkorn, M.C. Weber, M. Siering, ECIS 2014 (Tel Aviv). Accessed on: March 07, 2022. [Online]. Available:
<https://ssrn.com/abstract=2425247>
12. A.H. Dyhrberg, Fin. Res. Letters, **16(2)**, 85-92 (2016).
<https://doi.org/10.1016/j.frl.2015.10.008>
13. M.S. Pagano, J. Sedunov, Bitcoin and the Demand for Money: Is Bitcoin More Than a Speculative Asset? (2020). Accessed on: March 07, 2022. [Online]. Available:
<https://ssrn.com/abstract=3293998>
14. S. Shovkhalov, H. Idriso, Laws, **10**, 32-48 (2021).
<https://doi.org/10.3390/laws10020032>
15. J.R. Rallo, Bitcoin: The Alternative for a Dollar? (2019). Accessed on: March 07, 2022. [Online]. Available: <https://www.elcato.org/bitcoin-unaalternativa-al-dolar>
16. T. Adrian, R. Weeks-Brown, Cryptoassets as National Currency? A Step Too Far (2021). Accessed on: March 07, 2022. [Online]. Available:
<https://blogs.imf.org/2021/07/26/cryptoassets-as-national-currency-a-step-too-far/>
17. S. Gorjon, The role of cryptoassets as legal tender: The example of El Salvador, Bank of Spain Economic Bulletin 04/2021. Accessed on: March 07, 2022. [Online]. Available:
<https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/ArticulosAnaliticos/21/T4/Files/be2104-art35e.pdf>
18.) Bitcoin USD (BTC-USD). Accessed on: March 07, 2022. [Online]. Available:
Retrieved from: <https://sg.finance.yahoo.com/quote/BTC-USD/history>
19. US Dollar/USDX – Index – Cash (DX-Y.NYB). Accessed on: March 07, 2022. [Online]. Available: <https://finance.yahoo.com/quote/DX-Y.NYB/history>
20. D.K. Pandey, V. Kumari, Int. Rev. Econ. Fin. **71**, 467-483 (2021).
<https://doi.org/10.1016/j.iref.2020.09.014>
21. M.H. Bilgin, G. Gozgor, C.K.M. Lau, X. Sheng, Int. Rev. Fin. Analysis, **58**, 1-7 (2018). <https://doi.org/10.1016/j.irfa.2018.03.009>

Entrepreneurship and project management in context of interdisciplinary cross-pollination

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Abstract. The article aims to investigate the current scientific discourse on practical and theoretical cross-fertilization of entrepreneurship and project management. Despite the obvious similarities between these domains, the academic dialogue between two disciplines has been recently quite limited. However, the expansion of both areas and extreme dynamism of economic conditions has led to acceleration of the cross-pollination of these domains. More and more researches are analyzing versatile applications of entrepreneurship to project management and vice versa. This study is a systematic literature review of papers in scientific and partly professional journals devoted to entrepreneurship and project management interactions. The methodology includes systematic search, evaluation and selection of the most relevant papers, qualitative full-text analysis with thematic coding and identification of the most important themes concerning entrepreneurship and project management cross-pollination. 104 articles from Scopus indexed journals were analyzed. 36 papers were selected as the most relevant. 8 most important themes were identified. The performed analysis suggests that we can expect the rise of practical and theoretical interest to implementation of project management to entrepreneurship and vice versa. The most promising themes include application of different project management practical tools in order to improve the performance of entrepreneurial projects, adoption of opportunity identification and evaluation processes to project management methodologies, acquiring entrepreneurial orientation and attitudes to improve flexibility, innovativeness and creativity of project management practices.

Keywords: entrepreneurial project, project entrepreneurship, quantitative data analysis, literature review

1 Introduction

Times of crisis usually stimulate the development of new perspectives in theory and practice of management and entrepreneurship. Quite often the new directions of research and new practical methods are created as a result of cross-pollination of theoretical and

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practical domains that used be considered as different and distant in some respects, but similar and close in some other respects. Since the late 1990s, as the turbulence and complexity of economy started steadily increasing, researchers have been increasingly recognizing the opportunities of theoretical and practical mutual enrichment of project management and entrepreneurship. Especially promising is viewed the project management – entrepreneurship marriage in the field of technological entrepreneurship and technological innovation project management. Technological systems and products are traditionally considered as the domain of system engineering and project management. But in the dynamic environment, technology-oriented project management needs to be complemented by the entrepreneurial flexibility and value creation focus.

The current research stresses the practical similarities of two disciplines [1]. They both are dealing with innovative results and high risks. They are both coordinate and integrate complex endeavors consisted of different functional and professional activities in order to create value. But at the same time, both disciplines prefer to position itself as autonomous domains and seem not to develop intense theoretical or methodological dialog [2]. However, up to now, more than a dozen researchers already investigated various theoretical and practical implications of project management and entrepreneurship interplay in different context. Some of them pay attention to opportunities to imply project management tools and techniques within entrepreneurial area [3, 4]. Other authors are more interested in including entrepreneurial approaches and orientations into the practice of project managers [5, 6]. Yet another group of scholars try to combine both directions [7]. Considering the multiplicity, complexity and variety of different views on interplay of entrepreneurship and project management, it is high time to perform systematic review of the literature on this interaction. Hence, the aim of the paper present is to overview the topics that were investigated by the authors and that can indicate the directions for future research and practice development at the nexus of project management and entrepreneurship.

The article is based on the following structure. The second part summaries the contemporary expansions of entrepreneurship and project management beyond their traditional areas which helps to illustrate the inevitable interactions of both domains. In the third part the author explains the research methodology which is based on the systematic literature review and quantitative analysis of the current articles. The fourth part presents the key findings. Finally, the fifth section includes discussion, theoretical and practical implications, limitations of the study and suggestions for further research.

Entrepreneurship has many different definitions and understandings. Entrepreneurship can be considered not just as starting, owning and running new business. Entrepreneurship involves the processes of opportunity discovery, evaluation and exploitation in the context of creating future goods and services. Traditional perspective of entrepreneurship as an economic activity connected with creation of new ventures, goods and services has given way to a broader understanding of entrepreneurship as the specific type of behavior – innovative and change-oriented behavior. Today we are observing the proliferation of different types entrepreneurship in various contexts – social, institutional, political, educational, ecological, cultural, academic and other entrepreneurships. Among different definitions of entrepreneurship, there are not only traditional, ‘narrow’ themes such as creation of new enterprises, products, services, creation of employment and but also some relatively novel notions – value creation, innovation, change implementation, searching for opportunities and risk-taking. Individual or collective behavior characterized as creative, innovation, change-oriented, opportunity searching and risk-tolerant, regardless of its context, scope and forms, can be considered to certain degree as entrepreneurial. Another important aspect is underlined in the definition of European Commission (2006).

Entrepreneurship is about transforming ideas, related to new opportunities, into practical and targeted activities.

Entrepreneurship may manifest itself also within existing organizations in the form of intrapreneurship, corporate entrepreneurship, corporate venturing, strategic entrepreneurship. Entrepreneurial behavior is demonstrated not only by the top managers or owners, but also by middle managers, team leaders and employees. Entrepreneurship could also be operational and project-entrepreneurship.

To sum up, currently entrepreneurship is understood as a universal term describing forces implementing changes in existing practices, establishing new activities, implementing changes in economy and transforming societies [2]. Not surprisingly, many aspects of entrepreneurial behavior can be found and investigated in the context of project management.

Project management is also going through the process of universalization and expanding its borders into various spheres of modern societies. Started in the 1960s as a separate practical and academic discipline in weapon engineering, construction, shipbuilding and other industries producing complex and unique socio-technical systems, at the turn of the 21st century, project management had become the ubiquitous managerial practice in wide spectrum of areas connected with new product development, innovation, system design and social or technological change. Spreading its scope of application, project management is being successfully implemented in public sector, non-governmental organizations, universities, creative and cultural industries, within the context of international development. Popularity of project management in modern world is explained by projectization when more and more activities in organizations are structured as projects, projectification or project orientation when project management is becoming more incorporated to organized different, first of all research, development and innovation, business activities, or project orientation [8].

Development of various project management methodologies has led to that it is realized in different environments using broad range of approaches – controlled and predictive, agile and lean, adaptive and extreme, iterative and incremental, hybrid and evolutionary. The trend from predefined processes to tailorable practices, from ‘one size fits all’ to contingency approach and adaptation, from meeting requirements on time and within the schedule to creation of value under the conditions of uncertainty and change, from operational applications in limited number of industries to strategic significance for all organizations in almost any organizational context was embodied in the last, the 7th edition of Guide to PMBoK® and recognized by the majority of researchers and practitioners.

From the literature above, we can identify several aspects shared by both disciplines, such as value creation, innovation, change implementation, adaptivity to uncertain environment, increasing strategic importance for companies in different industries. Another very interesting trend is that both project management and entrepreneurship are becoming universal disciplines that describe not just some particular groups of activities, but specific sets of attitudes, principles and views that can be applied to any kind of activity in any area of modern society. Entrepreneurship is transforming into ‘entrepreneuriality’ applicable literally everywhere, and project management is associated with projectification of almost everything. In some significant points these two trends interlink and support each other and lead to the active interaction of project management and entrepreneurship domains.

The abovementioned cross-disciplinary similarities attracted the attention of researchers who tried to identify the certain linkages between practical and academic areas of both project management and entrepreneurship areas. The inter-disciplinary studies have already produced many interesting findings and accumulated significant knowledge which makes it

necessary to systematically review the current state of the research in the junction of project management and entrepreneurship.

2 Materials and methods

The research methodology is based on systematic literature review and quantitative data analysis. Applying a search term “project management” AND “entrepreneurship” in title, key words and abstracts within ‘Business, Management and Accounting’ 102 items were identified. To choose papers for further full-text analysis the following criteria were used:

A paper should fully deal with both entrepreneurship and project management domain;

A paper should not consider one of these domains as a minor topic;

Paper’s findings should include suggestions for implementation of project management in entrepreneurship or/and entrepreneurship in project management; it should not be just collocation of both terms in a paper;

A paper should not use such terms as ‘entrepreneurial project’, ‘entrepreneurial project management’ and alike without proper explanation of these terms.

The evaluators analyzed abstracts of the articles applied the criteria above. Decision were based on the majority of votes. As a result, 31 articles were chosen. The full texts of these articles were analyzed using thematic coding technique for identification of most important themes concerning project management and entrepreneurship. While reading chosen articles, 5 relevant non-Scopus sources were identified and added to the list for full-text analysis. In 36 articles the authors identified 58 themes. Upon the consideration of thematic codes each paper was labeled with one key idea. Besides, each paper was labeled as pertaining to two perspectives of project management vs entrepreneurship interaction: ‘PM in E’ – an idea is more about using project management concepts, methods, tools, techniques etc. in entrepreneurial context; ‘E in PM’ – an idea is about using entrepreneurship in project management.

Further, the key ideas from the papers were examined for their similarity and closeness of meaning, in order to develop broader categories that could show the general directions within the scientific discourse on project management and entrepreneurship interplay.

For instance, the key idea in [3] was formulated as ‘Entrepreneurship can be viewed as project-based activity, so that project management can be successfully used by entrepreneurs’. The key idea in [8] was ‘Entrepreneurial activities are plainly project-like processes’. These ideas were assessed as almost the same. Hence, these papers were coded with the key idea – ‘Entrepreneurship is project-based activity so it can successfully apply project management methods’. Both papers present the perspective of ‘PM in E’ – application of project management in entrepreneurship.

In [4] the key idea was identified as ‘Project management is used to organized corporate entrepreneurship’. Here we are dealing with slightly different context – not start-ups, but corporate entrepreneurship. Though the contexts are different, actually the idea is still the same.

The similar process of quantitative differentiation and integration of codes was performed for all reviewed papers.

3 Results

The results are summarized in Table 1 which identifies broad important themes, relevant scientific papers and frequencies for each theme. Comparison of frequencies in terms of perspectives reveals that the researchers most actively develop themes concerning

application of entrepreneurship to project management (24 papers). Whereas the themes dealing with project management implementation in entrepreneurship are relatively less attractive for scholars (10 papers). And two themes are elaborated in both perspectives.

The most frequently explored theme (9 papers) is about similarity of entrepreneurship to project management and usefulness of project management tools, techniques and methods to improve performance of entrepreneurial endeavors. The authors investigate the positive effect from project management to start-ups, venture creation, new market entry, corporate entrepreneurship.

Table 1. Broad themes in cross-disciplinary discourse on entrepreneurship and project management interactions.

Broad themes	Papers (examples)
Entrepreneurship can be viewed as project-based activity, so that different project management tools, techniques, methods can be successfully used by entrepreneurs	[3, 4, 7, 9]
Entrepreneurial project management includes processes of opportunity identification and evaluation	[10, 11]
Entrepreneurial projects and project in the context of high uncertainty successfully use agile methods	[12]
Project management systems, especially under high uncertainty, should adopt on entrepreneurial approached, tools, frameworks	[5, 7]
Project management should adopt entrepreneurship to foster innovativeness and creativity	[13]
Rigor of project management methods should be combined with flexibility of entrepreneurship to better deal with wider range of contexts	[2, 6, 14]
Entrepreneurial orientation has a positive effect on project management performance (with different moderating effects)	[15-17]
Effectuation is positively related to project management performance	[18]

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4 Discussion

The investigation of the papers prepared within the interdisciplinary research stream of entrepreneurship and project management shows that the interest of scholar to the cross-fertilization between two domains has been increasing. From 33 analyzed articles, 22 have been written in the last five years. The authors have been investigating both directions of this stream. However, the adoption of entrepreneurship in project management seem to attract notably more attention of academia. As the most important themes of current research we can distinguish the issues related to development of entrepreneurial attitudes and capabilities, such as entrepreneurial orientation and effectuation, by project managers,

adoption of entrepreneurial processes such as opportunity identification and evaluation in project management systems, implementation of entrepreneurial practices to foster innovation and creativity and to enhance flexibility and adaptability in dynamic economic contexts.

5 Conclusion

The findings indicate that in near future we can expect the increasing developments of entrepreneurial approaches in project management and numerous applications of project management techniques in entrepreneurial activities.

References

1. C. Fonrouge, C. Bredillet, C. Fouché, *IJMPB*, **12(1)**, 6-24 (2019).
<https://doi.org/10.1108/IJMPB-01-2018-0013>
2. A. Kuura, R.A. Blackburn, R.A. Lundin, *Scand. J. Manag.*, **30(2)**, 214-230 (2014).
<https://doi.org/10.1016/j.scaman.2013.10.002>
3. M. Lindgren, J. Packendorff, A project-based view of entrepreneurship: towards action-orientation, seriality and collectivity, in *New Movements in Entrepreneurship* (Edward Elgar Publishing; 2003). <https://doi.org/10.4337/9781781951200.00016>
4. L. Frederiksen, A. Davies, *Int. J. Project Manag.*, **26(5)**, 487-496 (2008).
<https://doi.org/10.1016/j.ijproman.2008.05.006>
5. W.B. Gartner, *IJMPB*, **12(1)**, 114-119 (2019).
<https://doi.org/10.1108/IJMPB-10-2018-0213>
6. W. Gedzun, The entrepreneurial project manager. Accessed on: March 07, 2022.
[Online]. Available:
https://www.projectmanagement.com/contentPages/article.cfm?ID=344389&thisPageURL=/articles/344389/The-Entrepreneurial-Project-Manager#_=_
7. A. Kuura, R.A. Lundin, *IJMPB*, **12(1)**, 25-47 (2019).
<https://doi.org/10.1108/IJMPB-12-2017-0165R>
8. H. Maylor, V. Turkulainen, *IJMPB*, **12(3)**, 565-577 (2019).
<https://doi.org/10.1108/IJMPB-09-2018-0202>
9. D. Reese, V. Rieger, A. Engelen, *Strat. Entrepr. J.*, **15(4)**, 568-589 (2020).
<https://doi.org/10.1002/sej.1356>
10. O. Belousova, B. Gailly, A. Basso, *A conceptual model of corporate entrepreneurial behaviour*, in Babson College Entrepreneurship Research Conference, Lausanne, Switzerland, 09-13, June (2010)
11. P. Di Muro, L. Lecoeuvre, R. Turner, *Int. J. Project Manag.*, **39(1)**, 45-58 (2021).
<https://doi.org/10.1016/j.ijproman.2020.09.006>
12. V.M.B. Garcia, C.D.P. Martens, R.B. Carvalho, M.L. Martens, *Innov. Manag. Rev.*, **18(1)**, 17-33 (2021). <https://doi.org/10.1108/INMR-01-2019-0002>
13. H.G. Gemünden, P. Lehner, A. Kock, *Int. J. Project Manag.*, **36(1)**, 147-160 (2018).
<https://doi.org/10.1016/j.ijproman.2017.07.009>
14. A.C. Belfort, C.D.P. Martens, H.M.R. Freitas, *J. Inf. Syst. Techn. Manag.*, **13(3)**, 405-422 (2016). <https://doi.org/10.4301/S1807-17752016000300003>
15. B. El Shal, M. Kadery, *J. Bus. Manag. Sci.*, **9(1)**, 36-49 (2021).
<https://doi.org/10.12691/jbms-9-1-5>

16. C.D.P. Martens, F.J. Machado, M.L. Martens, F.Q.P. Silva, H.M.R. Freitas, *Int. J. Project Manag.*, **36(2)**, 255-266 (2018). <https://doi.org/10.1016/j.ijproman.2017.10.005>
17. S. Sabahi, M.M. Parast, *Int. J. Prod. Econ.*, **226**, 107621 (2020). <https://doi.org/10.1016/j.ijpe.2020.107621>.
18. N.M. Nguyen, C.P. Killen, A. Kock, H.G. Gemünden, *Int. J. Project Manag.*, **36(8)**, 1054-1067 (2018). <https://doi.org/doi.org/10.1016/j.ijproman.2018.08.005>

Emergent decision-making in business-processes management

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Abstract. The object of the present article is new approaches to decision-making in management of social and economic systems. These new approaches have an aim to be more relevant to characteristics of modern economic life, such as volatility and high speed of metamorphosis. In the present exploration we expect to provide this relevance owing to three components. The first one is system economy: each manager's decision should take in account that economic system managed by him includes sub-systems of four types: environment, object, process and project. The second component is connection between decision of a manager and basic functions executed by him in an economic system: producing, administrating, entrepreneurship and integration. And the third component which connects the previous two is a phenomenological modeling. It is being used for a long period already in nature studying and technics for designing production circumstances of particular materials. And then, integrating such models forms a base for creating model which describes long-term laws of the relative materials' behavior. We offer to accept this experience to arena provided with management of economic systems. In the similar way, here phenomenological models are the base of managerial decisions for particular situations which are accompanied by lack of information, but demand decision in the shortest period.

Keywords: management of economic systems, managerial decision-making, phenomenological modeling

1 Introduction

Decision-making in management is characterized as rather specific field of activities. Because on one hand it develops for a long period, and by the present moment a solid base of definitions, models and instruments has been accumulated already in its theory. But on the other hand, modern circumstances of social and economic life establish some limits for using traditional methods of managerial decision-making. The root problem in this field is marked as following: there are no modeling instruments able to support urgent decision-making for nonstandard tasks, and now in practice it is based on unformulated mental processes only (such as intuition and heuristics).

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Traditionally, economical and managerial disciplines never had their own modeling apparatus, and they accepted this one from nature-studying disciplines. So, because of incapability of economics and management themselves to offer any points for growing knowledge provided with urgent decision-making for nonstandard tasks, we turned attention to nature-studying field. And it was found, that this field contents a type of models which are aimed just for creating quick decisions in situations with lack of knowledge about their mechanisms. These are phenomenological models which in studying natural and technical systems describe determinations between increments in a pair of indicators. It is important that in this pair one of the indicators characterizes internal influence, and the second one characterizes reaction of a modeled system on this influence. And in the same time phenomenological model has not an aim to describe this reaction's mechanism in details. For this reason, such type of models does not demand too much costs of time while being created, so urgent decisions are the field of their using [1]. On the first stage of the present exploring, we formulated primary hypothesis that it is necessary to transplant positive experience of nature-studying to management of the economic systems and use phenomenological models as a base of urgent decision-making for nonstandard tasks. And therefore, top aim of the exploration is concretized: creating the archetypical methodological basics for using phenomenological models in urgent decision-making for nonstandard tasks in management of the economic systems.

Concretization led to more exactly bordered field of searching provided with scientific compositions which's authors try to find the place of phenomenology in theory and practice of management in economic systems. This searching's conclusion is that in all compositions provided with problem of the exploration and published by the present moment their authors pay attention only to general phenomenological approach as an instrument of studying economical and managerial processes.

The first attempts to solve this problem were made in 1980s by the representatives of Siberian scientific school R. G. Khlebopros and A. N. Gorban. Since that time, they published a row of compositions, the latest among them are devoted to defining laws which determine the development of national economy under the circumstances of structural movements [2] and intellectual economy's establishment [3]. In later period the results of explorations were published which's authors pay attention to more particular aspects. These are results of two scientific collectives. The first one represents Crimean federal university, its results provided with using phenomenological approach in studying economic components of oil production [4]. Finance University explores the problems provided with phenomenology of analyzing financial stability in commercial companies [5].

Common feature of all described results is that they have qualitative expression only. And no one of these approaches contents any quantitative models based on phenomenological theory and acceptable for decision-making in management. So, in the present exploration we make attempt to cover this empty field and create basic elements of methodology provided with using phenomenological models for urgent decision-making in management.

2 Methods

The main part of the present exploration is model based on phenomenological theory of studying. Its top ideas we formulated in the beginning of cent. 20th by German thinker E. Husserl who established basic credo "Back to things as themselves"! It means that studying of a certain system should be constructed from facts (or phenomenon, speaking in terminology of Husserl) which take place in a system and are directly accepted by consciousness of a subject who studies it. And this studying subject should rely only on these facts and liberate his consciousness from all a priori established ideas about an object.

This is general way of receiving knowledge in the paradigm of phenomenological approach.

This knowledge creates the base for further movement to quantity phenomenological model. For this aim in total volume of accumulated phenomenon there should be chosen a part characterized by quantity indicators. Then these indicators are divided in two groups: the first one is provided with the experience of internal influence on a system, the second group is provided with reactions of a system on this influence. And quantitative description of dependence between the indicators of these two groups further is used to answer the question: how should a subject influence on a system in managerial processes?

3 Results

According to the principles described in the previous chapter, present exploration began with deep analyzing phenomenological characteristics of managerial decision-making as branch of human activity. Detailed results of this stage presented by authors in particular book [6]. Here we attract your attention only to general conclusion that there are three historically formatted branches in theory of decision-making, each one of them has its own view on the fundament of this activity. This fundament may include: algorithms of operations analyze [7]; behavioral factors [8, 9]; system approach [10].

But in spite of different opinions about factors which influence on decision-making, these three branches follow to singular idea that this process has first of all informational and cognitive gist. Each act of decision-making is always accompanied by creating new knowledge and information on a base of some initial quantity of them. Further it means increasing volume of knowledge and information in a whole system which unites a manager himself and resources managed by him. One of fundamental laws in development of all types of systems says that increasing of information's volume leads to increasing orderliness – law of information and orderliness [11]. Because of fundamental character of this process, it can be used in decision-making for cases which's specifics and laws are not clear or unknown at all. It means that a manager making decision in such cases should initially use the idea that this decision changes measure of order in managed system. Further it changes connections between internal elements of a system and between system as a whole and its internal surrounding. This idea gives start to methodological principles which make algorithm urgent decision-making for nonstandard tasks in management.

Decision-making starts with decomposing elements in economic mega-system. Here it is necessary to use basic instruments of systemizing facts accumulated by subject's thinking in each cognitive process. These are space and time. Using these two concepts in management of economic systems best of all presented in approach of G. B. Kleiner. According to him, differences in space and time limits give 4 types of sub-systems in each economic system. These types are environmental (unlimited both in space and time), object (limited in space and unlimited in time), process (unlimited in space and limited in time) and projective (limited both in space in time) [12]. Here we adapt this approach for being used in nonstandard tasks where decision-making manager has not enough knowledge about space and time limits of elements in an economic mega-system. We offer to overcome this difficulty using the initial idea of the present exploration that decision-making is an informational process first of all. And according to this idea the elements of an economic mega-system are divided in 4 sub-systems with different roles of information about them. Particularly, object sub-system includes elements information about which is not only used for the present decision, but also has already been used for the similar previous decisions. And this information influences on them directly according to the principle of short-distance action. The elements information about which is also used for many similar decisions but acts according to the principle of long distance are united in

environmental sub-system. So, this sub-system influences on decision indirectly through the object sub-system.

Besides there elements information about which influences directly on the present decision only – they form projective sub-system. And process sub-system influences on one decision only but indirectly through the projective sub-system.

Next initial idea of the present exploration is that managerial decision is an act which remakes the resource-exchange processes between the elements of an economic mega-system. And like the elements, these processes should also be divided in groups. This division is for being used in managerial tasks, that is why connections with managerial functions are taken in account here. The only conception of management where this factor is explored belongs to I. Adizes who marks 4 basic managerial functions. Function of producing (P) makes an economic system as total and its particular elements able to give each other resources initially in a short-term period. Function of administrating (A) makes them able to receive resources back from each other in the same period. Functions of entrepreneurship (E) and integration (I) provide the same abilities in long-term period [13, 14]. In the exploration we use classification of these 4 elementary resource-exchange acts and title them with letters according to connected managerial functions.

As a result, economic mega-system is presented as unity of 4 sub-systems where 4 kinds of resource-exchange processes take place. Totally, in a district moment mega-system is characterized by 16 resource-exchange indicators. Managerial decision is an act which changes all 4 resource-exchange processes and leads their indicators in 4 sub-systems to new meanings. On figure 1 there is a general scheme of this metamorphosis.

Connections on this figure are also formalized in four equations, each one of them is relevant to certain resource-exchange process.

$$\left\{ \begin{aligned} \frac{\Delta P(i)_{\delta}^{ad} + d_P(d_A, d_E, d_I)}{\Delta P_{\alpha}^{ad}} + \frac{\Delta P(i)_{\gamma}^{ad} + d_P(d_A, d_E, d_I)}{\Delta P_{\beta}^{ad}} &= \frac{\sum_{k=2}^n \left(\frac{\Delta P_{\delta}^{bdk}}{\Delta P_{\alpha}^{bdk}} + \frac{\Delta P_{\gamma}^{bdk}}{\Delta P_{\beta}^{bdk}} \right)}{n-1} \\ \frac{\Delta A(i)_{\delta}^{ad} + d_A(d_P, d_E, d_I)}{\Delta A_{\alpha}^{ad}} + \frac{\Delta A(i)_{\gamma}^{ad} + d_A(d_P, d_E, d_I)}{\Delta A_{\beta}^{ad}} &= \frac{\sum_{k=2}^n \left(\frac{\Delta A_{\delta}^{bdk}}{\Delta A_{\alpha}^{bdk}} + \frac{\Delta A_{\gamma}^{bdk}}{\Delta A_{\beta}^{bdk}} \right)}{n-1} \\ \frac{\Delta E(i)_{\delta}^{ad} + d_E(d_P, d_A, d_I)}{\Delta E_{\alpha}^{ad}} + \frac{\Delta E(i)_{\gamma}^{ad} + d_E(d_P, d_A, d_I)}{\Delta E_{\beta}^{ad}} &= \frac{\sum_{k=2}^n \left(\frac{\Delta E_{\delta}^{bdk}}{\Delta E_{\alpha}^{bdk}} + \frac{\Delta E_{\gamma}^{bdk}}{\Delta E_{\beta}^{bdk}} \right)}{n-1} \\ \frac{\Delta I(i)_{\delta}^{ad} + d_I(d_P, d_A, d_E)}{\Delta I_{\alpha}^{ad}} + \frac{\Delta I(i)_{\gamma}^{ad} + d_I(d_P, d_A, d_E)}{\Delta I_{\beta}^{ad}} &= \frac{\sum_{k=2}^n \left(\frac{\Delta I_{\delta}^{bdk}}{\Delta I_{\alpha}^{bdk}} + \frac{\Delta I_{\gamma}^{bdk}}{\Delta I_{\beta}^{bdk}} \right)}{n-1} \end{aligned} \right.$$

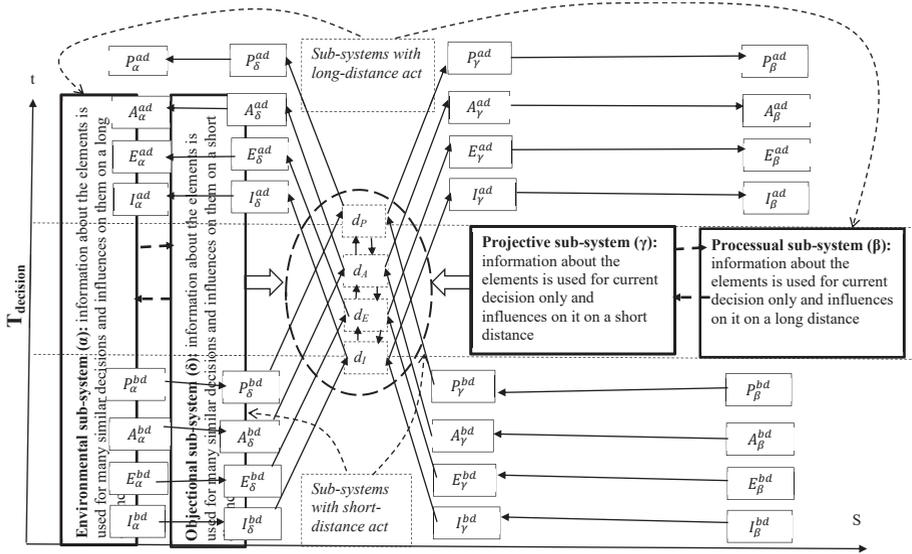


Fig. 1. General scheme of decomposing economic mega-system in extra decision-making for emergency tasks.

Although these mathematical constructions seem to be too abstract, in fact they reflect processes that practically take place in urgent decision-making for nonstandard tasks. In such situations gist of a manager’s activity is integrating two kinds of information: the first one has already been used for the previous similar decisions, the second one is individual just for the present decision. Their integration finally leads a manager to decision. But in present practice it is unformulated intuitive process. Here we offer to systemize it using phenomenological model of interaction between pairs of sub-systems “environment – object” (old information) and “process – project” (new information) with managerial decision as a final result.

The offered methodological principles have already been approbated for practical tasks provided with management of creating and using innovational technologies of oil refining [15].

4 Discussion

The main problem provided with this new methodology is its harmonization with classic theory of decision-making which insists on choosing the best alternative for a managed system. However, conditions of modern economic life in many cases do not give practicing managers a possibility to use classic algorithms of decision-making. The reasons for it are increasing volatility and lack of knowledge about many new situations in work. So, phenomenological modeling covers need in methodological instruments for managerial activities in such situations. Besides, offered methodology does not deny classic algorithms of decision-making. It is aimed to strengthen them while phenomenological models become a base for models which describe long-term laws of the economic systems’ development and form a base for the long-term decisions.

5 Conclusion

Present exploration reached its aim because there were created basic methodological principles for algorithms in the processes of urgent decision-making for nonstandard tasks. And these principles are based on phenomenological modeling which's methods are adapted to features of the economic systems as the objects of management. Offered principles are successfully approbated in practical cases.

The following activities are accepted for further development of these new methodological principles:

- Increasing number of practical managerial arenas with successful experience of using phenomenological models for urgent decisions;
- Creating special program products for computerized using of these models;
- Creating methodology of using phenomenological models as a base of models which describe long-term laws of the economic systems' development for strategic decision-making in them.

References

1. A.I. Priven, A.T. Kynin, *Int. J. Syst. Innov.*, **2**, 9-23 (2012)
2. L.S. Maergoiz, R.G. Khlebopros, *J. Sib. Fed. Univ. Human. Soc. Sci.*, **8**, 1739-1745 (2016)
3. I.Y. Tyukin, A.N. Gorban, K.I. Sofeykov, I.N. Romanenko, *Front. Neurorobot.* **12**, 49 (2018). <https://doi.org/10.3389/fnbot.2018.00049>
4. V.K. Semenychev, E.I. Kurkin, A.A. Danilova, E.V. Semenychev, *Energy*, **130**, 448-460 (2017). <https://doi.org/10.1016/j.energy.2017.04.098>
5. M.B. Ianenko, L.A. Badalov, Y.A. Rovensky, G.A. Bunich, E.B. Gerasimova, *Espacios*, **39** (2018)
6. M.F. Gumerov, *Econ. Manag.: Probl., Sol.*, **5**, 38-43 (2018)
7. I.N. Drogobetsky, *Sistemnaya kibernetizatsiya organizatsionnogo upravleniya* [System cybernatization of organizational management] (University Book, Moscow, 2018)
8. D. Kahneman, A. Tversky, *Choices, Val., Frames*, **2**, 437-488 (2019). <https://doi.org/10.1017/CBO9780511803475.027>
9. R.H. Thaler, *Choices, Val., Frames*, **6**, 269-287 (2019). <https://doi.org/10.1017/CBO9780511803475.016>
10. J. Kornai, *Rev. d'Etudes Compar. Est-Ouest.*, **48(1-2)**, 239-296 (2017). <https://doi.org/10.4074/S0338059917001097>
11. N. Viner, *Cybernetics: or control and communications in the animal and the machine* (Hermann & Cie, Paris, 1948)
12. G.B. Kleiner, V.A. Karpinskaya, *Lect. Notes Netw. Syst.*, **110**, 3-14 (2020). https://doi.org/10.1007/978-3-030-45913-0_1
13. I. Adizes, *The Pursuit of Prime* (Santa Monica, Santa Monica, 1996)
14. I. Adizes, *Amfiteatru Econ.*, **19(44)**, 232-248 (2017)
15. M.F. Gumerov, *Metodologiya prinyatiya dopolnitel'nykh reshenii v promyshlennosti na osnove fenomenologicheskikh modelei* [Methodology of extra decision-making in industry on the base of phenomenological models] (Central Economic Mathematical Institute, Moscow, 2020)

Coronacrisis and digital transformation of the economy: challenges for crisis management of companies (institutional aspect)

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Abstract. The article analyzes the impact of digital transformation processes on the development of the scientific theory of crisis management of companies based on the theories of technological revolutions and institutional economics. These processes have been significantly intensified by the current crisis in the economy caused by the coronavirus pandemic: on the one hand, the digital transformation of the economy required changes in socio-economic institutions, on the other hand, many companies faced the threat of bankruptcy due to the forced nature of this crisis. Using statistical and logical methods, the analysis of institutional conditions affecting the development of crisis management of companies and its adaptation to new technological conditions was carried out. The necessity of changing the “protective” shell of the theory of crisis management under the influence of the digital technological revolution is proved. The main challenges and directions of the transformation of crisis management in the digital economy and the new global economic crisis due to the coronavirus pandemic are identified. It is established that the digital transformation of companies of the pre-digital era has an crisis character.

Keywords: digital economy, crisis management, pandemic COVID-19, digital transformation, bankruptcy

1 Introduction

The ongoing processes in the economy caused by the coronavirus pandemic and digital transformation significantly affect the development of crisis management of companies as a separate scientific direction. This change is due to ongoing institutional transformations and adaptations. According to the theory of technological revolutions Perez K. [1] any such revolution requires a change of the technical and economic paradigm in society, which is expressed in the formation of new institutions and the adaptation of existing ones under technological changes in the external environment. The purpose of the study is to prove the impact of the digital revolution on changing the paradigm of crisis management of companies. Hypothesis: digitalization of the economy requires reconfiguring the protective shell of the scientific theory of crisis management by transforming it.

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The issues of the essence of the digital economy [2], its impact on society [3, 4] have already been sufficiently investigated. There are also scientific works explaining the nature of the digital economy through existing scientific economic theories, including the new institutionalism [6]. The theory of crisis management of companies has also received a wide research coverage [7-10]. However today there have been isolated studies on the impact of the digitalization of the economy on the transformation of the theory of crisis management [11, 12]. Foreign research mainly concerns the use of digital technologies in the crisis management system [13]. At the same time the practice of crisis management of companies in the context of the digital technological revolution requires a rethinking of crisis tools.

2 Methods

Statistical methods, logical methods (deduction, induction), synthesis, analysis were used to obtain scientific results of the study. The theory of technological revolutions is used as the methodological basis of the research.

3 Results

In the course of the study the following scientific results were obtained, which reflect the challenges for crisis management:

1) The massive suspension of the bankruptcy institution in many countries of the world during the coronavirus pandemic and the achievement of excessive debt burden of the corporate sector will lead in the near future to a boom in company bankruptcies and the necessity to develop tools for preventive debt restructuring;

2) The crisis in the economy caused by the coronavirus pandemic has accelerated the processes of digitalization of business, as a result of which the digital transformation of companies has acquired the character of crisis tools;

3) The digital transformation of the economy leads to the need to adapt institutions formed in the pre-digital era to new technological conditions, therefore, accelerated digitalization processes require changing the “protective shell” of the theory of crisis management, while the scientific “core” of the theory remains;

4) The factors of the crisis development of companies in the digital economy are becoming institutional in nature, consisting in lagging the speed of adaptation of institutions created in previous technological revolutions to new technological conditions. A significant role in overcoming such a crisis will be played by the state, which forms the main institutional environment for business in the new digital environment.

4 Discussion

Today the world economy is faced with two processes, the effects of which have overlapped and led to serious institutional changes in society. The first process is the digital transformation of the economy – the next cycle of a new digital technological revolution, the second process is the crisis in the economy, the factor of which was the coronacrisis pandemic. One of the key results of the overlapping of the consequences of these processes were the challenges for crisis management. On the one hand, the forced suspension of the traditional purely crisis instruments – bankruptcy procedures – will require the “adjustment” of crisis instruments related to debt restructuring in order to avoid mass bankruptcies after the resumption of the bankruptcy institution. On the other hand, new

technological conditions themselves act both as crisis factors for industrial companies of the pre-digital era and as opportunities to overcome the global economic crisis.

The present global economic crisis differs from all previous ones in that for the first time in the history of the institution of bankruptcy, the states of some countries of the world forcibly suspended the operation of this institution [14]. Any recession as one of the stages of the economic cycle is always accompanied by mass bankruptcies of companies, since this is a mechanism of self-regulation of the market: according to research by the International Monetary Fund, any previous recession was accompanied by a quarterly increase in the dynamics of company bankruptcies within two years from the beginning of the recession [15]. The forced suspension of the bankruptcy institute in 2020 will lead to mass bankruptcies in subsequent years, since the problems of accumulated debts have not been resolved. Today, the bankruptcy rate is projected to increase by 15% in 2022 [16]. In fact the suspension of bankruptcy proceedings delayed the problem of resolving overdue debts, the consequences of which can be unpredictable. At the same time a serious factor in mass bankruptcies of companies is the high level of debt of the corporate sector of the economy (according to estimates, global corporate debt accounts for over 95% of global GDP) [17]. All this indicates the need to improve crisis instruments for restructuring company debts, including preventive restructuring in the absence of signs of bankruptcy.

A comparison of the growth rates of the economy as a whole (- 4.3% by the end of 2020 [18]) with the growth rates of digital sectors (+ 25% of the e-commerce market by the end of 2020 [17]) of the economy suggests that digitalization is a key tool for overcoming the crisis in the current conditions. The peculiarity of the current crisis in the economy is the strengthening of the institutional factors of the crisis by the negative consequences of the coronavirus pandemic. Many of the largest industrial companies, the time of creation and the heyday of their economic power fell on the previous industrial technological revolution (General Electric, Ford, Nike), faced crisis factors long before the coronacrisis, which were caused by the inconsistency of their business model with the new institutional technological conditions. The economic crisis that hit the whole world due to the coronavirus pandemic only worsened the financial situation of these companies, but at the same time showed that digital transformation is a key tool for overcoming the crisis situation, which is now being actively mastered by all companies. However, according to research by Tony Saldanha [19], more than 80% of cases of digital transformation are unsuccessful, which indicates the need to improve the methodology of such transformation.

The results of the study show that the digitalization of the economy requires, among other things, the transformation of crisis management of companies for the following reasons: 1) the emergence of new economic entities – digital companies – in respect of which the crisis tools formed in the pre-digital era do not take into account the specifics of such companies (the intangible nature of assets, the platform business model, network effects); 2) it is necessary to form new crisis tools for companies of the pre-digital era in order to bring their business models into line with new institutional technological conditions; 3) the nature of the crisis factors is changing – they become technological and institutional in nature (studies show that at the beginning of the technological revolution, the crisis factors of economic entities always have an institutional nature, since they are primarily due to the change and adaptation of existing institutions and the need to form new institutions) (Figure 1).

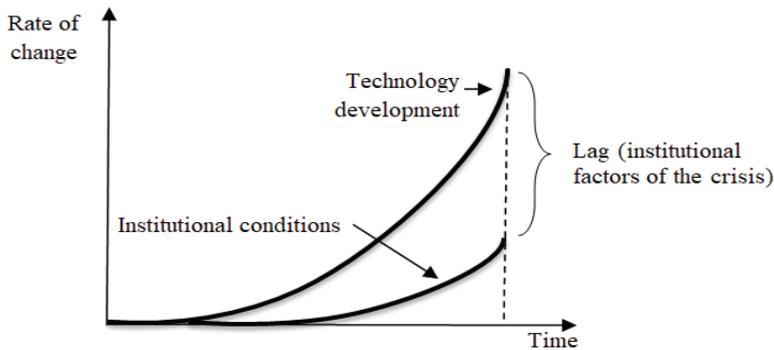


Fig. 1. Institutional factors of the crisis of companies in the context of technological revolutions.

Source: compiled by the author based on [20].

Platform business models based on network effects have a different economic nature of the crisis factors, since many open economic laws in the industrial era cease to work in the digital economy (for example, economies of scale, value chain) [11]. The changes that are taking place primarily concern the “protective shell” of the theory of crisis management, the “core” itself remains unchanged. The transformation of crisis tools should provide for the formation of a new, focused on the specifics of digital companies (including the restructuring of assets and capital, diagnostics of the identification of crisis factors), as well as the adaptation of existing tools created for industrial companies of the pre-digital era to new digital conditions (for example, digital transformation of the company as a traditional restructuring tool [21]).

The study also found that the institution of bankruptcy as a key tool of crisis management is evolving under the influence of technological revolutions. An analysis of the history of the development of the institute of bankruptcy showed that each technological revolution led to a radical revision of the main elements of this institution [12]. In particular, one of the key turning points in the development of the institution of bankruptcy is its orientation towards recovery (rescue business), rather than liquidation of companies.

5 Conclusion

The conducted research has shown the need to transform the crisis management of companies as a science, despite the relatively young age of this science. The reasons for this transformation are caused primarily by institutional factors due to the rapid development of the digital economy, and secondly by the factors of the global crisis caused by the coronacrisis pandemic. The results of the study determine the directions of further development of the theory of crisis management, which are primarily associated with the formation of new crisis tools. In addition, the evolution of the institution of bankruptcy under the influence of technological revolutions is investigated.

References

1. C. Perez, *Camb. J. Econ.*, **34(1)**, 185-202 (2010). <https://doi.org/10.1093/cje/bep051>
2. N. Negroponte, *Being digital* (Hodder and Stoughton, London, 1995)
3. L.D. Williams, *Int. J. Intel. Netw.*, **2**, 122-129 (2021). <https://doi.org/10.1016/j.ijin.2021.09.002>

4. D. Tapscott, *Grown Up Digital: How the Net Generation is Changing Your World* Growing up in the digital world (McGraw Hill, 2009)
5. A.A. Auzan, *Moscow Univ. Econ. Bul.*, **6**, 12-19 (2019).
<https://doi.org/10.38050/01300105201963>
6. C. Löbbecke, A. Picot, *J. Strateg. Inf. Syst.*, **24**, 149-157 (2015).
<https://doi.org/10.1016/j.jsis.2015.08.002>
7. B.A. Turner, *Admin. Sci. Quart.*, **21(3)**, 378-397 (1976).
<https://doi.org/10.2307/2391850>
8. S. Gotteiner, M. Mas-Machuka, F. Marimon, *Europ. Acc. Manag. Rev.*, **2(5)**, 12-37 (2019)
9. S.E. Kovan, *Teoriya antikrizisnogo upravleniya sotsialno-ekonomicheskimi sistemami (resursnyi podkhod)* [Theory of crisis management of socio-economic systems (resource approach) (INFRA-M, Moscow, 2016)
10. *Antikrizisnoe upravlenie kak osnova formirovaniya mekhanizma ustoichivogo razvitiya biznesa* [Crisis management as the basis for the formation of a mechanism for sustainable business development], A.N. Ryakhovskaya, S.E. Kovan (eds.) (INFRA-M, Moscow, 2021). <https://doi.org/10.12737/13445>
11. E.P. Kochetkov, *Strat. Decis. Risk Manag.*, **10(4)**, 330-341 (2019).
<https://doi.org/10.17747/2618-947X-2019-4-330-341>
12. E.P. Kochetkov, *Transformatsiya antikrizisnogo upravleniya v tsifrovoi ekonomike: obespechenie finansovoi i ekonomicheskoi stabilnosti vysokotekhnologichnogo biznesa* [Transformation of crisis management in the digital economy: ensuring financial and economic stability of high-tech business] (Prospect, Moscow, 2020).
<https://doi.org/10.31085/9785392299478-2020-328>
13. M. Gkeredakis, H. Lifshitz-Assaf, M. Barrett, *Inf. Org.*, **31(1)** (2021).
<https://doi.org/10.1016/j.infoandorg.2021.100344>
14. *Mirovye trendy zakonodatelstva o bankrotstve i korporativnom upravlenii vo vremya pandemii koronavirusnoi infektsii COVID-19* [Global trends in bankruptcy law and corporate governance during the COVID-19 coronavirus pandemic] (2020). Accessed on: March 07, 2022. [Online]. Available:
https://www.nifi.ru/images/FILES/COVID-19/worldtrends_02072020.pdf
15. *Policy Support and Vaccines Expected to Lift Activity* (2021). Accessed on: March 07, 2022. [Online]. Available:
<https://www.imf.org/en/Publications/WEO/Issues/2021/01/26/2021-world-economic-outlook-update>
16. M. Lemerle, A. Donnay, A. Saint, *Insolvency: We will be back* (Allianz Research, 2021)
17. *Information and analytical system Statista*. Accessed on: March 07, 2022. [Online]. Available: <https://www.statista.com>
18. *World Bank Group response to COVID-19 (coronavirus) Pandemic*. Accessed on: March 07, 2022. [Online]. Available:
<https://www.worldbank.org/en/who-we-are/news/coronavirus-covid19>
19. N. Radziwill, *Qual. Manag. J.*, **27(4)**, 242 (2020).
<https://doi.org/10.1080/10686967.2020.1812988>
20. G.E. Marchant, B.R. Allenby, J.R. Herkert, *The growing gap between emerging technologies and legal oversight: The pacing problem* (Springer, Dordrecht, 2011). <https://doi.org/10.1007/978-94-007-1356-7>

21. E.P. Kochetkov, A.A. Zabavina, M.G. Gafarov, *Strat. Decis. Risk Manag.*, **12(1)**, 68-81 (2021). <https://doi.org/10.17747/2618-947X-2021-1-68-81>

Why does Sber need a corporate university?

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Abstract. Why does an employer, when hiring a graduate of an educational institution, advise: “Forget everything you were taught at the university”? Is it possible to organize the process of training specialists, close to the immediate needs of business? In this paper, the experience of the Sberbank Corporate University (CU) training system is investigated. The main differences between the goal-setting and the content of the educational process of Sberbank CU and universities of the Ministry of Education and Science are determined. Based on a comparative analysis of education systems, recommendations are made to reduce the gap between the requirements for the competence of specialists from the side of business and the higher education system of the Russian Federation. Sberbank, tracking trends in management, notes that during the peak of attention to automation information technologies, management efforts were directed to assessing the quality of the final result of the management process. The next stage of the analyzed period is characterized by a shift of attention to the quality of processes. And recent trends show the concentration of organizational and methodological resources primarily on the quality of competence of participants in management processes. In this trend, there has recently been a need to shift attention from technical and contextual competencies (IQ) to behavioral (EQ). Sber CU in educational processes strives to activate the creative, creative potential of students with a shift of special attention to the development of management skills and emotional intelligence.

Keywords: competence gap, transformation of the educational process

1 Introduction

German Gref, the President of Sberbank has repeatedly stressed the discrepancy between the competence of university graduates and the requirements for the competence of business workers [1-3]. So, in particular, regarding the problem of education in general, he notes: “What are we suffering from? This is an overflow of knowledge and a lack of learning skills. We, as an employer, first of all want to get people with skills, because knowledge, the vastness of this knowledge is secondary today” [1]. The higher education system of the Russian Federation still cannot close the gap between the competence of graduates and the requirements for their competence on the part of business.

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2 Materials and methods

The author of the work based on a comparative analysis of his teaching experience at Sberbank and in the higher education system of the Russian Federation, as well as studying materials on this topic available in the public domain, determines the main differences between the educational processes of the corporate training center and universities. Based on this analysis, recommendations are made to change the goal setting and content of the educational process in universities.

According to the management of Sberbank, the situation in the system of training specialists in the banking business can be corrected by the development and organization of an educational process based on the principles of maximum satisfaction of the requirements for the competence of employees from the side of business processes today and tomorrow. For this purpose, the Sberbank Corporate University was created. In addition to the external “front office” need to create a Corporate University [2, 3]; the Sber obviously has deeper, not only externally utilitarian marketing reasons. Let us try to understand the true professional reasons for the creation of Sberbank Corporate University by analyzing the information available in the public domain and analyzing the existing trends of education systems in the digital society.

The existing education system in Europe [4] is not able even after a master’s degree to provide a professionally trained manager of large projects to business, let alone a bachelor’s degree [5]. At the 22nd World Congress of the International Association for Project Management in 2008, an urgent question was raised “How much time is needed to form a project manager”? As a result of the discussion, the world gurus came to the conclusion that the typical age at which a professional project manager is formed is about 37 years [6]. A typical life cycle of such a specialist is shown in Figure 1 [6]. This highlights the inefficiency of training professionals in project management by the education system not only in Russia, but also around the world [7, 8]. Around the same year 2008, research in the Russian segment of business education noted: “Employers complain that the knowledge of graduates coming to them, even the best Moscow universities, does not meet the requirements of the market, and are forced to create their own corporate universities. According to various sources, business today spends 500 billion rubles on retraining yesterday’s graduates – twice as much as all federal budget expenditures on higher education” [9].

3 Results and discussion

The Corporate University of Sber forms the learning process, focusing as much as possible on the activation of the creative potential of students. The main motto of the university is LTL – “Leaders teach leaders” [10]. The process of education is ineffective when the teacher positions himself as more experienced, intelligent, standing higher in the table of ranks of the guru than the students. The Corporate University emphasizes that there is no table of ranks in the learning process – this is teamwork, where everyone is equal. At the end of the education process, we should receive graduates who are more “advanced”, more creative, and more productive than the teacher. Hence the motto of the education system at the Corporate University of Sberbank: “The leader teaches the leader”. And this new leader will be more “advanced” than his mentor. In this setting, the Sber once again emphasizes that today the development of skills for organizing interaction in a team, the formation of emotional intelligence emotion quotient (EQ), is much more important than the formation

of IQ – the formation of a volume of knowledge. In the current education system, the situation is still the opposite.

Modern information technologies and means of communication allow you to quickly analyze and apply the achievements of leaders. The easy availability of information leads to the fact that many enterprises simply copy the achievements of others in order to increase competitiveness. At best, the company tries to adapt the copied process or methodology to its own conditions. However, what works well in some conditions may not necessarily be effective in others. The desire to be in the trend of global methodological transformations without the use of in-depth analysis and elimination of inaccuracies in the application of “best practices” can cause significant harm to business. On the other hand, globalization puts forward new, more complex requirements for project management methodologies as a tool for forming the competitiveness of organizations. But if we apply the best world achievements, taking into account national characteristics, traditions, taking into account the prevailing cultural values in the collectives, avoiding sharp revolutionary leaps, national and corporate business methods can be significantly enriched, and the quality and productivity of business processes will increase. As in any discipline, there is a gap in management between abstracted accumulated knowledge, theory and practice. Recently, the practice of project management shows that the level of theoretical generalizations, research, and development of new techniques does not meet the needs of practitioners. And here you cannot do without innovations in management.

When forming project management systems within enterprises, an important starting point is the creation of a common understanding of the mission and the collective acceptance of the vision of the development of the enterprise. This is the beginning of the management of the values of the enterprise from the standpoint of management.

Systematic management of values and skills is very important for the Sber, because it maximizes business efficiency and profit for all stakeholders. Values-based management is a style of management that uses value indicators. Almost all enterprises have an understanding of value management.

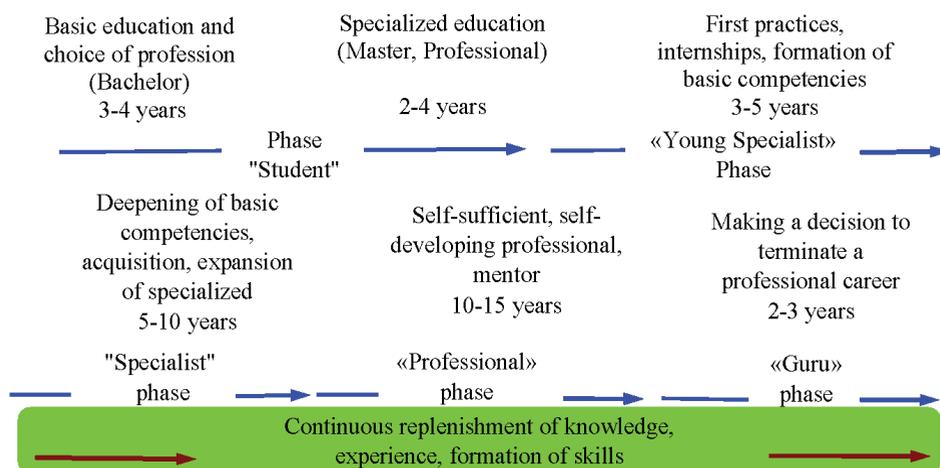


Fig. 1. IT-Specialist Lifecycle in Today’s Business.

In modern operating conditions, fast processing of big data and high reaction speed are required. A person with great difficulties copes with such a cognitive load, yielding to artificial intelligence (AI). On the other hand, the digital environment quickly leads

employees to a drop in productivity of creative work, to emotional burnout. Information technologies, the digitalization of life, reduce creativity, and, above all, the ability to heuristics (the creation of increments of fundamentally new knowledge). The flows of big data, the rapid change in the forms and composition of information, its heterogeneity, irrelevance (noise, unnecessary visual, sound, tactical), fundamentally affect a person's creative abilities. In extreme conditions, the adoption of a quick and effective decision in management activities is carried out by the head most intuitively, or in a state of altered state of consciousness (ASC), a person's thinking changes in such situations [11, 12]. In this state, all accumulated experience is usually involved in decision-making at an unconscious level, natural human predispositions (information transmitted at the genetic level) are used to the maximum [13-16], barriers of "error correction" are removed [17], professional intuition is maximally manifested. As a rule, highly professional, experienced managers, making a quick responsible decision, explain the reasoning of such a decision with intuition and sensual arguments. Unfortunately, the current state of even a "strong" AI does not have such unique resources of the human mind [18, 19].

In the conditions of creating new, unique products/services, when solving non-standard tasks that have never been solved by anyone before is required, it is almost impossible to completely replace a person with artificial intelligence. No matter how huge databases, encyclopedias, libraries, AI has, no matter what performance and processing speed AI has, it is unlikely to be able to come to fundamentally new heuristic discoveries and knowledge. Even the use of the latest AI developments based on effective hybrid technologies of "semiotic" and "bionic" approaches do not allow artificial intelligence to fundamentally approach a person in terms of emotional intelligence. As for the prospects of replacing people with artificial intelligence in the field of IQ, they are very positive. In the near future, and can successfully compete with a person in terms of IQ, but will not be able to compare with a person in terms of EQ.

4 Conclusion

In a digital society, in the conditions of replacing a person in routine, repetitive work with robots, knowledge as a resource is increasingly becoming in demand by artificial intelligence, and a person using intelligent tools can get the necessary information instantly, to a greater extent than the education system gave him at the time. Thus, as for IQ (the ability to quickly collect, sort and analyze in the right volume and direction), AI can eventually displace a person in this regard. However, in the foreseeable future, no AI, even with human-like logical operations, is able to compete with humans in the field of emotional intelligence EQ.

From the analysis of the educational process of Sberbank Corporate University, a fundamental recommendation follows for the system of training specialists in universities: it is necessary to change the purpose of training from the formation of the amount of knowledge – the IQ of students to the formation of emotional intelligence EQ; from the training of graduates with the same type of "output" characteristics to the identification of naturally inherent talents and their development for the needs of society and business.

References

1. G. Gref, Rossiiskie vuzy dolzhny obuchat navykam XXI veka [Russian universities should teach the skills of the XXI century] (2016). Accessed on: March 09, 2022. [Online]. Available: <https://ria.ru/20161207/1483041883.html>
2. M. Polyakova, E. Myazina, Zachem Sberbanku sobstvennyi universitet stoimostyu bolshe 10 mlrd rub. [Why does Sberbank need its own university worth more than 10 billion rubles] (2015). Accessed on: March 09, 2022. [Online]. Available: <https://www.rbc.ru/business/27/04/2015/552c5db89a7947afb2f0f06a>
3. Gref raskritikoval rossiiskoe vysshee obrazovanie [Gref G. criticized Russian higher education] (2020). Accessed on: March 09, 2022. [Online]. Available: <https://www.ntv.ru/novosti/2301243/>
4. The Zone of European Higher Education. Joint statement of the European Ministers of Education (1999). Accessed on: March 09, 2022. [Online]. Available: http://www.bologna.ntf.ru/DswMedia/bolognadeclaration1999_rus.pdf
5. V.I. Marshev, Issues of Historical and Managerial Research, in History of Management Thought. Contributions to Management Science, 1-73 (Springer; 2021). https://doi.org/10.1007/978-3-030-62337-1_1
6. E.Yu. Klimenko, S.I. Neizvestny, Proj. Prog. Manag., **3**, 212-220 (2016)
7. S. Bushuev, D. Bushuev, S. Neizvestny, Sci. J. Astana IT Univ., **2(2)**, 86-101 (2020). <https://doi.org/10.37943/AITU.2020.22.12.008>
8. S.I. Neizvestny, I.R. Chekanov, Contemp. Prob. Soc. Work, **5(1(17))**, 52-58 (2019). <https://doi.org/10.17922/2412-5466-2019-5-1-52-58>
9. S. Guriev, The New Times **22**, 5-6 (2008)
10. Slovar terminov po korporativnomu obucheniyu. Lidery uchat liderov [Dictionary of terms on corporate training. Leaders teach Leaders]. Accessed on: March 09, 2022. [Online]. Available: <https://sberuniversity.ru/edutech-club/glossary/927>
11. E.V. Vasilyeva, Managment **8(3)**, 53-61 (2020). <https://doi.org/10.26425/2309-3633-2020-8-3-53-61>
12. V. Warriier et al., Mol. Psych., **6**, 1-8 (2017). <https://doi.org/10.1038/MP.2017.122>
13. R. Plomin, I.J. Deary, Mol. Psych., **20(1)**, 98-108 (2015). <https://doi.org/10.1038/mp.2014.105>
14. K. Mitchell, Epigenetics: what impact does it have on our psychology? The conversation (2019). Accessed on: March 09, 2022. [Online]. Available: <https://theconversation.com/epigenetics-what-impact-does-it-have-on-our-psychology-109516>
15. M. Mangino, M. Roederer, M. Beddall et al., Nat. Commun **8**, 13850 (2017). <https://doi.org/10.1038/ncomms13850>
16. A. Agostini, C. Torras, F. Wörgötter, Artif. Intel., **247**, 187-212 (2017). <https://doi.org/10.1016/j.artint.2015.04.004>
17. P.C. Hew, Ethics Inf. Techn., **16(3)**, 197-206 (2014)
18. I. Kavathatzopoulos, R. Asai, *Can Machines Make Ethical Decisions?* in International Conference on Artificial Intelligence Applications and Innovations AIAI, 693-699 (2013)
19. F. Alaiერი, A. Vellino, Ethical Decision Making, in A. Agah, J.J.Cabibihan, A. Howard, M. Salichs, H. He (eds.), Robots: Autonomy, Trust and Responsibility, 159–168, ICSR 2016, LNAI **9979** (2016). https://doi.org/10.1007/978-3-319-47437-3_16

Vertically integrated enterprises management – peculiarities of organizational-economic tools usage

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Abstract. The article discusses and summarizes the issues of sustainable functioning of vertically integrated industrial enterprises in modern conditions. Current business units are forced to operate under conditions of uncertainty and often in a dynamically changing competitive environment, which is due to global changes in the international community as a whole, technological progress, digitalization and innovation. A company's success is determined by its flexibility in interacting with other companies at certain stages from creation to promotion of a product or service to the end consumer, in other words, by the effectiveness of organizational and economic management tools usage. The authors have identified the main factors that determine the performance and efficiency of domestic industrial enterprises in modern conditions. These are the indicators of Russia's leading vertically integrated companies, but each of them has a heterogeneous nature within itself and combines structural units of different types, it should be assumed that for each of them has its own the most important factors. Thus, based on the adaptation of insights from systems economics and systems management theory to the field of industrial production, a model of using organizational and economic management tools for vertically integrated industrial enterprises is proposed for discussion. The main factors determining the effectiveness and efficiency of Russian industrial companies are structured.

Keywords: groups of enterprises, model, spatial and temporal limitlessness, efficiency

1 Introduction

Vertically integrated companies are successfully operating in all areas of activity, including in basic branches of commercial operation in Russia nowadays. The high performance of these companies is because they unite structural units that implement the sequentially arranged stages of the business cycle (raw materials extraction – manufacture of a product of varying percentage completed – logistics and sales) [1]. This is their difference from

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diversified companies, which constituent units produce goods and services associated with only one stage of the business cycle [2].

Integration can be realized in two ways. In the first case, the leading industrial enterprises themselves are integrators that have in their structure production facilities different percentage of completion and logistics units. For example, three of Russian TOP (leading Russian) chemical companies – Uralkaliy, Evrokhim and Akron [3] – do their business this way in manufacturing chemical fertilizers. In the second case, large and successful industries cooperate with enterprises of other stages of the business cycle inside of the major structure. According to this principle, the largest Russian petrochemical enterprises – SIBUR and Bashkir Gazprom Neftekhim Salavat, whose business is integrated with Gazprom as the largest supplier of hydrocarbons, as well as Tatarstan petrochemical enterprises integrated as part of the republic holding TAIF with enterprises for primary oil refining and trade and logistics companies. The executive performance of each integrated structure reflects the characteristics of its business and may have various modifications [4].

2 Methods

Consolidation of the experience of setup vertically integrated companies in Russian industrial production allows us to distinguish three large groups of units that there are always in their structure:

- units with established production that create products which has been associated with the company's business for a long time (over 3 years); all business processes in these structural units are streamlined and well-regulated, and their manufactures have already had their own and very significant market niche [5];
- units with new mastered production are concerned with the manufacturing of products the company has been dealing with in the recent (less than 3 years); these plants are launched by vertically integrated companies to optimize using of either raw materials used by units with established production or by products which result from companies' activities [6];
- logistic and retail units are engaged in the promotion of products which are being manufactured by both previous groups of units.

The listed groups of units and their role in a comprehensive vertically integrated structure can be estimated from the perspective of dividing economic systems by spatiotemporal limitations [7]. To be exact, units with established production wield features of object type systems. Each of that kind of production unit is localized in a strictly defined region, and the time of its operating one may see as unlimited, whereas this production is running in a definite period of time that can be considered as a long-term and has already been established [8].

Units with new mastered production are design-type systems, which follows from their very definition [9]. These structural units, as well as those that have established production facilities, are aimed at the comprehensive expansion of the range of presence of their products on the market – i.e., should work with high performance. But at the same time, units of this group should also work to ensure the stability of their functioning over time. This work is associated with the activity and active design-type system tools – marketing, PR, development of a product quality control system.

Logistic and sales units for their main purpose have an extensive network of warehouses, transport arteries and communication channels with customers which are being used – i.e., these are systems whose activity is almost unlimited. But at the same time, in the temporal dimension, their activity is not as consistently as object systems are –

manufactures with established production, whose work is ongoing with the same rhythm [10]. The functioning of these units is closer to the work of design systems, because each consignment of goods requires an individual approach in the implementation process [11]. Consequently, logistic and sales units should be considered as economic systems that are limited in time and can be attributed to the process type. For this system, the problem of capturing more expanse is not relevant, because logistic and sales units already have a wide network of sales channels. It is important to give these channels a time-stable character so that cooperation with all customers to be a long-term.

3 Results

The authors identified three main factors that determine the viability and efficiency of Russian industrial enterprises in present realities: this is the existence of strong investment support, location as a high importance for the economy and strong competitive position in the market. The work of the company can achieve the greatest efficiency only if the indicators of all three factors are on the top. Most of the leading Russian companies with vertically integrated character have these indicators on its highest level. But taking into account the fact that each such company is heterogeneous within itself and combines structural units of different types, it should be assumed that for each of them there is a factor that is most important.

For example, if we consider the factor of localization of the activity of a company structural unit in a particular locality and its significance for the economy of a given locality, it is obvious that this factor is of the least importance for logistics and sales units as process-type systems. Moreover, for them a high level of localization is extremely undesirable, because the process system, by definition, should be unlimited in expanse. Also, a logistics or sales company cannot play the role of a city-forming enterprise for a settlement.

The structural units of a vertically integrated company with a new developing production are a design-type system, therefore, the localization factor is already more important for it than for process systems of marketing units, and can increase their efficiency [12]. But at the same time, the level of activity localization for the project system should not be too high, and it needs to have some room for maneuvering when choosing a business location. Because the project, by its very definition, is an unstable system that is at the initial stage of the life cycle, and the success of its development is possible only if it is possible to quickly relocate production or some of its individual structural units with sharp changes in market conditions.

Structural units with established production as an object-type system in their work should focus on the highest possible level of activity localization – this follows from the fact that such a system is limited in expanse, and at this point in space it constantly works for a long period of time. Such systems include all industrial enterprises currently operating in Russia that are city-forming in the settlements of their location. Each such production unit, figuratively speaking, has already “grown into the soil” of the locality in which it operates, and this cooperation of the two systems gives a synergistic effect tangible for both of them. In an extended sense characteristic of the three types of systems in terms of localization of their activities are presented in Figure 1.

The factor of external investment among the three types of systems is of the least importance for object systems with well-established production. Indeed, since this system is already working “well-groomed”, then any additional infusion of resources into it will not bring any benefit, but, on the contrary, can lead to an increase in loss-making. This is

explained by the law of diminishing marginal returns J.B. Clark, according to which the return on new investments in the system can again grow, only if you make a radical qualitative update of the entire system and modernize the technologies used in its work [13].

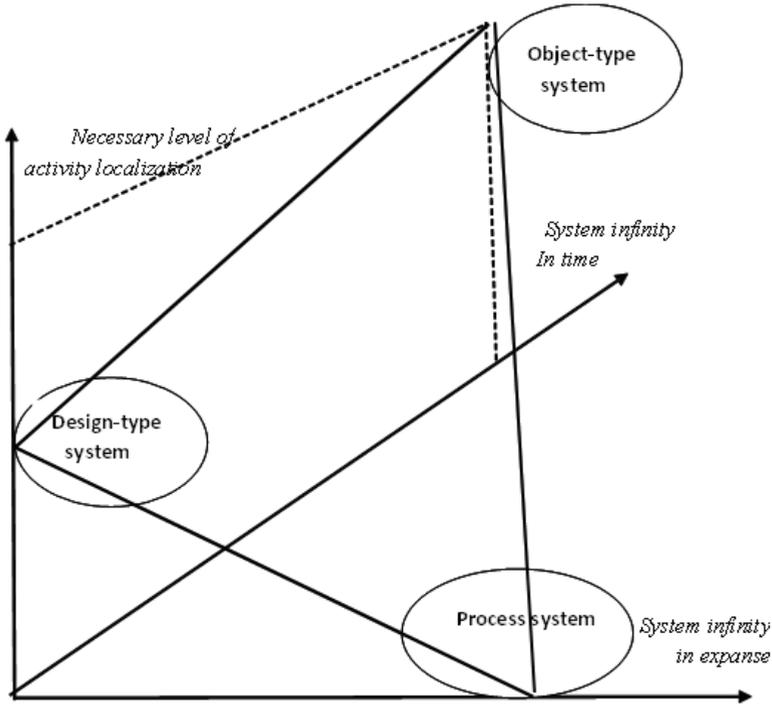


Fig. 1. The relationship of the spatio-temporal unboundedness of economic systems with the required level of activity localization.

For the process system of sales and logistic structural units, strong investment support is already of higher positive importance than for object systems with established production. These units must be constantly active in the market in order to strengthen their market position and give long-term character to cooperation with customers and communication channels with them. Investments are required only in this area of activity of sales and logistics units, i.e., they should be aimed at their intensive development. Thus, in process systems, the need for investment is at an average level.

Based on their definition, design systems are always associated with large-scale investments, because they represent the initial stage of the life cycle of any business. The design system must scale up the use of both spatial and temporal resources, i.e., at the same time intensively produce products and fill the market with it, and actively gain positions in this very market in order to gain a foothold on it on a long-term basis. The representation of three types of systems in a three-dimensional graph of the dependence of the required level of investment on spatial and temporal unlimited has the form shown in Figure 2.

The factor of competitive advantages and market position also plays different roles for various types of economic systems in vertically integrated chemical companies.

For object systems with established production, this factor does not play a significant role in their work. As practice shows, this kind of production unit does not need its own structural unit, actively promoting its products on the market. A much greater positive

synergistic effect is achieved if the production unit entrusts this work to a specialized logistics or sales unit.

For a design system with a new mastering production, market positions are more important than for an object [14]. At the initial stage of activity, the design system should try to promote its products on the market itself. Because here it is still not completely clear what kind of result the project will lead to, and there is always the possibility that in case of failure in the production field this system will have to reorient itself to the sales and logistics sectors. Nevertheless, in order to strengthen market positions, a project system with a new mastering production should not devote most of its resources to this activity.

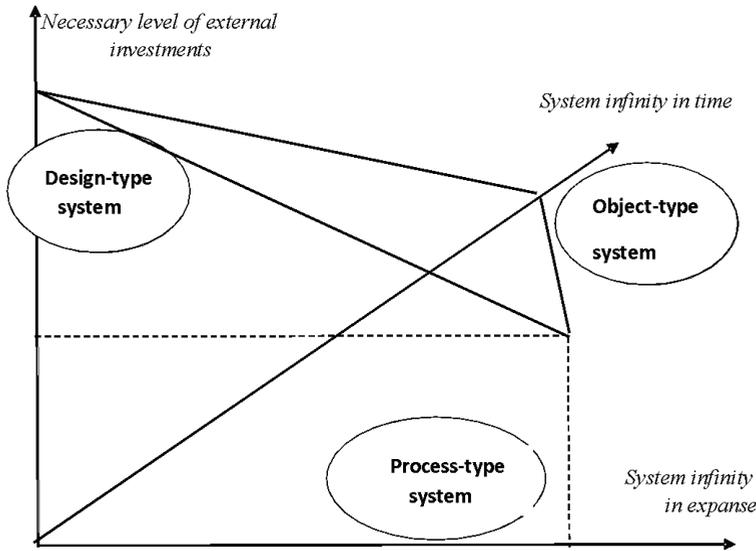


Fig. 2. The relationship of spatio-temporal unlimited economic systems with the required level of external investment.

The process marketing and logistics system should have top-level market position indicators. Because it is precisely the promotion of production units on the market that is its main purpose. The logistics and sales unit must have a recognizable brand and a good reputation that attracts new customers. Also, its network of transport channels, communications and points of sale of products should create the greatest possible convenience for existing and potential customers.

Generalized distribution of systems according to the required level of competitive advantages depending on spatial and temporal limitations is presented in the form of a three-dimensional graph in Figure 3.

The differences in the structural units of a vertically integrated industrial company in terms of spatial and temporal limitations and factors that have a decisive influence on their work, determine different approaches to the application of organizational and economic management tools [15].

4 Discussion

Relationships of the characteristics of all units of vertically integrated companies with their systemic properties, factors affecting their work and approaches to the use of organizational and economic management tools are summarized in Table 1.

5 Conclusions

That is to say on the basis of adapting the ideas of the theory of system economics and system management to the sphere of industrial production a model of a vertically integrated industrial company is developed. There are three types of economic system in this kind of company grouped by: units for creating basic products – object systems, units for processing by-products – design, sales units are process units, the company as a whole is an environmental system. This model allows you to choose management tools for each group of structural units of the company on a more formalized basis than in the current practice.

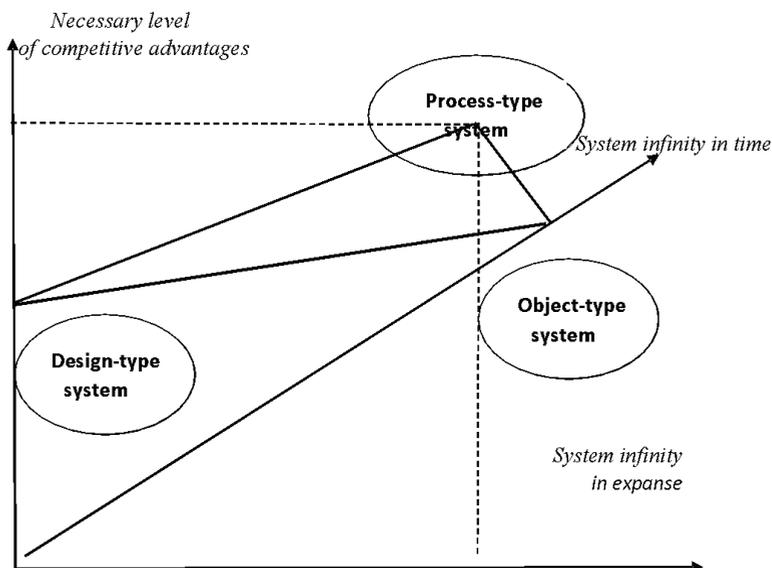


Fig. 3. The relationship of spatio-temporal unlimited economic systems with the required level of competitive advantage.

Table 1. Summary characteristics of enlarged groups of structural units of vertically integrated industrial companies. *Source:* developed by the authors.

Group of structural units	The type of economic system to which the units relate	Decisive factor in system operation	Approach to the application of organizational and economic system management tools
With established production	Object	Importance for Location Economy	Establishment of general operating rules for system elements
With new mastering production	Design	Having a strong external investor	Active influence on system elements to obtain a result
Logistic and sales	Process	Competitive advantage in the market	Observation of the phenomena in the system and the establishment of relations between them

Vertically integrated company as a whole	Context	All three factors together	Combination of all three approaches
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References

1. Y. Guo, Y. Yang, C. Wang, *Renew. Sust. Energy Rev.*, **139**, 110698 (2021). <https://doi.org/10.1016/j.rser.2020.110698>
2. A.G. Koryakov, O.I. Zhemerikin, *Digital transformation as a key to increasing the competitiveness of the Russian chemical industry*, in Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019, Education Excellence and Innovation Management through Vision, 96-103 (2020)
3. A.G. Koryakov, O.I. Zhemerikin, M.V. Kulikov, *Features of development of Russian garbage treatment clusters through the implementation of methods of project management*, in Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019, Education Excellence and Innovation Management through Vision, 1297-1305 (2020)
4. I. Trifonov, N. Cherepovskaya, P. Trifonov, I. Korneeva, A. Ksenofontov, *Int. J. Rec. Techn. Eng.*, **8(1)**, 2154-2160 (2019)
5. M. Sony, J. Antony, O. Mc Dermott, J.A. Garza-Reyez, *Techn. Soc.*, **67**, 101754 (2021). <https://doi.org/10.1016/j.techsoc.2021.101754>
6. V. Kumar, H. Pallathadka, *Materialstoday Proc.*, in press (2021). <https://doi.org/10.1016/j.matpr.2021.11.625>
7. S. Sosnovskikh, *Rus. J. Econ.*, **3(2)**, 174-199 (2017). <https://doi.org/10.1016/j.ruje.2017.06.004>
8. T.V. Kiseleva, V.G. Mikhailov, G.S. Mikhailov, *IOP Conf. Ser.: Mater. Sci. Eng.* **865**, 012011 (2020). <https://doi.org/10.1088/1757-899X/865/1/012011>
9. A. Trianni, E. Cagno, M. Bertolotti, P. Thollander, E. Andersson, *Appl. Energy*, **235**, 1614-1636 (2019). <https://doi.org/10.1016/j.apenergy.2018.11.032>
10. A. Benesova, M. Hirman, F. Steiner, J. Tupa, *Proc. Manuf.*, **38**, 1691-1696 (2019). <https://doi.org/10.1016/j.promfg.2020.01.112>
11. O.I. Zhemerikin, *Mod. Sci. Thought*, **5**, 243-248 (2017)
12. I.V. Trifonov, *Vestnik VESU*, **3(65)**, 155-160 (2013)
13. A.G. Koryakov, *Bus. Law*, **3**, 179-182 (2012)
14. V.G. Mikhailov, N.U. Petukhova, *Bul. Kuzbass State Tech. Univ.*, **2(102)**, 147-151 (2014)
15. Q. Xue, Z. Wang, S. Liu, P. Chang, *Fuel*, **310(B)**, 122349 (2022). <https://doi.org/10.1016/j.fuel.2021.122349>

Transformation of the fiscal system and investment potential

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Abstract. The study aims to analyze and prove the impact of indirect tax collection on the growth of human capital due to the growth of negative cash flow during the implementation of an investment project (within the concept of the cost of money), while some experts argue that there is no connection between these variables as contrary to the current tax legislation in Russia. The scientific novelty of the study results lies in the discovery of the relationship between the qualitative parameters of the administration of the fiscal system and the cost of human capital without changing the basic parameters. The research is based on the empirical method and cash flow modeling method. Results: identification of the decline in business efficiency due to the digitalization of the tax system which has led to a revision of the financial models of companies to optimize tax policy. Conclusions and perspectives: companies' financial models, before the digitalization of the tax system had a much higher degree of flexibility, which allowed to level internal and external risks by offsetting them through optimization schemes to maintain profitability and investment opportunities. The rising cost of human capital due to rising associated costs for companies for a considerable time is one of the outcomes of opening up the economy and finances of the corporate sector to fiscal and security forces. This has led to a decrease in the ability to invest in the creation of new products and services and in their implementation in the real economy.

Keywords: human capital cost, fiscal system, investment potential, ESG metrics

1 Introduction

The evolution and synergy of computer technology, information space, nanotechnology, and biotechnology now have such a significant effect that, as a result of the interaction, we can allow not only the erasure of the boundaries between the physical, digital (information), and biological (including human) worlds, but also the scaling of the state structure through absorption and enlargement similar to current conditions [1].

The notion that the economy of the future is primarily about intangible assets dates back to the last century. Alvin Toffler and Daniel Bell of the 1960s and 1970s, the founders of the

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concept of post-industrial society, anticipating the impact of post-industrialism on social processes, highlighted the dominant role of **knowledge and human capital** [2, 3].

Considerable attention to the industrial revolution and its impact on the global economy is paid at the annual meetings in Davos, the World Economic Forum. These expert assessments allowed Klaus Schwab to draw conclusions about Industry 4.0. Other conclusions include:

Revise the concepts of company development by focusing on **highly qualified personnel**.

The problem of **social instability and tension**.

The success of Industry 4.0 technology adoption – “**winner takes all**” [4].

These processes are developing against the backdrop of trade wars between countries, the purpose of which is to secure the interests of national economies at the expense of the economies of other countries, which in 2021 was once again confirmed by a statement by British Ambassador to Washington Karen Pearce on the prevention of technological superiority of Russia and China over the countries of the Western world. Under these circumstances, there is a need to:

1. Establish boundaries of interaction between states. A prime example is the UK’s “Brexit” and the May 2019 elections to the European Parliament, with a significant increase in representatives of nationalist parties and Euroskeptics, the victory of the German Social Democratic Party in September 2021 [5].

2. Fighting for capital transferred by multinational corporations outside the jurisdictions of countries for tax optimization purposes [6].

At the same time, Professor Charles Kupchin, a famous theorist of international relations, spoke about the development of technology as follows: “No single model or force will replace the Western order. For the first time in history it will be a system of mutual dependence, but without a common center of gravity and without a world gendarme”. In this way, Charles Kupchan somewhat confirms the conclusions of Klaus Schwab that primacy will be determined based on the technological development of a particular country [7].

2 Methods

2.1 Tax burden and SME

A significant number of studies in the economic literature are devoted to the effectiveness of the fiscal system. Adam Smith, forming the concept of a fair system of taxation, identified the following elements:

1. Taxes should be transparent.
2. Taxes must be paid at a convenient time for taxpayers.
3. The cost of collecting taxes should not exceed the amount of fees.
4. The taxes paid must reflect the benefit the taxpayer receives from the state [8].

Numerous works by Western and domestic scientists are devoted to the Laffer curve a concept that implies having an optimal level of taxation to maximize tax revenues while maintaining the interest of capital to accrue, taking into account the current macroeconomic conditions [9].

In his research, Spencer Bastany and Daniel Waldenström conclude that the fiscal system, as one of the main blocks of fiscal policy, is most effective when the authorities that regulate and control the fiscal system are able to assess the qualitative parameters and the

revenue/profit potential of each economic entity. In this case, there are no economic contradictions between the state and the economic actors and there is an opportunity to invest and develop new products and services [10].

However, the vast majority of studies on taxes and taxation concern the macroeconomic level, while the impact of the fiscal system should be investigated primarily based on the size of the company and, preferably, the type of economic activity, and the region of operation, taking into account the digitalization of data collection processes. Note that the structure of cash flow of micro, small and medium-sized enterprises (hereinafter – SMEs) is more dependent on mandatory fiscal payments than large companies.

At the same time, the flexibility and evolvability of tax regulation, as a continuation of state policy aimed at the development of the innovation economy and the formation of economic relations in a digital environment, should take into account:

1. Features of the development of companies with a new technological mode of assets [11].
2. Features of settings of financial and economic relations of subjects of economic activity – potential consumers of digital services [12].
3. Development of financial digital services markets and digital payment platforms [13].

However, the development of digital products is one of the steps to build an innovation economy. Equally important is the introduction of these technologies into industrial production and sales to the population (see point 2 above), which must be taken into account in the formation of the fiscal system. **The generation of free and sufficient cash flow from both companies and the population (the author emphasizes that the free cash flow from companies and the population are interdependent)**, based on the fundamental concepts of economic theory, forms the potential demand, which is the quintessence for the development of any product/service.

2.2 Financial model of the human capital cost.

Given the comparability of data on cash flow with **management accounting**, let us analyze the company's costs per (One) ruble of wages paid, taken as the main element of **human capital assessment** and the driver of the formation of potential **demand** for digital products from the population. The analysis includes the formed and current conditions of the external environment in the conduct of financial and economic activities of the company, which must be considered by representatives of SMEs:

Application of the general system of taxation, where input VAT is an important component of the economy and finances of any customer, buyer.

Accounting for tax risks when planning, average industry profitability indicators, characterizing financial and economic activities of taxpayers under the “Concept of planning of field tax audits” (Order of the Federal Tax Service of Russia of 30.05.2007 No. MM-3-06/333@) (the average check on field audit – 21 RUB mln).

The company's ability to generate free and sufficient cash flow to meet ESG metrics, primarily for sustainability purposes:

Paying the cost of human capital (attracting highly qualified employees);

Investing in human capital (professional development, training, health insurance payments, etc.);

Reinvestment in non-current assets [14].

Forming a market for the consumption of digital products, both on their part and at the expense of employees.

The result is given in Table 1.

In managerial accounting, 81% of the employer's costs per ruble, while the costs declared in the regulations are 31%, including 1% – the average by type of economic activity – deductions to the Social Insurance Fund. In fact, the burden of paying personal income tax in managerial accounting is assumed by the employer, despite the statement in the tax code that this tax is paid by the salary recipient. **Wages, personal income tax, insurance premiums do not form a VAT deduction**, so the employer has an automatic “gap” on this amount (the difference between the outgoing and incoming VAT), that is, during the implementation of the investment project, the performer forms an additional negative cash flow.

Table 1. Calculation of costs per 1 ruble of salary payable, based on management accounting.

Name of accrual item	Official economy, rub.	Shadow economy, rub.
Accrued	1.15	1.00
Personal income tax 13%	0.15	
To be issued	1.00	
Insurance premiums, including the National Social Security Fund (average by type of economic activity), 31%	0.36	
VAT 20%	0.30	
Cost of VAT and cashing 17%		0.17
Total:	0.81	0.17

Source: the calculation was made by the author, [15].

Table 2. VAT analysis by cost elements.

Cost item, rub	Sum	Ratio, %	The estimated cost of construction is \$1150, including 20% VAT, \$ 191.67, then without VAT	Input VAT amount
Material costs	16 676.00	49.27	410.59	82.12
Wages and salaries, including personal income tax 13%	10 288.00	30,40	25331	
Social contributions 31%	3 189.28	9.42	78.53	
Depreciation	1 306.00	3.86	32.16	6.43
Other	2 386.00	7.05	58.75	11.75
Total:	33 845.28	100.00	833.33	
Planned accruals 13%:			125	
Total:			958.33	100.30

Thus, the amount of VAT paid:	91.37
Including:	
Payable VAT on profits:	25.00
Payable VAT from payroll	66.37
Ratio of the ruble received by an employee to the load	220,38
Personal Income Tax	32.93
Social contributions 31%	78.53
Payable VAT from payroll	66.37
Total taxes and contributions	177.83

Ratio of taxes and contributions to 1 ruble paid to the employee, %	80,69
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Source: calculation made by the author.

Let us take the structure of income and expenses of a company in the construction sector as an example. The construction sector is characterized by capital intensity and multiplication for other sectors of the economy, which is largely similar in characteristics to technology-based industries. Let us use the data from the textbook “Cost Management in Construction”, published by a team of authors under the editorship of Doctor of Economics, Professor A. N. Asaul [16]. To simplify the perception of information, the author derived the proportions of costs involved in the formation of the cost of construction and erection works from the above textbook with the subsequent translation of the proportion of costs to the simplified pricing of construction and erection works (see Table 2).

The result of Table 2 corresponds to the result of Table 1, which confirms the need to consider VAT as a tax involved in the formation of additional expenses when paying wages in management accounting and, accordingly, in the cash budget. However, scaling the business allows reducing the impact of VAT on the total cash flow due to the presence of costs that are inherently VAT (materials, fixed assets, etc.). This reduces the cost of the cost part (negative cash flow) of the company to pay 1 ruble of wages. Let us test this hypothesis on the financial model of a residential house built in the Leningrad region in Kirishi city in 2014, VAT 18%, through a reinforced financial model plan/fact (Table 3):

Table 3. Percentage of sources of VAT payable.

Cost items	Planned (estimated) investments			Actual investments			Mean %	Root mean square deviation	Distribution interval of values	Standard plan deviation, %
	Value with VAT, mln rub	VAT, mln rub	VAT rel. distribution indicator, %	Value with VAT, mln rub	VAT, mln rub	VAT rel. distribution indicator, %				
Pavroll	128.0	19.5	61.14	139.8	21.3	68.80	64.97	1.64	3.29	2.33
Planned accural	64.0	9.8	30,57	45.6	7.0	22.43	26.50	1.64	3.29	2.47
Other, VAT ex.	17.4	2.6	8.30	17.8	2.7	8.78	8.54	1.64	3.29	0.15
		31.9			31.0					

Source: calculation made by the author.

Using the Monte Carlo method, we obtain the probability of redistribution of indirect VAT tax relative to payroll, planned accumulation and other expenses without VAT, provided that:

- we will assume that the falling out of the middle values within each of the studied intervals is more likely, so it works with the normal distribution law;

- 90% confidence interval;

- iteration is 100.

Then we get (Figs. 1-3).

Thus, due to the scaling of the project achieved a reduction in the impact of the payroll on payable VAT to the limit of 63%-66% based on the financial model of the project implemented, which in turn confirms the need to model the impact of the fiscal system on SMEs separately from large businesses due to different distribution of company costs per ruble paid wages in the cost structure of products/services during the investment project taking into account the concept of the cost of money.

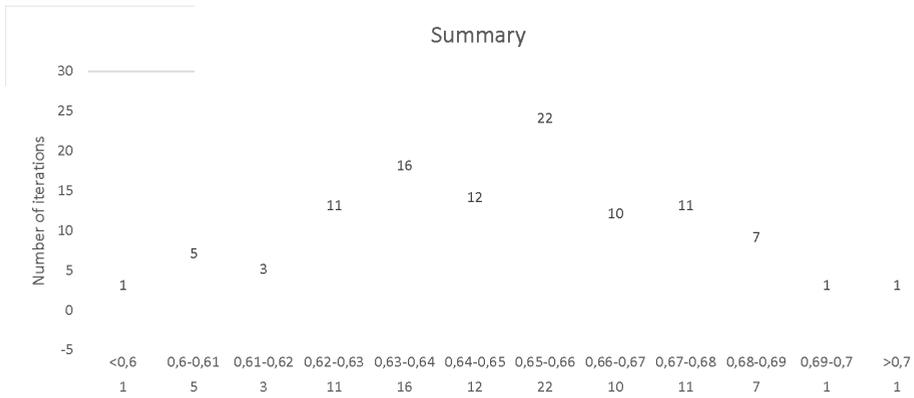


Fig. 1. The effect of payroll on the amount of VAT paid. *Source:* compiled by the author.

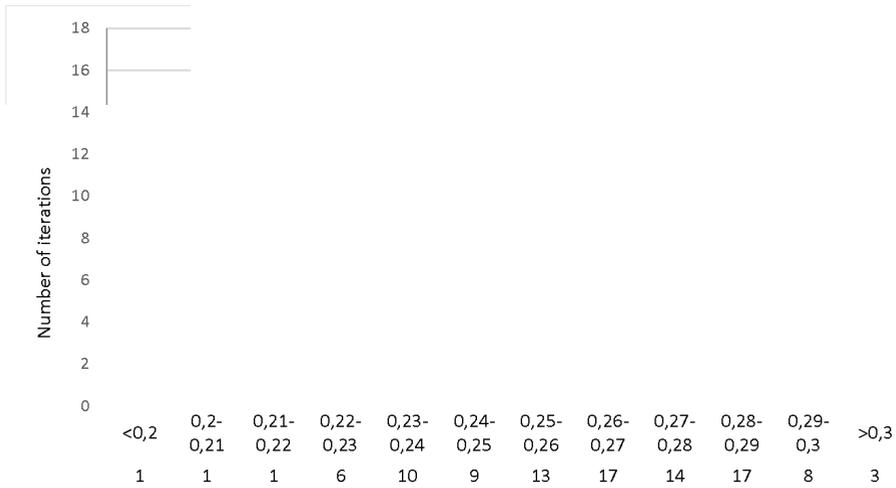


Fig. 2. The effect of the accumulation fund on the amount of VAT payable. *Source:* compiled by the author.

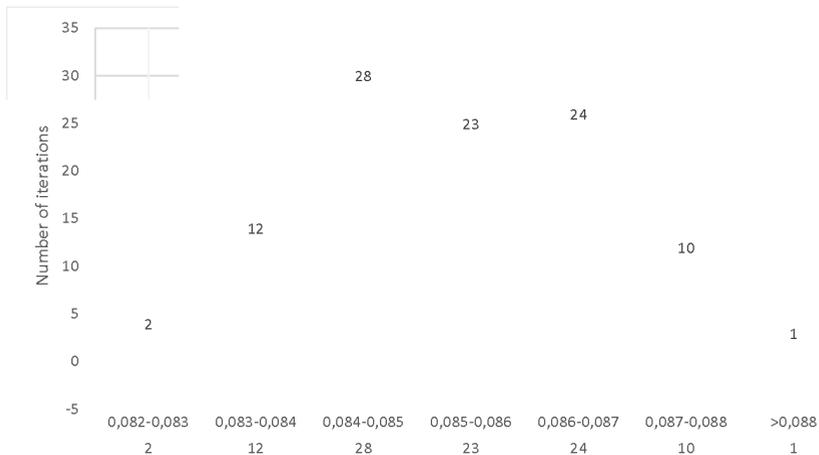


Fig. 3. Effect of other expenses without VAT on the amount of VAT payable. *Source:* compiled by the author.

3 Results

Given the correlation found between the scale of entrepreneurial activity, through the parameter – payroll, and the fiscal burden, through indirect taxation, the structure of cash flow and the ability to generate cash flow in SMEs is under pressure from factors shaped by the impact of the following conditions:

1. SMEs are a category of companies that, compared to large companies, are mostly in the risk zone in terms of tax optimization operations, which is caused by the lack of mandatory auditing and internal controls to a proper extent, as well as lower requirements for the reliability of financial statements (manipulation with the indicators of cost items).

2. State monopolization, the formation of an oligopolistic market of certain sectors, currently observed, tends to develop [17]. Companies participating in the formation of an oligopolistic market have such an important parameter as “power = capital”, having access to funding through an administrative resource, namely state budgets, companies with state participation (cheap capital), thereby increasing their competitive opportunities [18]. Scaling companies with administrative resources allows, by reducing the cost of products/services, to strengthen their expansion into markets of interest through dumping or by absorbing competitors. It is virtually impossible for SMEs to compete with such companies without the use of optimization tax schemes.

3. Lack of opportunity for SMEs to participate in capital investment incentive programs due to requirements concerning the volume of investment.

In addition, according to the study results of small and medium business in Russia, Prikhodko K.S., Kozlovskaya S.A. conclude: “A high tax burden, according to the entrepreneurs themselves, is the main barrier to development [19]. In other words, SMEs in most cases react negatively to changes in tax legislation as they do not feel financially stable. Apostolic results were obtained by the author through financial modeling of the implementation of investment potential. The main conclusions of the research were presented, reported and discussed at the plenary session of the All-Russian scientific-practical conference “Economic security of person, society and state”, which was held in St. Petersburg University of the Ministry of Internal Affairs of Russia with the participation of the management personnel of Department of the Economic Security and Forensic Activity and the Expert-Criminalistic Center of the Main Department of Internal Affairs of Russia in St. Petersburg and the Leningrad region, April 9, 2021; and also at the 9th scientific-practical conference “Science Management in the Modern World”, held on November 9-10, 2021.

4 Discussion

Thus, using Rosstat data, we state that 14 million people are informally employed in the Russian economy at the end of 2018 (19.3% of total employment), which amounts to 12.6% of GDP (over 13 RUB trillion) (see Table 4).

Thus, we can draw an important practical conclusion from the diagrams in Fig. 4, 5: **the dynamics of growth of VAT receipts largely does not correspond to the dynamics of Russia’s GDP**, especially in dollar terms, indicating the absence of macroeconomic fundamentals in the economy for this growth, except for one indicator – the indicator that determines **a significant reduction in the share of the shadow economy** in its structure.

5 Conclusion

The results of the study identified the following key factors that reduce the level of investment and innovation activity in Russia:

- the lack of an econometric model of a comprehensive system to control the impact of taxes and fees, taking into account the proportionality of companies, led to an imbalance of economic interests in SMEs, as it was SMEs were mostly involved in activities to optimize the tax base, which predetermines the inability of SMEs to participate in the implementation of investment potential, both as a performer and as a consumer due to the rising cost of capital;

Table 4. Savings due to tax optimization schemes, RUB bln.

Name of cost items	Official economy
Accrued	14 950.00
Personal Income Tax 13%	1 943.50
To be issued	13 000.00
Insurance premiums, including the National Social Security Fund (average by type of economic activity), 31%	4 634.50
VAT 20%	3 916.90
Cost of VAT and cashing 17%	
Total:	10 494.90

Source: calculation made by the author [19].

25.4 RUB trillion, including VAT 4 RUB trillion is the potential for tax revenues realized over the past 5.5 years (Fig. 4, 5)

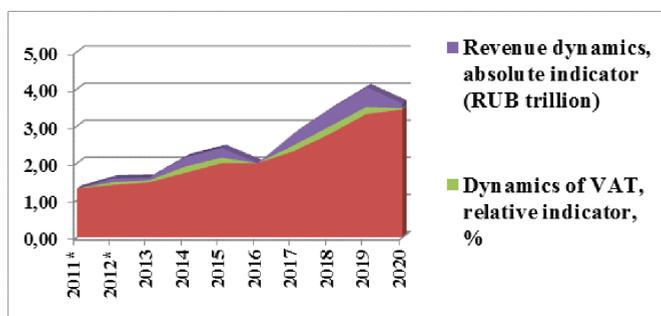


Fig. 4. VAT revenue dynamics. Source: [20].

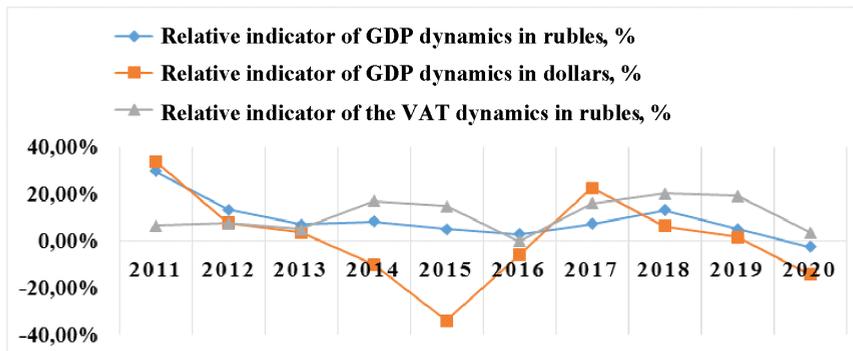


Fig. 5. Dynamics of VAT and GDP of Russia. *Source:* [21, 22].

- the amount of costs for SMEs, taking into account the improvement of the quality of administration of taxes and fees, can be approximately estimated at 23,494 RUB billion, which is about 22% of GDP recalculated for 2018 based on the author's financial model. The validity of the calculations in Tables 1-4 is confirmed by the similarity of the results obtained by the author and the information published by the Federal Financial Monitoring Service of the Russian Federation. Given that the size of the shadow economy is an approximate value, the validity can only be subjected by comparing the results of various research methods and calculations.

References

1. K.A. Gulin, *Econ. Soc. Changes: Facts, Trends, Forecast*, **10(5)**, 216-221 (2017). <https://doi.org/10.15838/esc/2017.5.53.15>
2. A. Toffler, *The Third Wave* (William Morrow, New York, 1980)
3. D. Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting* (Basic Books, New York, 1976)
4. K. Schwab, *Die Vierte Industrielle Revolution Perfect* (Pantheon Books, New York, 2016)
5. E. Hossin, K. Islam, *Int. J. Soc. Sci., Innov. Edu. Techn.*, **1(4)**, 367-378 (2020). <https://doi.org/10.5281/zenodo.4173945>
6. F. Shukurov, *Three essays on transfer pricing, base erosion and profit shifting of U.S. multinational companies*, ETD doctoral thesis in Philosophy (State University of New Jersey, 2020). <https://doi.org/10.7282/t3-py1r-f430>
7. Ch.A. Kupchan, *No One's World. The West, the Rising Rest and the Coming Global Turn* (Oxford University Press, New York, 2012)
8. A. Hayes, *Adam Smith and "The Wealth of Nations"* (2021). Accessed on: March 11, 2022. [Online]. Available: <https://www.investopedia.com/updates/adam-smith-wealth-of-nations/>
9. M.O. Kakaulina, *J. App. Econ. Res.*, **16**, 336-356 (2017). <https://doi.org/10.15826/vestnik.2017.16.3.017>
10. S. Bastani, D. Waldenström, *J. Econ. Surv.*, **34(4)**, 812-846 (2020). <https://doi.org/10.1111/joes.12380>
11. S. Kraus, P. Jones, N. Kailer, A. Weinmann, N. Chaparro-Banegas, N. Roig-Tierno, *SAGE Open* **11(3)** (2021). <https://doi.org/10.1177/21582440211047576>

12. C. Bonina, K. Koskinen, B. Eaton, A. Gawer, *Inf. Syst. J.*, **31(6)**, 869-902 (2021).
<https://doi.org/10.1111/isj.12326>
13. N.V. Gorodnova, V.V. Klevtsov, A.V. Pavin, *Innov. Econ. Iss.*, **10(1)**, 205-222 (2020).
<https://doi.org/10.18334/vinec.10.1.41174>
14. T.-T. Li, K. Wang, T. Sueyoshi, D.D. Wang, *ESG: Sustainability* **13(21)**, 11663 (2021).
<https://doi.org/10.3390/su132111663>
15. Eksperty predupredili o negativnykh effektakh vyvoda ekonomiki iz teni Prinuditelnoe “obeleni” mozhet negativno skazatsya na roste ekonomiki [Experts have warned about the negative effects of bringing the economy out of the shadows Forced “whitewashing” can negatively affect the growth of the economy] (2019). Accessed on: March 11, 2022. [Online]. Available:
<https://www.rbc.ru/economics/24/09/2019/5d81ec209a7947a916d86aad>
16. A.N. Asaul, M.K. Starovoitov, R.A. Faltinsky, *Cost Management in Construction*, A.N. Asaul (ed.) (IPEV, SPb, 2009)
17. V.V. Kelarev, *State Munic. Admin. Sci. Notes*, **1**, 127-137 (2021).
<https://doi.org/10.22394/2079-1690-2021-1-1-127-137>
18. I.Z. Islamov, *El. Econ. Bul.*, **4**, 19-29 (2019)
19. Rabochaya sila, zanyatost i bezrobotitsa v Rossii (po rezultatam vyborochnykh obsledovaniy rabochei sily) [Labor force, employment and unemployment in Russia (based on the results of sample surveys of the labor force)] (Rosstat, Moscow, 2018)
20. Analiticheskii portal FNS Rossii [Analytical portal of the Federal Tax Service of Russia]. Accessed on: March 11, 2022. [Online]. Available:
<https://analytic.nalog.ru/portal/index.ru-RU.htm>
21. GDP (current LCU) – Russian Federation. Accessed on: March 11, 2022. [Online]. Available:
<https://data.worldbank.org/indicator/NY.GDP.MKTP.CN?locale=ru&locations=RU>
22. Natsional'nye scheta [National accounts]. <https://rosstat.gov.ru/accounts>

Digital transformation and higher education in the Republic of Uzbekistan

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Abstract. This article is devoted to the main directions of the transformation of higher education in the Republic of Uzbekistan in the context of the formation of the digital economy. The authors analyzed the main ways of modernizing higher education based on the study of legal documents, scientific research of modern scientists and their own experience in the university. In addition, this article shows innovative solutions to improve higher education in the context of the formation of the digital economy. The authors show that the modern educational policy regarding the influence of higher educational institutions on the socio-economic structure of society in the Republic of Uzbekistan proceeds from the fact that the development of the higher education system is one of the main components of the higher education system. innovative development of the country. The article notes that currently in Uzbekistan, within the framework of the implementation of the President's Decree "On measures for the further development of the higher education system", each higher educational institution establishes close partnerships with leading foreign universities and centers. At the same time, work is underway to widely introduce advanced pedagogical technologies, curricula and teaching materials based on international educational standards into the educational process. Taking into account the prospects for the integrated development of regions and sectors of the economy, the needs of territorial and sectoral programs, target parameters of personnel training are formed in accordance with higher education, directions and specialties of training are optimized.

Keywords: digital technologies, innovative pedagogical technologies, modernization, optimization, qualifications of specialists

1 Introduction

In the conditions of the formation of the digital economy, serious qualitative changes are taking place, which are reflected in the development of all sectors and spheres of the economy, including the modernization of the education system. Scientific research by

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scientists testifies that education is not just a way of transferring knowledge, it accumulates the cultural heritage of the nation, contributes to the empowerment of a person, and forms his moral ideals. Education in general and higher education in particular, is one of the conditions for economic growth, increasing the material well-being of the country's population. The level of education has a significant impact on various aspects of human life: health, perception of culture and art, professional and political mobility, etc.

The role of education in increasing labor productivity, increasing the production of goods and services, as well as increasing workers' income is assessed within the framework of the theory of the so-called human capital. Human potential is the main part of the country's national wealth. The reasons for the lag in the economic development of countries with a high level of education may be the following:

- irrational structure of education;
- ineffective use of the existing educational potential (for example, when a person is forced to perform work that does not correspond to his level of education);
- low level and inadequate structure of investment in education;
- low quality of education;
- incorrectly chosen strategy for the development of education.

In this regard, the study of the processes of optimization of the education system in the context of the formation of the digital economy is an urgent direction in scientific research of scientists from different countries of the world.

2 Methods

The methodology for researching the transformation of higher education and the development of effective mechanisms for teaching students at the university is based on a theoretical and methodological analysis of advanced pedagogical and information technologies used in the educational process of the university, the study of legal and special literary sources, methods of effective teaching of special disciplines in higher educational institutions using digital technologies.

3 Results

The Republic of Uzbekistan pays close attention to the development of the digital economy and higher education. In the Republic of Uzbekistan, a whole complex of regulatory and legal documents has been adopted, which provide for the consistent implementation of the following tasks

- increasing the level of knowledge, skills and abilities of future specialists who have the necessary competencies, high moral principles and are able to think independently;
- modernization of higher education;
- social and economic development based on the latest educational approaches.

The overall coordination of activities for the functioning of the higher education system in the Republic of Uzbekistan is carried out by the Ministry of Higher and Secondary Specialized Education. The activities of the sphere of higher education are implemented in accordance with a set of government documents and are aimed at cardinal transformations of the educational process in universities in order to achieve high rating indicators at the world level. In this regard, in the modern period, qualification requirements have been updated in all universities of Uzbekistan, the purpose of which is to improve a set of indicators such as:

- improving the quality of the educational process and the level of training;
- ensuring consistency and continuity, optimization of the educational process;

- ensuring the demand for graduates in the labor market;
- filling the educational process with the principles of humanism and democracy;
- optimization of the educational process at all its stages and in all forms.

As the results of sociological research by the Center for the Study of Public Opinion show, education occupies one of the main places in the system of life values of the young generation (Table 1.)

Table 1. Dynamics of the increase in universities, applicants and competition for admission to universities for the period from 2010 to 2020

Year	Universities (including foreign branches)	Number of entrants	Quota	Contest
2010	65	385 700	56 607	6.8
2011	66	418 724	56 607	7.4
2012	68	432 110	56 374	7.7
2013	70	480 540	56 607	8.5
2014	71	543 244	57 907	9.4
2015	72	605 800	57 907	10.5
2016	74	663 298	57 907	11.5
2017	78	729 947	66 316	11.0
2018	80	1 262 551	78 701	16.0
2019	92	1 214 688	80 430	15.1
2020	122	1 484 463	103 575	14.3

Source: [1].

Work is being consistently carried out to solve the problem of creating and introducing a new generation of textbooks into the higher education system, providing universities with modern educational and scientific literature. Work has been established to translate the latest foreign literature into the Uzbek language. In order to organize interaction with compatriots with great scientific potential, scientists, specialists and talented youth living and conducting their professional activities abroad, in September 2018, the “El-Yurt Umidi” foundation was established in Uzbekistan (Decree of the President of the Republic of Uzbekistan “On the organization activities of the “El-yurt umidi” foundation on training specialists abroad and dialogue with compatriots under the Cabinet of Ministers of the Republic of Uzbekistan” dated September 25, 2018 No.UP-5545). Based on modern reality, the following priority areas of interaction between universities in Uzbekistan and foreign universities and research centers can be identified:

- branches of foreign universities;
- joint faculties;
- joint educational programs of double degrees;
- attraction of foreign specialists;
- advanced training and internships [24, 25].

A very important decision in higher education today is the decision made in 2018, which grants the right to basic (leading) universities, based on the needs of customers, to independently develop and approve curricula and programs in agreement with the Ministry of Higher Education.

As practice shows, the main directions of the development of higher education are:

- firstly, all possible assistance to the vocational education market;
- secondly, the priority of the formation of a “talent pool” for the development of promising markets and technologies, training of personnel for those industries that have not yet begun to present a broad effective demand for graduates;

- third, the formation of innovative corporate cooperation as a form of integration of diverse educational institutions of higher and secondary vocational education, research institutes, basic enterprises and organizations, within which educational programs of different levels of professional education will function;

- fourthly, the priority of the scientific function of the higher education system, which directly affects the change in the principles of organizing production;

- fifth, the priority of enhancing the impact of higher education on the labor market by creating new technologies and opening up new areas of social activity.

A good example of the transformation of higher education in the modern era is the shift to distance education using digital platforms. As practice shows, many universities have developed their own digital platforms that allow you to post materials on the disciplines of the curriculum for students and undergraduates of all courses and groups. The educational platform allows students to assess their knowledge of the topic being studied by answering questions that teachers have posted on certain pages of the platform. This form of organization of the educational process allows students to train, monitor their mastering of educational material, in addition, it contributes to improving the knowledge of the teaching staff in the field of modern digital technologies. Digital platforms are an important tool in the emerging digital economy. Digital platforms developed for various industries and spheres of the national economy contribute to openness, transparency, reliability of data, improve the quality of provision of public services to various categories of users, conduct analytical analysis at a high professional level, improve the quality of intradepartmental and interdepartmental information interaction, and improve the quality of life of the population [2].

4 Discussion

Many works of such foreign scientists as R. Ackoff, R. Brailey, P. Drucker, R. Kaplan, M. Meyer, R. Nelson, P. Niven are devoted to the development of various teaching methods based on modern pedagogical and information technologies in the context of digital transformation., D. Norton, B. Twiss, P. Trott, S. Winter, M. Hirooka, G. Chesbrough, Sony M., Naik S. (2019) [3], Rajput S., Singh S.P. (2019) [4], Raudeliūnienė J., Davidavičienė V., Jakubavičius A. (2018) [5], Tang T.W. (2016) [6], Anderson M.H., Sun P.Y. (2015) [7], Mohamed L.M. (2016) [8], Yadav G., Luthra S., Jakhar S., Mangla S.K., Rai D. (2020) [9], Ghobakhloo M. (2018) [10], Xu L.D., Xu E.L., Li L. (2018) [11], Müller J.M., Buliga O., Voigt K.-I. (2018) [12] and others. Russian scientists also comprehensively investigate the problem of developing effective methodological approaches to teaching in higher educational institutions based on modern pedagogical and technological solutions based on digital technologies. These literary sources include the works of rectors of leading economic universities in Russia and neighboring countries, as well as the works of Dmitruk I.K., 2020 [13], Noskova M.V., Popova V.V., 2015 [14], Kochegurova E.A., Gorokhova, 2015 [15], Levitina E.S., 2015 [16], Boldovskaya T.E., Rozhdestvenskaya E.A., 2016 [17,], A.D. Zhukovskiy, 2021 [21], L. Burunchuk, 2022 [22], F. Kubareva 2022 [23].

A number of works by scientists of the Tashkent State Economic University are devoted to the methods of the effectiveness of organizing the educational process based on the use of modern pedagogical and information technologies. These are the works of S. S. Gulyamov. [18], Begalov B.A. [19], Dadabaeva R.A., Zhukovskaya I.E. [20], Faizullaeva N., etc.

5 Conclusion

Considering in the context of the studied problem the influence of higher education on the socio-economic development of the country, it should be noted that the development of the educational sphere of the Republic of Uzbekistan as a whole is conditioned by a number of factors. The first is the introduction of a credit-modular system. Regional factors include the specifics of the local labor market, the peculiarities of the personnel potential of universities, a fairly deep differentiation of universities in terms of the level of competitiveness in the educational services market.

The main directions of modernization of education in the context of increasing the role and influence of the educational process on socio-economic development include the following:

- openness of the educational space, implying, among other things, a new approach to defining the goals and results of education, to the quality content of acquired competencies;
- strengthening the prognostic orientation of education, combining educational activities with research activities at all stages of education;
- ensuring the practice-orientedness of the process of studying disciplines in order to more fully implement the acquired knowledge and skills, professional competencies by students.

Thus, we can conclude that the quality of higher education determines the effectiveness of economic development. With an increase in the rate of economic growth, the need for highly qualified specialists who are able to develop and introduce new methods and technologies increases, which has a positive effect on the education development system and contributes to economic growth.

References

1. Bul. Sci. Pract., **8(45)** (2019). <https://doi.org/10.33619/2414-2948/45>
2. I.E. Zhukovskaya, S.V. Begicheva, D.M. Nazarov, E3S Web of Conf., **208**, 09018 (2020). <https://doi.org/10.1051/e3sconf/202020809018>
3. M. Sony, S. Naik, Prod. Plan. Control, **31(10)**, 799-815 (2019). <https://doi.org/10.1080/09537287.2019.1691278>
4. S. Rajput, S.P. Singh, Benchmarking **1(1)**, 1-23 (2019). <https://doi.org/10.1108/BIJ-12-2018-0430>
5. J. Raudeliūnienė, V. Davidavičienė, A. Jakubavičius, Entrep. Sust. Iss., **5(3)**, 542-554 (2018). [https://doi.org/10.9770/jesi.2018.5.3\(10\)](https://doi.org/10.9770/jesi.2018.5.3(10))
6. T.W. Tang, Int. J. Hosp. Manag., **56**, 56-65 (2016). <https://doi.org/10.1016/j.ijhm.2016.04.002>
7. M.H. Anderson, P.Y. Sun, Leadership Quart., **26(5)**, 790-801 (2015). <https://doi.org/10.1016/j.leaqua.2015.05.002>
8. L.M. Mohamed, J. Hosp. Tourism Manag., **27**, 49-59 (2016). <https://doi.org/10.1016/j.jhtm.2016.04.001>
9. G. Yadav, S. Luthra, S. Jakhar, S.K. Mangla, D. Rai, J. Clean. Prod., **254**, 1-21 (2020). <https://doi.org/10.1016/j.jclepro.2020.120112>
10. M. Ghobakhloo, J. Manuf. Tech. Manag., **29(6)**, 910-936 (2018). <https://doi.org/10.1108/JMTM-02-2018-0057>
11. L.D. Xu, E.L. Xu, L. Li, Int. J. Prod. Res., **56(8)**, 2941-2962 (2018). <https://doi.org/10.1080/00207543.2018.1444806>
12. J.M. Müller, O. Buliga, K.-I. Voigt, Tech. Forecast. Soc. Change, **132(C)**, 2-17 (2018). <https://doi.org/10.1016/j.tech-fore.2017.12.019>

13. I.K. Dmitruk, Realizatsiya mezhpredmetnykh svyazei predmetov estestvennonauchnogo tsikla, matematiki i informatiki [Realization of intersubject connections of subjects of natural science cycle, mathematics and informatics]. Accessed on: March 07, 2022. [Online]. Available: <https://refdb.ru/look/1876453.html>
14. M.V. Noskov, V.V. Popova, Bul. KSPU V.P. Astafiev, **1(31)**, 65-68 (2015)
15. E.A. Kochegurova, E.S. Gorokhova, *Concept* **15**, 6-10 (2015)
16. E.S. Levitin, Mathematical education and mathematics in modern civilization. Who needs mathematics and why? The role of mathematics in the past, present, future, in *On applied directions in mathematics* (Poli Print Service, Moscow, 2014)
17. T.E. Boldovskaya, E.A. Rozhdestvenskaya, *Problemy matematicheskogo modelirovaniya transportnykh potokov v kurse matematiki v tekhnicheskom vuze* [Problems of mathematical modeling of traffic flows in the course of mathematics in a technical university], in materials of the II International scientific-practical conference, Science of the XXI century: experience of the past – a look into the future, 7-12, Omsk (2016)
18. S.S. Gulyamov, M.Kh. Saidov, A.M. Khakimov, Sovremennye aspekty povysheniya kachestva obrazovaniya v Respublike Uzbekistan v kontekste ispolzovaniya peredovykh informatsionno-kommunikatsionnykh tekhnologii [Modern aspects of improving the quality of education in the Republic of Uzbekistan in the context of the use of advanced information and communication technologies], in *Modern information and communication technologies and IT education*, 217-227 (Moscow State University, Moscow, 2016)
19. B.A. Begalov, O.T. Mamadaliev, *Stat. Econ.*, **18(1)**, 4-13 (2021)
20. I.E. Zhukovskaya, *Open Edu.*, **25(3)**, 15-25 (2021).
<https://doi.org/10.21686/1818-4243-2021-3-15-258>.
21. A.D. Zhukovskiy, *Stat. Econ.*, **18(3)**, 56-64 (2021).
<https://doi.org/10.21686/2500-3925-2021-3-56-64>
22. L. Burunchuk, Investitsii v budushchee [Investments in the future]. Accessed on: March 09, 2022. [Online]. Available: <https://www.gazeta.uz/ru/2018/09/04/education>.
23. F. Kubareva, Chem zhivesh, molodezh? [How do you live, youth?]. Accessed on: March 09, 2022. [Online]. Available:
<http://www.ut.uz/ru/eshyo/analitika/chem-zhivesh-molodezh/>
24. O'zbekiston respublikasi davlat statistika qo'mitasi [Official portal of the State Committee of the Republic of Uzbekistan on Statistics]. Accessed on: March 09, 2022. [Online]. Available: <https://www.stat.uz>
25. Postanovlenie Prezidenta Respubliki Uzbekistan "O merakh po dalneishemu razvitiyu sistemy vysshego obrazovaniya" [Resolution of the President of the Republic of Uzbekistan "On measures for the further development of the higher education system"] (2017). Accessed on: March 09, 2022. [Online]. Available:
https://gubkin.uz/uploads/sveden/Zakoni_i_Postanovleniya/PP_2909.pdf

Factors of consumer irrationality in the context of the COVID-19 pandemic

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Abstract. In today's world, scientists recognize the importance of irrational factors and the need to consider them in the construction of economic models. Human irrationality manifests itself when actions are performed that defy the laws of logic. Often we choose the least beneficial options available to us for reasons that we often do not even notice and do not think about. Everything that is not accessible to reason passes into the sphere of irrationalism. The main purpose of this study was to analyze the main irrational factors that can affect the economic behavior of consumers in the context of the lockdown caused by the COVID-19 pandemic. As a result, a grouping of irrational factors is presented according to the degree of their influence on consumers when they make a purchase decision, as well as changes in consumer preferences in favor of necessary and inexpensive goods. Using economic and statistical methods the authors revealed the dependence of expensive goods purchase on the level of income. However, there is no correlation between the average monthly income and a new car purchase. This irrational factor in human behavior confirms the change in spontaneous consumer sentiment during a pandemic.

Keywords: irrational factors, consumer behavior, decision making, pandemic

1 Introduction

The influence of irrational factors on human decision-making is undeniable. Especially these factors directly affect the formation of a single set of durable goods. Psychological factors affect economic growth indirectly and gradually through an increase in aggregate supply and demand, consumption, investment and savings. The research focuses on individual consumer behavior and its causes. The analysis of consumers was carried out taking into account the COVID-19 pandemic, it allowed to conclude that during the crisis,

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the influence of some irrational factors on purchasing decisions is increasing, while the influence of others is weakening. This kind of research is seldom carried out in the Russian market, since the importance of irrational factors and the need to take them into account during the construction of economic models is not a strategically important task. However, in our opinion, without taking into account irrational factors, it is impossible to correctly predict and interpret the economic behavior of the consumer and his motives when making a purchase.

Statement of the problem: What irrational factors increase the influence on consumer behavior when making a purchase decision, and which ones weaken in a lockdown? How have consumer preferences changed during the COVID-19 pandemic?

Objective of the study: Classify the influence of irrational factors on consumer choice.

Behavioral macroeconomics studies the causes and consequences of the influence of emotional and psychological factors on economic decision-making at the macro – level, as well as changes in economic variables due to the influence of social factors [4].

The first economist to pay attention to irrationality in economics was Adam Smith (1776) [1]. He argued that people's desire for wealth, which is one of the engines of economic relations, is nothing more than an attempt to attract attention and stand out from the others, thus causing their response in the form of praise and recognition. However, in The Leisure Class Theory [2], the role of psychological, social, religious factors is associated with their influence on economic decisions made by individuals, and the author proved that these decisions in fact often undermine the well-being of the individual, and do not strengthen it.

Despite the fact that economic activity is primarily determined by rational motives, a significant part of it is closely associated with irrational incentives [9]. As incomes rise, the propensity of society to consume grows, and when incomes decrease, it also decreases, but slowly. The research of J. M. Keynes served as the basis for new researches, the purpose of which was to study the role of psychological factors in the fluctuations inherent in the market system [5], the construction of a model of rational choice [6], the use of economic analysis methods to study human behavior [7], the study of the reasons for the differences between neoclassical theory and the real circumstances of economic decision-making [8].

This study proves that the main behavioral factors can influence the economic behavior of consumers when making decisions. But it was not until the 2000s that sporadic behavioral economics studies began to appear, the authors of these works sought to understand in detail how a consumer makes a purchase decision. Gunduz Caginalp (professor of mathematics and editor-in-chief of the Journal of Behavioral Finance, 2000-2004) [3], as well as his co-authors: Nobel laureate (2002) Vernon Smith, David Porter, Vladimir Iliev, Ahmet Duran, Don Valenovich and Ray Sterm studied the possibility of identifying behavior trends. Psychological factors influence economic growth indirectly and gradually through an increase in aggregate supply and demand, consumption, investment and savings [10]. Nevertheless, there is a serious gap in the description and explanation of phenomena occurring simultaneously under the influence of rational and irrational factors, if both economic and non-economic motives are present [11]. The world crisis of 2008-2010 served as a recognition of the need to take into account psychological factors when forecasting the economic growth of a country [11]. Herd behavior, the level of trust, optimism and pessimism, as well as other psychological phenomena, according to scientists, play a decisive role in making economic decisions [12].

2 Methods

As a part of a comprehensive study of irrational factors affecting the decision to purchase, it was decided to conduct a questionnaire survey of Moscow residents over 18 years old with a calculated quota sample. The selection of the sample was determined by a number of social and economic characteristics of the region, indicating the highest level of effective demand and consumer activity of the population.

The object of the study was residents of the city of Moscow over 18 years old. The subject of the research was the state and characteristics of consumer behavior, consumer choice criteria, as well as irrational factors that determine consumer behavior. The objective of the study was to assess the influence of irrational factors on the formation of consumer choice criteria when making a purchase decision.

The research was based on the quantitative approach in its implementation. Note, that the research hypothesis development involved the preparation of the toolkits containing a block of questions that reflect the characteristics of consumer behavior when making purchases. The questionnaire form contained a number of questions characterizing irrational factors, including Anchoring Effect, Mutual Benefit, Herd Behavior, Loss Aversion and others in accordance with a certain scale to identify the degree of their influence.

The calculation of the sample size for a quantitative survey of consumers, consumer goods and food products with a known volume of the general population was carried out according to the following formula 1:

$$n = t^2 \sigma^2 N^2 / (N \Delta^2 + t^2 \sigma^2), \quad (1)$$

where: n – the size of the sample, Δ – the value of the permissible error in shares, N – the value of the general population, t – the confidence coefficient (reliability criterion), σ – the variance or measure of dispersion of the studied feature, characterizing the deviation from the average values in the general population. The determination of the required number of sample units was based on the following parameters: the marginal sampling error – 0.05, and the confidence coefficient – 2 with a variance of 0.5. These parameters provide high reliability of survey results in 95% of cases with a marginal error of $\pm 5\%$.

According to official data, 12,615,300 residents lived in Moscow as of January 01, 2019 [13]. Considering that, in accordance with the program and objectives of the study, it was planned to interview adults (of working age and older than working age), the general population was made up of these categories of Moscow residents (Table 1).

Table 1. Distribution of the adult population of the city of Moscow by sex and working capacity in 2019.

Gender	Working age	Over working age	Total, thousand people	Share, %
Male	3 708.0	1 131.4	4 839.4	45.27
Female	3 484.8	2 365.7	5 850.5	54.73
Total	7 192.8	3 497.1	10 689.9	100

In accordance with the fact that the presented general population is distinguished by its heterogeneity, it was decided to quote the sample population by sex. In fact, the study collected and accepted for analysis data from 400 residents of the city of Moscow, which made it possible to obtain a holistic picture of the impact of irrational factors on consumer behavior, as well as to assess their influence. The research plan and program were drawn up in accordance with the methodological foundations outlined in fundamental and applied

researches on sociology, marketing, and management. To analyze the data of the survey questionnaire, a database was formed using the Qlik Sense software package. The processing of the collected information and basic calculations were carried out by constructing frequency distributions based on the survey, as well as tables of interconnection of the parameters of control questions with the socio-demographic data of the respondents.

The distribution of respondents by average income was compiled to check the sample representativeness. A uniform distribution of income hypothesis in the sample is tested. Figure 1 shows a histogram of the income distribution among the respondents in comparison with the theoretical equal distribution.

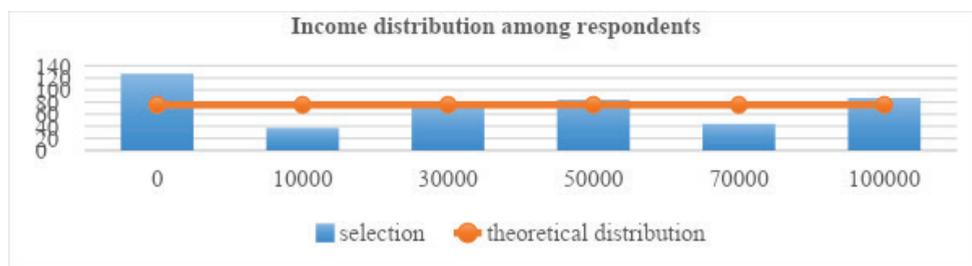


Fig. 1. Statistical series alignment.

According to Pearson's goodness-of-fit criterion at a 5% significance level (95% is the confidence level), the hypothesis about the empirical distribution consistency with the theoretical one is accepted. Random outliers in the first interval of profitability values (up to 20,000 rubles) are explained by the addition of participants who answered "I find it difficult to answer". Among the respondents there were students with non-permanent earnings. It is in this range of values that we have the greatest deviation. However when all possible values of income were divided into six intervals, the observed value of the Chi-square test was 70.85 at the critical one, with a significance level of $\alpha = 0.05$ and the degree of freedom

$k=n-1=452$ equal to 401.82. Since $\chi^2_{observed} < \chi^2_{0.05;452}$ we have no reason to reject the hypothesis of an even income distribution among the respondents. Thus, the sample is representative not only by gender, but also by the average income of the respondents.

3 Results

The economic downturn caused by the coronavirus pandemic has changed consumer behavior in Russia [15]. The end date of the pandemic is unknown, and it is too early to talk about economic recovery. Under these conditions, the consumer behavior of Russians is associated with the rationality of choice and the desire to save money. Among the surveyed Russians, a fairly large part (32%) is skeptical about new products and is not ready to purchase innovative products in the context of a pandemic. Only 6% of respondents are the innovators who are most risk-prone, susceptible to innovative products, and buy them when they first appear on the market. The respondent tendency to save is marked by their readiness to repair broken things (45.5%) instead of buying new goods. However, the majority of Russians is ready to purchase new things instead of broken and damaged ones (49.6%), which indicates the potential for purchasing innovative goods. During the pandemic, Russian residents have become smarter about making purchases, as evidenced by the analysis.

The hypothesis about the average income independence of the population and the volume of expensive goods purchases was tested to confirm the reasons for choosing goods. We have used the Chi-square test to determine independence for which we have compiled a contingency table of features in order to test the main hypothesis (2).

$$H_0: P(X = x_i, Y = y_j) = P(X = x_i)P(Y = y_j), \quad i = 1, \dots, 6; j = 1, \dots, 5 \quad (2)$$

The first X is the average income of the respondents ($k = 6$ intervals of possible values), and the second sign Y is the purchase of expensive goods ($l = 5$ answer options: never, rarely, irregularly, regularly and often).

As a result of calculations the observed Chi-square value was $\chi^2_{observed} = 44.232$ at critical $\chi^2_{\alpha, (k-1)(l-1)} = \chi^2_{0.05; 20} = 31.41$. Since $\chi^2_{observed} > \chi^2_{0.05; 20}$ the main hypothesis about the independence of features is rejected. That is, we have reason to assert about an obvious connection between the population income and the expensive goods purchases. However having decided to detail this feature in order to identify the irrationality of the population behavior, we have noticed attention to such indicators as the growth of active customers on the Moscow Exchange and new cars sales, which showed a noticeable increase during the pandemic. After conducting a correlation analysis between the main feature – the population average income and by two factors – the number of active individuals of the Moscow Exchange and new cars sales, we may state the relationship between the level of income and investment. The linear correlation coefficient was 0.58, which indicates its significance. This fact is quite explainable by people desire to preserve their savings during inflation.

But the correlation coefficient between income and new car sales was about $r \approx 0.15$. We have compiled statistics to check the significance of this coefficient according to the Student's test (3):

$$T_{observed} = \frac{r}{\sqrt{1-r^2}} \sqrt{n-2} \approx 0.92 \quad (3)$$

Statistics selected from January 2018 to February 2021. And the number of considered periods (months) was $n = 38$. Critical value of statistics:

Since $T_{observed} < t_{\alpha/2; n-2}$ then the hypothesis that the correlation coefficient is equal to zero is accepted. According to the Student's criterion, there is no significant linear correlation between the population income and new car sales. We see a paradox: new cars are an expensive product and, according to the principle of rationality, the demand for them should not have increased. But we observed a completely opposite picture (Fig. 2). We have examined the average monthly income in Russia for the period from January 2018 to February 2021. During the same period, we have analyzed the volume of new car sales in Russia [14].

The connection between loans received and new car purchases seems obvious in this case. But the correlation coefficient turned out to be insignificant, amounted to -0.12 even

between these indicators. It has showed even though weak, but the opposite trend. The loans demand has slightly decreased with the increase of new car purchases (Figure 3).

This trend may only be explained by the irrational thinking of Russian consumers during a pandemic. It can be a result of uncertainty in a future or any other reason. This fact allows the automotive industry income to grow. Therefore, a more detailed consideration of this issue is required.

Discussion When determining the degree of influence of irrational factors on consumer behavior when shopping, special attention should be paid to such factors as the snob effect, the degree of trust, the momentum effect, the Diderot effect, the prospect theory, the Inequity aversion, the overconfidence, the anchoring effect. It is also worth considering factors that influence to a lesser extent, but also play a role in economic decision-making, such as the money illusion, the effect of possession, the “less is better” effect, the loss aversion. This analysis confirms the theory of R. Schiller and J. Akerlof, who study irrational factors that influence customer behavior when making a purchase decision.

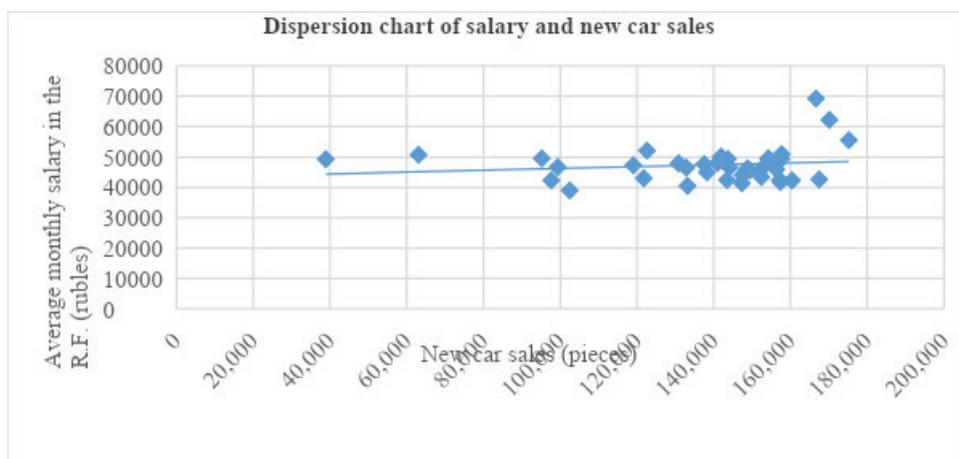


Fig. 2. No correlation between average salary and new car sales.

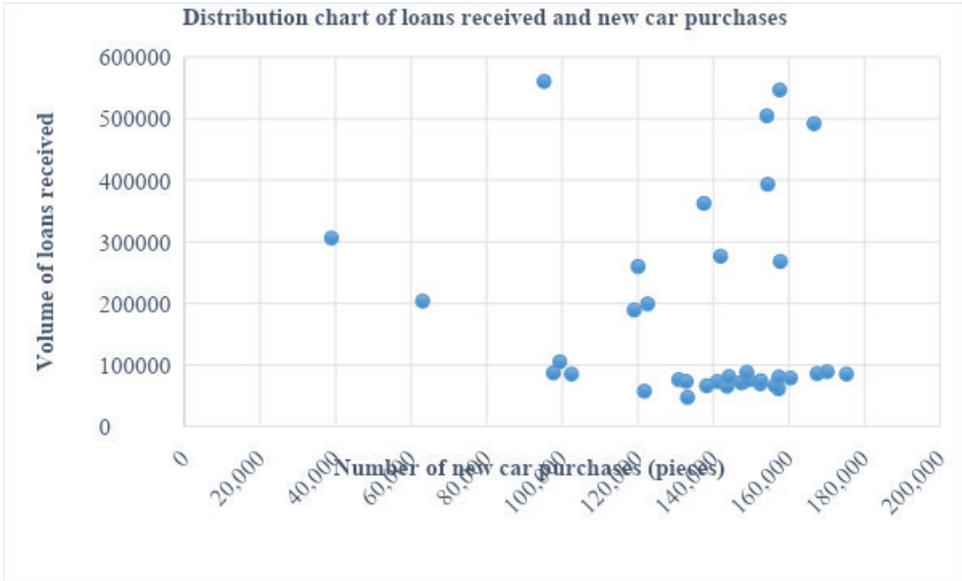


Fig. 3. No dependence between the loans received and new car purchases.

To determine the degree of influence of irrational factors, the respondents’ answers, based on a given scale, were grouped into four groups: “strong reaction”, “moderate reaction”, “weak reaction”, “no reaction”. The results obtained indicate that an insignificant part of the population (Fig. 4) is strongly influenced by such factors as the Anchoring Effect, the Momentum Effect, the Status Quo (1.5%, 5.3% and 4.5%, respectively), while the Snob Effect is manifested only in 48% consumers. During the crisis, mutual benefit gained particular importance (34.8%). At the same time, a moderate and weak reaction of buyers to impulsive purchases is noted (momentum effect) (37.3% and 40.3%, respectively). Russian consumers have become more cautious about their decisions, as unjustified confidence (overconfidence) is characteristic of only 12.8% of the population.

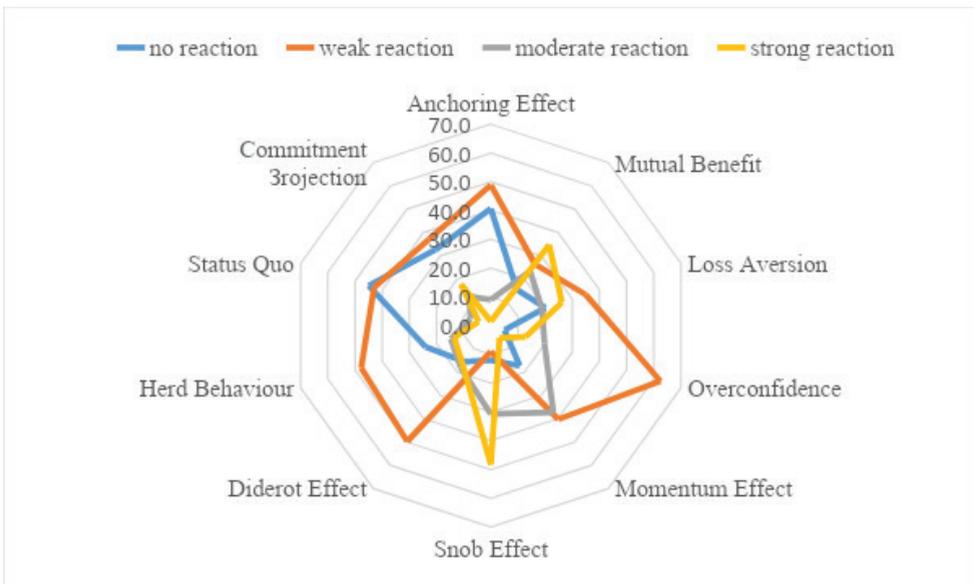


Fig. 4. Grouping of irrational factors according to the degree of their influence on consumer behavior. Source: compiled by the authors.

The study revealed that irrational optimism convinces buyers to purchase a product as much as possible (76.3% – in favor against 23.7%). Customers evaluated the product by comparing it with similar products and referring to their own past experience. In a moment of uncertainty, a person makes purchases based on their own previous experience (89.5% of respondents). However, 77.1% of respondents prefer to read customer comments or a review when it comes to buying a new product. The mentality of Russian citizens is such that, in general, they are not ready to make rash purchases (62.6%). Definitely, consumers rarely refuse to make planned and desired purchases. But the analysis showed that even in the case of the proposed loan, Russian citizens (65.5% of respondents) are ready to refuse to make a purchase. However, 76% of respondents are ready to save money and buy goods in the future. Moreover, about 60% of respondents do not give up the idea of an acquisition, even if there is no money at the moment.

Moral and ethical factors also restrained respondents from joint purchases with relatives or friends (40.8%), at the same time, 32% of respondents make purchases “jointly” if it concerns a joint celebration. During the pandemic, Russian citizens have become more restrained in purchasing goods, as evidenced by the data. Thus, the majority of the respondents admitted that they are ready to completely abandon the purchase (57%), if the amount of resources available at the moment does not correspond to the degree of emotional persuasiveness of the arguments.

Under the influence of the momentum effect, almost all respondents make purchases (94.9%), however, 37.3% of respondents do it very rarely and 40.3% sometimes. On a regular basis, impulse purchases are made by 17.3% of respondents. It is also worth noting that consumers made a purchase decision to a greater extent under the influence of the nominal amount, rather than the real purchasing power of money (55.1%), and are to a lesser extent guided by real prices (45%).

The analysis showed that during the crisis, people are inclined to hoarding, and they are in the majority (79%). They buy goods for future use, knowing that the prices of goods will increase. Moreover, people (83.3% of respondents) often buy lowcost goods related to the main one. It can also be noted that people (50.5%) are generally not ready to purchase expensive, unnecessary goods that show status and social belonging. It should be noted that personal opinion and experience are the defining characteristics when making a purchase (89% of respondents), but the effect of the crowd is confirmed to a greater extent by women than men, 42% and 23%, respectively.

In a situation of uncertainty, a person is afraid of the unknown, changes and prefers to purchase goods with familiar characteristics (Status Quo). Only 6% of respondents purchase any new product as soon as it appears on the market, and 32% of respondents never purchase a new product when it first appears on the market. In the course of the study, it was revealed that only 9.3% of respondents buy new products, focusing on their characteristics, if they are really interested in it. However, 45% of respondents believe that new products are necessary to replace the usual things; only 5% do not agree to replace them with new ones.

The degree of trust influences the preferences of buyers and is an important condition for choosing a product or service. A clear understanding of the specifics of building trust in goods or services can be useful when carrying out activities to promote products to the market. The study revealed that 74.3% of respondents trust their own opinion more, 10.3% – the opinion of friends, 10.3% – reviews of other buyers and only 5% trust advertising

messages. At the same time, women are characterized by greater confidence in their own opinions (40.5%) than men (33.7%).

The analysis revealed that when it comes to making a risky purchase decision, 73.0% of respondents are not ready for this, and it is more important for them to avoid loss than to gain profit. Moreover, about 10% more women perceive losses more acutely than men.

The current crisis is forcing consumers to change their preferences (Fig. 5).

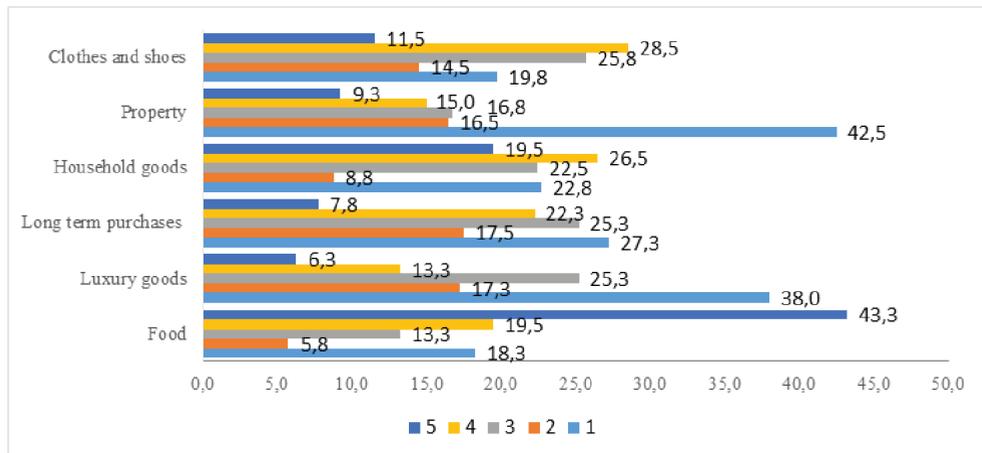


Fig. 5. Grouping of irrational factors according to the degree of their influence on consumer behaviour. *Source: compiled by the authors*

Thus, the category of goods “food” is the main one for the respondents (81%), the category of “household goods” also occupies a special place (68.5%), and the attitude towards “shoes and clothes” has changed: only for 40% of respondents this category remained important, the rest of the respondents (60%) did not attribute it to the first degree of necessity. As for luxury goods and real estate, Russian citizens (60.6%) see no reason to purchase goods of this category. Even such long-term purchases as a TV, refrigerator, etc. have ceased to be important for the majority (70.1%) of the respondents.

4 Conclusion

This study showed that in a pandemic, irrational factors influence the consumer behavior of Russians, but the assessment of this influence demonstrated a variable degree of such influence. Some factors, in contrast to previous periods of time, for example, such as Anchoring Effect, Momentum Effect, Status Quo do not have a strong impact on the majority of Russians in a pandemic. It was found that a number of factors have a moderate and weak influence, for example, Overconfidence, Impulse Buying. The factors that have a significant impact on the behavior of Russian consumers in a pandemic include factors such as Mutual Benefit and The Snob Effect.

The study also showed that in the context of the coronavirus pandemic the preferences of Russian citizens have changed. During pandemic consumers buy mainly food and household goods, while clothes and shoes are no longer essential goods, luxury goods and real estate are no longer important, and long-term purchases are also postponed. Russian consumers tend to save money and are not ready to take out a loan to buy; they prefer to save money for future large purchases. In the context of the pandemic, Russians do not have the desire to purchase new innovative products and make rash and risky purchases.

Taking into account the revealed features of the influence of irrational factors on making decisions to buy goods in a pandemic, it becomes urgent to further study the possibility of influencing consumer behavior by developing marketing measures during the lockdown period and after the end of the pandemic.

References

1. A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Oxford University Press, 1976)
2. T. Veblen, *The Theory of the Leisure Class: An Economic Study of Institutions* (The Macmillan Company, New York, 1899)
3. G. Caginalp, J. Psych. Fin.l Markets, **3(2)**, 72-75 (2002). https://doi.org/10.1207/S15327760JPFM0302_01
4. A. Gorbunova., T.A. Ason, O.E. Ustinova, Mod. Sci.: Act. Prob. Theory Pract. Ser.: Econ. Law, **05(2)**, 5-9 (2021). <https://doi.org/10.37882/2223-2974.2021.05-2.02>
5. J.M. Keynes, *General Theory of Employment, Interest and Money* (Biznescom, Moscow, 2013)
6. G. Katona, *Psychological Analysis of Economical Behavior* (McGraw-Hill, New York, 1951). <https://doi.org/10.2307/1907857>
7. H. Simon, *Models of Man: Social and Rational* (John Wiley & Sons, New York, 1957)
8. G. Becker, *The Economic Approach to Human Behavior* (University of Chicago Press, 2013)
9. D. Kahneman, A. Tversky, *Econometrica* **47(2)**, 263-291 (1979)
10. R. Thaler, H. Sunstein, R. Cass, *Nudge: Improving Decisions About Health, Wealth, And Happiness* (Yale University Press, New Haven, 2008). <https://doi.org/10.1017/S1474747209990175>
11. J. Akerlof, R. Schiller, *Spiritus animalis* ili kak chelovecheskaya psikhologiya upravlyaet ekonomikoi i pochemu eto vazhno dlya mirovogo kapitalizma [*Spiritus animalis* or how human psychology manages the economy and why it is important for world capitalism] (Moscow, 2010)
12. J. Heckman, *Longitudinal Analysis of Labor Market Data* (Cambridge University Press, 1985). <https://doi.org/10.1017/CCOL0521304539>
13. Rossiiskii statisticheskii ezhegodnik [Russian statistical yearbook] (2019). Accessed on: March 09, 2022. [Online]. Available: <https://rosstat.gov.ru/?http://www.gks.ru/>
14. Statistika prodazh avtomobilei v mire [World car sales statistics]. Accessed on: March 09, 2022. [Online]. Available: <https://auto.vercity.ru/statistics/sales/>
15. A.I. Ukhova, A.D. Okolnishnikov, N.A. Belyaev, Bul. South Ural State Univ. 178 Ser. Econ. Manag., **15(1)**, 176-181 (2021). <https://doi.org/10.14529/em210118>

Assessment of management decisions using graphs

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Abstract. Economic and managerial sciences always deal with a high level of uncertainty, and the environment in which managerial decisions are made (and any other decisions in general) is dynamically changing. It turns out that the results of decisions taken in the field of economics and management (by corporations or the state) are mostly not subsequently analyzed, since on the one hand – evaluation criteria are not set, and on the other hand – the macro- and microenvironment changes so much that it is not clear whether the changes were related to the decision taken. Thus, the problem of assessing the consequences of the decisions taken has not yet been solved, and the existing approaches and solutions do not justify themselves, since, on the one hand, they are too complex, and on the other hand, they do not lead to improving the efficiency of activities. The paper proposes an approach in which the consequences of decisions are analyzed using graphs of a particular key indicator.

Keywords: management decisions, management, schedule, decision-making

1 Introduction

The problem of evaluating decisions is still quite acute on the agenda. This is especially true of the state and corporate levels of governance, for example, the state regularly makes decisions (laws, government resolutions, presidential decrees) in the field of economic and social development, the same thing happens at the regional level, in corporations, but what consequences these decisions often lead to is not clear. In any case, the currently available approaches and methods are mainly based on several control points (Key Performance Indicators, KPIs), which, on the one hand, must first be correctly determined, and on the other hand, they must be regularly evaluated.

We consider our proposed graph-based approach to evaluating decisions to be more correct and effective, since: firstly, it is based on a single indicator (which can also be complex) and does not require complex calculation, secondly, it allows us to consider the situation in dynamics, and thirdly, due to the graphical representation, it helps to assess the situation faster and make new decisions. For example, if we do not see growth on the company's stock chart after the appointment of a new CEO or president (or the

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implementation of a particular project by the company), then we can negatively evaluate these decisions. The same applies to public administration bodies, the assessment of the activities of mayors and governors

– if the schedule does not reflect the positive consequences of the appointment of a manager, then the effectiveness of his work can already be questioned.

This approach, although presented separately for the first time at this conference, has already received scientific confirmation, its main ideas are set out in an article published in the Journal Economic Policy (issue: 6, 2019, pages: 82-101) “Economic security index as a tool for assessing the development of agro- industrial regions” [1], in addition, we applied the same methods when evaluating decisions on economic integration in research commissioned by the government of the Russian Federation “Development of an online system for collecting, storing and analyzing information on cross-border financial flows” in 2019 [2].

2 Materials and Methods

Our approach, based on the representation of socio-economic events through graphs, grows out of such a phenomenon as technical analysis. In our work in the journal Problems of Modern Economics (No. 4 (72) Year: 2019 Pages: 109-113) “The evolution of forecasting methods (technical and fundamental analysis) of the movement of financial markets” [3], we made a complete review of this concept, referring to the opinions of 30 sources, including the use of technical analysis methods not only in financial markets, but also for forecasting socio-economic phenomena.

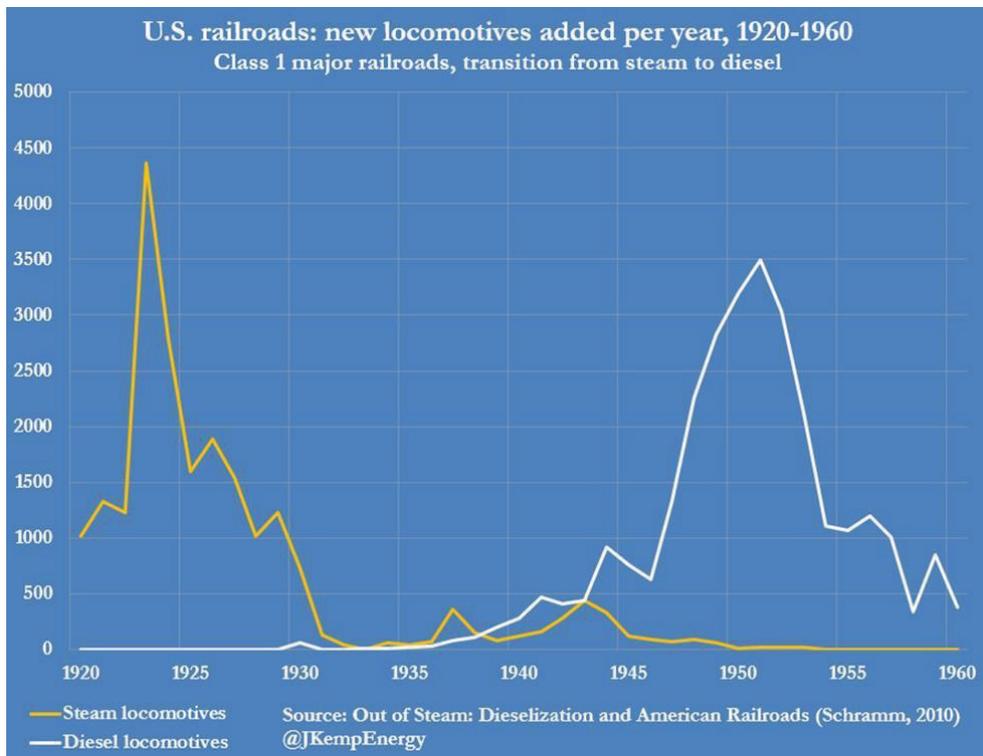


Fig. 1. American railways, dynamics of the use of locomotives with steam and diesel engines by year [4].

The chart clearly shows 2 triggered head-shoulders technical analysis figures, first on yellow, and then on white. This example shows that the principles of technical analysis can be transferred to broader phenomena based on market power, since all quantitative indicators in the economy are also based on demand, and demand underlies price movements in financial markets.

We have also developed a hypothesis for further research – technical analysis allows us to draw conclusions about any series based on human behavior, if at the same time human behavior is largely based on market principles, and people interact with each other through the mechanism of the market.

In the already mentioned article “Economic Security Index as a tool for assessing the development of agro-industrial regions”, the method of evaluating management decisions through graphs was presented more broadly. First, I must say that The Omsk Scientific Center of the SB RAS has been developing the problems of economic security of the region (ESR) since 2013. During this time, the methodological aspects of the economic security of the region have been studied [5], also a system of ESR indicators, a methodology for calculating the integral index and ESR estimates have been formed. Mathematical algorithms for modeling [6], forecasting and evaluation of individual areas of the EBR have been developed and tested [7]. The analysis of economic security is carried out on the example of the Omsk region and other subjects of the Russian Federation [8]. Within the framework of the adopted approach, the economic security of a region is an integral characteristic of the state of its economy, which reflects the level of its protection from threats to development and takes into account the impact of social and financial factors.

Accordingly, in the article [1] we did not try to justify the method of determining the index of economic security of the region, but its application in practice. Unfortunately, in the process of working on the article, it was necessary to delete passages related to the relationship of economic security and competitiveness of the region, nevertheless, the comprehensive indicator of economic security of the region developed at the Omsk Scientific Center can act as a 100% objective indicator of the economic, social, and financial condition of a region, the dynamics of this indicator presented on the graph allows us to judge the consequences of the decisions taken in the region.

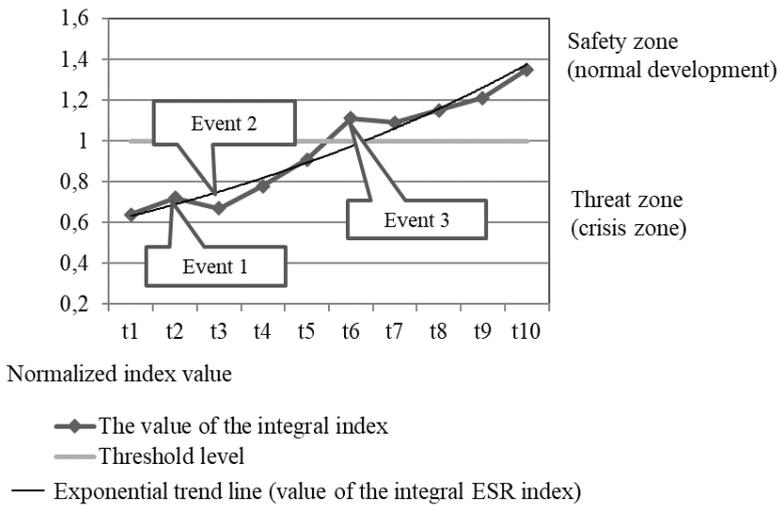


Fig. 2. An example of the dynamics of the integral index with the plotting of events on the graph.

Figure 2 shows an example of how the economic security index of a region can be used. From the figure, during the time period t1-t6, this region was in the threat implementation zone, but the security level is gradually increasing, and the region is moving into the zone of normal development. The location of the economic security index in the crisis zone and/or its negative dynamics indicate, first, the deterioration of the socio-economic situation in the region, which requires appropriate management measures.

In Fig. 2 shows a hypothetical example of such a diagram, in this case, “Event 1” could be the development of a region the regional development concept (or strategy or brand of the region), “Event 2” – the appointment of a new Governor, “Event 3” – the adoption of a new regional legislation, etc.

In this approach there is a possibility of making a forecast of the economic security index, and therefore the socio-economic development of the region.

3 Results

Based on the use of autoregression models and integrated moving average, Holt and Brown using the IBM SPSS Statistics software package, we have developed a forecast for the socio-economic development of the Siberian Federal District:

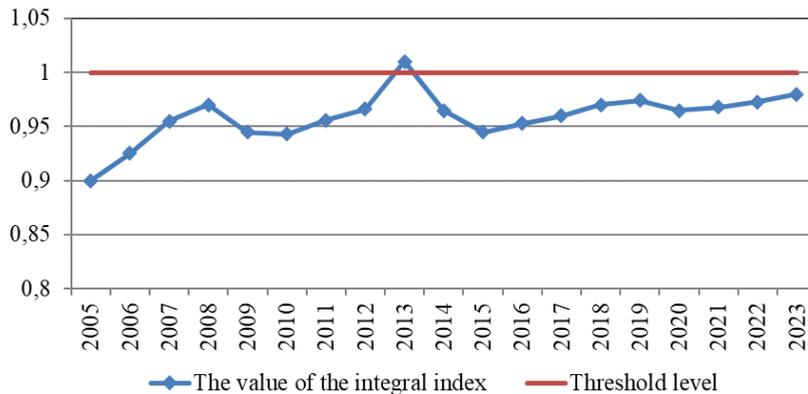


Fig. 3. Integral index of economic security of the Siberian Federal District with a forecast until 2023.

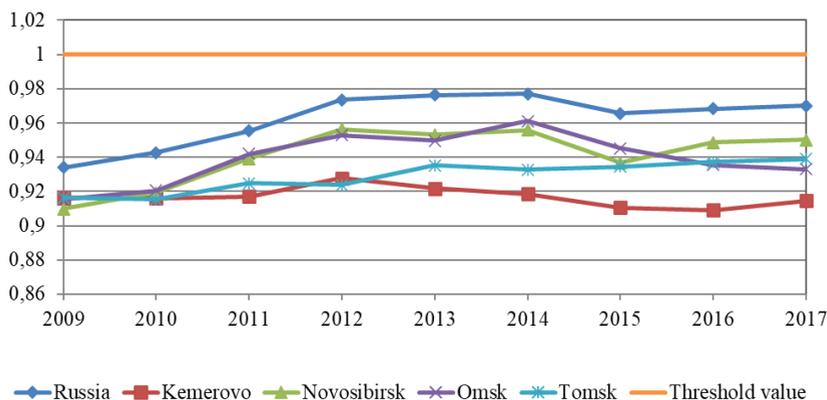


Fig. 4. Integral indices of the social sphere of the subjects of the Russian Federation.

Another important advantage of our approach is that it becomes possible to compare regions, both with average indicators and among themselves, Figure 4 shows an example of such a comparison by the indices of the social sphere of several Siberian regions.

As you can see, the social sphere of the designated Siberian regions is developing in a close trend, but nevertheless it lags below both the threshold value and the all-Russian indicators.

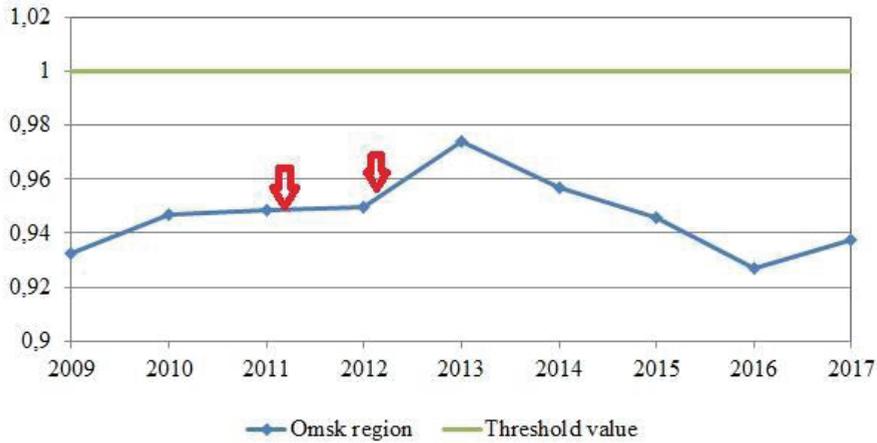


Fig. 5. Integral index of economic security of the Omsk region.

In 2011, the brand of the Omsk region was adopted, a program for promoting the brand of the region (economic and event) and a program for information and communication support of the brand was developed.

On April 3, 2012, Russian President Dmitry Medvedev proposed the candidacy of Viktor Nazarov for the post of Governor of the Omsk region. On October 9, 2017, he was dismissed from office by the decree of the President of Russia ahead of schedule at his own request.

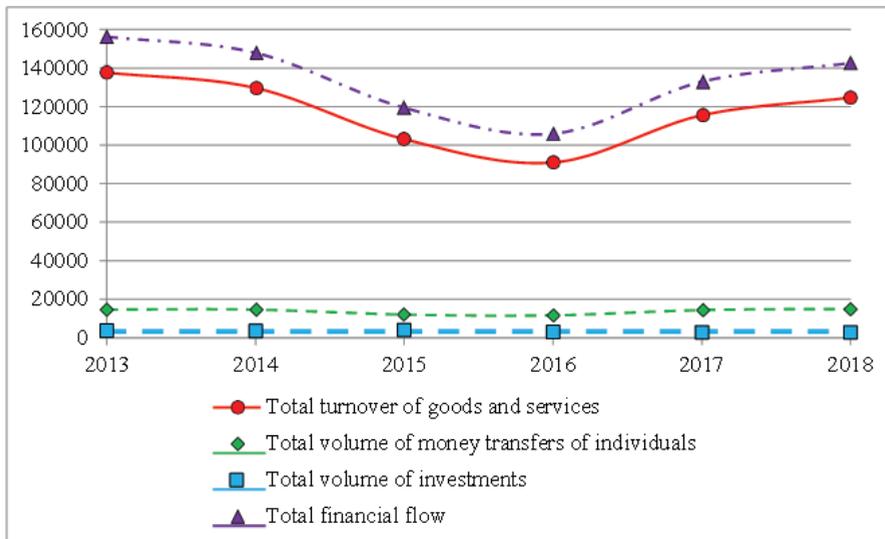


Fig. 6. Total cross-border financial flows between the Eurasian Economic Union countries in terms of turnover of goods and services, money transfers of individuals and mutual investments, million USD.

As can be seen from the graph, none of these 2 events (red arrows on the graph) had a positive impact on the integral index of economic security of the Omsk region, therefore, the decisions taken then can be considered ineffective.

At the Research commissioned by the Government of the Russian Federation “Development of an online system for collecting, storing and analyzing information on

cross-border financial flows” based on the methodology developed during this study, we presented graphs of cross-border financial flows in the Eurasian Economic Union.

Figure 7 shows total financial flow in the EAEU, a real event happened in October 2015 – at the Supreme Eurasian Economic Council, the Presidents of the five Union countries approved the Main Directions of Economic Development of the Eurasian Economic Union, defining promising directions of socio-economic development of the Union for the period up to 2030 (you can see that after that decision (marked with red arrow) in 2016 the total financial flow went up).

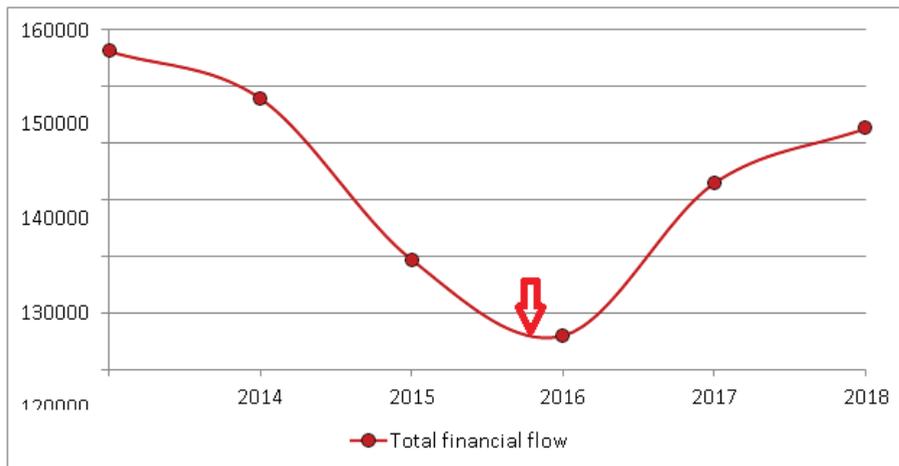


Fig. 7. Graph of the impact of decisions on the desired result (total financial flow in the EAEU).

As you can see, this decision has had a positive impact on financial flows and they have begun to grow, the reasons may not only be in this, but nevertheless we can see what the decisions have led to.

4 Discussion

As we said in the introduction, currently one of the main methods of evaluating decisions is KPI and this topic is quite well developed, we can mention Paulo Roberto Martins de Andrade and Samira Sadaoui, who write about “Improving business decision making based on KPI management system” [9], David Hatch with the work “Making Smart Decisions: The Role of key performance indicators” [10], Martina Jakobova, which writes about “Key Performance Indicators for Supporting Decision-Making Process in Make-to-Order Manufacturing” [11].

We can also mention the work of L. Stankova “Management decisions – realization and assessment” [12], where she argue that the effectiveness of the management decisions made in the organization largely depends on various factors. First, it is the environment, in which decisions are made, which “influences through economic, competitive, social, market, political, and technological factors and conditions”. Another important factor that affects the effectiveness of the decisions made is the manager’s choice of an approach and style to be applied and the degree to which the manager chooses to attract and involve employees in the management decision-making process. But in this article author do not give any approach how to evaluate management decisions.

Magradze Tengiz from Georgia in the article “New methodology of evaluating the efficiency of managerial decision- making” says that assessment of the effectiveness of

managerial decision making directly affects the functioning of the organization as a whole [13]. As long as the organization maintains a hierarchical structure, where some elements have a controlling influence on others, it is necessary to study the decision-making methodology and evaluate their effectiveness. He offers to use SWOT analysis for that purpose.

In the article “KPI-Based Approach for Business Process Improvement” authors propose an approach to business process improvement based on key performance indicators during the Business Process Management lifecycle, they also build a meta-model based on key performance indicators [14]. Which we think makes decision assessment very complex and difficult.

The KPI method was also researched by a group of authors in the article called “A Method for Key Performance Indicator Assessment in Manufacturing” [15]. The method developed in this paper for KPI assessment draws heavily on organizational stakeholder involvement at varying levels throughout the KPI assessment process, improving current methods by introducing a mathematical foundation based on value- focused thinking. In our view this is also a very difficult to calculate especially in practice.

In general, the KPI-based approach has serious drawbacks, firstly, someone has to justify and determine the indicators themselves, for example, the percentage of economic or industry growth, the number of employees, the number of beds in hospitals, etc., etc. But if these indicators are objective, their dynamics are laid down analytically, i.e. the planned results are subjective. In addition, the achievement of control points may not be related to the decisions taken but may be a consequence of the development of a trend when the economy and society itself, without managerial influence, achieves its goals.

Another disadvantage is the complexity of calculations and the impossibility of their representation in dynamics. A large number of control points require a separate bureaucratic structure for making calculations, checking data, etc. If this does not make the evaluation process impossible, it certainly does not simplify it. In addition, decision makers do not have enough time to analyze many control points, especially since these points may or may not manifest themselves without managerial influence.

The method and calculations presented by us make it possible to significantly simplify the evaluation process, although several problems arise here. First– what will be on the chart? A comprehensive indicator, such as the economic security index developed in Omsk, is of course preferable. The cash flows that we calculated in the study commissioned by the government are also quite objective as an indicator. But, for example, the dynamics of stock prices is influenced not only by intra-company decisions, but also by many other factors, such as the valuation of a security, the level of volatility, bull or bear market, etc. Therefore, in this case, we will need additional research.

The second problem is that with the help of further research (especially on the economic security of the regions) we will be able to answer a more complex question. In general, do management decisions have at least some impacts on the economic and social sphere of the regions? It can be ruled out that such a position as the governor of the region cannot change anything, which means that regional economies and societies live according to their dynamics, which cannot be changed by any managerial influences. The same conclusion can be made with respect to large corporations such as Gazprom, Sberbank, etc.

5 Conclusion

The demonstrated approach can become an element of the public administration system, when decisions are applied to the timeline and correlated with the corresponding effective

schedule, in our case, these are economic security schedules and the general schedule of cross-border financial flows in EAEU, but it can also be other schedules – GDP, budget revenues, demography, etc.

In our father research we plan to correlate the charts of shares of Russian corporations with the decisions taken by the management of these companies.

References

1. R. Khasanov, A. Korableva, *Econ. Pol.*, **6**, 82-101 (2019)
2. V.V. Karpov, B.G. Khairov et al., The development of online system for the collection, storage and analysis of information on cross-border financial flows (Financial University under the Government of the Russian Federation, Omsk, 2020)
3. R. Khasanov, *Prob. Mod. Econ.*, **4(72)**, 109-113 (2019)
4. R. Khasanov, *Zadadimsya voprosom — chto na samom dele izmeryaet tekhnicheskii analiz?* [Let's ask ourselves — what does technical analysis actually measure?]. Accessed on: March 09, 2022. [Online]. Available: <https://ftinvest.ru/2019/10/25/zadadimsja-voprosom-chto-na-samo-dele-izmerjaet-tehni-cheskij-analiz/>
5. A.A. Korableva, *Bul. Sib. State Auto. Road Acad.*, **6(34)**, 118-125 (2013)
6. *Teoriya i praktika otsenki ekonomicheskoi bezopasnosti (na primere regionov Sibirskogo federalnogo okruga)* [Theory and practice of economic security assessment (on the example of the regions of the Siberian Federal District)], in V.V. Karpov, A.A. Korableva (eds.) (Publishing house of IEOPP SB RAS, Novosibirsk, 2017)
7. A.Yu. Lagzdin, *Proc. Ural State Econ. Univ.*, **6(68)**, 123-131 (2016).
8. K.K. Loginov, A.A. Korableva, V.V. Karpov, *Sci. Man: Human. Stud.*, **1(31)**, 141-150 (2018)
9. P.R. Martins de Andrade, S. Sadaoui, *Improving Business Decision Making based on KPI Management System*, in IEEE International Conference on Systems, Man, and Cybernetics (SMC), Canada (2017)
10. D. Hatch, *Making Smart Decisions: The Role of Key Performance Indicators* (2017). Accessed on: March 09, 2022. [Online]. Available: <https://esj.com/articles/2007/10/30/making-smart-decisions-the-role-of-key-performance-indicators.aspx>
11. M. Jakabova, *Key Performance Indicators for Supporting Decision-Making Process in Make-to-Order Manufacturing*. Research papers. Faculty of materials science and technology in Trnava. Slovak university of technology in Bratislava (2012)
12. L. Stankova, *Trakia J. Sci.*, **13(1)**, 233-239 (2015)
13. T. Magradze, *Colloq.-J.*, **8(60)**, 141-144 (2020)
14. A. Wannes, S.A. Ghannouchia, *Proc. Comp. Sci.*, **164**, 265-270 (2019). <https://doi.org/10.1016/j.procs.2019.12.182>
15. P.T. Hester, B. Ezell, A. Collins, K. Lawsure et al., *Int. J. Oper. Res.*, **14(4)**, 157-167 (2017)

Problems of digital transformation of energy companies

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Abstract. The transition to a digital economy requires adequate transformation of both the managing and managed subsystems of enterprises, including energy companies. At the same time, there is no unified methodology, so the enterprises carry out the processes of digitalization ad hoc. The purpose of our study is to identify and systematize of the problems of improving the management system in the digital transformation. We propose to analyse the problems separately at each stage of production and combine them with a unified approach to the management system. The methods used are the system method, logical analysis, mental experiment, method of decomposition, method of approximation, expert methods based on statistical processing of the obtained data. Digital transformation requires changes in the entire management system. New models and methods based on the use of artificial intelligence are needed. The introduction of distributed systems as part of digital transformation will change the centralized management system. Basic competencies in the digital economy among managers of energy enterprises are not enough. To accelerate the digitalization, more extensive use of global experience is needed.

Keywords: digital economy, end-to-end technologies, energy enterprises, information system scalability

1 Introduction

The digital transformation of enterprises is caused by the current requirements for a complete change in the management system. Such requirements are due to the global transition to a digital economy [1]. For planned and managed transformation, the national program “Digital Economy of the Russian Federation”, approved by the minutes of the meeting of the Presidium of the Presidential Council for Strategic Development and National Projects on June 4, 2019 No. 7, was approved. The baseline data for the national program were the Decree of the President of the Russian Federation of 7.05.2018 No. 204

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“On national goals and strategic objectives of development of the Russian Federation for the period up to 2024” and Decree No. 474 “On national development goals of the Russian Federation for the period up to 2030” of 21.07.2020. The production and transmission of energy occur in several stages [2].

Energy is a field of human economic activity, a set of large natural and artificial subsystems for the transformation, distribution, and use of energy resources of various types. Its purpose is to ensure energy production by converting primary, natural energy into secondary, such as electrical or thermal energy.

2 Methods

There is an academic debate on the implementation of digital transformation in the energy industry concerning the impact of specific information technologies on the entire process. More often than not, the subject is the affiliation of software and new technologies with foreign countries.

Not all problems caused by the digital transformation have technical solutions. Multiple problems can be grouped into groups related to:

- lack of managerial competencies related to the digital economy and information technology;
- IT products supplied from other countries with the possibility of remote modification (denial of service);
- processing of personal data;
- lack of scientific discipline necessary to improve the digital transformation [3].

Digital transformation in this paper refers to changes in the management system through the widespread adoption of digital technologies. Digital technologies facilitate innovations in business models that either remove bottlenecks in the integration of sustainable energy technologies into existing structures, or bottlenecks related to the independence of sustainable energy technologies from existing structures [4].

Foreign and Russian experts emphasize the crucial role of employees in information security, and the importance of the development of personnel competence in this area.

The work of Giraldo et al., examines the transition from local management strategy at energy enterprises to a global strategy, including synergistic interaction, learning processes, teamwork, communication skills, and mastery of various technological tools. Implementing these tools in an Industry 4.0 environment entails managing volumes of structured data that add value to the information needed for risk management and decision-making [5].

In this regard, it is necessary to optimize (re-engineer) business processes based on digital solutions, taking into account the technical recommendations provided by the system of normative and legal regulation of member countries of the International Telecommunication Union. The main recommendations relate to general tariffing principles; transmission system and environment, digital systems, and networks; and security systems [6].

Some researchers point out that digital transformation in energy enterprises offers unlimited opportunities and is a problem at the same time [2]. Most energy enterprises have critical information infrastructure (CII). Critical information infrastructure in energy enterprises should include management information systems, information and telecommunication networks for information collection and transmission, and automated energy production management systems [7].

The territorial aspect of digitalization is very important. Thus, digitalization makes it possible to improve various aspects of smart cities [8].

A study by Venkatachary et al. focuses on the organization of virtual power plants and consumers of their services [9].

Digital transformation takes place predominantly in four key areas: pollution control, waste management, sustainable production, and urban sustainability [10].

Angelopoulos et al., focuses on the following areas: general strategy and procedural aspects of digital transformation, digital transformation and lean digital management, applications of lean digital transformation, and transforming enterprise resource planning systems into intelligent engaged systems. Finally, this study examines the challenges of digital transformation in the energy utility industry [11].

The importance of organizational learning and organizational knowledge in advancing digital transformation is highlighted in the work of González-Varona [12]. The model developed by González-Varona provides an opportunity to plan actions to develop the necessary digital capabilities to move toward digital maturity.

For policies to be effective in the digital economy and society, they must take into account the interdependent and overlapping characteristics of digital transformation but can be divided into three main categories: (1) scale, scope, and speed; (2) property, assets and economic value; and (3) relationships, markets and ecosystems [13].

3 Results

Digital transformation of energy enterprises is the optimization of enterprise management system using digital technology. The transformation requires:

- making a decision to change the development strategy;
- development of new methods and models of management [7];
- implementation of intelligent systems;
- transfer of routine operations into automated management;
- changes in the organization of the provision of energy products [14];
- optimization of marketing strategy;
- reduction of providing systems.

The analysis of energy enterprises has established redundancy, excessive specialization, fragmentation, and high cost of business processes of energy enterprises due to the position of natural monopolists. A number of authors also note that one of the important problems of successful digital transformation of the energy sector is the low level of technical readiness of the supporting infrastructure, which has a negative impact on the entire management system of enterprises.

The main reason for the unpreparedness of top management to widely implement digital transformation is caused by objective factors. As can be seen from Table 1, there are no specialists with basic education related to the digital economy among the managerial staff of power companies. This was due to objective reasons caused by the lack of “Digital Economy” training profiles when most of the managers received basic education.

Table 1. Number of managers at energy companies with basic/additional education related to the digital economy and information technology (%)

Management level	Thermal power	Hydro power	Nuclear power
Senior Management	0/4	0/14	0/22
Middle Management	0/26	0/20	0/28
Engineering staff	2/14	4/14	8/18
Technical staff	8/16	9/15	8/16

One of the most important problems of the digital transformation of the modern management system of the energy industry is to bring the conditions of digitalization into compliance with the institutional system [15].

The rapid digital transformation of energy enterprises requires an ecosystem, which should be created taking into account the synergy of factors of the territory in which the enterprise is located. Figure 1 shows the relationship between the main properties of the ecosystem of the energy enterprises. Most of the properties are related to each other. Such relations are characteristic of ecosystems.

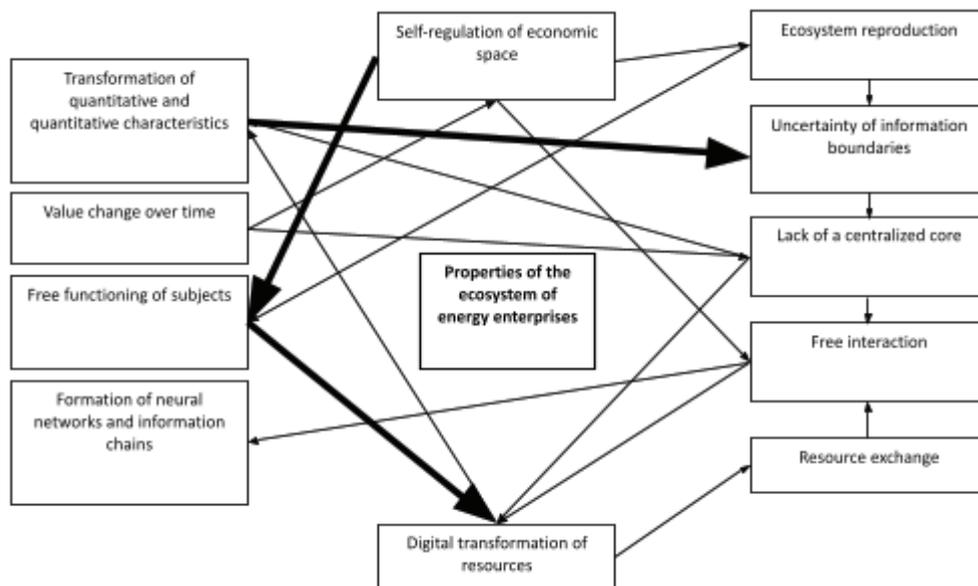


Fig. 1. Relationships of main properties of power companies' ecosystem.

Self-regulation of economic space, conditioned by market relations, relates to reproduction of ecosystem and its main subjects. The processes of reproduction of the modern digital ecosystem must provide a revolutionary advance.

At the same time, the consumption of digital services in the energy sector may indicate not the positive effects of network communication (access to and ownership of information and computer technologies), but the consumer's desire to save money by replacing offline consumption with online consumption, if, other things being equal, the consumer would choose offline consumption. Thus, one of the challenges of digital transformation is to correctly define the boundaries of digital communication [16].

The value change of assets over time, as well as the transformation of qualitative and quantitative characteristics, is not an innovation. Such changes are characteristic of the traditional economy. However, in the process of digital transformation, such processes can move to a new level, which has wave deviations. This effect can have both positive and negative consequences. Figure 2 shows the ripple effect of asset change over time which occurs during digital transformation.

A skilfully executed and fast digital transformation will provide a competitive advantage.

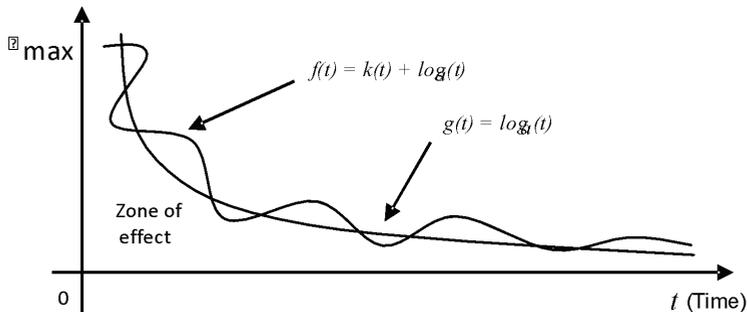


Fig. 2. Wave effect – change in assets over time.

4 Discussion

The digital transformation is not only positive for the economy. The rapid transition in a number of developing countries is causing the so-called “digital divide”, for example in the Republic of South Africa (RSA) the gap between people who have access to digital technology and those who do not is much wider than in European countries [17]. The digital divide is further accentuated by geography.

According to experts, the level of digital transformation in energy enterprises is realized at 5-10% of the potential opportunities. It may follow that the digital transformation of energy enterprises through optimized management and cost reduction may allow a leapfrog development [18].

Helms explores the barriers to servicization in Swiss and German utilities [19]. Asset transformation as a shift from tangible to intangible assets is a major factor in the complexity of the transition of the servicization business model. Development policy managers should support the transition by improving the regulatory framework for energy services and encouraging knowledge sharing within the industry.

The implementation of digital transformation in energy enterprises, determining the distribution system of added value between the participants of the chain, has a significant impact on the configuration of value chains and the territorial location of the production links of these chains. This increases the profitability of assets [20], thus there is an objective need for energy companies to form important competencies for global value chains, primarily on the basis of digital solutions.

For most energy companies, digital transformation is not happening from scratch. Digital transformation must take into account the scalability of the information system. Scalability implies a full set of measures to re-engineer the management system, specialized software, databases, and telecom networks. In digital transformation, scalability should be

assessed through the ratio of information system performance to the cost of resources used [21].

5 Conclusion

Digital transformation cannot achieve the planned effect with the usual digitization of document management. The entire management system should be restructured.

The introduction of new digital technologies will change the usual hierarchical management system and transform it into a more sustainable collective management. Such sustainable management is especially necessary for energy companies.

The result of a successful digital transformation should be an increase in the productivity of each specialist of an energy company, a release from routine work, and a significant reduction in costs.

The results of the study allow us to better understand the nature of the digital economy; to use the experience of digitalization obtained by leading foreign and Russian organizations; to form new principles and requirements for the management system, to improve the planning of digital transformation at energy enterprises, to reduce management costs.

We justify that digital transformation of energy enterprises will lead to the liberation of specialists from routine work and enrichment of labour.

The relationships of the main properties of the ecosystem of energy enterprises are established and the synergistic wave effect arising in the digital transformation is shown.

References

1. S.V. Leshchev, *Sci. Techn. Inf. Proces.*, **42**, 135-139 (2015).
<http://dx.doi.org/10.3103/S014768821503003X>
2. A. Gibadullin et al., *E3S Web of Conf.*, **175**, 14011 (2020).
<https://doi.org/10.1051/e3sconf/202017514011>
3. M.J. Milenkovic et al., *Inf. Devel.*, **32(4)**, 1120-1136 (2016).
<https://doi.org/10.1177/0266666915593136>
4. M. Looock, *Energy Res. Soc. Sci.*, **69**, 101740 (2020).
<https://doi.org/10.1016/j.erss.2020.101740>
5. S. Giraldo et al., *Energies* **14(9)**, 2523 (2021). <https://doi.org/10.3390/en14092523>
6. M. Larionova, A. Shelepov, *Int. Org. Res. J.*, **16(1)**, 32 (2021).
<http://dx.doi.org/10.17323/1996-7845-2021-01-02>
7. V.V. Tatarinov, N.V. Unizhaev, *AIP Conf. Proc.*, **2195(1)**, 020059 (2019).
<https://doi.org/10.1063/1.5140159>
8. S. Talari et al., *Energies* **10(4)**, 421 (2017). <https://doi.org/10.3390/en10040421>
9. S.K. Venkatachary et al., *Int. J. Energy Econ. Pol.*, **10(5)**, 196-207 (2020).
<https://doi.org/10.32479/ijeeep.9602>
10. A.K. Feroz, H. Zo, A. Chiravuri, *Sustainability* **13(3)**, 1530 (2021).
<https://doi.org/10.3390/su13031530>
11. M. Angelopoulos, C. Kontakou, Y. Pollalis, *J. Adv. Res. Manag.*, **10(2)**, 57-69 (2020)
12. J.M. González-Varona et al., *J. Ind. Eng. Manag.*, **14(1)**, 15-24 (2021).
<http://dx.doi.org/10.3926/jiem.3279>

13. OECD Digital Economy Papers, **273** (2019). <https://doi.org/10.1787/5ade2bba-e>
14. M. Dobrota, V. Jeremic, A. Markovic, *Inf. Devel.*, **28(4)**, 271-280 (2012).
<https://doi.org/10.1177/0266666912446497>
15. A.A. Efremov, *Pub. Admin. Iss.*, **4**, 59-83 (2020)
16. D. Konoplev, *J. New Econ. Assoc.*, **49(1)**, 138-164 (2021).
<https://doi.org/10.31737/2221-2264-2021-49-1-5>
17. E. Bornman, *Inf., Commun. Soc.*, **19(2)**, 264-278 (2016).
<https://doi.org/10.1080/1369118X.2015.1065285>
18. E. Kabbar, P. Dell, Weaknesses of the E-Government Development Index, in S. Uesugi (ed.), *IT Enabled Services*, 111-124 (Springer, Vienna, 2013).
http://dx.doi.org/10.1007/978-3-7091-1425-4_7
19. T. Helms, *Energy Pol.*, **91**, 98-112 (2016).
<http://dx.doi.org/10.1016/j.enpol.2015.12.046>
20. V.E. Dementiev, *Econ. Iss.*, **0(3)**, 68-83 (2021)
21. V.V. Dobrodey, L.D. Gitelman, M. Kozhevnikov, *Int. J. Design Nature Ecodyn.*, **11**, 628-634 (2016). <http://dx.doi.org/10.2495/dne-v11-n4-628-634/015>

Developing microgeneration based on RES as a Russia decarbonisation driver

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Abstract. The acceleration of the development of a low-carbon economy in the world is accompanied by the introduction of new measures that stimulate the active use of renewable energy sources (RES) generation. Around the world, a significant share of new local capacities is microgeneration based on RES. In many countries solar panels on the roof of a house has become a common part of the urban and rural landscape. And it is a really effective tool for reducing the carbon footprint of buildings and structures. In Russia today, microgeneration has not yet become widespread, however, the potential of the market for microgeneration based on RES is estimated to be quite large. This article discusses how the renewable microgeneration is developing, what is the mechanism of its functioning. The authors identify two main growth drivers for the microgeneration market in Russia, the main reasons for the current weak development, and what obstacles may appear based on the experience of advanced countries. The authors also assess the prospects for the development of this market in Russia. Having analysed the domestic and foreign experience of developing the market of microgeneration based on RES, the authors conclude that a smart industrial policy can ensure an expedited transition to zero-carbon economy and stimulate economic growth in the country. Research background: Russia’s commitment to achieve carbon neutrality by 2060. Research purpose: assessing the prospects and barriers in the development of microgeneration based on RES. Methods: generalising, comparing, analysing empirical evidence of microgeneration market development in Russia and abroad, calculating the levelized cost of electricity (LCOE) of a solar plant and comparing it with current low voltage tariffs for small and medium-sized businesses. Results and novelty: the authors have determined the most effective industrial policy tools for developing the market of microgeneration based on RES.

Keywords: industrial policy, RES, microgeneration, zero-carbon economy

1 Introduction

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At present, around 80% of countries are committed to achieving carbon neutrality by certain deadlines [1]. Russia is aiming to meet this goal by 2060. According to President Putin's instructions to the Government, the low-carbon strategy of the country's social and economic development through 2050 must provide for a reduction in the volume of net greenhouse gas emissions accumulated from 2021 to 2050 to a lower level as compared to the EU [2].

The housing and utilities sector is one of the world's significant sources of CO₂ emissions. In 2020, the operation of buildings and structures accounted for around 30% of the global demand for energy resources, and emissions resulting from the operation of buildings and structures made around 27% of the overall global CO₂ emissions connected with the power sector [3]. The transition to microgeneration based on RES is an effective tool for reducing the carbon footprint of buildings and structures and boosting energy efficiency and energy savings.

2 Methods

The article outlines an empirical analysis of global experience in developing microgeneration based on RES starting from 2010s. The paper elicits the factors stimulating and hampering the development of microgeneration market and identifies the most efficient tools for supporting microgeneration, which are applicable to the domestic market.

The authors have assessed the development potential of microgeneration market in Russia. They have analysed the LCOE of a solar plant for various Russian regions by comparing it with low voltage power tariffs for small and medium-sized businesses, drawn conclusions on the prospects of microgeneration in Russia and determined the principal tools of industrial policy on this market.

3 Results

Based on the study of international experience, Table 1 outlines the most significant factors affecting the development of RES-based microgeneration market and the tools that the government can use to stimulate this economy sector, thus attaining economic growth and carbon neutrality.

Table 1. Factors of considerable importance for the development of microgeneration based on RES.

No.	Principal factors	State policy tools	Effects
1	Economic stimuli, such as reduced capital and equipment installation costs	Subsidies to equipment manufacturers	Developing domestic industrial cluster of RES
2	Prospect of attaining an additional financial advantage	Tax benefits for end consumers	Stimulating the demand for RES-based microgeneration
3	Available and trustworthy information on microgeneration	Informing consumers of existing economic incentives and opportunities for using RES	

4 Discussion

4.1 The motivations and barriers in the development of microgeneration abroad

Based on global experience, two principal goals behind the development of RES-based microgeneration are: reducing the negative environmental impact and attaining economic benefits.

According to a research among US house owners [4], 68 % of respondents wish to reduce their carbon footprint with 53 % of respondents saying it is extremely important that a part of electric power they consume should come from RES. Businesses are also increasingly focused on sustainability agenda and are striving to implement RES-based technologies, a trend that is likely to preserve in the long-term perspective.

A survey among 291 UK residents [5] has elicited that the main motivations for adopting microgeneration are economic benefits and the desire to improve the environment. T. Hakon and J. Inderberg also conclude in their study [6] that government incentive schemes have accelerated the development of microgeneration in Germany, UK and Norway. Decarbonisation has been an important driving force in Germany and UK. In Norway, due to low economic support and low electricity prices the number of prosumers is limited. Yet, the reduction in solar plant prices helps increase microgeneration uptake. Electricity prices and 'green' tariffs play a less important role than the value of microgeneration units [7]. The 'green' tariffs only encourage an earlier development of microgeneration, which would grow in scope anyway in the long-term perspective owing to increasingly lower prices.

The most significant barrier in the development of microgeneration based on RES [5] is the economic aspects of the project: high capital costs, unsuitable house configuration, insufficient potential benefit, and the prospect of losing money when moving to another house. The second major obstacle in microgeneration uptake is the difficulty in finding trustworthy information required to make a decision.

Other studies [8] contain the same conclusions about the importance of accessible and accurate information on microgeneration. From 2008 to 2014 there was a growth on the market of PV systems in Sweden owing to the introduction of subsidies. Yet, since 2014 barriers have been emerging that significantly restrain the development of microgeneration in the country, such as increased administrative burden and difficulty in finding trustworthy information, including on reliable and competent installation companies and on the income a domestic consumer can generate by selling electricity to the grid.

Other authors support these conclusions, noting that access to reliable information is crucial [6, 9] and the growth of microgeneration market depends on whether expertise and technical solutions are provided to facilitate the uptake for new households [10].

4.2 Tools applied in Russia to stimulate microgeneration based on RES

In December 2019, the Federal Law on microgeneration [11] came into force that established the right of every individual or corporate owner of a microgeneration unit to export surplus electricity to the grid. The power supply company, in turn, has an obligation to purchase this power. On March 2, 2021, the Russian Government's Resolution No. 299

was issued to determine a specific legal regulation of relationships connected with the functioning of microgeneration units and liaisons with the grid and power supply companies [12].

According to the documents adopted, a microgeneration unit owner (prosumer) must do the following (Fig. 1).

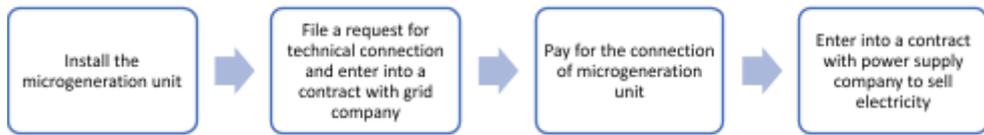


Fig. 1 Procedure for obtaining the microgeneration status.

As part of technological connection, the grid company installs at no cost a bi-directional meter that measures active and reactive flow of electricity per hour in AC networks allowing the supply company to analyse remotely the input and output of the microgenerator.

At present, a subsidised connection fee is available for microgeneration units with the owner paying a maximum of \$7.6 only for the ‘paper’, provided that the distance from the border of the plot to power grid units is no greater than 300 m in a city and 500 m in suburban areas [13].

The electricity produced by the microgeneration unit is primarily used to fill the consumer’s needs. The ‘surplus’ power that is not needed at the moment is exported to the external grid, which operates in this case as a large energy accumulator. Then the consumer may either ‘retrieve’ the surplus on the terms of an offset (balancing) or sell it.

As an additional incentive, apart from the ability to cut on purchased power and sell the surplus, the owner of a microgeneration unit will be able to sell power free of personal income tax (13% or 15% depending on the individual’s income) until 2029.

A serious drawback of the current microgeneration incentive scheme is that it does not cover apartment buildings.

The introduction of this scheme was expected to cause a spike in the number of installations, but this did not happen mostly because people had not been sufficiently informed of the advantages the scheme provides.

4.3 Assessing the development potential of microgeneration market in Russia

It is difficult to accurately assess the development of the Russian RES-based microgeneration market, given that all its players are small companies that do not publish their data, and the state does not collect statistics of microgeneration adopters. Based on preliminary assessment, the capacity of solar plants installed in this sector between 2014 and 2020 is in way of 100 MW (the domestic market being represented mainly by solar PV). Most of microgeneration units based on RES were put into operation in 2020, their capacity amounting to 50-60 MW [14]. The largest share of this capacity is installed at the properties of legal entities with individuals accounting for only 10-15 MW [15].

Microgeneration has not yet become widespread in Russia, but the estimated market potential of microgeneration based on RES is substantial, although there is no clear understanding of the actual capacities of completed projects.

According to some experts, within five years from 2021, the uptake of microgeneration based on RES in Russia will reach 150-200 MW per year and the market turnover will be around \$140 mln [16]. Others say that microgeneration based on RES may provide additional 0.6 GW of generating capacities [17]. Experts' assessment of the total attainable potential for the market of microgeneration based on RES without a negative impact on the energy system [18, 19] is in way of 15 GW. At the same time, the Ministry of Energy expects an insignificant increase in microgeneration capacities at the level of 15-30 MW per year [20].

Experts believe that the increase in electricity prices and reduction in the value of RES equipment are the main drivers of the microgeneration market in Russia. According to the Association Guaranteeing suppliers and Power suppliers, the full price of electric power in Russia is in the range of \$0.08–0.15 per kWh depending on the region [21]. By 2025, the tariffs in some regions may rise to \$0.2 per kWh [14]. This motivates consumers to consider alternative ways of power generation, such as building their own microgeneration units based on RES.

In Krasnodar Territory, Kalmykia, Altai and Volgograd Region, the electricity price for small and medium-sized businesses on low voltage networks is in way of \$0.1–0.12 per kWh. At the same time, based on our assessment, the LCOE of microgeneration facilities based on solar panels is around \$0.08 per kWh. In the long term, this gap will be getting larger owing to the increase in grid electricity prices and reduction in the value of RES equipment (Fig. 2).

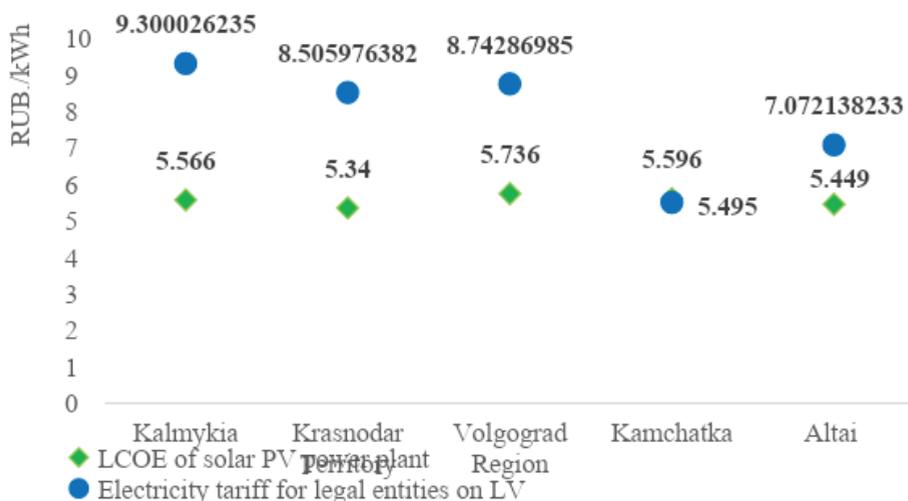


Fig. 2. Value of solar power and electric power from the grid in Russian regions in 2021.

Given the above trends on the domestic market of microgeneration based on RES, the government will not need to implement any additional incentive schemes unless it is interested in accelerating decarbonisation of the housing and utilities area and in implementing an industrial policy aimed at strengthening the Russian renewable energy sector.

With the tax benefits for owners of microgeneration units having already been introduced, to attain the above goals of decarbonisation and economic growth the industrial

policymakers should introduce subsidies for the domestic renewable energy industry, address the reduction of transactional costs connected with searching for good faith suppliers and inform consumers about the advantages of using their own microgeneration units based on RES.

5 Conclusion

Having analysed the potential for the development of microgeneration based on RES in Russia the authors conclude that this sector may be instrumental in reducing CO₂ emissions in the housing and utilities area, as well as in the Russian economy in general. In addition, the use of incentive schemes that have proven to be effective abroad to boost the domestic market of microgeneration based on RES will allow for a faster decarbonisation and growth of the national economy.

References

1. Okolo 80% stran mira oboznachili sroki po dostizheniyu uglerodnoi neutral'nosti [Around 80% of countries have announced the timelines for achieving carbon neutrality] (2021). Accessed on: March 09, 2022. [Online]. Available: <https://tass.ru/obschestvo/12812589>
2. Perechen' poruchenii po realizatsii Poslaniya Prezidenta Federal'nomu Sobraniyu [List of instructions to implement the President's Message to Russian Federal Assembly] (2021). Accessed on: March 09, 2022. [Online]. Available: <http://kremlin.ru/acts/assignments/orders/65524>
3. 2021 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector. Accessed on: March 09, 2022. [Online]. Available: https://globalabc.org/sites/default/files/2021-10/GABC_Buildings-GSR-2021_BOOK.pdf
4. Deloitte Resources 2020 Study. Energy management: Paused by pandemic, but poised to prevail. Accessed on: March 09, 2022. [Online]. Available: <https://www2.deloitte.com/us/en/insights/industry/power-and-utilities/energy-study-of-businesses-and-residential-consumers.html>
5. P. Balcombe, D. Rigby, A. Azapagic, *App. Energy*, **130**, 403-418 (2014). <http://doi.org/10.1016/j.apenergy.2014.05.047>
6. T. Hakon, J. Inderberg, K. Tews, *Energy Res. Soc. Sci.*, **42**, 258-269 (2018). <http://doi.org/10.1016/j.erss.2018.04.006>
7. P. Pearce, R. Slade, *Energy Pol.*, **116**, 95-111 (2018). <http://doi.org/10.1016/j.enpol.2018.01.060>
8. J. Palm, *Energy Pol.*, **113**, 1-8 (2018). <http://doi.org/10.1016/j.enpol.2017.10.047>
9. G. Simpson, J. Clifton, *Energy Pol.*, **81**, 141-151 (2015). <http://doi.org/10.1016/j.enpol.2015.02.028>
10. M. Korsnes, W. Throndsen, *J. Clean. Prod.*, **306**, 127273 (2021). <http://doi.org/10.1016/j.jclepro.2021.127273>
11. Federal'nyi zakon ot 27.12.2019 No. 471-FZ "O vnesenii izmenenii v Federalnyi zakon "Ob elektroenergetike" v chasti razvitiya mikrogeneratsii" [Federal Law No. 471-FZ "On amending the Federal Law 'On electric power sector' in relation to developing

- microgeneration”]. Accessed on: March 09, 2022. [Online]. Available: <http://publication.pravo.gov.ru/Document/View/0001201912280019>
12. Postanovlenie Pravitelstva Rossiiskoi Federatsii ot 02.03.2021 No. 299 “O vnesenii izmenenii v nekotorye akty Pravitelstva Rossiiskoi Federatsii v chasti opredeleniya osobennosti pravovogo regulirovaniya otnoshenii po funktsionirovaniyu obektov mikrogeneratsii” [Government’s Resolution No. 299 “On amending individual acts of the Government of the Russian Federation in relation to determining the specific legal regulation of relationships connected with the functioning of microgeneration units”]. Accessed on: March 09, 2022. [Online]. Available: <http://publication.pravo.gov.ru/Document/View/0001202103060015>
 13. Postanovlenie Pravitelstva RF ot 27.12.2004 N 861 (red. ot 29.12.2021) “Ob utverzhdenii Pravil nediskriminatsionnogo dostupa k uslugam po peredache elektricheskoi energii ... [The Government’ Resolution No. 861 “On approving the rules for non-discriminatory access to and supply of electricity transmission services...”], 27 December 2004. Accessed on: March 09, 2022. [Online]. Available: http://www.consultant.ru/document/cons_doc_LAW_51030/
 14. T. Lanshina, Nesubsidiruemiy rossiiskii rynek solnechnoi energii: ozhidaetsya vzryvnoi rost [Non-subsidised Russian market of solar energy: expecting an explosive growth] (Association “Target Number Seven”, Moscow, 2021)
 15. I. Shakhrai, Rynka prosto net — ego nado pridumat [There is simply no market, it has to be built from scratch (2021)]. Accessed on: March 09, 2022. [Online]. Available: <https://www.kommersant.ru/doc/4753144>
 16. Informatsionnyi byulleten “Rynok vozobnovlyaemoi energetiki Rossii: tekushchii status i perspektivy razvitiya” [Newsletter “Renewable Energy Market of Russia: current status and development prospects”] (2021). Accessed on: March 09, 2022. [Online]. Available: <https://treda.ru/information-bulletin-july2021>
 17. A. Khokhlov, Yu. Melnikov, F. Veselov et al., Raspredeleonnaya generatsiya elektroenergii v Rossii: potentsial razvitiya [Distributed power generation in Russia: development potential] (Energy Centre of the Moscow School of Management SKOLKOVO, 2018)
 18. S. Rozhenko, Revolyutsiya krysh. Kak snizit' tseny na “zelenuyu” energiyu v Rossii [Revolution of roofs. How to reduce the ‘green’ power prices in Russia] (2018). Accessed on: March 09, 2022. [Online]. Available: <https://www.forbes.ru/biznes/356227-revolyciyakrysh-kak-snizit-ceny-na-zelenuyu-energiyu-v-rossii>
 19. U. Losse, T. Andreeva, R. Bryukmann et al., Vozmozhnosti solnechnoi energetiki v Rossii. Sozdanie blagopriyatnykh uslovii dlya fotoelektricheskikh tekhnologii v Rossii [Opportunities for solar power in Russia. Enabling PV in Russia] (Eclareon GmbH, 2018)
 20. P. Smertina, Solntse nashikh krysh [Sun on our roofs] (2021). Accessed on: March 09, 2022. [Online]. Available: <https://www.kommersant.ru/doc/4753266>
 21. Baza tarifov na elektroenergiyu [Electricity tariff base] (2021). Accessed on: March 09, 2022. [Online]. Available: <https://time2save.ru/calculaters/nereguliruemie-ceni-na-elektroenergiu>

Theoretical and methodological foundations for the formation of the competitiveness of insurance companies

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Abstract. This research aims to develop theoretical and methodological foundations for the formation of the competitiveness of insurance organizations, taking into account industry specifics, a comprehensive methodological toolkit for assessing their competitive capabilities and advantages in the context of economic globalization. The research methods include systemic analysis and synthesis, financial analysis as part of the analysis of the insurance organizations competitiveness. The main results obtained in the research are the following: the economic content of the concept of “competitive potential of the insurer” has been clarified; methodological tools for assessing the competitive potential of an insurance organization has been developed, taking into account the specifics of its activities; the assessment of the competitiveness of insurance organizations in the countries on the EAEU insurance market has been carried out based on the relative insurance penetration coefficient; theoretical and methodological conditions for stabilizing the insurance service market in the context of integration have been formed. Scientific novelty lies in the proposals for the development of theoretical and methodological foundations for the formation of the competitive potential of insurance organizations, taking into account industry specifics; a comprehensive methodological toolkit for assessing their competitive capabilities and advantages; formation of the institutional foundations of insurance activities in the context of economic globalization and a comparative assessment of the countries participating in the EAEU insurance market based on the relative insurance penetration coefficient.

Keywords: competitiveness, competitive potential, relative insurance penetration coefficient, insurance product

1 Introduction

The processes of globalization, increased competition, decline in business activity and other factors in the development of the business environment create macroeconomic risks for

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insurance organizations, which necessitates the need to increase their competitiveness. On the one hand, insurance provides an opportunity to compensate for losses resulting from various accidents, on the other hand, it provides the accumulation of funds from citizens and organizations, which is one of the most important sources of domestic investment. Thus, we have to admit the fact that the development of theoretical and methodological foundations for the formation and assessment of the competitiveness of insurance companies is one of the important conditions for stable macroeconomic development of the Republic of Belarus [1]. In modern scientific economic schools, the issues of forming a methodology for assessing the competitiveness of insurance organizations, taking into account the industry specifics of their functioning, remain insufficiently developed [1, 2].

2 Materials and methods

The general research methods are a systematic approach to the studied phenomena and processes, observation, analysis and synthesis, grouping and comparison, methods of financial analysis, mathematical modeling, which allow formalizing the most significant features of the studied phenomena and economic processes in the framework of the competitiveness analysis of the insurance market.

The study is based on the results of scientific research within the framework of the implemented task 2.1.08 “Strategy for the development of the service sector in the Republic of Belarus” of the State program of scientific research “Humanities as a factor in the development of the Belarusian society and state ideology (history, culture, society, state)” of the research topic “Methodological and practical aspects of the formation of an organizational and economic mechanism for ensuring the financial stability of insurance companies in the context of economic integration”, the Program for Socio-Economic Development of the Republic of Belarus for 2021-2025, approved by Decree of the President of the Republic of Belarus No. 292 of July 29, 2021.

3 Results

Solving the problem of transition to an innovative type of development of insurance organizations implies the need for a deep analysis of the laws and patterns of institutionalization of the insurance environment, determining the content of the processes of institutional regulation of the insurance organizations activities in the modern economy [3, 4].

Improving technologies, approaches and methods of insurance, introducing innovative products, making effective management decisions can directly increase the competitiveness of a particular insurance company and the insurance industry as a whole [5, 6].

The development of insurance relations in the Russian Federation and the Republic of Belarus is based on the processes of harmonization of insurance policy within the framework of the EAEU and the Union State. Therefore, the approved Guidelines for the implementation of the provisions of the Treaty on the Establishment of the Union State for 2021-2023 and 28 Union programs define measures to implement large-scale tasks to strengthen Russian-Belarusian integration. The main directions for harmonization of financial market regulation are designated [7]. The implementation of the tasks set should be supported by the growth of target indicators for the development of competition in the insurance sector of the countries participating in these integration associations: activation of the competitive behavior of insurance service consumers; increase in the share of online

sales in the total insurance revenue to the level of 40-45%; growth of the economic efficiency of insurance companies and ensuring the profitability of sales of at least 15% [8].

According to article 70 of the Treaty on the Eurasian Economic Union adopted in Astana on May 29, 2014, the participants in the integration process plan to create a single financial market by 2025 [9].

A certain institutional insurance environment has already been formed in the EAEU countries. However, it is important to analyze the existing practice and identify environmental factors that are significant both for the economic activity of the subjects of insurance relations and the insurance market of the EAEU member countries as a whole [10].

The main tasks that, in our opinion, need to be addressed to ensure the development of the Belarusian insurance market and its integration with the EAEU states, include: improving the insurance culture of the population, streamlining the system of compulsory insurance, creating an adequate modern-day system of state regulation of insurance activities, increasing the efficient functioning of the insurance market infrastructure, development of the reinsurance mechanism. However, it is also necessary to provide for the formation of unified approaches within the framework of the EAEU integrated insurance market.

It would be advisable to bring the regulatory requirements of the legislative acts of each EAEU country (Armenia, Belarus, Kazakhstan, Russia, Kyrgyzstan) on motor third party liability insurance to a common standard in order to ensure equality and recognition of national policies on the territory of the integration union, but this option may be complicated due to the need to take into account and harmonize all aspects of national legislation [11].

4 Discussion

The development of insurance activity in the Republic of Belarus should significantly intensify after the formation of a common financial market with the EAEU and the entry of the Republic of Belarus into the WTO. It is prearranged to increase the number of insurance brokers in the Belarusian insurance market by an average of 20% by 2025 [12].

In order to assess the development potential of the insurance sector of the countries participating in the EAEU insurance market, we have developed a methodology based on the calculation of the relative insurance penetration coefficient (*CPI*):

$$CPI = PINE/BP \quad (1)$$

where *PINE* is the value of the indicator of the level of actual penetration of insurance into the national economy;

BP is the basic level of penetration of insurance into the national economy of countries with a similar level of development.

CPI makes it possible to carry out the analysis of the potential for the development of the insurance industry taking into account the stage of the country's overall economic development in terms of GDP per capita. Therefore, *CPI* provides a more adequate assessment for comparing countries participating in the insurance market than the volume of insurance premiums, the penetration rate and insurance density. To calculate the *CPI* indicator, it is necessary to sort countries according to the level of economic development that ensures the penetration of insurance into the national economy.

We have already revealed that the homogeneity of countries in terms of the nature of macroeconomic conditions for the development of insurance is determined by the interval

of the level of GDP per capita [13-16]. Russia, Kazakhstan, Belarus, and Armenia belong to the group of countries with GDP per capita in the range from \$1,000 to \$12,000, which means that the share of insurance in the country's GDP can rapidly grow, and consequently, high growth rates of national insurance markets can be achieved [10].

To analyze the level of the growth potential of the EAEU member countries insurance market, we calculate the relative penetration coefficient for the countries of this integration association.

In our calculations, we took the average level of insurance penetration for the EAEU countries as the "basic level of insurance penetration".

The analysis carried out on the basis of the proposed methodology allows us to draw the following conclusions. The relative insurance penetration coefficient among the EAEU countries is the highest in Russia and Belarus. In Russia, it made 1.81, and in Belarus 1.4, which indicates that in these countries additional conditions have been created for the development of the insurance sector.

The development of strategic directions for the development of the insurance market will be facilitated by the analysis of indicators to determine the level of the insurance market concentration. At the initial stage, we will determine the level of the insurance market concentration for the EAEU member countries. To do this, we will use the following indicators:

- 1) market concentration ratio (CR)
- 2) Herfindahl-Hirschman Market Concentration Index (HHI)

To demonstrate the indicators of the level of concentration of the insurance markets of Russia, Kazakhstan, Belarus at the end of 2020, we need not consider data on the markets of Armenia and Kyrgyzstan, since the market volumes in those countries are insignificant (Table 1).

Table 1. Indicators of the concentration level of insurance markets in some EAEU countries in 2020, mln USD

Insurance organizations	Belarus (mln rub.)	Kazakhstan (mln tenge)	Russia (bln rub.)
Leading companies of the insurance market	235.4	169.3	2712.1
Average companies in the insurance market	45.6	140.4	1768.9
Outsider companies of the insurance market	41.3	117.9	1589.9
Total amount of insurance premiums	1510.2	568.1	659.3
CR3 concentration factor, %	55	38	27

Source: compiled by the authors

Based on the results of concentration coefficient calculations, it can be seen that in Kazakhstan CR3 is 38%, in Russia CR3 is 27%. Since the concentration ratios in these countries are below 45%, we conclude that these insurance markets are low-concentration ones. The insurance market of Belarus is distinguished by a high concentration of CR3 55%, which exceeds the optimal level of concentration by almost 10%. Consequently, the degree of monopolization in the insurance market of Belarus is quite significant.

The concentration coefficient has a significant drawback: it does not characterize all insurance companies on the market, but only the first three insurance companies, which occupy the largest share in the total volume of insurance premiums. Therefore, a more

reliable indicator of the level of competition is the Herfindahl–Hirschman index. The index formula is as follows:

$$HHI = S_1 + S_2 + \dots + S_n, \quad (2)$$

where S_1 and S_2 are the squared percentage of the company's volume of services in the industry;

n is the number of insurance organizations.

This part is defined as the ratio of sales of a particular company in the market to the total volume of services in the insurance industry. The resulting value must be between 1 and 10,000.

An indicator of 10,000 means the complete monopolization of the economy sector by one company (Table 2).

Table 2. Herfindahl-Hirschman index of some EAEU countries insurance markets

Herfindahl-Hirschman Index	Kazakhstan, tenge	Russia, rub.	Belarus, Bel. rub.
HHI	$S_1 + S_2 + \dots + S_{n29}$	$S_1 + S_2 + \dots + S_{n198}$	$S_1 + S_2 + \dots + S_{n16}$

Source: compiled by the author

Table 2 shows the data taking into account the number of insurance organizations in the insurance service market: 29 in the Republic of Kazakhstan, 198 in Russia, 16 in the Republic of Belarus.

Having calculated the Herfindahl-Hirschman index for the three EAEU member countries, we should note that the insurance markets of Kazakhstan (HHI of 727.28) and Russia (HHI of 460.89) can be characterized as markets with developed competition, since in these countries the index is less than 1000. In turn, the insurance market of Belarus is characterized by low competition, the dominant position in the insurance service market in this country is occupied by BRUIC Belgosstrakh, which is a state-owned insurance organization and this insurer accounts for more than 40% of all insurance premiums.

The analysis of the considered indicators characterizing the development of the national insurance market can be used with good reason to calculate the sectoral competitiveness coefficient of the EAEU member countries insurance market. These indicators fully characterize the potential of national markets in competition on the markets for insurance services.

5 Conclusion

In light of the carried out research, the results have been obtained and appropriate measures proposed for the development of the insurance market:

- the institutional conditions for the functioning of insurance organizations in the context of the EAEU countries integration have been shown, taking into account the industry specifics of the development of the insurance market. The proposed measures to develop infrastructure and increase the capacity of the insurance market will contribute to the growth of the role of insurance as a mechanism for protecting the property interests of citizens and business entities, will strengthen the investment potential of insurance organizations in order to invest it in the economy;

- a methodology has been developed for assessing the development potential of the insurance sector of the countries participating in the EAEU integrated insurance market based on the relative insurance penetration coefficient, and the methodology for calculating

the concentration coefficient has been adapted taking into account the industry specifics of insurance. Taking into account the ongoing integration processes, an analysis of market concentration has been carried out on the example of the insurance market of the EAEU member countries. At the initial stage, the level of insurance market concentration of the EAEU member countries has been determined using the following indicators: market concentration coefficient; the Herfindahl–Hirschman market concentration index, which made it possible to form fundamentally new methodological approaches to changing the insurance system, taking into account the ongoing integration processes in the insurance market of the EAEU member countries.

References

1. A. Evans, S. Naurodski, J. *Entrepr. Pub. Pol.*, **8(2)**, 226-240 (2019).
<https://doi.org/10.1108/JEPP-07-2019-108>
2. M. Altuntas, J. Rauch, J. *Risk Fin.*, **18(3)**, 284-302 (2017).
<https://doi.org/10.1108/JRF-10-2016-0128>
3. S. Kourtzidis, N.G. Tzeremes, *Europ. J. Manag. Bus. Econ.*, **29(1)**, 3-22 (2020).
<https://doi.org/10.1108/EJMBE-09-2018-0094>
4. M.S. Musaitova, *Int. Res. J.*, **7(14)**, 43-44 (2021)
5. G.V. Fedorova, S.A. Borisov, S.G. Zakharova, I.V. Makarycheva, T.Yu. Rusakova, *E3S Web of Conf.*, **291**, 07003 (2021). <https://doi.org/10.1051/e3sconf/202129107003>
6. D. Ahmed, X. Yuantao, U.S. Bhutta *Europ. J. Manag. Bus. Econ.*, (2021)
<https://doi.org/10.1108/EJMBE-08-2021-0221>
7. Sovmestnoe zayavlenie Predsedatelya Pravitelstva Rossiiskoi Federatsii i Premier-ministra Respubliki Belarus o tekushchem razvitii i dalneishikh shagakh po uglubleniyu integratsionnykh protsessov v ramkakh Soyuznogo gosudarstva [Joint statement by the Prime Minister of the Russian Federation and the Prime Minister of the Republic of Belarus on the current development and further steps to deepen integration processes within the Union State]. Accessed on: February 16, 2022. [Online]. Available: <http://government.ru/news/43234>
8. M.E. Karpitskaya, *Konkurentnyi potentsial strakhovykh organizatsii Respubliki Belarus kak faktor obespecheniya natsionalnoi konkurentsii* [Competitive potential of insurance organizations of the Republic of Belarus as a factor in ensuring national competition], in V.L. Gurskiy et al. (eds), collection of scientific articles, in two volumes, Belarus Economy Development Strategy: Challenges, Implementation Tools and Prospects, v. 1, 98 (Law and Economics, Minsk, 2021)
9. “Dogovor o Evraziiskom ekonomicheskom soyuze” (Podpisan v g. Astane 29.05.2014) (red. ot 01.10.2019) (s izm. i dop., vstup. v silu s 28.10.2021) [“The Treaty on the Eurasian Economic Union” (Signed in Astana on 29.05.2014) (ed. from 01.10.2019) (with amendments and additions, intro. effective from 10/28/2021)]. Accessed on: February 16, 2022. [Online]. Available: http://www.consultant.ru/document/cons_doc_LAW_163855
10. A.K. Sembekov, E.G. Budeshov, *Fin. J.*, **2**, 84-93 (2018)
11. A.K. Sembekov, *Sci. Symbol*, **8**, 132–135 (2015)
12. M.E. Karpitskaya, *Bul. Polotsk State Univ. Ser. D, Econ. Legal Sci.*, **5**, 50-58 (2021)
13. W.H. Chau, A.A. Khin, K.L. Teng, *Austr. J. Basic App. Sci.*, **7(10)**, 538-546 (2013)

14. J.D. Cummins, M. Rubio-Misas, D. Vencappa, J. Fin. Stab., **28**, 66-78 (2017).
<https://doi.org/10.1016/J.JFS.2016.11.007>
15. T.P. Kramarić, M. Miletić, South East Europ. J. Econ. Bus., **14(2)**, 1-12 (2019).
<https://doi.org/10.2478/jeb-2019-0009>
16. A.A. Elamer, A.A. Hares, C.G. Ntim, I. Benyazid, Int. J. Ethics Sys., **34(4)**, 493-509 (2018). <https://doi.org/10.1108/IJOES-07-2018-0103>

Business sophistication level in the rankings of the Global Innovation Index of Russia, Kazakhstan and China

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Abstract. The article investigates the issue of the role of innovation in business in the overall ranking of the Global Innovation Index in comparison with Russia, Kazakhstan and China. The study is based on a comparative analysis of individual indicators of the Global Innovation Index (GII), in order to substantiate the socio-economic development of the countries. The article compares the countries in several ways: the place that the country occupies in the overall ranking in the dynamics of change over the past three years, a comparative description of the factors of innovative development in 2020 and indicators of the business sophistication level in the overall ranking of countries in 2020. A brief business sophistication analysis is carried out according to a list of indicators, including such important characteristics as knowledge workers analysis, innovation linkages, knowledge absorption as compared between Russia, Kazakhstan and China. The article presents the opinion of researchers concerning the reasons for the sharp decline in innovation activity during the pandemic and its impact on the development of global innovation and the socio-economic development of countries with emerging market economies. The phenomenon and driving force of China's innovative development is considered, which still provides a high level of innovation corresponding to developed countries with high per capita income.

Keywords: Global Innovation Index, business sophistication level, cross-country comparison, factors of the territory innovative development

1 Introduction

The study of the importance of business innovation activity in the overall ranking of the Global Innovation Index is of great significance for the development of programs for the socio-economic territory development. The ranking comparison of innovative business

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development in Russia, Kazakhstan and China, countries with different overall rankings of innovative development at the global level, will determine the direction of additional investment and efforts on the part of management structures. Two large countries were selected for the study, Russia and Kazakhstan, as they changed the model of corporate governance (the socialist model of socio-economic development and the command-administrative style of management) in the hope of positive changes in socio-economic development and a significant increase in the quality of life of the population, as well as the country which has preserved the socialist model of socio-economic development (China). The overall dynamic ranking of Russia, Kazakhstan and China in 2018-2020 is shown in Fig. 1.

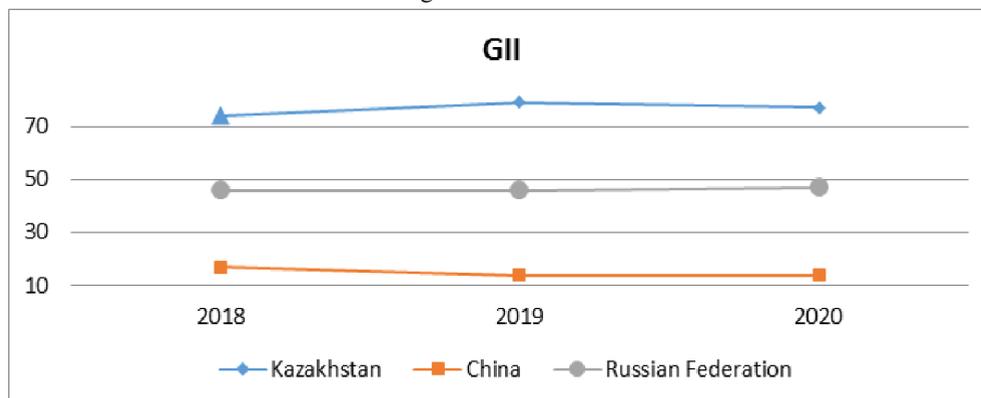


Fig. 1. Rankings of Russia, Kazakhstan and China in dynamics for 2018-2020 against the world-scale GII ranking.

China, in comparison with Kazakhstan and Russia, occupies the best place in the overall GII ranking, maintaining positive trends in its innovative development even during the Covid-19 pandemic. During this period, Russia maintains its position among the top fifty countries in terms of innovative development. The place of Russia in the overall ranking has not changed much over the past three years, while the task of introducing the digital economy is still relevant for the country. Kazakhstan is among the countries of the eighth ten in terms of innovative development and tends to decrease in indicators compared to other countries. The phenomenon of the development of the Chinese economy needs to be carefully analyzed, especially in the framework of innovative business sophistication.

2 Materials and methods

The indicators of the Global Innovation Index (GII) developed by the World Intellectual Property Organization jointly with Cornell University (USA) and the INSEAD business school [1] were taken as the basis for the study. This index includes 80 indicators reflecting the diversity of innovation processes and their impact on the territory development. The comparative characteristics of the innovative development factors for 2020 in Russia, Kazakhstan and China, as well as indicators of the business sophistication level in the overall ranking of countries in 2020, are of particular interest.

Figure 2 highlights the main areas of research for the calculation of the Global Innovation Index (GII), in which the indicators considered in this study are marked in color.

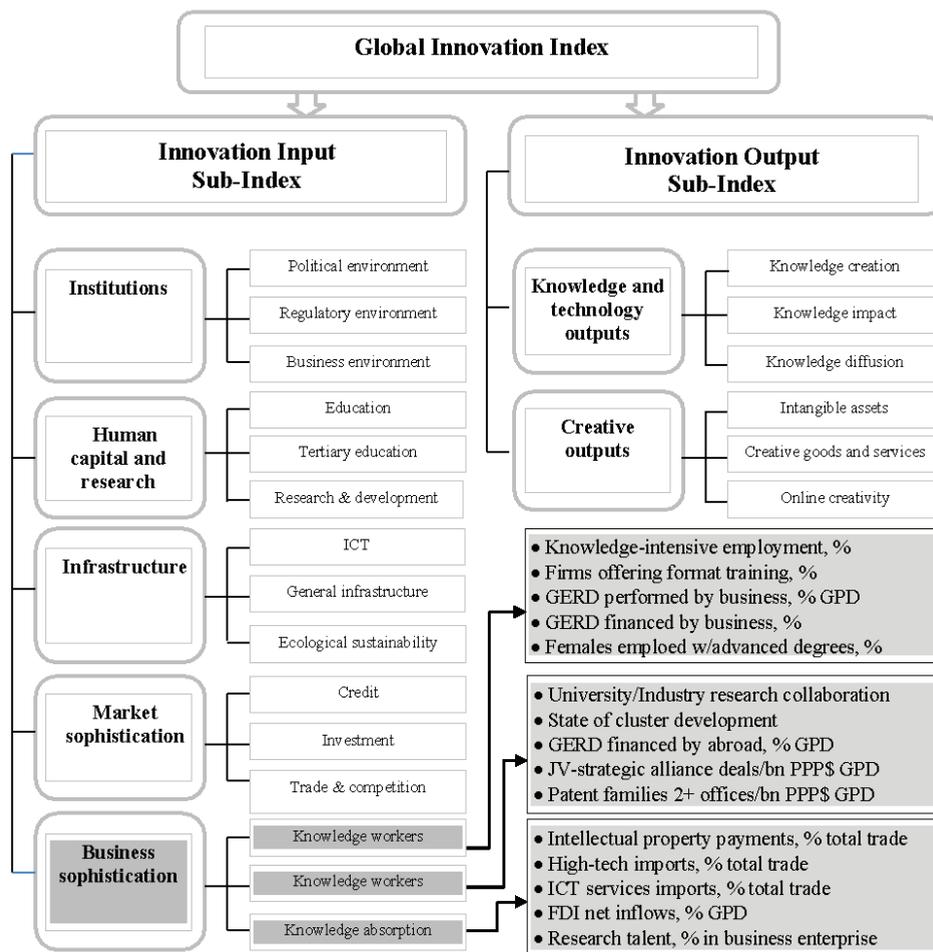


Fig. 2. Analysis indicators in the GII ranking of Russia, Kazakhstan and China.

Innovative business sophistication is one of the key areas for the analysis of the selected countries. This area includes three components that are assessed based on a list of indicators. The knowledge workers component includes indicators such as knowledge-intensive employment, the number of firms offering format training, accounting for GERD performed by business, accounting for GERD financed by business, employees with advanced degrees. The indicators characterizing innovation linkages include University/Industry research collaboration, state of cluster development, accounting for GERD financed by abroad, JV-strategic alliance deals, as well as B2B patent families 2+ offices. A special role is played by indicators for assessing knowledge absorption, which include assessment of the possibility of intellectual property payments, the share of high-tech imports, the share of ICT services imports, FDI net inflows and research talent % in business enterprise.

Undoubtedly, the role and significance of integration processes in the development of the economy and business are of extreme importance. The fulfillment by the state of social functions aimed at improving the quality of life of the population in accordance with the international level is impossible without the introduction of innovative processes in the economy. In this regard, the issues of regulating integration processes, especially in

innovation, are very relevant for modern society, and, of course, should be influenced by public administration [2]. The authors of GII in their report, based on the results of a world study, establish a direct dependence of the country's socio-economic development on the level of its innovation activity [3]. Of particular relevance are progressive methods of managing the development of innovative industrial clusters based on mathematical development models [4].

A wide-scale assessment of the national innovation system is given in the works by Russian scientists who are looking for indicators and approaches to better reflect the diversity of innovations in society, while going beyond the traditional framework of measuring innovations [5]. The assessment of the Global Innovation Index provides both an assessment of the commercial results of innovation activities in business in various countries, and the ability of business to implement innovation processes. A well-known economist Aganbegyan A.G. writes about the need for urgent action to enhance social and economic growth and gives a number of practical recommendations for the innovative development of the country and business structures [6, 7]. Governing state structures, business and the world scientific community are puzzled by the issues of assessing the innovative development of society and economy, developing economic and mathematical models based on a list of indicators. The review and analysis of the results of the generalized Global Innovation Index (GII) stimulates targeted innovation activity during this difficult pandemic period [8].

3 Results

Figure 3 shows a brief analysis of business sophistication based on a list of indicators, including such important characteristics as knowledge workers analysis, innovation linkages, knowledge absorption in comparison between Russia, Kazakhstan and China. This analysis is based on the materials of the international Global Innovation Index study [3].

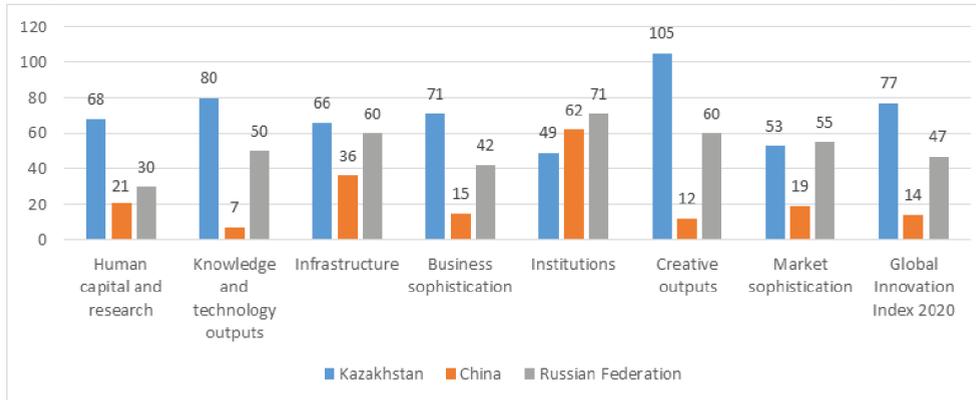


Fig. 3. Comparative characteristics of the innovative development factors of Russia, Kazakhstan and China in 2020.

The analysis of business sophistication results as the main component of the Global Innovation Index (GII) development shows that China occupies an honorable 15th place in the overall country ranking in GII 14, catching up with high-income countries, while the income level of the Chinese population remains significantly lower. Business sophistication in Russia and Kazakhstan is also generally in line with the overall ranking of the country, slightly exceeding it.

Business sophistication in the mentioned countries has its own strengths and weaknesses, shown in Fig. 4.

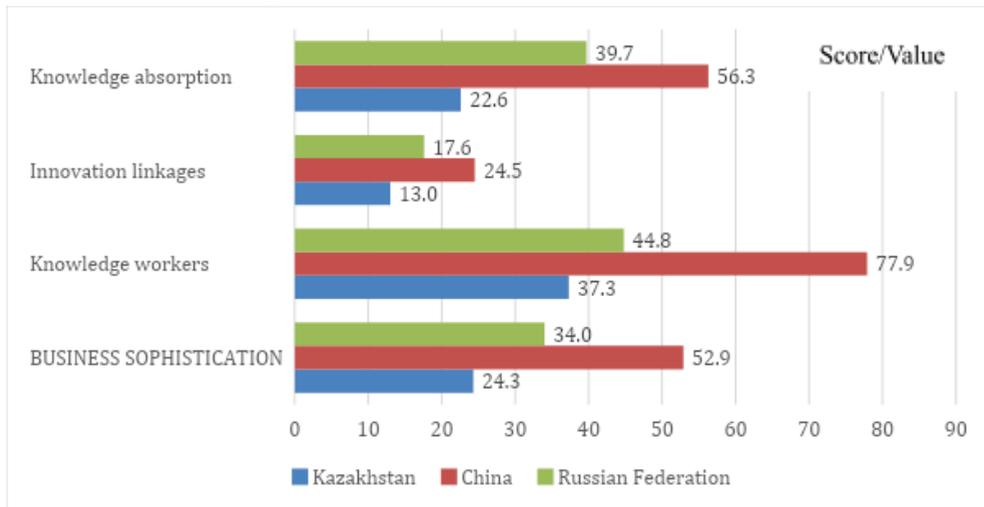


Fig. 4. Comparative characteristics of indicators of the business sophistication level of Russia, Kazakhstan and China in 2020 by 3 components.

The knowledge workers component of 77.9% is significant in the overall ranking of China, outperforming Russia and Kazakhstan by almost two times (44.8%; 37.3% respectively). The high level of this indicator is provided primarily by the number of firms offering format training, high GERD financed by business. The highest results for Russia were obtained in terms of knowledge-intensive employment – 44.1%, as well as indicators characterizing **innovation linkages** – this is University/Industry research collaboration – 46.8%, state of cluster development – 40.3%, and research talent % in business enterprise – 44.2%. Kazakhstan lags behind in all respects. A large number of works by Russian and Western authors are devoted to the study of the formation and development of clusters, the implementation of scientific research results in business processes, and the optimization of innovation costs not only for large industrial enterprises, but also for small business structures aimed at ensuring sustainable development [9-13]. Based on the GII analysis, the authors, as well as scientists from the Russian Federation [8, 14-15], develop and propose options for solving the problematic issues of development.

4 Discussion

According to most researchers, the pandemic period has significantly slowed down the development of global innovations. Innovative inertia has affected the socio-economic development of all countries without exception, but as we see from the example of Kazakhstan, it is much more difficult for countries with developing market economies to stabilize economic processes. First of all, this is due to the fact that the costs of fighting the pandemic and its social consequences limit the financing of innovative entrepreneurship, high-tech industries and start-ups.

The phenomenon of China's development makes one wonder what is the main source and driving force that ensures a high level of innovation. It is worth paying attention to the "soft power" strategy systematically and steadily implemented by the People's Republic of

China, which covers not only the attraction of foreign specialists as a result of a well-thought-out educational policy, but also the creation of “think tanks” for the training of research personnel at manufacturing enterprises. In the policy of the Chinese leadership, these areas have a special priority. However, as we see from the analysis, and this is also noted by scientists [16], over the past two years (the period of the pandemic), problems have escalated in China in attracting scientific and technical innovative personnel from abroad. Research is being actively conducted on the impact of investments in regional research and development on the efficiency of innovation development at enterprises [17, 18].

In general, it should be noted that the discussion regarding certain areas of China’s “soft power” is unfounded, since, as can be seen from the analysis against the global background, the innovation potential index is not declining.

At the same time, the crisis should not be viewed only from the negative side, because under certain conditions it opens up new opportunities and can become the start for an innovative breakthrough. Scientists from all countries are actively involved in the global issues of the impact of investment in R&D on innovation activity, and this gives hope for an early withdrawal of the world economy from stagnation and regression [19-23].

The pandemic has already generated interest in innovative solutions in healthcare, remote work, education, online commerce, mobility, etc. It remains to be hoped that the fight against the pandemic will unite nations and push for the emergence of new international research projects, as the inertia in the field of innovation at the global level will be compensated by public investment to support innovation in business structures.

Business sophistication level as the main component of GII for Russia is ensured by a fairly large number of people employed in knowledge-intensive industries, and high payments (compared to other countries represented in the rankings 2020) related to intellectual property. The weak indicators of this component include the low level of cluster development and a small share of companies with educational centers. These indicators can be improved through the introduction of state support and development programs in the form of an integrated approach that takes into account the specialization of the cluster, its needs, connection with auxiliary industries, etc. The experience of China has shown that constructive interaction between business and specialized educational institutions is necessary within the framework of bilateral relations between the scientific and business communities, aimed at increasing the level of competence of both parties.

5 Conclusion

The Global Innovation Index helps countries, businesses and scientific organizations track the main indicators of the innovative development of society and the economy. The main task of the GII is not to compile a ranking, but to stimulate innovative development and improvement of management processes that will allow the most comprehensive development of the socio-economic system. An analysis of the Global Innovation Index stimulates and supports innovation during this critical period, spreading positive experience in the intercountry space. The review of the Global Innovation Index 2020 presented in the article, comparing three countries, namely, Russian Federation, Kazakhstan and China, made it possible to identify the strengths and weaknesses of the countries’ innovative development.

References

1. Global Innovation Index Database. Accessed on: February 16, 2022. [Online]. Available: https://www.wipo.int/global_innovation_index/ru/2020/
2. D.N. Matakova, *Regulirovanie integratsionnykh protsessov na gosudarstvennom urovne* [Regulation of integration processes at the state level], in Competitiveness of territories, Materials of the 20th All-Russian Economic Forum of Young Scientists and Students, 196-199, Ekaterinburg, 27-28 April (2017)
3. Global Innovation Index, Who will finance innovation. Main conclusions. Accessed on: February 16, 2022. [Online]. Available: https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII_2020_KeyFindings_RU_web.pdf
4. S.N. Yashin, Yu.V. Trifonov, E.V. Koshelev, Formirovanie mekhanizma upravleniya innovatsionnym razvitiem regiona [Formation of a mechanism for managing the innovative development of the region] (Radonezh, Nizhny Novgorod, 2017)
5. Rossiya v zerkale mezhdunarodnykh reitingov [Russia in the mirror of international rankings], V.I. Suslov (ed.) (Autograph, Novosibirsk, 2015)
6. A.G. Aganbegyan, Stud. Rus. Econ. Devel., **30**, 1-9 (2019). <https://doi.org/10.1134/S1075700719010027>
7. A.G. Aganbegyan, A.N. Klepach, B.N. Porfiryev et al., Stud. Rus. Econ. Devel., **31**, 599-605 (2020). <https://doi.org/10.1134/S1075700720060027>
8. E.S. Podbornova, M.A. Melnikov, V.A. Berdnikov, Bul. Samara Univ. Ecom. Manag., **12(1)**, 37-42 (2021). DOI: <https://doi.org/10.18287/2542-0461-2021-12-1-37-42>
9. S.N. Yashin, S.G. Zakharova, L.F. Sukhodoeva, N.S. Somenkova, S.V. Tumanov, SHS Web of Conf., **103**, 02006 (2021). <https://doi.org/10.1051/shsconf/202110302006>
10. G.V. Fedorova, S.A. Borisov, S.G. Zakharova, I.V. Makarycheva, T.Yu. Rusakova, E3S Web of Conf., 291 07003 (2021). <https://doi.org/10.1051/e3sconf/202129107003>
11. S. Yashin, N. Yashina, E. Koshelev, O. Kashina, N. Pronchatova-Rubtsova, Int. J. Techn., **11(6)**, 1171-1180 (2020). <https://doi.org/10.14716/ijtech.v11i6.4432>
12. V. Hyk, E3S Web of Conf., **234**, 00049 (2021). <https://doi.org/10.1051/e3sconf/202123400049>
13. S.P. Dehmer, P.G. Pardey, J.M. Beddow, Y. Chai, PLoS ONE **14(3)**, 1980-2050 (2019). <https://doi.org/10.1371/journal.pone.0213801>
14. A. Polyinin, L. Pronyaeva, A. Pavlova, O. Fedotenkova, D. Rodionov, Int. J. Tech., **11(6)**, 1148-1160 (2020). <https://doi.org/10.14716/ijtech.v11i6.4420>
15. L. Tashenova, A. Babkin, D. Mamrayeva, I. Babkin, I., Int. J. Tech., **11(8)**, 1499-1508 (2020). <https://doi.org/10.14716/ijtech.v11i8.4537>
16. A. Landelun, Problems of training scientific and technical innovative personnel in China. Accessed on: December 03, 2021. [Online]. Available: http://www.bseu.by:8080/bitstream/edoc/73256/1/Landelun_A._s._241_242.pdf
17. H. Xu, Open J. Soc. Sci., **6**, 183-199 (2018). <https://doi.org/10.4236/jss.2018.63013>
18. Zh. Chen, Zh. Yang, L. Yang, Soc.-Econ. Plan. Sci., **69**, 100707 (2019). <https://doi.org/10.1016/j.seps.2019.04.004>
19. P. Dobrzanski, S. Bobowski, Sustainability **12(7)**, 2686 (2020). <https://doi.org/10.3390/su12072686>
20. D. Kiselakova, B. Sofrankova, V. Cabinova, E. Onuferova, J. Soltesova, J. Compet., **10(3)**, 34-50 (2018). <https://doi.org/10.7441/joc.2018.03.03>

21. N. Salimi, J. Rezaei, *Eval. Program Plan.*, **66**, 147-155 (2018).
<https://doi.org/10.1016/j.evalprogplan.2017.10.002>
22. M.C. Huang, M.H. Liou, Y. Iwaki, *J. Soc. Econ. Devel.*, **23**, 447-467 (2020).
<https://doi.org/10.1007/s40847-020-00113-1>
23. A. Sadollah, M. Nasir, Z.W. Geem, *Sustainability* **12(5)**, 2027 (2020).
<https://doi.org/10.3390/su12052027>

Effectiveness of national projects as a tool for ensuring the socioeconomic development of Russia

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Abstract. In the context of socioeconomic crisis, the implementation of national projects becomes the principal instrument of the Government for improving the people's social well-being. The study aims to develop methodological tools for evaluating effectiveness of national projects that allow implementing budget policy of Russia. That policy is focused on enhancing quality of life standards of the population. Methodological procedures include economic analysis method, system analysis method and mathematical statistics. The methodological tools have been tested using official data of the Federal State Statistics Service of the Russian Federation and the Ministry of Finance of the Russian Federation for 2018-2019. Based on the results of the study, the effectiveness of the implementation of the value-based budget strategy of the Russian regions was determined using a comprehensive normalized goal indicator and an indicator of immediate results of national projects. The numerical value of the proposed comprehensive indicator became a parameter for ranking regions and allowed identifying territorial entities with a high, satisfactory and unsatisfactory level of implementation of national projects. Classification of regions by levels of implementation of national projects makes it possible not only to evaluate the effectiveness of their implementation but also to determine the tendency of social and economic development of regions in order to implement the value-based budget strategy that promotes population growth and enhances the standard of living of citizens and their well-being.

Keywords: national projects, efficiency evaluation, rating of regions, comprehensive normalized main indicator, value-based budget strategy

1 Introduction

The Executive Order of the President of the Russian Federation No. 204 "On national goals and strategic objectives of the Russian Federation through to 2024" of 7 May 2015 identified areas for the development of a system of national projects of Russia, which

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should become the ideological and methodological basis for the implementation of the value-based development strategy of the State.

Government policy aimed at achieving the goals of the value-based development strategy of the State should lead to the breakthrough in science and technology and socioeconomic development in the Russian Federation, increase the country's population, and improve the living standards. The policy should not only provide comfortable living conditions but also create an environment and opportunities for all to fulfil their potential. Those areas of Government policy have been reflected in a number of scientific publications [1-13].

The main qualitative and quantitative indicators of achieving the goal and indicators of direct results of national projects of the Russian Federation have been developed to evaluate the effectiveness of the implementation of the value-based development strategy of the State.

The basis of financial support and resourcing for the value-based strategy of the State is budgetary resources of the budgetary system of the Russian Federation as well as the resources of governmental non-budgetary foundations.

Considering the value-based approach, state budget management assumes a way of public finance management when the results are obtained while respecting universal human values, such as truth, goodness, beauty, and life, the main personally and socially meaningful value.

“The enemy has not yet been defeated, I mean the poverty of a significant number of the population, unresolved problems in the health care system, education, infrastructure development”, Russian President Vladimir Putin said at a meeting with the Government. In effect, this means that public resources should be directed towards science and education, healthcare and the social welfare of citizens.

According to the Ministry of Finance of the Russian Federation, all national projects and an integrated infrastructure plan will receive 51.1% from the federal budget, 29.2% from the extrabudgetary sources, 19,1% from the consolidated budgets of constituent territories of the Russian Federation, and 0.6% from the state extrabudgetary funds [14].

For example, when considering the funding of national projects in the rapidly growing Nizhny Novgorod region, it is noteworthy that the region participates in the implementation of all 12 national projects. According to the information of the Ministry of Finance of the Nizhny Novgorod region [15], funding of national projects comes from the federal and regional budgets respectively (Table 1).

Table 1. Financing structure of national projects in the Nizhny Novgorod region

Types of budgets	2020, %	2021, %	2022, %	2023, %
Federal budget	34	60	51	43
Regional budget	66	40	49	57
Total	100	100	100	100

Source: compiled by the authors based on data from the Ministry of Finance of the Nizhny Novgorod region.

It is expected to allocate 28.9 billion rubles in 2021 for the implementation of national projects in the Nizhny Novgorod region; 27.7 billion rubles – in 2022 and 22.8 billion rubles – in 2023.

The implementation of national projects in the current socioeconomic conditions can be influenced by many factors that determine the low degree and quality of their implementation based on monitoring activities. For example, the execution of national projects in the Nizhny Novgorod region in the first half of 2020 amounted to 25% of the

annual volume due to the Covid-19 pandemic constraints and uneven funding of the work performed, which are mainly paid in the second half of the year.

High accuracy of planning contributes to improving the efficiency of state budget management, however, does not guarantee the permanence of the values of budget figures.

The increased allocations are planned in 2022 for the healthcare sector in the Nizhny Novgorod region. For example, 1.1 billion rubles for the overhaul of health facilities; 2.3 billion rubles for medicines to privileged categories of citizens; 482.3 million rubles from the federal budget for modernization of equipment in health facilities that offer assistance to persons with cancer; 390.6 million rubles from the federal budget for equipping regional cardiovascular centers and primary vascular departments.

Therefore, the development of methodological tools for evaluating the effectiveness of national projects as a way to ensure an effective budgetary policy of the Russian Federation is an important task, the solution of which would allow making managerial decisions to achieve the growth of the welfare state of the country's population.

2 Materials and methods

At the first stage, main indicators of achieving the goal and indicators of direct results of national projects (Table 2), which form the system of implementation of national projects, help to analyze information.

Table 2. System of implementation of national projects according to the main indicators of achievement of the goal and indicators of direct results of national projects

Name of the national project (NP)	Main indicators of achievement of the goal and indicators of direct results of national projects	Desired trend of changes in the values of the main indicators of achievement of the goal and indicators of direct results of NP
Demography	Life expectancy of citizens aged 55 years, years	max
	Healthy life expectancy, years	max
	Mortality of the population over the working age, per 100,000 people	min
	Total fertility rate, the number of children per 1 woman	max
	Proportion of citizens leading a healthy lifestyle, %	max
Healthcare	Mortality of the working age population, per 100,000 people of the corresponding age	min
	Mortality from diseases of the circulatory system, per 100,000 people	min
	Mortality from malignancies, per 100,000 people	min
	Infant mortality, the number of children dying under a year of age, per 1000 live births	min
Housing and urban environment	Volume of housing construction, million ^{square meters} of total area	max
	New housing construction in multi-family buildings, million square meters of total area	max
	The average price of 1 ^{square meter} of model housing in the primary market, thousand rubles	max
Science	The share of researchers under the age of 39 among the total number of researchers in Russia, %	max

Name of the national project (NP)	Main indicators of achievement of the goal and indicators of direct results of national projects	Desired trend of changes in the values of the main indicators of achievement of the goal and indicators of direct results of NP
	Domestic expenses on research and development from all sources, billion rubles	min
Digital economy	Proportion of households with broadband Internet access, %	max

Source: compiled by the authors.

At the second stage, the indicators are normalized, that is, they are reduced to a single dimension from 0 to 1 according to the transformation formulas (1) and (2).

The first group (improvement (1) of the main indicators of achievement of the goal and indicators of direct results of national projects, MIP):

$$MIP_{ij}^* = \frac{MIP_{i\max} - MIP_{ij}}{MIP_{i\max} - MIP_{i\min}} \quad (1)$$

The second group (deterioration (2) of the main indicators of achievement of the goal and indicators of direct results of national projects):

$$MIP_{ij}^* = \frac{MIP_{ij} - MIP_{i\min}}{MIP_{i\max} - MIP_{i\min}} \quad (2)$$

where MIP_{ij} is the calculated value and MIP_{ij}^* is the normalized value of the i -th main indicator of achievement of the goal and the indicator of direct results of national projects in the j -th region, $MIP_{i\max}$ is the largest and $MIP_{i\min}$ is the smallest calculated value of the i -th main indicator of achievement of the goal and the indicator of direct results of national projects in the sample.

At the third stage, a comprehensive normalized main indicator of achievement of the goal and an indicator of the direct results of national projects are determined ($CMIP_j^{norm}$) according to formula (3).

$$CMIP_j^{norm} = \sum_{i=1}^n MIP_{ij}^* \quad (3)$$

Then a numerical score is carried out on the basis $CMIP$, one score is assigned to the region with the highest level of implementation of national projects, which corresponds to the lowest value $CMIP$.

3 Results

The empirical results of calculations based on the proposed methodology using these sources [14-17] are presented in Table 3.

Table 3. Ranking of the regions based on a comprehensive normalized main indicator of achievement of the goal and the indicator of direct results of national projects for the period 2018-2019

Name of regions	CMIP for all NP	Score
Republic of Ingushetia	6.147	1
Moscow	6.571	2
Chechen Republic	7.065	3
Khanty-Mansi Autonomous Okrug	7.073	4
Tyumen region	7.149	5
Yamalo-Nenets Autonomous Okrug	7.377	6
Republic of Tatarstan	7.401	7
Moscow Oblast	7.441	8
St. Petersburg	7.971	9
Republic of Dagestan	8.071	10
Nenets Autonomous Okrug	8.073	11
Tyumen region without autonomous okrug	8.222	12
First level	8.253	13
Krasnodar Territory	8.595	14
...		
The Chuvash Republic	8.863	17
Republic of Kalmykia	8.934	18
Republic of Bashkortostan	9.018	19
...		
Kaliningrad region	9.218	22
Murmansk region	9.260	23
Voronezh Region	9.314	24
Republic of North Ossetia-Alania	9.348	25
Republic of Mordovia	9.360	26
...		
Tomsk region	9.555	34
Omsk region	9.562	35
Nizhny Novgorod region	9.570	36
Perm Region	9.579	37
Stavropol Territory	9.593	38
...		
Sevastopol	10.084	59
...		
Republic of Buryatia	10.150	63
Second level	10.194	64
Smolensk region	10.216	65
Vladimir region	10.220	66
...		
Trans-Baikal Territory	10.939	82
Oryol region	10.965	83
Republic of Khakassia	10.984	84
Amur region	11.048	85
Primorsky Krai	11.071	86
Pskov region	11.155	87
Jewish Autonomous Region	11.939	88
Third level	11.951	89
Chukotka Autonomous Okrug	12.102	90

Source: authors' calculations.

The leading regions that successfully implement national projects are the Republic of Ingushetia, Moscow, Moscow Oblast, Tyumen region, Chechen Republic, Republic of

Dagestan, St. Petersburg, and the Republic of Tatarstan. Their values *CMIP* range from 6,147 to 8,253 inclusive, in particular (see Table 3).

The regions with a satisfactory level of implementation of national projects include the territorial entities of the Russian Federation, whose values *CMIP* range from 8,595 to 10,194 inclusive, for example (see Table 3), the Republics of Bashkortostan and Kalmykia, the Chuvash Republic, Kaliningrad region, Leningrad region, Murmansk region, Stavropol Territory, the Republic of Mordovia, Tomsk region, Sevastopol, Nizhny Novgorod region, etc.

Outsider regions include the regions, whose values *CMIP* range from 10,216 to 12,102 inclusive, for example (see Table 3), Pskov region, Oryol region, Amur region, Trans-Baikal Territory, Primorsky Territory, Republic of Khakassia. Moreover, the Jewish Autonomous Region and the Chukotka Autonomous Okrug are characterized by the “low rate of implementation” of national projects.

4 Discussion

It was found that not all activities, benchmarks and results were executed without breaking time limits. The implementation of the Demography national project has shown that the authorities are not fully capable of identifying the key challenges and risks. Currently, there is no clear formalized understanding for identifying the contingent factors and the technique of assistance. The “long-term care” concept is controversial; there is no list and level of social and medical assistance depending on the need, criteria and conditions for providing appropriate support measures to citizens, the procedure and sources of funding, including the range of free and paid services. The “over the working age” concept is defined as women aged 55 and older, and men aged 60 and older. It provokes the risks of management decisions based on data that do not take into account the pension changes in 2018.

5 Conclusion

Because of the evaluation of the implementation of national projects by the main indicators of achievement of the goal and indicators of direct results of national projects, there were identified negative tendencies. During the negotiations on the official statistical methodology for calculating indicators of national and federal projects, the following problems were identified.

1. There are no clear guidelines of normative values or they are changeable.
2. There are no methods for calculating the main indicators of achievement of the goal and indicators of direct results and their comprehensive evaluation.
3. The units of measurement of the main indicators of achievement of the goal and indicators of direct results and their comprehensive evaluation do not coincide with the passports or change.

In general, the use of the developed methodological tools is important for the implementation of the budget strategy of Russia. The presented methodology makes it possible to evaluate the regions of Russia and create a certain vector of their development in order to implement a value-based budget strategy that promotes population growth and enhances the standard of living of citizens and their well-being.

Acknowledgments

The study was carried out within the framework of the realization of the Strategic Academic Leadership Program "Priority 2030", project H-426-99_2022-2023 "Socio-economic models and technologies for the creative human capital development in the innovative society"

References

1. E.V. Kireeva, *Reg. Econ. Manag.*, **1-3(49)**, 359-368 (2017)
2. E.V. Kireeva, *Reg. Econ. Manag.*, **2-1(50)**, 30-34 (2017)
3. R.N. Shpakova, *State Admin.*, **77**, 311-336 (2019).
<https://doi.org/10.24411/2070-1381-2019-10030>
4. A.G. Aganbegyan, A.N. Klepach, B.N. Porfiriyev et al., *Stud. Russ. Econ. Devel.*, **31**, 599-605 (2020). <https://doi.org/10.1134/S1075700720060027>
5. A.G. Aganbegyan, *Stud. Russ. Econ. Devel.*, **30**, 1-9 (2019).
<https://doi.org/10.1134/S1075700719010027>
6. T.G. Bondarenko, *Utopía y Praxis Latinoamericana*, **25(5)**, 370-378 (2020).
<https://doi.org/10.5281/zenodo.3984269>
7. H. Dawid, P. Harting, M. Neugart, *Rev. Int. Econ.*, **26(3)**, 651-671 (2018).
<https://doi.org/10.1111/roie.12317>
8. A. Hamdan, A. Sarea, R. Khamis, M. Anaswehc, *Heliyon*, **6(6)**, e04046 (2020).
<https://doi.org/10.1016/j.heliyon.2020.e04046>
9. V.M. Kuzenkova, *Pub. Admin. Iss.*, **5(1)**, 161-175 (2021).
<https://doi.org/10.17323/1999-5431-2021-0-5-161-175>
10. M.A. Pechenskaya-Polishchuk, *J. New Econ.*, **22(1)**, 90-104 (2021).
<https://doi.org/10.29141/2658-5081-2020-22-1-5>
11. O. Vaganova, L. Konshina, I. Polevoy, B. Palashenkov, M. Sizyoongo, *Implementation of national projects as the main instrument for increasing the economic growth of Russia*, in Proceedings of the 8th International Conference on Contemporary Problems in the Development of Economic, Financial and Credit Systems (DEFCS 2020), 270-274 (2020). <https://doi.org/10.2991/aebmr.k.201215.057>
12. S.N. Yashin, N.I. Yashina, N.N. Pronchatova-Rubtsova, O.I. Kashina, *Methodical approaches to assessing the budget potential of the region taking into account the innovative development of high-tech industries*, in Proceedings of the 15th International Scientific Conference, European Financial Systems 2018, 849-856, Brno, Masaryk University (2018)
13. N.I. Yashina, S.S. Petrov, N.N. Pronchatova-Rubtsova, O.I. Kashina, *Methodical approaches to the formation of model budgets in order to improve the effectiveness of the budget process in Russia*, in Proceedings of the 15th International Scientific Conference, European Financial Systems 2018, 857-864, Brno, Masaryk University (2018)
14. Ministerstvo finansov Rossiiskoi Federatsii [Ministry of Finance of the Russian Federation]. Accessed on: February 17, 2022. [Online]. Available: <https://www.minfin.ru/>
15. Ministerstvo finansov Nizhegorodskoi oblasti [Ministry of Finance of the Nizhny Novgorod region]. Accessed on: February 17, 2022. [Online]. Available: <http://mf.nnov.ru/>

16. Federalnaya nalogovaya sluzhba Rossii [Federal Tax Service of Russia]. Accessed on: February 17, 2022. [Online]. Available: <https://www.nalog.ru/>
17. Federalnaya sluzhba gosudarstvennoi statistiki [Federal State Statistics Service]. Accessed on: February 17, 2022. [Online]. Available: <https://rosstat.gov.ru/>

Modeling the process of development of the staff capacity of the region

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Abstract. The scientific paper examines the processes of development of the staff capacity management system of the region as a type of economic activity. This aspect of the economy is a complex intersectoral and multifunctional complex with diverse connections. It is shown that in order to effectively manage human resources in the digital economy, it is necessary to pre-calculate indicators to evaluate the elements of this potential. The specifics of the strategy for optimizing the methods and factors of choosing these indicators for the purpose of making economic decisions are revealed. Statistical data on the costs of digital technologies in staff capacity management is systematized. The directions and tools of state regulation of the country's staff capacity based on the development of digital technologies and the staffing of their use are investigated. The principles and indicators of the target program for the development of municipal personnel policy are analyzed. The standard and individual indicators of the development of staff capacity are proposed for monitoring. A model of innovative human capital is developed taking into account competitiveness in the market and the characteristics of territories. The main problems are the low efficiency of staff capacity in the implementation of digital technologies and a leveled mechanism for creating resource potential.

Keywords: staff capacities and resources, optimal resource structure, multivariable model, capacity assessment

1 Introduction

The tools for optimizing the performance of resource management in the region are associated with the use of dynamic series connected with changes in staff capacity [1]. The object of management can be both the region as a whole and enterprises that have a balance of human resources according to their individual sources. The study focuses on the region. At the current stage of development, digital technologies for managing the human resource

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potential of the region are the most relevant [2]. To accelerate their formation, the national program “Digital Economy of the Russian Federation” has been developed [3]. To increase the human resource potential, the solution of digital tasks has some difficulties. Firstly, the requirements for experience and expertise for staff are sharply increasing (adaptation to changes in the external environment and new digital communication channels). Secondly, there is uncertainty in the use of resource sources and market opportunities for their supply. Thirdly, a change in the way of thinking is required, that is a transition from standard processes of activity to flexible operations and self-realization with high speeds [4]. Issues of theory and practice of resource potential research are reflected in the works of such foreign authors as: M. Armstrong, S. Taylor, Yu. Vaitauskas, A. Grakulskis, R. Kaplan et al. The issues of human resource management are most represented in foreign studies of Yu.A. Bodak and R.S. Shulera. Then R. Bennett and H.T.Graham are paid attention to new approaches to human resource management. Larry W. Stout, D. Joy-Matthews and Martin Hilb concentrated on human resource development. Human resource management is a multifunctional process with the possibility of obtaining optimal results [2, 5]. The strategic innovation structure of the region’s resources should ensure maximum business profitability with minimal capital investments, which is possible when sources of these resources are available. The formation of an optimal structure of the region’s resources using digital technologies at the initial stage will lead to a risky strategy.

2 Methods

Solving problems of optimal resource potential of the region involves complex digital algorithms when using information technologies. This is especially noticeable when considering various IT projects. On average, the cost of software is 66%, for non-software projects – 43%. IT developments that have a negative impact threatening the organization’s activities are 17% [6, 7]. To exclude negative results, it is advisable to group all resources. When forming them, consumer demand for each market entity is taken into account. To do this, it is necessary to ensure the implementation of national digital programs; create highly professional human capital; transform the organizational development of resource potential; take into account the fulfillment of business requirements for the quality of resources; meet the needs for qualified staff resources. The specifics of each region form limitations associated with the diversity of their development programs [6]. The tools of resource potential formation in combination with the mechanism of the digital economy make it possible to optimize interaction with consumers and mechanisms of regional impact [8]. Regional human resource management includes monitoring of resource sources to determine their scarcity and explore the potential to replenish the resources. The distancing of employees’ work in 2020 due to the coronavirus pandemic at many enterprises, according to respondents, has led to a decrease in their results in terms of labor productivity and income, which is associated with reduced control (88%), increased time for processing electronic correspondence and increased fatigue (83%), and distractions when working at home (75%) [9, 10]. Different working conditions are required to solve these problems.

3 Results

When managing human resource potential, it is necessary to create structured groups of research objects that evaluate the optimal state of the resource potential. Further, the analysis of the main internal and external sources influencing the creation of a resource base in the region is carried out [11, 12]. The mechanism of functioning in this regulatory system

should take into account a group of stress factors. Optimization of resource potential management is not possible without strategic changes. Performance growth is possible through the use of digital technologies and resource usage conditions. The intellectual approach is the most progressive [1]. It involves radical innovative changes in the structure of reserves, which will allow achieving a new level of development of staffing. They involve the development and implementation of new technologies that have no analogues. The basis for their appearance is the fluctuations occurring in the structure of human capabilities, which provide an innovative leap. Consequently, the implemented strategies should direct the activities of managers to increase the efficiency of using the potential [13]. When developing the potential, 4 main parameters are determined: the availability and nature of demand; the risk of using a new reserve; the mass nature of its use; competitiveness in this market segment. Innovative human reserves are most in demand in the modern economy of the Russian Federation (Fig. 1).

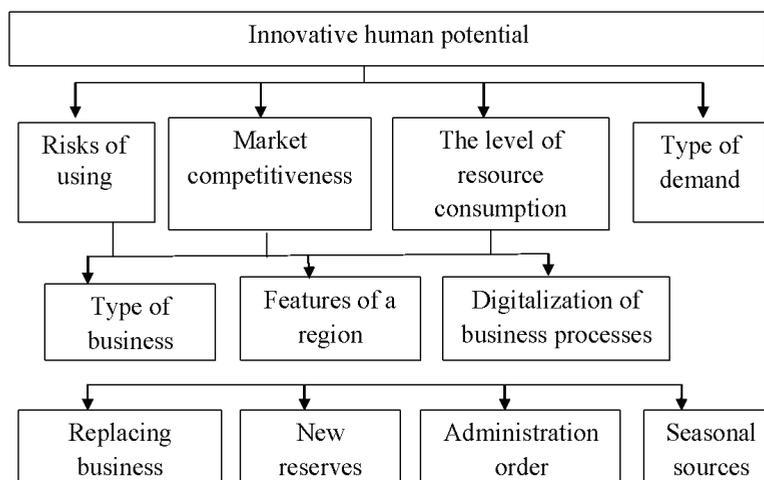


Fig.1. Model of innovative human potential.

The production capacity leaving the existing basic opportunities has reduced the number of standard programs and tightened the requirements for the innovativeness of a resource.

4 Discussion

The human resource potential of the region largely depends on the efficiency of reproduction and development of reserves due to digital technologies, which is associated with the ultimate goal of the region's development in the modern economy of the Russian Federation [2, 14]. It is necessary to increase the results for each unit costs in the process of using existing reserves. Ways to achieve are the following: saving resources and reproduction of innovative resources. The production potential depends on the resource potential [1]. Its cost estimate includes the costs of wages, improving the qualification level, and rest. The resource potential has an age structure, educational and intellectual level. The appearance of new digital tasks in the work requires decisions from the staff in the use of resources; training in new technologies; professional interaction with the external environment. These factors are characterized by complexity and heterogeneity, and differ

significantly in the degree of controllability. The priority factors are real regulators of human resource development allowing us to build the structure of the process of creating the resource potential of the region (Table 1).

Table 1. Leveled process of resource potential creation

Levels	Priority factors	Directions of resource potential development
Federal governance	The level of education of employees	Foreign internships; language training
	Organization of competitions on educational grants	Generation of new ideas and entrenching the values of a creative approach
	Innovative educational programs	Creating conditions for innovation activity
Regional management	Encouraging young people to remain in the region	Introducing mechanisms of support innovative human resources
	Creating an information and educational environment	Training and professional development programmes in end-to-end digital technologies
	Youth scientific and educational centers	Systematic approach to the use of human resources
Management of an organization	Microenvironment of the use of human resources	Creating a corporate innovative communication
	Retraining of staff	Self-development of resources
	Adapting resources to innovation	Optimizing the qualification of resources for innovation
	Corporate culture	Integration of values and norms of staff behavior

The process of creating resource potential allows you to reveal unused personnel reserves to increase the efficiency of resource provision at different levels. At the federal level, industry regulators of the quality of staff training are insufficiently used; at the regional level, training in new areas of knowledge on the use of digital technologies is poorly used. Special training programs are needed to eliminate deficiencies. In the digital economy, it is difficult to overestimate the importance of job satisfaction [11, 15]. In addition to a simple understanding of what the department's work is for, people want to understand why they are involved in the digital process. Employees of an organization want to see that their work has a digital transformation of this value – from standard work to personal significance and satisfaction [16].

Many scientists believe that teamwork provides a unique opportunity to realize the goals of their work, especially when using digital technologies [1, 15]. They note that today's workers do not want to work just for money. They want something more and something different, and teams can give it to them. Teamwork fosters self-esteem, self-respect and a sense of commitment [1]. The ability to make regional organizational changes in human resources demonstrates another advantage of teamwork: the emergence of multiple prospects for the development of digital technologies. In other words, the mosaic of multiple prospects for the development of human resources creates conditions for strengthening the position of an organization. Larry Stout identifies 2 initial advantages of working in groups: they strive for better performance, as the complexity of tasks increases. This is confirmed by the fact that individual employees are limited in intellectual and

informational abilities [6]. In a digital environment, teams will provide real value to their organizations because they contain diverse perspectives.

5 Conclusion

Common creative commitment is an advantage in the development of the human potential of the region. However, the difference between creative teams not only gives multiple perspectives but also provides the presence of competing ideas within the team. T.B. Malkova believes that it is necessary to have a balance between competing values in self-managed teams [12]. Groups in the form of self-ruling teams make decisions from a position of diverse values. Self-ruling teams provide a natural opportunity to improve decision-making thanks to the competing values brought by many different team members.

Acknowledgment

The study was carried out within the framework of the realization of the Strategic Academic Leadership Program "Priority 2030", project H-426-99_2022-2023 "Socio-economic models and technologies for the creative human capital development in the innovative society.

References

1. I. Raïche, H. Moloo, J. Schoenherr, S. Boet, *Perioper. Care Oper. Room Manag.*, **24**, 100180 (2021). <https://doi.org/10.1016/j.pcorn.2021.100180>
2. A. Usman, H. Wirawan, Zulkifli, *Heliyon*, **7(5)**, e06945 (2021). <https://doi.org/10.1016/j.heliyon.2021.e06945>
3. Ukaz Prezidenta Rossiiskoi Federatsii ot 07.05.2018 g. № 204 O natsionalnykh tselyakh i strategicheskikh zadachakh razvitiya Rossiiskoi Federatsii na period do 2024 goda ["On the national goals and strategic tasks of the development of the Russian Federation for the period up to 2024". Decree of the President of the Russian Federation of May 7, 2018 No. 204]. Accessed on: February 17, 2022. [Online]. Available: <http://www.kremlin.ru/acts/bank/43027>
4. R. Burga, Ch. Spraakman, C. Balestreri, D. Rezanja, *Int. J. Project Manag.*, in press (2021). <https://doi.org/10.1016/j.ijproman.2021.10.004>
5. M. Armstrong, *Strategic Human Resource management: A guide to action* (Kogan Page, London, Philadelphia, 2008)
6. S.A. Borisov, A.F. Plekhanova, *Fund. Res.*, **9-3**, 625-629 (2014)
7. V. Ulasik, *Upravlenie proektami: statistika i interesnye fakty* [Project management: statistics and interesting facts] (2021). Accessed on: February 17, 2022. [Online]. Available: <https://blog.ganttpro.com/ru/upravlenie-proektami-statistika/>
8. J. Ahamed, A.V. Rajan, *Internet of Things (IoT): Application systems and security vulnerabilities*, in International Conference on Electronic Devices, Systems, and Applications. IEEE Computer Society, 1-5 (2016). <https://doi.org/10.1109/ICEDSA.2016.7818534>
9. M.R. Azizi, R. Atlasi, A. Ziapour, J. Abbas, R. Naemi, *Heliyon*, **7(6)**, e07233 (2021). <https://doi.org/10.1016/j.heliyon.2021.e07233>

10. N.E. Hammond, L. Crowe, B. Abbenbroek, R. Elliott, D.H. Tian, L.H. Donaldson, A. Delaney et al., *Austral. Crit. Care*, **34(2)**, 146-154 (2021).
<https://doi.org/10.1016/j.aucc.2020.12.004>
11. S. Barykin, O. Kalinina, I. Aleksandrov, E. Konnikov, V. Yadikin, M. Draganov, J. *Open Innov.: Techn., Market, Complexity*, **6(4)**, 1-20 (2020).
<https://doi.org/10.3390/joitmc6040152>
12. S.A. Grachev, T.B. Malkova, O.A. Donichev, Digital Technologies in Production and Spatial Development of Regions, in Proceedings of the 2nd International Scientific and Practical Conference “Modern Management Trends and the Digital Economy: from Regional Development to Global Economic Growth” (MTDE 2020), 656-660 (Atlantis Press, 2020). <https://doi.org/10.2991/aebmr.k.200502.106>
13. Postanovlenie Administratsii goroda Nizhnego Novgoroda Nizhegorodskoi oblasti ob utverzhdenii munitsipalnoi programmy “Razvitie munitsipalnoi kadrovoy politiki” na 2019-2024 gody ot 6 avgusta 2021 goda № 3768 [Resolution of the Administration of the city of Nizhny Novgorod of the Nizhny Novgorod region on the approval of the municipal program “Development of municipal personnel policy” for 2019-2024 dated August 6, 2021 No. 3768]. Accessed on: February 17, 2022. [Online]. Available: <https://docs.cntd.ru/document/465587490>
14. O sisteme upravleniya realizatsiei natsionalnoi programmy “Tsifrovaya ekonomika Rossiiskoi Federatsii” [On the management system for the implementation of the national program “Digital Economy of the Russian Federation”]. Accessed on: February 17, 2022. [Online]. Available: <http://government.ru/docs/35964/>
15. L. Claus, *Bus. Res. Quarterly*, **22(3)**, 207-215 (2019).
<https://doi.org/10.1016/j.brq.2019.04.002>
16. D.V. Sukhodoev, L.F. Sukhodoeva, D.Yu. Vagin, E.V. Yashkova, Yu.N. Zhulkova, O.T. Chernei, *Ad Alta-J. Interdisc. Res.*, **11(1)**, 67-70 (2021)

Global optimization of cross-financing of research costs in the regions

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Abstract. The paper studies the issue of the levels of funding for research and development within the regions of Russia that have adequate scientific capabilities. For this purpose, a model of optimization and planning of cross-financing of research in the federal district has been developed, which takes into account the specific technological and economic results of research in the regions. This model reflects the dependence of various research costs by type of work on three directions of planning innovative development of regions: investment, productive, and financial. Nonlinear regression models of research costs by type of work are optimized using a genetic algorithm, simulated annealing and pattern search. This enables to reveal the reserve or lack of corresponding research costs in each region. As a result of global optimization, it was concluded that the federal district can partially meet the costs of research and development in those regions that need it most under conditions of budgetary savings. In order to identify such regions, it is necessary to analyze this situation in more detail, i.e. in the context of various research costs by type of work. This would significantly save federal budget funds allocated for the scientific and innovative development of the regions.

Keywords: innovative development of regions, investment planning, manufacturing planning, financial planning, research and development costs

1 Introduction

Currently, the costs of research and development are an important component of the expenditure of the State budget. Financing of scientific research allows the State to find solutions to global technological challenges including the problems for implementing the policy of import substitution.

It seems impossible to solve such tasks in isolation from the specific technological and economic results of research and development in the regions. Planning these results, as well as the resources necessary to achieve them, is an urgent task of optimizing research costs. In this regard, we distinguish three types of planning: investment, manufacturing and financial.

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At the same time, we consider all three processes simultaneously. This will allow us to cover a wide range of tasks of optimizing research and development (R&D) costs in the regions and contribute to their innovative development.

Such issues have been studied in sufficient detail by many scientists in relation to the planning of business development of companies. For example, Krushwitz and Lorenz [1] studied the processes of simultaneous investment and financial planning, as well as simultaneous investment and manufacturing planning. Limitovsky [2] supplemented their results with systemic financial effects of investment programs. By such effects, he meant cross financing, cross subsidizing, cross holding and cross hedging.

Although these results are of real practical interest for the successful development of business firms, we strive to use their experience to optimize and plan national and regional research costs. In this regard, the issue of managing the costs of research and development in innovative and industrial clusters that contribute to the socio-economic development of the regions where these clusters are located is relevant. To do this, it is necessary to solve the corresponding cluster management problems. Polyanin et al. [3] have developed scientific and methodological recommendations that can contribute to the timely identification of real and potential economic threats in a cluster. Tashenova et al. [4] have developed a method for assessing the digital potential of main innovative active industrial clusters.

However, in a broader sense, the issue of managing R&D costs in an industrial region is important, but not in its separate cluster. Thus, Ksu [5] has found that regional investments in R&D in the field of human resources have a positive effect on the efficiency of internal R&D of an enterprise. Chen, Yang and Yang [6] have found that in China, the elasticity of R&D capital production is much higher than that of R&D personnel, which suggests that R&D capital is the main driving force of research results. Dobrzanski and Bobowski [7] have determined the extent of the funds not utilized for research and development in the countries of the Association of Southeast Asian Nations (ASEAN). It is identified that Hong Kong and the Philippines are the most effective countries in the field of research and development (R&D) using an approach based on a constant return to scale. Dahmer et al. [8], using the evolving structure of past R&D expenditures for long-term forecasting and in the absence of noticeable changes in scientific policy and spending priorities, predict the continuation of a significant shift in the geography of R&D towards Asian countries, as well as the continuing large gap between the scientific “haves” and “have-nots” in the world. Kiselyakova et al. [9] have confirmed the importance of increasing R&D spending, especially in the higher education sector, as this has a significant impact on improving the global competitiveness of the European Union member countries from Central and Eastern Europe. Gaponenko [10] has considered situations in which it is potentially possible to reduce the actual costs of research.

Nevertheless, in these works, in our opinion, the solution to the problem of choosing reasonable quantitative guidelines for planning the costs of research in the regions of the country has not been sufficiently developed. Moreover, the issue of planning the redistribution of research costs between regions remains open. On the contrary, Yashin et al. [11] in their work show the result of the foresight of the innovation system of the federal district using a multipurpose genetic algorithm. It is found that, in order to increase the synergetic effect of the federal district, it is expected to redirect investment resources and research costs to those regions where resources are not enough.

This brings us to the need to solve the problem of optimizing regional research costs and to choose the most rational methods for this purpose. Salimi and Rezai [12] have found that assigning different weights to different R&D indicators (as opposed to simple averages)

leads to different ranking of firms and allows R&D managers to formulate more effective strategies to improve the efficiency of their firm's R&D by applying knowledge about the importance of various R&D indicators. Huang, Leu and Iwaki [13], taking into account the paradox of the side effect of R&D spared from the global supply chain, used a general equilibrium calculation model with the GTAP v10 database to analyze the impact of Japanese public investment in R&D on key sectors of the global supply chain, namely, chemical and pharmaceutical, electronic equipment, machinery and transport equipment to verify its output, foreign trade and public wealth. Sadola, Nasir and Gim [14] have set the main goal of optimization to improve overall sustainability including environmental, social, economic sustainability and sustainability of energy resources through the implementation of appropriate target functions. Hick [15] has developed a model that justifies the relationship between the studied indicators of innovation costs, allows predicting the amount of sales revenue and ensures that its optimal value is achieved.

2 Materials and methods

In this study, the author uses metaheuristic algorithms to optimize research costs in the regions of the federal district. This will make it possible to plan cross-financing of research within one district in the future. The following metaheuristic algorithms are used:

- 1) genetic (evolutionary) algorithm (GA);
- 2) Simulated Annealing (SA);
- 3) Pattern Search (PS).

Using those metaheuristic algorithms, a model of optimization and planning of cross-financing of R&D costs in the regions can be developed (Fig. 1). It includes 5 stages, which are going to be described in more detail.

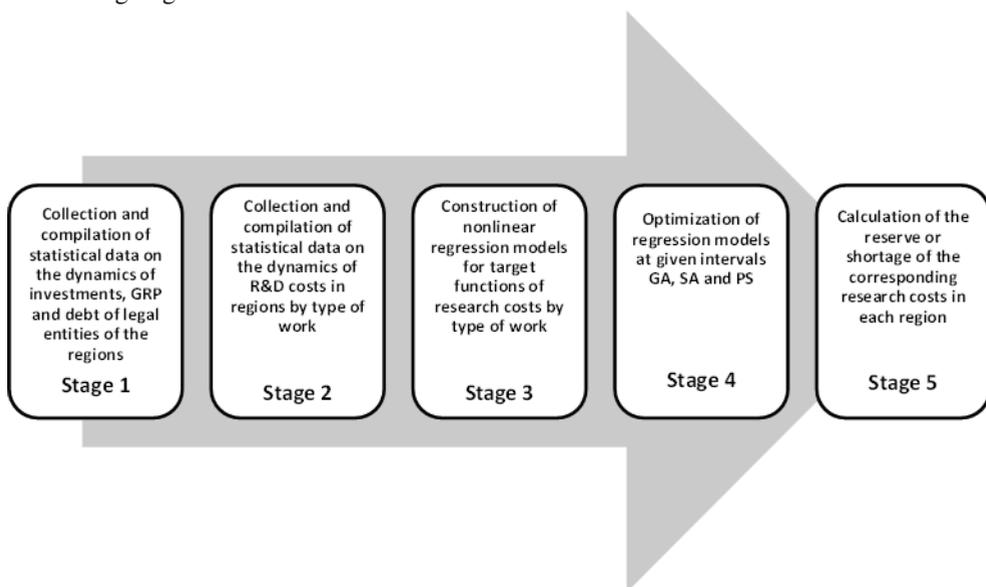


Fig. 1. Model of optimization and planning of cross-financing of R&D costs in the regions. *Source:* Compiled by the authors.

Stage 1 – Collection and compilation of statistical data on the dynamics of investments, GRP and debt of legal entities of the regions. At this stage, data on the dynamics of investments in fixed assets (x_1), gross regional product (GRP) (x_2) and debt of

legal entities on loans (x_3) of the regions of the federal District for 10 years are collected and adjusted for inflation. In order to collect this data, the website of the Federal State Statistics Service can be used (<https://www.gks.ru>). Thus, the parameter x_1 characterizes investment planning, x_2 – manufacturing planning, and x_3 – financial planning of the district.

Stage 2 – Collection and compilation of statistical data on the dynamics of R&D costs in regions by type of work. Statistical information is collected and adjusted for inflation on the internal current costs of R&D in total (y), as well as by types of work, which are divided into basic research (y_1), applied research (y_2) and development (y_3). These data are collected for the same period as in the previous stage.

Stage 3 – Construction of nonlinear regression models for target functions of research costs by type of work. Nonlinear regression models of R&D costs of the form indicated below

$$y = f(x_1, x_2, x_3) , \quad (1)$$

they reflect more effective economic processes in comparison with linear ones and will be multiple. In order to get them, the *Statistica* program is used.

Stage 4 – Optimization of regression models at given intervals GA, SA and PS. The global optimization of regression target functions will be carried out in the *Matlab* program using three metaheuristic algorithms: genetic algorithm (GA), simulated annealing (SA) and pattern search (PS). For more precise search results of the GA and SA methods, the results of optimization of target functions will be supplemented with hybrid pattern search functions and the interior point method. That is, GA or SA algorithms are applied first, and then their results are used as a starting point for subsequent optimization of the target function. This will lead to obtaining better solutions in each specific case of optimizing the corresponding research costs.

However, in each specific case, we will look for the global maximum of R&D costs in the federal district, i.e. we calculate how much maximum funds can be allocated for R&D and on which values of parameters x_1, x_2, x_3 this maximum depends. Then we optimize the regression models obtained for each type of research for the segments of parameters x_1, x_2, x_3 characteristic of each region of the federal district under study.

Stage 5 – Calculation of the reserve or shortage of the corresponding research costs in each region. At this stage, we compare the obtained optimum R&D costs for each region of the district with its actual maximum value for the period under study and calculate the reserve or lack of corresponding R&D costs in each region as the difference between the actual and optimal value. This will allow us to plan in more detail, i.e. by region, the possibilities of cross-financing research within one district.

3 Results

We are going to show how this model works using the Volga Federal District (VFD) as an example. At the same time, we consider only those 8 regions (regions or republics) in the VFD, in which pilot innovative territorial clusters are located from the list approved by the Government of the Russian Federation. It is in such industrial regions that the main research projects of the federal district are carried out.

Because of the analysis, according to the model presented in Fig. 1, it was identified that under conditions of budgetary savings, the VFD can partially finance all the costs of research in those regions that need it most. They include the Republic of Mordovia (lack of research costs is 2,287.2 million rubles), Samara region (53,941.5 million rubles), Perm Krai (52,862.7 million rubles), Udmurt Republic (26,577 million rubles), as well as the

Republic of Tatarstan (116,768.6 million rubles) and Bashkortostan (77,906.7 million rubles). Moreover, it turns out that the Republic of Tatarstan is the neediest region.

In order to answer this question more reasonably, it is necessary to analyze this situation in more detail and in the context of various research costs by type of work. It was found that the Republic of Tatarstan, on the contrary, has some reserve for the costs of basic research (1,294.6 million rubles), which can be redirected to other regions of the Volga Federal District. In addition, for Tatarstan, necessary expenses for applied research and development for 26,536.6 million rubles are significantly lower than total expenses for research and development (116,768.6 million rubles).

On the contrary, the Samara region is the neediest region in financing various types of research costs (31,595.8 million rubles), Republic of Bashkortostan (29,880.4 million rubles) and the Perm region (25,338.9 million rubles). At the same time, the Nizhny Novgorod region remains the main donor of the costs reserve for various types of research (costs reserve for 28,171.6 million rubles) if we consider domestic cross-financing of R&D costs within the VFD. This would significantly save federal budget funds allocated for the scientific and innovative development of the regions.

4 Discussion

The actual result seriously correlates with the conclusions obtained in the work of Yashin et al. [11]. Namely, for the Samara region, there was the greatest lack of current research costs compared to the optimal plan. It amounts to 10,673 million rubles. It can be partially replenished at the expense of reserves for research in the Nizhny Novgorod and Ulyanovsk regions, the Udmurt Republic, the Republics of Tatarstan and Bashkortostan. In total, such a reserve is 8,412 million rubles. It should be directed to the Samara region. Then its synergistic effect will amount to 86,153.7 million rubles. It is also possible to partially allocate the reserve of 8,412 million rubles for research in the Republic of Mordovia and Perm Krai, and direct the balance to the Samara region. However, the synergetic effect of the entire VFD (429,344 million rubles), in this case, will be comparable to that if the entire reserve is directed to research in the Samara region.

When comparing the results obtained with the help of other scientists, it can be noted that Gaponenko [10] considered situations in which it is potentially possible to reduce the actual costs of performing research. They are the following. Performance of scientific research work similar to the work performed earlier by the same performer, a scientific organization or researcher; performance of scientific research work close to those performed earlier by other performers or scientific organizations; performance (even simultaneously) similar scientific research work for different customers; using previously obtained research results, previously collected data in a new study in the absence of analogy between the topics of old and new research; including tasks in the reference that do not correspond to the purpose of research, the results of which can be used, for example, in another research, publication, or patent.

The authors offer reasonable quantitative guidelines for planning costs for R&D of an industrial region obtained as a result of global optimization of the shown costs.

5 Conclusion

In conclusion, we can outline the most important findings of the study.

The results of global optimization allow us to conclude that the federal district can partially meet the costs of research and development in those regions that need it most

under conditions of budgetary savings. In order to answer this question more reasonably, it is necessary to analyze this situation in more detail and in the context of various research costs by type of work.

2. It was found that the Samara region, the Republic of Bashkortostan and the Perm region are the neediest regions in financing various types of research costs. At the same time, the Nizhny Novgorod region is the main donor of the costs reserve for various types of research and development. This is the essence of domestic cross-financing of R&D costs within the VFD. This would significantly save federal budget funds allocated for the scientific and innovative development of the regions.

Acknowledgment

The study was carried out within the framework of the basic part of the state assignment of the Ministry of Education and Science of the Russian Federation, project 0729-2020-0056 “Modern methods and models for diagnosing, monitoring, preventing and overcoming crisis phenomena in the economy in the context of digitalization as a way to ensure the economic security of the Russian Federation”.

References

1. L. Kruschwitz, D. Lorenz, *Investitionsrechnung [Investment accounting]* (De Gruyter Oldenbourg (Verlag), Munchen, Wien, 2019)
2. M.A. Limitovskiy, *Investitsionnye proekty i realnye optionsy na razvivayuschikhsya rynkakh [Investment Projects and Real Options in Developing Markets]* (Yurayt, Moscow, 2019)
3. A. Polyanin, L. Pronyaeva, A. Pavlova, O. Fedotenkova, D. Rodionov, *Int. J. Techn.*, **11(6)**, 1148-1160 (2020). <https://doi.org/10.14716/ijtech.v11i6.4420>
4. L. Tashenova, A. Babkin, D. Mamrayeva, I. Babkin, I., *Int. J. Techn.*, **11(8)**, 1499-1508 (2020). <https://doi.org/10.14716/ijtech.v11i8.4537>
5. H. Xu, *Open J. Soc. Sci.*, **6**, 183-199 (2018). <https://doi.org/10.4236/jss.2018.63013>
6. Zh. Chen, Zh. Yang, L. Yang, *Soc.-Econ. Plan. Sci.*, **69** (2019). <https://doi.org/10.1016/j.seps.2019.04.004>
7. P. Dobrzanski, S. Bobowski, *Sustainability* **12**, 2686 (2020). <https://doi.org/10.3390/su12072686>
8. S.P. Dehmer, P.G. Pardey, J.M. Beddow, Y. Chai, *PLoS ONE* **14(3)**, 1980-2050 (2019). <https://doi.org/10.1371/journal.pone.0213801>
9. D. Kiselakova, B. Sofrankova, V. Cabinova, E. Onuferova, J. Soltesova, *J. Competitiv.*, **10(3)**, 34-50 (2018). <https://doi.org/10.7441/joc.2018.03.03>
10. V.F. Gaponenko, *Proc. Manag. Acad. Min. Interior Rus.*, **1(45)**, 58-62 (2018)
11. S. Yashin, N. Yashina, E. Koshelev, O. Kashina, N. Pronchatova-Rubtsova, *Int. J. Techn.*, **11(6)**, 1171-1180 (2020). <https://doi.org/10.14716/ijtech.v11i6.4432>
12. N. Salimi, J. Rezaei, *Eval. Program Plan.*, **66**, 147-155 (2018). <https://doi.org/10.1016/j.evalprogplan.2017.10.002>
13. M.C. Huang, M.H. Liou, Y. Iwaki, 2020. *J. Soc. Econ. Devel.*, **23**, 447-467 (2020). <https://doi.org/10.1007/s40847-020-00113-1>
14. A. Sadollah, M. Nasir, Z.W. Geem, *Sustainability* **12(5)**, 2027 (2020). <https://doi.org/10.3390/su12052027>

15. V. Hyk, E3S Web Conf., **234**, 00049 (2021).
<https://doi.org/10.1051/e3sconf/202123400049>

Study of the efficiency of economic activity of Russian regions – Moscow and the Moscow Region

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Abstract. The work examines the activities of the Russian regions. Two constituent entities of the federation were subjected to financial and economic assessment: Moscow and the Moscow region. The data provided by the Federal Tax Service of the Russian Federation and Rosstat were used for the analysis. Statistical methods, namely the index method, were applied during the research. Based on the analysis we obtained the efficiency ratings of regional functioning, both by total tax revenue and by individual indicators describing the main types of economic activity. The places of the studied regions in the functioning efficiency ranking of the entities on the total tax income were determined. A separate assessment was made of the activities of entities in sectors of paramount importance to their economic development. These types of economic activities were: “Manufacturing”, “Provision of electricity, gas and steam; air conditioning”, “Construction”, “Activities in the field of information and communication”. The positions of entities in these industries are defined. The analysis revealed that the regions are sufficiently provided with electricity, human resources, have a high rate of construction and are sufficiently provided with information and telecommunication technologies. The conclusion is that the entities have good prerequisites for active economic development and the leverage of this development should be the digitalization of the economy.

Keywords: regional economy, management, taxes, statistics, index method

1 Introduction

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To this day, the issue of economic development of the regions of the Russian Federation is very topical. Many scientists do not see serious prospects for economic growth in our state and its constituent entities. They support this widespread opinion with the following factors: the global economic crisis, the undying Covid 19 pandemic, global trade wars, financial and economic sanctions against leading Russian companies and Russia as a whole, etc.

However, there is another opinion. In the opinion of the authors of the article, our country has very serious prerequisites for its economic development. Facts confirming this statement include developed infrastructure for doing business in many regions thorough provision of many entities with electricity, availability of a tangible amount of human resources, etc. Moreover, one of the factors, which may become a lever for economic development of regions is widespread distribution of telecommunication networks and systems, a variety of communications, widespread use of computers, etc. This aspect is necessary and quite sufficient for economic development of the regions. This aspect is a necessary and sufficient basis for the digitalization of companies located in the Russian regions.

2 Methods

The proposed work will analyze the effectiveness of economic activity and growth prospects of two Russian regions: Moscow and the Moscow region. The research is based on many years of experience in studying regional economics by the authors of the proposed article. Part of the financial and economic analysis was performed based on the information-analytical system “Taxes of the Russian Federation” developed by the authors of the article [1].

The article aims to study the financial and economic activities of the two entities of the Russian Federation: Moscow and the Moscow region. These regions are the object of ongoing analysis. The sectors of the national economy functioning on their territories are the subject of research. The general scientific methodological basis of research is system analysis and synthesis, comparisons, induction and deduction. Statistical methods were chosen as special methods of knowledge. The index method was used as a private-scientific method. The analyzed data were obtained from the reference books of Rosstat and statistical reports and the Federal Tax Service (FTS) of the RF.

Statistical methods are widely used to conduct economic analysis of regional economies. One of the uses of these studies is the use of the index method. Numerous works by foreign [2, 3] and Russian authors [4, 5] are devoted to the use of the index method in research. A particularly popular direction of economic research is based on the application of Sustainable Development Goals (SDG) Indicators [6, 7]. The index method can be applied to evaluate the industrial activity [8, 9]. For example, the article [10] discusses the use of indices to analyze the activity of the transport system. In turn, this aspect of research is significant for further analysis of financial and economic activity of innovative companies [11, 12].

A classic example of the use of indices is the method of calculating the Genuine Progress Indicator, GPI. This indicator was introduced by John Cobb and Herman Daly. GPI is calculated as the ratio of GDP per capita of the country, adjusted by the amount of costs invested in the socio-economic and environmental development of the studied state [13].

3 Results

Further research will be conducted based on the statement that the ratio of tax revenue (TR) collected in the region to the number of population employed in its creation (PE) reflects the efficiency of economic activity of the studied region. Similar studies can be carried out on the economic sectors operating in the entities. According to the All-Russian Classifier of Economic Activities, each branch of the economy corresponds to a certain type of economic activity (TEA). The Federal Tax Service of the Russian Federation and Rosstat provide the data used in this work on TR and PE in the context of foreign economic activity. Table 1 will present the examined TEA and their corresponding indicators in two entities of the Russian Federation.

We will assess the effectiveness of the studied regions on the basis of the indicator proposed by the authors of the article. The studied indicator is a relative indicator of the effectiveness of the RF entity activity and is equal to the ratio of the TR value to the average annual number of PE of the subject in any TEA. The proposed indicator is called the relative performance of tax revenues (RPTR). RPTR is an integral indicator and can be applied to assess the level of economic development of economic sectors in the regions of the country. The resulting indicators are dimensionless standardized relative indicators of the intensity of tax revenues. The methodology of creating and using RPTR is presented in the article [5].

In 2018, in Moscow and the Moscow region, TR was collected in the amount of 3,479,129,088 and 918,834,399 RUB thousand, respectively. 8,838.2 and 3,385.7 thousand people were employed in creating these revenues, respectively. According to the rating of the efficiency of functioning of all entities of the Russian Federation (Indicator-1010, the total TR) calculated by the authors of the article, Moscow took the first place, and the Moscow region – the twelfth place in the rating. Note that the Russian Federation consists of 85 constituent entities of the federation.

The proposed methodology allows to rank the constituent entities of the Russian Federation not only by Indicator-1010 (total TR), but also by individual TEA. Table 1 presents data on the number of PE and the volume of TR as a whole and for some TEA. Table also shows the positions of these regions in the ranking of the entities of the Russian Federation by indicators 1085, 1240, 1270 and 1360.

Table 1. Performance of Moscow and the Moscow region by main economic sectors in 2018.

	TR, RUB mln		PE, thousand people		Rating	
	Moscow	Moscow region	Moscow	Moscow region	Moscow	Moscow region
TOTAL – 1010	3,479,129	918,834	8838.2	3385.7	1	12
Manufacturing industries – 1085	271,283	244,221	763.3	563.8	19	15
Provision of electric energy, gas and steam; air conditioning – 1240	147,368	35,316	77.7	69	1	7
Construction – 1270	222,757	45,175	1040.2	333.8	6	18
Information and communication activities – 1360	405,030	14,440	364.5	54.1	1	14

Source: Table compiled and calculated based on data from Rosstat [15] and the Federal Tax Service of the Russian Federation [16]

4 Discussion

Figure 1 presents a diagram visually displaying the efficiency of economic activity of the studied regions among the 85 entities of the Russian Federation. The zero mark on the ordinate axis corresponds to the national average. The figure confirms the well-known fact that the entities have no mineral deposits. There is also another negative indicator in Moscow in the area of transportation and storage. The agricultural sector may be of interest. Despite the fact that the Moscow region has extensive areas for the development of agriculture in Moscow the intensity of this TEA is much higher [14].

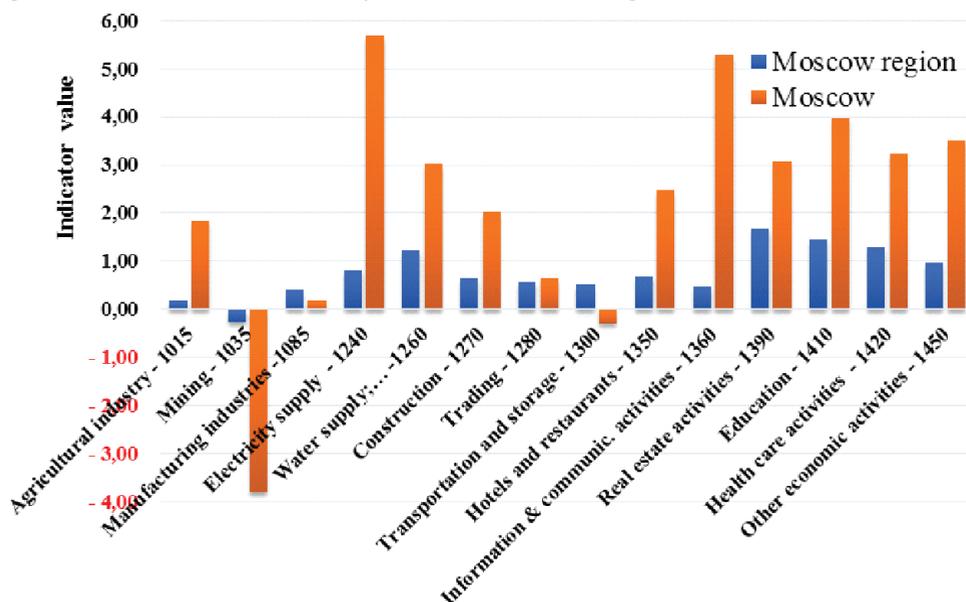


Fig. 1. Efficiency of economic activity. Source: based on calculations based on data from Rosstat [15] and the Russian Federal Tax Service [16]

5 Conclusion

We can conclude that the work examined two regions of the Russian Federation: Moscow and the Moscow region. Statistical methods, namely the index method, were used to conduct an economic assessment. As a result of this research, a rating of the efficiency of economic functioning of Russian regions was obtained. Moscow and the Moscow region ranked first and twelfth in the proposed ranking.

Ratings of the entities performance by economic sector were also compiled. Of greatest interest are such sectors of the economy as manufacturing, electricity supply, construction and activities in the field of information and communication. The latter industry is responsible for seizing the opportunity of active digitalization of the region. It is shown that these entities have sufficient resources and competencies for active economic development and digitalization can be a lever for positive changes in the economy of the studied regions.

References

1. A.A. Ksenofontov, A.Sh. Kamaletdinov, I.V. Trifonov, P.V. Trifonov, N.A. Cherepovskaya, *IOP Conf. Ser.: Mater., Sci. Eng.*, **828(1)**, 012014 (2020). <https://doi.org/10.1088/1757-899X/828/1/012014>
2. B. Bleys, A. Whitby, *Environ. Econ.*, **117**, 162-172 (2015). <https://doi.org/10.1016/j.ecolecon.2015.06.021>
3. D. Tebala, G.D. Tebala, *Arch. Pub. Health*, **79(1)**, 65 (2021). <https://doi.org/10.1186/s13690-021-00590-8>
4. R. Sharafutdinov, V. Gerasimov, E. Akhmetshin, E. Karasik, O. Kalimullina, *Bul. Nat. Acad. Manag. Staff Cult. Arts*, **2**, 1-4 (2018)
5. A.Sh. Kamaletdinov, A.A. Ksenofontov, *Fin.: Theory Pract.*, **23(3)**, 82-95 (2019). <https://doi.org/10.26794/2587-5671-2019-23-3-82-95>
6. J.M. Diaz-Sarachaga, D. Jato-Espino, *Sust. Devel.*, **26(6)**, 663-671 (2018). <https://doi.org/10.1002/sd.1735>
7. M. Jabbari, M.S. Motlagh, K. Ashrafi, G. Abdoli, *Envir. Devel. Sust.*, **22(7)**, 6405-6423 (2019). <https://doi.org/10.1007/s10668-019-00489-z>
8. J. Rezaei, S. Wilco van Roekel, L. Tavasszy, *Transport Pol.*, **68**, 158-169 (2018). <https://doi.org/10.1016/j.tranpol.2018.05.007>
9. B. Meng, G. Chi, *Singapore Econ. Rev.*, **63(2)**, 229-248 (2018). <https://doi.org/10.1142/S0217590817400094>
10. U. Illahi, M.S. Mir, *J. Sci. Tech. Pol. Manag.*, **13(1)**, 43-72 (2021). <https://doi.org/10.1108/JSTPM-12-2019-0116>
11. A.V. Trachuk, N.V. Linder, *Fin.: Theory Pract.*, **25(1)**, 51-69 (2021). <https://doi.org/10.26794/2587-5671-2021-25-1-51-69>
12. T.Yu. Mazurina, Ya.S. Matkovskaya, K.L. Neopulo, T.M. Rogulenko, *Entrep. Sust. Iss.*, **3(7)**, 1513-1526 (2020). [https://doi.org/10.9770/jesi.2020.7.3\(6\)](https://doi.org/10.9770/jesi.2020.7.3(6))
13. H. Daly, J. Cobb, *Popul. Envir.*, **12(1)**, 69-71 (1989). <https://doi.org/10.1007/BF01378553>
14. G.N. Ryazanova, S.L. Sazanova, *Lect. Notes Netw. Syst.*, **111**, 761-769 (2020)
15. Federalnaya sluzhba gosudarstvennoi statistiki RF [Federal State Statistics Service RF]. Accessed on: March 11, 2022. [Online]. Available: <https://rosstat.gov.ru/>
16. Otchet po forme 1-NOM po sostoyaniyu na 01.01.2017 [Report on Form 1 as of 01.01.2017]. Accessed on: March 11, 2022. [Online]. Available: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/6092076/

Analyzing social expectations of foreign graduates of Russian universities

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Abstract. The article analyzes social expectations of foreign graduates of Russian universities. Social expectations are defined by the authors as a set of the individuals' ideas about their future, determined by personal factors, on the one hand, and environmental (microsocial and macrosocial), on the other. Being one of the most important motivators of human activity, social expectations form the social behavior of a person; act as an indicator of "significance", social recognition of a person in society. Hence the importance of studying social expectations of foreign graduates of Russian universities in the aspect of their compliance with the values of Russian labor culture. This is the goal of this study. Its tasks are: 1) highlighting the criteria for comparing the norms and values that exist in the labor culture of different nations; 2) identification of ethnic markers of the disintegration of a foreigner in the Russian-speaking work collective; 3) search for ways to overcome a foreigner's negative attitudes to the traditions of Russian labor culture. The norms and values of labor culture are socially and ethnically determined and they influence the prospects for the integration or disintegration of a foreigner to the work collective. Among them we distinguish: 1) acceptance or rejection of authority; 2) attitude to the labor process; 3) attitude towards public opinion; 4) the degree of value of material reward; 5) attitude towards informal relationships at work. The analysis of experimental data allows us to conclude that the effectiveness of the formation of positive social expectations among foreign graduates depends on the quality of the preliminary work (social adaptation, psychological) carried out by a Russian university.

Keywords: foreign graduates, social expectations, social behavior, ethnoculture

1 Introduction

A foreigner applying for a job in a Russian company is influenced by two opposing forces. The first of them is the traditions of the labor culture of the host society, the second is the ethnic attitudes that form social expectations of the individual (Social expectations). Social

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expectations as a set of an individual's ideas about his future is determined by “personal and environmental (microsocial and macrosocial) socio-psychological factors” (Shalimova, 2014, p. 11) [1] and largely determines the meaning and trajectories of human behavior in the work collective. The reality, reflected through social expectations, forms goal-setting activity and determines the behavioral connotations of the personality. That is, in a broad sense, social expectations act as elements of a system of social requirements, a system based on the principles and priorities of a particular ethnic culture. Being one of the most important motivators of human activity, social expectations form the social behavior of a person, act as an indicator of "significance", social recognition of a person in society. Hence the importance of studying social expectations of foreign graduates of Russian universities in the aspect of their compliance with the values of Russian labor culture. This is the goal of this study. Its tasks can be considered: 1) the selection of criteria for comparing the norms and values that exist in the labor culture of different peoples; 2) identification of ethnic markers of the disintegration of a foreigner in the Russian-speaking work collective; 3) search for ways to overcome a foreigner's negative attitudes to the traditions of Russian labor culture.

2 Methods

Being interdisciplinary by nature, this study required the involvement of data from a number of sciences: economic psychology, sociology, cultural studies, social pedagogy. For us of particular importance were the works containing the analysis of:

1) factors and conditions of adaptation of foreign employees to the professional environment [2-6];

2) specific sociocultural phenomena (favoritism, nepotism, protectionism, etc.) that mark some corporate ethnocultures [7-12];

3) formation of social (social and professional) expectations of foreign university graduates [9, 13-17].

In the course of work, it was revealed that the amount of research in the field of human resource management practices and, especially, in terms of innovative practices in the education sector, is rather small, and this explains the importance and relevance of this study [18].

To identify ethnic (socio-ethnic) characteristics that hinder the successful adaptation of foreigners in Russian companies, a survey of foreign graduates of a number of Russian universities (Kosygin Russian State University, Moscow State Pedagogical University, St. Petersburg State University, Russian Technological University) was conducted.

For this purpose, a questionnaire was developed. It allows to identify the ethnic component of labor culture, to determine the attitude of representatives of particular nation to the acceptance or rejection of authority, to the labor process, to public opinion. The questionnaire helps to identify the degree of importance of material remuneration for the high-quality performance of professional duties and to assess the attitude of an ethnic group to the problem of informal relations at work.

3 Results

We have identified several criteria by which it became possible to compare the norms and values that exist in a particular labor culture, and to draw a conclusion about the integration or disintegration of a foreigner in the Russian-speaking collective. Let us consider in detail the most relevant ones.

3.1 Acceptance or rejection of authority

Despite the active influence of the processes of globalization and internationalization on world culture, the national cultures of many peoples retain patriarchal features associated with a special attitude towards leadership and seniority (authority). According to our survey conducted in a youth multinational audience, many foreign students have misunderstandings, caused by situations associated with criticism of decisions of their superiors or senior people. 34% of Afghan students and 24% of Chinese students did not consider it right to interfere in unfair dismissal of employees and they would not side with their "offended" colleagues. 10% of Iranian students condemned actions related to the "office conflicts". It seemed interesting to us that in the follow up interviews these students qualified their answers: their comments could only be referred to the cases in their home countries or countries with similar culture, while they admitted that during their stay in Russia, where there were so many "communicative contexts", they might be opposing local Russian management as well as be willing to take sides in the office conflicts. Russian students responded more consistently as their answers were virtually similar for both domestic and foreign cases.

3.2 Attitude to the labor process

The survey shows that in many cultures the worker (or somebody employed) has a significant degree of respect; however, the percentage of those who self-identify as a working person has significantly decreased. That is, the majority of the respondents see some specific traits of their people (nation), such as: a desire to "work hard at any age", "to be a goal oriented worker", an ability to "critically evaluate own work results", but, at the same time, they do not like being involved into activities with high workload. "Obviously, modern global trends aimed at promoting "the value of free time, expanding the possibilities of spending it, as well as" striving for self-realization not in work, but in other types of activity" (Sabetova, 2016, p. 50) [19] have an impact on many ethnic groups, and this attitude towards leisure is becoming a part of the national culture. Hence, there is an inconsistency in the responses. Their answers included: "I am ready to work a lot" and "I do not want to spend a significant part of my time on earning money (working)"; "It is typical for my people to work hard and receive little" and "I will never work hard for little money"; "I respect people who work hard" and "People who have to work hard are losers."

3.3 Attitude towards public opinion

By public opinion we understand "the attitude of people, developed in the course of discussion, a kind of rational view of a particular point of view" (Grushin, 2006, p. 85) [20]. The markers helping to determine ethnic stereotypes of attitudes towards public opinion are (1) the degree of ideologization of society, (2) the degree of social mobility in society and (3) the level of development of public consciousness.

Total ideology inherent in closed political systems inevitably leads to the formation of a strong dependence of the individual on public opinion. The state ideology dictates to a person what he should believe in, what to be guided by when making certain decisions, what to accept (or not to accept) as a model of behavior. In this situation, the individual does not make a conscious choice. In fact, the choice has already been made by society. In this connection, an interesting commentary was made by a North Korean student in

assessing the necessity "to express an opinion opposite to the opinion of the work collective": "Why should I think differently if I know that all think correctly?"

Social mobility leads to the emergence and development of the role of some communities and strata and the withering away or humiliation of others; therefore it also characterizes the formation of public opinion and the degree of its influence on a person. Insufficiently controlled mobility ultimately leads to a loss of stability in social relations and public opinion ceases to be "rational view of things". In this case, there is a certain transformation of the definition; public opinion is interpreted in the framework of the subjective-evaluative category "good vs bad". Foreign students from countries with a high level of social mobility often identify public opinion with the opinion of the management. They give positive answers to the questions about the correctness of doing something, for example "to carry out the instructions of the leader, without paying attention to the opinion of colleagues", "to neglect the opinion of colleagues, if it is important for work activity and has been approved by the head ", etc.

Studying the labor culture we faced the fact that the tendency to "support one of own people" in a foreign society prevails in a situation of choice over the desire to follow the public opinion (especially in a situation of censure, disapproval). Thus, the majority of the surveyed foreign students consider it correct "to condemn what the majority of the work collective considers to be wrong," but they are ready to "express an opinion opposite to the opinion of the collective, if we are talking about a compatriot, even if the compatriot is mistaken."

A high level of development of public consciousness presupposes a strong dependence on public opinion. This feature of the national culture is quite stable and persists both in the native and in a foreign environment, when working in a foreign collective.

3.4 The value of material reward

For many respondents from countries with a high level of development of social consciousness, material reward is an indicator of their own value (significance). Confirmation of this are value judgments such as "low-paid work cannot depict a person well", "agreeing to any job means undermining your achievements", "when so much has been invested in your head, it is a shame to work with your hands" and so on. The percentage of answers to the questions of the questionnaire that imply an assessment of "convention" for the ethnic group "not to work in a low-paid position with higher education and/or high professional skills" is also high for this category of respondents. It is interesting that the opposite situation is typical for the Russian respondents. Although material incentives to work are very important for Russian potential workers (especially young ones). They consider it normal for our society "to work well for little money if you are respected in the work collective", "not to demand more remuneration for yourself when doing common work", "to do the work well, even if it was not paid for it", "to be silent if you do not agree with the working conditions and your salary". It turns out that "doing things for the best of motives" as well as merely enjoying the work process and result that are typical for of the Russian working culture, can be unappreciated by the foreign co-workers.

3.5 Assessment of informal relationships at work

It is no secret that in many countries employment can be based on the clan principle, and foreign graduates, starting to work in a Russian company, have to revise of their views on

HR policies, on the one hand, and the need to accept Russian priorities (not always and not necessarily right), on the other hand. The ambiguity of this approach determines the complexity of assessing informal relationships at work.

Researchers from different countries write about specific sociocultural phenomena (favoritism, nepotism, protectionism, etc.) that mark individual corporate ethnocultures [7-12, 21]. Some of them consider such phenomena to be some kind of cultural traditions that cannot be eradicated [22], but most still tend to see the remnants of patriarchy in protectionism and nepotism. In their opinion, protectionism contributes to demotivation of employees and stagnation in the functioning of the organization [23].

The results of our survey confirmed the importance of assessing the labor culture of a foreign employee from the standpoint of tolerance to informal relationships at work. Underestimation of this factor is a frequent cause of corporate conflicts. Thus, students from a number of Central Asian countries consider it normal for the majority of the population (and therefore correct) “to get a job as per the recommendation of relatives and good acquaintances”, “not to take work seriously if you got a job under patronage”, “to pay money for getting a position”, “not to engage in professional development if you work under patronage”, “to disrespect colleagues if the boss is your friend or relative”.

4 Discussion

The social expectations of foreign graduates can be represented at three levels: positive, negative and neutral (Shalimova, 2014, p. 11) [1]. As applied to our study, a positive level of social expectations of foreign graduates will be characterized by: 1) a positive attitude towards the host country [5, 15, 16], 2) a positive attitude towards their chosen work [8, 23, 24], 3) a desire to embrace the cultural values of a multinational workforce [14, 25], 4) the desire to feel part of it [2, 26]. A negative level of social expectations will be expressed in a negative attitude towards the host country, a negative attitude towards the chosen work activity and a desire to accept the cultural values of the multinational work collective. With this approach, a person practically deprives himself of the opportunity to integrate in a work collective and is unconsciously in opposition to it. The neutral level of social expectations can be characterized as the “level of incomplete readiness” of a person for interpersonal and intercultural interaction. Foreign students with neutral social expectations are poorly adapted in the Russian-speaking environment and have no idea about the content and specifics of their future profession. The norms and values that exist in a particular ethnoculture have the most direct impact on the formation of the level of human social expectations [27].

Overcoming negative attitudes towards a foreigner towards the traditions of Russian labor culture through a system of training events helps to raise the level of social expectations and improve the climate of the workforce.

5 Conclusion

We understand that the topic we have touched upon is too voluminous to be covered in detail in one article, so we dwelled on only some of its aspects. We examined the norms and values of the labor culture of individual ethnic groups, experimentally identified markers of integration or non-integration of a foreign graduate in the work collective and identified ways and means of successful adaptation of graduates. Based on the analysis of experimental data, it was concluded that the effectiveness of the formation of positive social

expectations among foreign graduates depends on the quality of the preliminary work (social adaptation, psychological) carried out by a Russian university.

References

1. A.M. Shalimova, *Sotsial'no-psikhologicheskie faktory professional'nykh ozhidanii studentov-sotsiologov* [Socio-psychological factors of professional expectations of sociology students], Doctoral Thesis in Psychology (Moscow, 2014)
2. J. Li, P.N. Nuno Guimarães Costa, *Manag. Res.: J. Iberoam. Acad. Manag.*, **14(2)**, 166-187 (2016)
3. J. Chen, *Thunderbird Int. Bus. Rev.*, **59(3)**, 367-383 (2017).
<https://doi.org/10.1002/tie.21877>
4. A. Ganzaroli, I. De Noni, *J. Enterp. Comm.: Peop. Places Glob. Econ.*, **11(4)**, 491-513 (2017). <https://doi.org/10.1108/JEC-11-2015-0052>.
5. S.W. Lee, *J. Stud. Int. Edu.*, **21(2)**, 170-190 (2017).
<https://doi.org/10.1177/1028315317697540>
6. G.R. Ferris, B.P. Ellen, C.P. McAllister, L.P. Maher, *Ann. Rev. Org. Psych. Org. Behav.*, **6(1)**, 299-323 (2019).
<https://doi.org/10.1146/annurev-orgpsych-012218-015221>
7. D. Safina, *Proc. Econ. Fin.*, **23**, 630-634 (2015).
[https://doi.org/10.1016/S2212-5671\(15\)00416-5](https://doi.org/10.1016/S2212-5671(15)00416-5)
8. Y. Bian, *Manag. Org. Rev.*, **13(02)**, 261-267 (2017).
<https://doi.org/10.1017/mor.2017.20>
9. S. Hudson, C. Claasen, *Nepotism and Cronyism as a Cultural Phenomenon? in M.S. Abländer, S. Hudson (eds.), The Handbook of Business and Corruption*, 95-118 (Emerald Publishing Limited, Bingley, 2017).
<https://doi.org/10.1108/978-1-78635-445-720161006>
10. I. Chukwuma, E. Agbaeze, I. Madu, N. Nwakoby, A. Icha-Ituma, *J. Manag., Inf. Decis. Sci.*, **22(3)**, 273-283 (2019)
11. A. Dağlı, Z. Akyol, *J. Edu. Train. Stud.*, **7(7)**, 35-49 (2019).
<https://doi.org/10.11114/jets.v7i7.4191>
12. J. Vveinhardt, W. Sroka, *Sustainability* **12(4)**, 1425 (2020).
<https://doi.org/390/su12041425>
13. P.A. Nilsson, N. Ripmeester, *J. Int. Stud.*, **6(2)**, 614-631 (2016).
<https://doi.org/10.32674/jis.v6i2.373>
14. M.K. Swanson, B.A. Swanson, *Int. J. Qual. Res. Serv.*, **2(4)**, 251-261 (2017).
<https://doi.org/10.1504/IJQRS.2017.088110>
15. R. McManus, *J. Higher Edu. Pol. Manag.*, **39(4)**, 390-405 (2017).
<https://doi.org/10.1080/1360080X.2017.1330806>
16. H. Jupiter, I.W. Othman, N.M. Suki, S.Y. Muhammad, H. Awang, A.R. Rudie, *Lab. E-J. Muamalat Soc.*, **11**, 86-97 (2017)
17. K. Tone, *Res. Bus. Manag.*, **5(2)**, 1-16 (2018). <https://doi.org/10.5296/rbm.v5i2.12773>
18. O.V. Okhotnikov, Yu.E. Kazakova, *Bul. Ural Fed. Univ. Ser. Econ. Manag.*, **18(3)**, 431-449 (2019). <https://doi.org/10.15826/vestnik.2019.18.3.022>
19. T.V. Sabetova, *RJOAS*, **7(55)**, 47-53 (2016). <https://doi.org/10.18551/rjoas.2016-07.07>
20. B.A. Grushin, *Soc. Real.*, **3**, 83-86 (2006)

21. A.M. Elbaz, M.Y. Haddoud, Y.M. Shehawy, *Tour. Manag.*, **67**, 3-16 (2018).
<https://doi.org/10.1016/j.tourman.2018.01.002>
22. S. Firfiray, C. Cruz, I. Neacsu, L.R. Gomez-Mejia, *Human Res. Manag. Rev.*, **28(1)**, 83-97 (2018). <https://doi.org/10.1016/j.hrmmr.2017.05.008>
23. M. Bibi, R.A. Khan, A. Manzoor, *Market Forces Res. J.*, **16(1)**, 105-128 (2021).
<https://doi.org/10.51153/mf.v16i1.447>
24. O.A. Bakumenko, *Accred. Edu.*, **7(107)**, 12-19 (2018)
25. A.W. Jabid, I. Buamonabot, J. Fahri, M.A. Arilaha, *Binus Bus. Rev.*, **12(1)**, 1-9 (2021).
<https://doi.org/10.21512/bbr.v12i1.6226>
26. A. Mohsen, N. Neyazi, S. Ebtekar, *Int. J. Manag.*, **11(8)**, 879-888 (2020).
<https://doi.org/10.34218/IJM.11.8.2020.079>
27. R. Grigolienė, R. Tamoševičienė, *J. Manag.*, **1(36)**, 33-38 (2020).
<https://doi.org/10.38104/vadyba.2020.04>

Sustainable development of the Astrakhan region

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Abstract. Sustainable regional development is connected with the implementation of a strategy, developed in accordance with the principles of applying modern methods of making management decisions, based on strategic planning. Indicators of sustainable regional socioeconomic development are the source of information in strategic planning. In modern life, the role of analyzing sustainable development of the region becomes more significant due to the increasing influence of external and internal factors of instability of the regional economy. The relevance of the topic presented in this article is explained by the fact that the strategic priorities chosen in the planning process rely directly on the quality of the regional development analysis. The article examines sustainable growth of the region through the analysis and study of innovation processes, which will have a positive impact on the competitiveness of the entire national economy.

Keywords: region, economic growth, innovation, competitiveness, resource balance, mechanism, factors, development.

1 Introduction

Issues that relate to sustainable development of regions are considered as a major factor in the development of the regional and national economies.

The main postulate of sustainable development is to strike a balance between the interests of economic, social, and environmental intergenerational factors. The main objective of sustainable development should be to improve the quality of life of the population.

The article examines different sectors of the economy in the Astrakhan Region that form the concept of sustainable regional development.

It should be noted that the issue of sustainable development of the Astrakhan Region is discussed and approved at both regional and federal levels, since the economic development depends on it.

Despite the negative effects of the pandemic, it is necessary to strive for sustainable development of the regional economy, which is why the region has established a headquarters for coordination and development of measures to maintain economic stability, chaired by the head of the region.

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2 Methodology of the conducted study

The assessment of sustainable development of the region is based on analysis of certain development indicators.

There are various methods of compiling these indicators, presented by both Russian and foreign authors. The works of Russian authors, such as Zolotareva, Dvinin, et al., present different indicators corresponding to the objectives of the ongoing study of regional development [12].

It is also worth saying that most authors suggest using weighting coefficients for analysis. Alongside this approach, foreign authors suggest analyzing social, economic, and environmental indicators equally [5].

The present study will follow the concept of sustainable development adopted 29 years ago by the United Nations (Fig. 1).

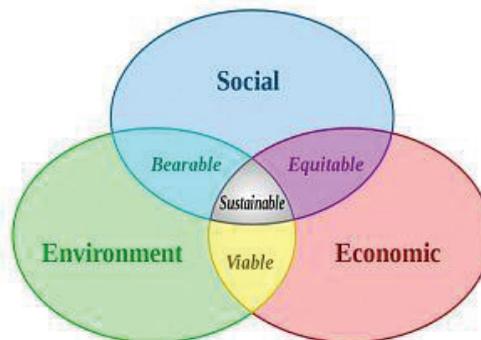


Figure 1. The concept of sustainable development.

The essence of this concept is that all areas are equal and there is no weighting assessment for each area individually.

Thus, the article looks at the average wage in the region over a three-year period and analyzes the unemployment rate.

It also analyzes the mineral extraction and utilization rates in the region, examines the areas of engineering and shipbuilding. Within the frameworks of the study, the authors analyzed the aquaculture and fisheries cluster, the agro-industrial sector of the economy and the tourism sphere in the Astrakhan Region.

The article covers the environmental policy of the region: the authors studied the regional sector of solid municipal waste management and the amount of woodland, and also examined the structure of specially-protected natural areas [16].

Due to the geographical location of the region, the considered sectors of the economy are actively developing. It should be emphasized that sustainable development of the region requires all sectors of the economy to be studied, analyzed and supported.

3 Analysis of sustainable development of the region

As a recommendation for the further effective functioning of the Russia's economy, it is worth suggesting that a strategy for its sustainable development should be followed [1].

Note that the further development of the Russia is directly connected with the socioeconomic model of its dynamics in the world civilisation.

The Astrakhan Region is located in the Caspian lowlands in the lower reaches of the Volga River, in the southeast of the European part of Russia.

The administrative center is the city of Astrakhan. Figure 2 shows the administrative map of the region.

The Astrakhan Region is known for its reserves of natural gas and gas condensate. The continental part of our region and the adjacent area of the Caspian Sea contain large oil and gas reserves, which are the largest in the European part of the country.



Figure 2. Administrative map of the Astrakhan Region.

To assess the social sphere of activity, it is necessary to present the dynamics of average wages in the region for 2018-2020 (Fig. 3).

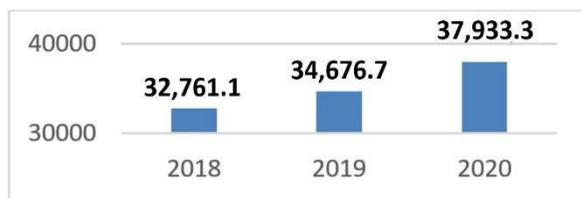


Figure 3. Average wages in the region for 2018-2020, RUB.

Analysis of the data presented allows to say that there is a positive trend in the indicator, which demonstrates improvement in the financial condition of society.

The authors analyzed the unemployment rate in the Astrakhan Region over a three-year period: in 2018, it was 1.0%, in 2019 - 1.2%, in 2020 - 5.8%.

The figures for 2018, 2019 show a fairly low level of unemployment in the region, indicating a stable labour market. In 2020, there was a sharp increase of 4.6 p.p. compared to 2019, due to two factors – the pandemic and its consequences and the implementation of a simplified procedure to apply for increased unemployment compensation.

It should be emphasized that the unemployment compensation reform was adopted by the State to support the population.

Let us analyze the economic sphere of the region. As of early 2021, the region has about 5.3 trillion cubic metres of natural gas reserves and about 1.1 billion tonnes of liquid hydrocarbons, which are mainly in the gas-condensate fields of the Astrakhan structural high.

It should be noted that hydrocarbon production in the Caspian Sea is being quite active. At the moment, there are eight large oil and gas condensate fields.

Table 1. Hydrocarbon production parameters for 2018-2019 [7]

Parameters	2018	2019	2019/2018
Oil, Million tonnes	0.045	0.052	115.5
Free gas, billion m ³	12.165	12.495	102.7

Condensate, million tonnes	2.956	3.060	103.5
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The table shows that the production of the presented hydrocarbons increased in 2019: oil production increased by 15.5% in 2019, free gas - by 2.7%, and condensate - by 3.5%.

It should be noted that the Astrakhan Region also has deposits of minerals such as table salt, gypsum, mineral water, therapeutic mud, and iodine.

In the Akhtubinsky district of the Astrakhan Region, there is a salt lake called Baskunchak. It should be emphasized that this salt deposit has existed for more than a hundred years. It is considered the main source of both edible and industrial salt in the country.

Thanks to the brine deposit, which contains a huge amount of bromine (330 g/cu m), it is possible to produce and sell bromine. It is worth noting that on the western shore of Lake Baskunchak there is a deposit of rock salt, which is also used in production. In addition to salt, there are ochre clays near the lake, which are used to produce lime-cement paints and are used as a pigment needed to create dry and oil-based paints.

In addition to salt and clay, gypsum is mined there, which is the basis for the production of crushed gypsum, gypsum stone and various construction mixes. It is also worth highlighting that the exploration work started on a new subsoil sector in the lake area in the neighbouring village of Sredny Baskunchak.

It is not only the Baskunchak natural resource deposits that are unique. The Kamenoyarskoye deposit of siliceous raw materials and gaize is also unique in terms of its qualitative composition.

The Astrakhan Region has substantial reserves of therapeutic mud, which are confined to salt lakes and are mainly located in the south-west and northern part of the region. Muds are used in sanatoriums. The unique sulphide silt mud found in Lake Baskunchak is identical to the mud from the Dead Sea by its composition and properties. There is a health centre and spa treatment in the village of Nizhny Baskunchak, not far from the salt lake.

Almost all areas of the region have various natural resource deposits, such as sand and clay, which are used extensively in industry.

Analyzing the structure of the Astrakhan Region's gross regional product by economic activity for 2019, it is worth saying that the lion's share of the region's GRP belongs to mineral extraction (47.9%) [7]. The gross regional product in the Astrakhan Region for 2019 was 602.3 billion RUB. Mineral extraction accounted for 288.86 billion RUB in the region's GRP. This fact demonstrates the importance of implementing activities aimed at prospecting and extracting minerals in the region.

The shipbuilding industry in the region is also developing, in parallel with the development of the Caspian offshore oil and gas fields. In the Astrakhan Region, the shipbuilding industry is developing thanks to the state programme that supports the development of the country's shipbuilding industry until 2035, signed by D. Medvedev [4]. Thus, the *Golden Ring* cruise ship has been designed and launched at the Astrakhan shipyard *Lotos*.

The Astrakhan Region has a favourable geographical location (access to the Caspian Sea) and therefore plays a special role in the system of international routes. The Astrakhan Region is located at the crossroads of the North-South and West-East corridors, therefore the region has a rather well developed transport and logistics complex, port and other infrastructure.

Another important sector of the region's economy is agribusiness, represented by crop and livestock production.

Figure 4 shows the dynamics of gross agricultural output for 2018-2020, in billion RUB.

As of the beginning of 2020, the total reserves of gypsum in the Astrakhan Region include balance reserves A+B+C1 of 166,709 thousand tonnes and off-balance reserves of 3,208 thousand tonnes. The Baskunchak deposit includes five plots, four of which are in the allocated subsoil fund.

Analyzing the chart below, it is worth saying that the gross agricultural production is increasing: in 2019, the increase was 5.9%, and in 2020, it was 14.5%.

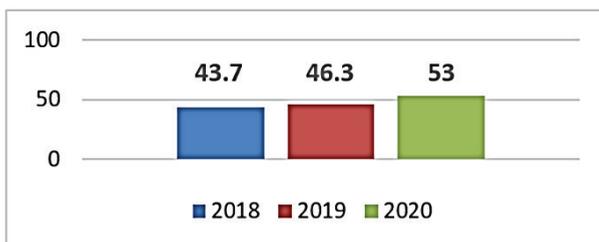


Figure 4. Dynamics of gross agricultural output in the Astrakhan Region for 2018-2020.

Figure 5 shows the level of average wages in the Astrakhan Region in the agricultural sector [4].

It should be emphasized that the biggest increase in wages in this industry occurs in summer, due to the increased volume of work. It is also worth noting that the level of wages in the agricultural sector is close to the average level of wages in the Astrakhan Region, which is 33,100 rubles in 2021 [6].

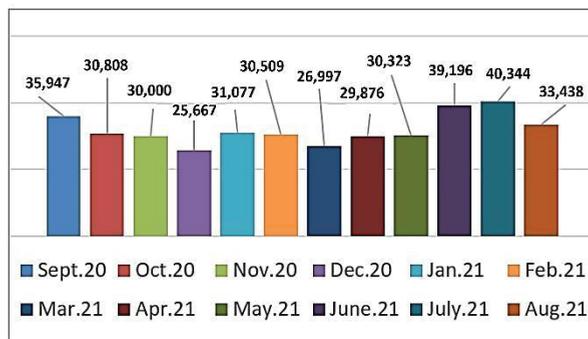


Figure 5. Average wages in the Astrakhan agricultural sector over the last 12 months.

The Astrakhan Region is the largest producer of vegetables in the country. In 2019, crop production was 1.6 million tonnes and in 2020 - 1.427 million tonnes, a 5% increase in comparison with the previous period. It should be noted that only a certain part of the harvested production is processed, so the Astrakhan Region has the potential to develop vegetable processing enterprises.

Discussing the fishing and fish processing industry in the Astrakhan Region, it should be emphasized that the whole industry is based on the availability of substantial fish resources in the Volga River and Caspian Sea.

It should be noted that the aquaculture industry for the production of marketable fish is developing quite effectively in the region.

It should be said that the COVID-19 pandemic has also had an impact on fisheries and fish production in the Astrakhan Region: in 2020, it dropped by 200 tonnes to 61,800 tonnes. The decrease in the catch rate was caused by the delayed return to work and adverse weather conditions.

The region has an aquaculture and fisheries cluster. Its main objective is to create a full cycle of high-quality fish production using modern innovative technologies and to improve the competitiveness of the cluster companies at both the federal and international levels.

Considering the machine-building industry of the Astrakhan Region, it can be said that it includes enterprises that produce press-forging equipment, metal and woodworking machines, paint equipment, press-dies and fittings for metal-working enterprises, and ferrite products.

The regional branch of *Zheldorremmash* company is the main locomotive repair company and spare parts producer, as it currently manufactures and sells more than 50 types of products.

It should be emphasized that the Ministry of Industry of the Astrakhan Region has directed its efforts towards the development of the engineering industry in the region by providing support to the industry.

Tourism is another important sector of the economy of the Astrakhan Region. The variety of landscapes and the beauty of nature attracts tourists from various cities and countries to the region.

A survey on tourism development conducted in 2020 by Sberbank suggests that domestic tourism has driven outbound tourism out: more than half of the surveyed who spent their holidays abroad in 2019, preferred to stay in Russia in 2020.

It is worth noting that this was triggered by external factors, one of which was the COVID-19 pandemic and the imposition of several restrictions.

Sberbank has carried out an analytical study to find out the top-10 Russian regions in terms of growth in the number of tourists during the pandemic. The experts also put the Astrakhan Region on this list.

It is worth noting that the development of tourism in the region is one of the priorities that will positively impact the economy of the region.

The figures for the total tourist flow for the 3-year period from 2018 to 2020 are shown in Table 2.

The tourist flow figures show that in 2019, the number of tourists increased by 6.7% against 2018. The growth in the number of tourists is directly connected with the diversity of tourism and recreational resources in the Astrakhan Region. There are cultural, sightseeing, cruising, family, fishing, and hunting programmes.

In 2020, the total tourist flow to the Astrakhan region decreased by 25% against the figures for 2019, which is directly connected with the introduction of lockdown in the region.

Table 2. Total tourist flow to the Astrakhan Region in 2018-2020

Indicator	2018	2019	2020
Total tourist flow to the Astrakhan Region for the reporting period, million people.	1.5	1.6	1.2
Changes against the previous period, %	-	6.7	-25.0

Analyzing the paper by O.V. Konanykhina, who studied sustainable tourism development in the Astrakhan Region, it is worth saying that from 2008 to 2015, tourism development in the region was unsustainable, as the indicator varied from 0.26 to 0.46 [4].

Figure 6 below shows the breakdown of tourist flows to the Astrakhan Region by tourism type.

Analysis of Figure 6 allows to say that fishing and hunting tourism prevails in the region. This flow accounts for 85% of the total regional tourist traffic. Cruise tours and health-related tours account for the smallest share (1%).

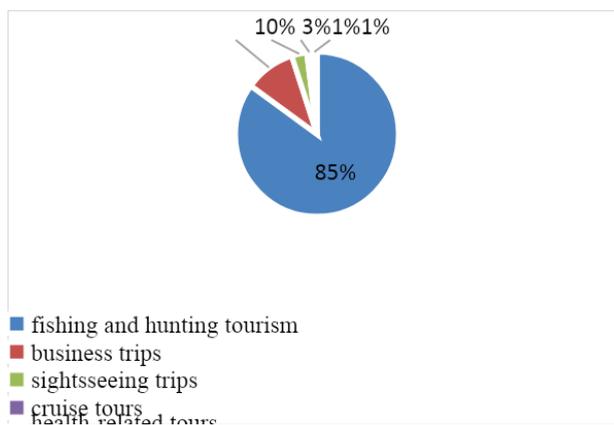


Figure 6. Breakdown of the tourist flow to the Astrakhan Region by tourism type, %.

It should be noted that analyzing O.V. Konanykhina's paper, the authors found out that fishing and hunting remain the prevailing tourist destinations in the Astrakhan Region [4].

In order to increase the number of tourists in 2021 and to direct efforts towards developing domestic tourism, it is essential to inform people about the possibility to get cashback for traveling across Russia.

This year, on 18 March, a new travel-back programme was launched, which was previously supposed to cover the period until June 15, 2021. The programme terms are modified to suit the tourists' needs, giving more Russians the opportunity to opt for domestic tourism. People will be able to get back 20% of a tour cost in Russia, with the maximum sum of 20,000 rubles. The minimum duration of the trip is up to 2 nights, and the trip must be paid online via Mir payment system.

Discussing the environmental sphere, it is necessary to examine the region's water resources. The Volga River is the only source of water supply for the region's population. Today, the weediness of waters and the shoaling of river channels can lead to negative consequences for many economic sectors. The regional project *Revitalization of the Volga* has been launched in order to prevent this situation.

Regarding the sector of municipal solid waste (MSW), it should be said that despite the fact that the Astrakhan Region is experiencing a shortage of MSW storage sites, 236,736.96 tonnes were disposed in 2018. About 3 years ago, *EcoCentre* company installed paper recycling bins for separate waste collection at public institutions in the region and plastic bottle collection bins across the region.

In 2018, a waste sorting facility was set up to receive waste from the entire region, and according to the socioeconomic development strategy of the Astrakhan Region until 2035, there are plans to build additional facilities in the region's districts.

As for the beginning of 2020, there are 51 protected natural areas (PNA). Figure 7 shows the structure of the PNAs in the region.

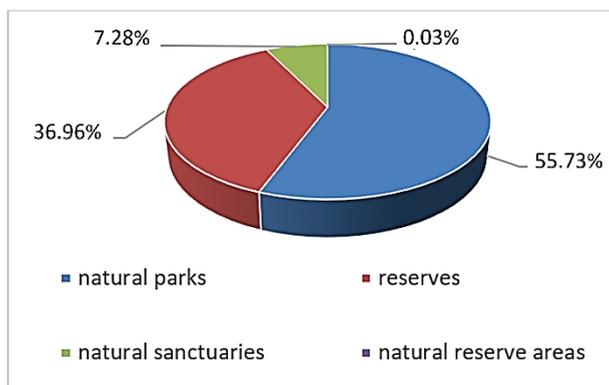


Figure 7. Structure of PNAs in the Astrakhan Region, %.

Let us also examine the level of woodiness in the region, which is 1.8%. It means that the region is classified as low forest cover. The main forest fund is located in the Volga-Akhtuba floodplain and the Volga Delta [14].

In order to achieve growth in the region's socioeconomic development, it is necessary to transition to an innovation and science and technology policy.

Innovative sustainability of a particular region is shaped through the use of the region's available resources and with the help of the State.

It should be noted that the development of this innovation sustainability of any region is carried out not only at the regional level but also with the state help and support, as well as with the use of the innovation activity results at the level of municipalities [3].

Consistent support for innovative enterprises makes sure that regions and municipalities move towards an innovative type of development. At present, many programmes have been implemented to promote innovation at both regional and federal levels in order to promote the transition. The goal of the State is to increase sustainability of innovative development both in the country as a whole and in the regions. It should be emphasized that sustainability of the innovation climate in regions is created through the efficient and targeted interaction of all governmental levels.

It is necessary to consider the factors of sustainable development of the Astrakhan Region.

The changing trends of the country's economy have changed the development of the economy of the Astrakhan Region. These changes include a slowdown in the speed of capital movements, slow development of regional financial centres, and slow growth of innovation and information development in the region.

It should be noted that the Astrakhan Region is becoming increasingly dependent on the processes that take place at the international and federal levels. This demonstrates the importance of pursuing different paths towards sustainable development in the region.

Regarding the development of a state innovation policy in the Astrakhan Region, it is worth saying that the policy is based on the following principles:

1) It is important to admit the priority of innovation, as it is aimed at increasing the efficiency and technological development of social production, the competitiveness of science-intensive products, as well as the quality of citizens' life, and at improving the environmental safety of the region;

2) The State should regulate innovation activities in the innovation environment using the available efficient means;

3) It is necessary to improve market relations in the field of innovation activities and prohibit unfair competition during the implementation of innovation activities;

4) A favourable innovation climate should be ensured as a part of the implementation of innovation activities in the Astrakhan Region;

5) The State should ensure protection for all actors involved in innovation;

6) International cooperation should be introduced as part of the implementation of innovation activities.

The innovation processes of a particular region depend directly on the strength and nature of the impact of innovation factors. The lack of a clear understanding and maintenance can lead to misapplication of innovation potential reserves. Implementation and development of innovation activities is possible only if there is interaction between the factors.

It should be emphasized that the implementation of innovation processes in practice is an innovation activity consisting of the implementation of many scientific, technical, design, technological, organisational, financial and commercial projects leading to creation of innovations and their commercialization.

4 Conclusion

The study on the specific features of the innovative development of Russia's economy revealed that there are some issues of concern in the current practices. These include inefficient legal and regulatory frameworks that regulate innovation activities, an unfavourable innovation image, poor development of innovation infrastructure, lack of understanding of the economic benefits of applying intellectual property, high depreciation of fixed assets, lack of investment and highly skilled professionals in the field of innovation activities.

The main important tasks of sustainable development in our region include measures aimed at solving issues regarding stabilization of the labour market, supporting small and medium-sized businesses, and ensuring the existence of all the vital infrastructure of the Astrakhan Region. It is worth mentioning that a certain financial reserve of up to 5% of the revenue part of the Astrakhan Region budget for 2020 should also be formed [8].

Authors' contributions

The article has been written by a team of authors, all authors have taken equal part in the theoretical analysis of the problem and in carrying out the research. A.N. Tuktarova summarized the data to conduct an analysis on the research topic and wrote the original manuscript. R.I. Akmaeva analysed and generalized ideas of the Russian and foreign authors on the problem of the research. E.V. Kryukova studied the innovation policy of the region and contributed to revising the paper. E.A. Matsui was responsible for the economic indicators, presented in the article, and contributed to editing the paper.

References

1. M.M. Brinchuk, *The concept of sustainable development as a methodological basis of civilizational development*, in: State and Law, **10**, 15-24 (2019)
2. Yu.V. Vertakova, *Sustainable development of industrial complexes based on modernization of the mechanism of economic resources spatial distribution* (Rusains Publ., Moscow, 2017)
3. N.V. Gorodnikova, L.M. Gokhberg et al. (Eds.), *Indicators of innovation activity* (HSE, Moscow, 2015)

4. O.V. Konanykhina, Nature-oriented tourism as a factor of development of regions without a strong tourist attraction (the case of the Astrakhan Region) (Sochi, 2017)
5. Yu.A. Kuznetsova, *Stages of formation and development of the sustainable development concept*, in: Young Scientist, **5**, 337-339 (2019)
6. B.M. Mirkin, L.G. Naumova, Sustainable development (Universitetskaya Kniga, Moscow, 2018)
7. P. Murray, Individual approach to sustainable development (Education/Binom Publ., Moscow, 2017)
8. M. Porter, Competition, translated from English (Williams Publ. House, Moscow, 2005)
9. S.G. Serikov, *The concept of sustainable development: a theoretical aspect*, in: Siberian Financial School, **4(117)**, 36-40 (2019)
10. E.V. Skomorokhina, *Strategy (concept) of sustainable development: implementation prospects in the world and Russia*, in: Bulletin of the Voronezh State University, Series: Law, **4(23)**, 13-18 (2018)
11. A.D. Ursul, *Conceptual issues of sustainable development*, in: Bulletin of the Russian Academy of Sciences, Use and Protection of Natural Resources in Russia, **1**, 30-38 (2019)
12. Yu.V. Shumilov, M.Yu. Shumilova, *On the concept of sustainable development in an unstable world*, in: Eurasian Scientific Association, **2(24)**, 159-162 (2017)
13. R.G.RU [Online]. Available: <https://rg.ru/ahttps://rg.ru/2019/11/07/reg-ufo/kak-v-astrahanskoj-oblasti-razvivaetsia-sudostroenie.html>
14. Trud.com [Online]. Available: <https://www.trud.com/astrakhan/salary/897/4688.html>
15. Visasam.ru: <https://visasam.ru/russia/rabotavrf/zarplata-v-astrahani.html#:~:text=Watch%20on-,К акая%20средняя%20зарплата%20в%20 Астраханской%20области%3F,году%20составляет%2033%20100%20рублей>
16. Environmental Resources Management Service of the Astrakhan Region [Online]. Available: <https://nat.astrobl.ru/>
17. Information on the status and prospects of use of the mineral resource base of the Astrakhan Region as of 15.03.2021 [Online]. Available: <https://www.rosnedra.gov.ru/data/Fast/Files/202104/be7fe40e265cd8aa1a87ebd947a32da6.pdf>
18. Strategy of socioeconomic development until 2020 [Online]. Available: <https://minec.astrobl.ru>

Prospects for developing a comfortable tourist center environment: the case of Astrakhan

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Abstract. The paper aims at introducing the conceptual framework of structuration into the regional urbanism practices, which will help develop the necessary conditions for modern participatory design of a comfortable urban environment – a source and result of touristification of a modern city space. The study examined the best practices of Russian megacities, in particular the experience of Moscow as a leading center of participatory sociocultural design, and showed the essential trends of evolution of the formative practices capable of bringing the environment of the city closer to its residents / tourists and making it as comfortable, accessible, and safe as possible, within the framework of public-private partnership; it also postulated the need for multidimensional assessment of the tourist potential of an urban space based on the basic indicators of logistics, digitalization, environmental policy and local branding. Comprehensive analysis of a comfortable environment of Astrakhan as a promising tourist center was carried out; the basic trends of development of urban areas were identified with regard to the regional specificity and sociocultural design requirements, which allows to institutionalize such a unique type of tourism as atmospheric tourism at the intersection of interdisciplinary studies; programmes of the latter give the opportunity to pay attention to the emotional potential of the architectural pattern of the city, determining its beauty, uniqueness and general demand in the tourist market.

Keywords: urbanism, formative practices, structuration, participatory sociocultural design, comfortable environment, tourist center, tourist navigation, atmospheric tourism.

1 Introduction

The development of any city in the current context implies implementation of the widest range of functional approaches to its space planning. The urban space is, above all, a formative environment. Being in this environment, people not only carry out their life activities, but also develop their personality [1]. The well-being of all members of society will be conditional on how this environment will depend on the indicated settings of sociocultural development and on how it will meet the basic functions of society that are aimed at developing the necessary level of social solidarity, civic consciousness and culture.

Creating a happy, comfortable, and protected urban environment, which consists in the availability of all amenities necessary for people, is a priority task of social organizations and public authorities, and it constitutes the essence of their existence. Urban environment

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improvement includes socially significant connotations, drawing in imagination a positive image of a bright and confident future, connected with people's aspiration for "prosperous, wealthy, safe, and interesting" life [2, 3].

The experience gained by the Government of Moscow can serve as an important guide in developing a comfortable environment in Russian regions. The Russian capital is a world-renowned leader in terms of the development of modern social, transport, and engineering infrastructure.

The *My Neighbourhood* programme, launched in 2019 in Moscow, aims at addressing tasks in various areas – "security, clean air, quality transport, sound medicine, comfortable streets, parks, and garden squares," - implementing breakthrough ideas of sociocultural design that include individual aspects of both engineering (construction, reconstruction, restoration, transport logistics, digitalization, greening, etc.) and humanitarian design (developing the necessary conditions for creativity, education, work, service, and recreation).

The programme allows to build full-fledged year-round leisure centers within public spaces - "bicycle lanes and playgrounds in summer, and skiing runs, skating rinks and slides in winter" [3] - that are located in Moscow districts and can be found in close proximity to people's houses.

It should be noted that much attention is paid to receiving feedback from the residents as part of the overall development and improvement of the Moscow areas. In particular, the e-voting on the *Active Citizen* website allows to concentrate the available resources on the projects that are the most important from the citizens' viewpoint, and to adjust these projects upon request of the Moscow residents, taking into account their fundamental interests [4].

Currently, the deep interdependence of the integrated development of urban areas and the tourism industry, where "tourist attractiveness grows alongside the consistent development of the city", is being clearly realized [5].

2 Methodological framework of the study (review of approaches)

The interdependence of the development of tourism and urban spaces has determined the need for applying both general scientific methods and quite heuristic methods of comparative and structural-functional analysis in this study.

Applying methodological approaches of structuration allows to identify some algorithms - dual structures ("memory imprints") - of the formative practices of urban systems in the terms used by E. Giddens and P. Sztompka; they can act both as a primary element and as a resultant of structuration. This algorithm allows to develop the urban environment of the region in a way that local communities start perceiving its improvement as a personal benefit, including from the perspective of regional tourism development. In its turn, touristification of a comfortable environment of the city / region allows to enhance this effect, acting as a basis for developing new spaces that would be aesthetically attractive and preserved by the local population [6].

The algorithm has a flexible structure, adapting in itself the most priority trends and possibilities of development of the area taking into account the widest range of factors.

It should be noted that most of modern studies mainly focus on the factors associated, above all, with the architectural and urban development concepts of the city and with the specificity of developing open spaces in the city. Some aspects of this approach have been considered in the paper by V. Petrova, E. Piskanova, and Zh. Stepanova, who refer to the priority transformation of the architectural and landscape component of the modern city's appearance by strengthening the human-nature relationship [7]. The view of E. Lagodina,

calling the need for dialogue between stakeholders on the issue of equal development of different parts of urban settlements, is also of interest [4].

On the contrary, a smaller number of researchers has tried considering the totality of all these factors through the lens of comparative analysis. This approach is well represented in the paper by O. Sergeeva and E. Lazareva, according to which the integrated assessment of the current level of a comfortable environment impacts the development of ideas about its potential, allowing the management structures to avoid strategic mistakes in their activities [8, p. 166-173].

Anyway, the standard of quality of a comfortable city environment in the current context may be expressed not so much by the level of its tourist infrastructure health as by the degree of development of the innovative potential of the urban space, “availability of various information services” that are linked to the consumer so that both local residents and tourists “would feel comfortable to be in it” [5].

The digital ecosystem of Moscow integrates popular Internet projects (*My Neighbourhood Programme*, *Hello! Moscow*, *Discover Moscow*) and tourist e-services (*#Moskvastoboy*, *RUSSPASS*, *izi.TRAVEL*, etc.) which allow Moscow residents and visitors to obtain all the necessary information about the capital, events, recreation areas and attractions, and to use this information to plan their individual travel routes.

The concept of an open-to-innovation city determines the need for turning any municipal entity into a promising multifunctional tourist center, where the whole range of services can be equally demanded both by the local population and by tourists [6, p. 76-79].

Tourism infrastructure creates a framework for sustainable development of urban areas and allows to fulfil the tourist potential of the city according to the needs and interests of different ethnic and religious groups. These goals can be achieved by means of using technologies of sociocultural design and construction of social reality, which should include, among other things, technologies of tourist branding, mythic symbolism and legend creation [9].

Applying these technologies takes on a special resonance in developing the region’s visual ID - the city’s design code, its brand platform, including the city’s logos made in a particular brand style - which plays an essential role in generating key narratives of urban areas and allows to show the country’s history as clear as possible, cultivate mutual respect, and educate [10].

Being a tool of the open mass language system, tourist navigation provides visually integral perception of the architectural pattern of the city and its tourist myth; it determines the efficiency of visual communications as a certain kind of “packaging and its accompaniment”, without which “it is (already) impossible to sell” the travel destination [11, p. 29].

Brand ID of a city/tourist area not only makes it pleasant to see and recognizable, but also has a beneficial effect on the psychoemotional state of the city residents, after all [10, 11].

Indeed, developing urban narratives creates a special atmosphere of the city and its unique identity. It becomes obvious that today the “urban narrative” about its comfortable environment, as well as this environment itself, becomes a self-valuable resource that can be considered as a very attractive conceptual idea for tourists.

In this regard, it is reasonable to talk about the formation of a new kind of tourism that activates the tourists’ interest in the city as a “pure” space that is open for changes and where transformations can be perceived as a kind of artistic act. Atmospheric tourism programmes are aimed at “creating certain sensations... which can be organized in familiar, habitual places” [12]. This approach allows to stimulate the demand for innovations, by means of which the updated infrastructure that is far from being involved in mass tourism offers (parks, garden squares, yards, including in dormitory areas of the city), can give a

significant cooperative effect and offer original solutions in sociocultural design even in case of a limited amount of cultural and historical heritage sites, which are an integral basis for development of excursion and educational tourism.

Peculiarity of the region's cultural industry products is of significant value for the market consumers, is a marker of regional identity and a result of the rich, creative imagination which has vivid national and cultural specificity.

Modern technology provides tourists with an opportunity to always find something of their own, emotionally close and native in each city, which eventually makes them feel at home. In their turn, local residents get an opportunity to keep discovering their home town in a new way, to notice details previously inaccessible to them, to take pride in their city, region, and country.

The experience of capital cities in designing a comfortable urban environment can be adapted to various regional contexts: using the best practices in this area allows to transfer ready-made solutions and algorithms of the urban area transformation to the regions, taking into account their cultural specificity and financial capacities.

Besides, implementation of programmes for developing a comfortable environment in boundary regions can successfully update the mechanisms of cultural exchange, transfer of initiatives, experience and products of cultural industries, forming the basis of sociocultural design and construction technologies, in order to establish international contacts within the framework of cross-border cooperation between Russia and foreign countries.

Therefore, a comfortable environment of the city as a tourist center can be a powerful incentive to attract tourists from other countries, and the cultural/tourist practices implemented in it can form an image of an "ideal city" that can be "exported" and implemented in other foreign cultural contexts. This allows to speak about a comfortable environment of the tourist center as a certain innovative platform, on the basis of which it is possible to build an equal dialogue between peoples and cultures, to maintain and develop cultural relations.

3 Developing a comfortable urban environment in regional context

This approach takes on particular importance in relation to the geopolitical aspirations of Russia in the Caspian region, based not only on the growing authority of the country as an important partner for other countries of this region in the fields of "energy, biological resources, transport, force development and security", but also as a carrier of fundamental values, ideas and meanings, a guide of cultures, a facilitator of the dialogue between European and Asian countries [13].

Astrakhan, which has historically been a cultural center of Southern Russia and of the Russian part of the Caspian Sea region and still has a geostrategic importance for the entire Caspian Sea region, plays a prominent role in this process. Consistent implementation of the concept of developing a comfortable environment in Astrakhan as a tourist center is meant for manifesting the widest range of values of a modern city in its original dimension which is unique for the world culture, to demonstrate the benefits of sociocultural (engineering, humanitarian) design and, above all, of social engineering, greening, transport logistics and digitalization technologies for preservation and sustainable development of the cultural heritage sites.

Implementing this concept is impossible without a solid foundation in the form of new or reconstructed social infrastructure facilities, including public spaces. However, their functionality may differ depending largely on their form, or "shell". The more thoroughly this form, or "shell", is designed, the greater effect can be for the stakeholders in developing a comfortable environment in the city/tourist center.

Let us try and consider prospects of the development of a comfortable environment in Astrakhan as a tourist center and identify points of possible growth in this sphere along two main trajectories that include infrastructural and service recommendations.

Infrastructural indicators of development should include, first of all, the need to build a river terminal in Astrakhan, which, in addition to the transport functions of forming and managing traffic flows, should also serve as a public space, a space for leisure, communication and recreation, being a large platform for business events and contracting.

The terminal also has a symbolic meaning. It is no coincidence that in the early 1930s, a quite large - for those times - river terminal complex was designed for Astrakhan, along with Saratov and Gorky (now Nizhny Novgorod) in the Soviet eclectic style. Despite the fact that the terminal was wooden, it had an impressive size, original architecture, and, according to contemporary estimates, showed the status of the city as a major river and sea port. Unfortunately, this building did not survive, and the city has not had its own river terminal for many years, although there have been talks about its construction in Astrakhan since 1982. This is at least strange, given a special position the city has always held among other Lower Volga cities throughout its existence [13, p. 20].

Development of the river cruise industry allows to get back to the issue of building a modern river / marine terminal with an appropriate passenger terminal and hotel facilities, including a garden square, parking, catering facilities, an entertainment center, a representative office of the tourist information center, an exhibition hall, and a public event site.

Currently, the only place for constructing a new complex of a river / marine terminal could be the shoreline of the Elling district in the wasteland between Bekhterev Street and the same-name lane. The authors believe that the complex, built at the intersection of the Volga and Tsarev rivers and Privolzhsky backwater, will become a powerful tourist location, the center of cruise tourism development in the region, particularly taking into account the upcoming commissioning of the *Peter the Great* exclusive river-sea cruise (commissioned by Moscow River Shipping Company).

However, the authors think that despite obvious advantages of this vessel, it will not solve the problem of obsolescence of the motor vessels working on the regional water routes. Moreover, many Astrakhan citizens will not afford themselves a stay in such a premium class floating hotel. The authors link the solution of this problem with the need for building more low-cost high-speed hydrofoil vessels and river cruise ships that could cruise both within one or several regions of the Southern Federal District.

Providing transport communication with the beaches on Gorodskoy and Oblivnoy islands is also seen as important. If earlier the transportation to the beaches was carried out with quite comfortable watercrafts - riverboat buses – in a civilized way and according to the timetable, after they were discarded in the 2010s, the transportation to the beaches has been carried out by motor and row boats, sometimes illegally and with safety rules violation.

An extensive network of water routes along the city's canals and rivers can make a significant contribution to improving the quality of a comfortable environment in Astrakhan. The capital of the Lower Volga has long been called the "Venice on the Volga", but boat excursions along the city's canals were scaled back in the early 2000s. Currently, the situation is gradually improving; for example, a promenade 8-passenger catamaran has been built in Rostov-on-Don especially for Astrakhan entrepreneurs under support of the *My Business* center. An expanding range of offerings in this sphere can favor the city's image on the Volga, increase its reputation capital and strengthen the market positions of Astrakhan as a promising tourist center of Southern Russia.

Developing a comfortable environment in a modern city is possible if the concepts of an urban center and periphery are smoothly leveled. Even development and improvement of

urban areas implies development of a comfortable environment for daily life, leisure and work in close proximity to people's houses.

More recently, Astrakhan has initiated work on establishing communication between the districts that are remote from the city's historical center. In particular, it is planned to build a new bridge over the Volga River, which will not only increase the efficiency of the North-South International Transport Corridor, but also improve the transport situation in the city itself, integrate the peripheral Trusovsky district into a single logistics system of tourism in the region.

Implementing an ambitious project on opening a ropeway across the Volga can give a significant impetus to the overall development of the Trusovsky district. The ropeway is supposed to connect the two banks of the river and run from the Central Peter the Great Embankment (left bank) to the garden square of F.E. Dzerzhinsky or Lenin park (right bank) with an intermediate support on Gorodskoy Island. This 2-km road can become not only a "new transport and logistics hub" with all the associated social infrastructure, but also a powerful sightseeing and entertainment attractor, a locomotive of development of this area as one of the centers of atmospheric tourism in the city / region [14].

At the same time, long pending issues related to the touristification of several neighborhood units of the Trusovsky District, which until 1929 was called "Outpost", resulting from the merging of three settlements - Atamanskaya Village, Arkhiereisky and Novosolyansky settlements, - can be addressed. The sites that are of special interest in the Trusovsky District are the ATsKK neighbourhood unit which emerged on the site of the suburb of the dismantled capital of the Astrakhan Khanate - the ancient town of Hajji Tarkhan, - as well as the historical nucleus of the district - the central part of Atamanskaya Village, with merchant houses of the late 19th - early 20th centuries and later Soviet architecture sites like the *Chayka* consumer services center which is one of the outstanding examples of Soviet modernism in the region.

Concentration of tourist flows in the historic centre of the Trusovsky District raises the question of museumification of the water-tower and station ensemble (1910-1911, designed by the architect N.N. Milovidov), a recognized Art Nouveau masterpiece of industrial architecture. Opening a branch of the Astrakhan Art Gallery named after P. M. Dogadin and developing creative spaces for work, recreation and learning there would allow to consider this cultural site as a major resource for the development of the area, an efficient tool for transforming the urban environment, for example, in terms of implementing the experience of developing the riverfronts of the Volga and the Solyanka shallow channel and building comfortable and multifunctional embankments.

Developing a comfortable environment is of great importance in revealing the potential of the tourist center specifically for tourist entities. Here, service technologies come to the forefront; they interpret the concept of tourist comfort in the urban environment as, above all, consideration of ethno-cultural and ethno-religious features of tourists.

Today's national tourism practices have developed an understanding of the idea that it is necessary to develop specialized tourism service programmes, aimed at representatives of different religions and cultures. Meeting the conditions of service programmes (standards) like Halal Friendly, China Friendly, Indian Friendly, Japan Friendly, Kosher Friendly, European Friendly, American Friendly and many others implies achieving the basic and specific requirements for food, accommodation, etiquette, a specific way to present tourist information, typical of specific faiths and ethnic groups of countries that generate tourist flows to Russia.

Adaptability of the region's tourism industry facilities - accommodation facilities (health resorts, hotels, guest houses, recreation centers), restaurant businesses, transportation companies, shopping and entertainment centers, sightseeing agencies and historic sites - that would correspond to their traditions and lifestyle, to the national and

cultural traits of consumers allows to increase the tourist attractiveness of Astrakhan in the Russian tourist market [15].

Implementation of ethno-confessional service programmes entails the need to develop a wide range of information services facilitating foreign tourists' stay in the tourist center. These services can be part of the city's multimedia system of tourist navigation and information and provide the necessary language support during their city walks. The public transport reform being implemented in the city will also open up the possibility of using applications to track the traffic flow in the near future.

It should be noted that innovative services are quite actively used in the excursion practices of Astrakhan travel agencies. These are immersive interactive excursions, role-play excursions with the use of modern multimedia technologies, and various quests with the use of QR code and AR technologies [16].

Talking about the tourist navigation in general, 700 street name plates, 30 guide posts and 10 navigation signs, including tourist passports of the city districts which were designed according to the regional brand ID, have been installed in the city as part of the *Renewed Astrakhan* project. It should be noted that the design of these navigation tools is as good as, and in some ways even better than their comparables in such leading Russian tourist centers as Moscow and Sochi.

The authors connect further work in this area with the need to develop navigation services that could visualize the mobility of the borders of a constantly growing city, to identify the location of disappeared watercourses and fortification sites in a historical retrospective. Such digital technologies can return history to everyday life, make it closer, more visible and easier to understand.

4 Conclusion

The following conclusions can be drawn based on the aforesaid: a comfortable and safe urban environment is a priority for citizens who want to live in a modern, open, and prosperous city. Currently, tourism development and the development of the urban environment are in a direct structural interdependence with each other. The focus of the government, society and businesses on the design of urban spaces that are relevant in the context of urban planning, leads to the necessity of atmospheric tourism institutionalization.

Programmes of this type of tourism are aimed at giving people positive impressions from their everyday communication with the immediate environment and habitual places - garden squares, parks and public spaces. The impact of atmospheric tourism on the development of a comfortable environment of the Caspian capital of Russia should not only stimulate the region's socioeconomic development, increase business activities and expand production of goods and services, but also provide the necessary level of its tourist attractiveness.

The authors define the abovementioned problems as top-priority ones. At the same time, it is sure that their list can be expanded through the planned development and improvement of green areas throughout the city as part of participatory design. This type of design can ensure more efficient development of urban areas with regard to the opinions (including through an e-voting system) of all stakeholders, mainly local residents and also special-need people.

Implementing new technologies in the system of design and touristification of urban spaces is meant for creating all the necessary conditions for a happy life, full of vivid and memorable moments that are rich from both an intellectual and spiritual prospective.

Organizing a comfortable environment of the city in this way, we can overcome many destructive problems of local communities and make their everyday life not only more stable, but surely more humane and inclusive in this sense.

Authors' contribution

Associate Professor A. Leukhin studied the problematic issues of designing a comfortable environment of the region's tourist center as a conceptual category of modern city development. Associate professor E. Kryukova considered the issues of atmospheric tourism development in the city. Associate professor N. Kanatieva was in charge of studying, among other things, peculiarities and requirements of the ethno-confessional service. Associate professor Ya. Abdurazakova analyzed the areas of tourist navigation and information sharing.

Acknowledgments

The authors are sincerely grateful to A.S. Kuskov, a well-known and enthusiastic scientist and a recognized tourism expert, for his qualified assistance in consultations on the development of interactive technologies in the tourism industry and their integration into the urban environment, as well as development of immersive programmes of regional tourism in the context of the Russian economy virtualization.

References

1. Kuskov, Yu. Dzhalyadyan, *Fundamentals of Tourism* (KNORUS Publ., 2008)
2. V. Fedorov, I. Koval, *Mythic symbolism of architecture* (LIBROCOM Publ., 2009)
3. Official website of the Mayor of Moscow [Online]. Available: <https://www.mos.ru/>
4. E. Lagodina, *Comfortable urban environment through the citizens' eyes*, in: *New Insight: International Scientific Bulletin*, 75-78
5. Website of Moscow Mayor Sergey Sobyenin [Online]. Available: <https://www.sobyenin.ru/>
6. Leukhin, *Phenomenon of tourist institutional space: experience of sociological analysis in the region* (Astrakhan University Publ. House, Astrakhan, 2008)
7. V. Petrova, E. Piskanova, Zh. Stepanova, *Specific features of developing a comfortable urban environment*, in: *Human, Society and Culture in the 21st Century* (Belgorod, 2017)
8. O. Sergeeva, E. Lazareva, *Comfortable urban environment as the determining factor of the development of megapolises*, in: *Administrative Consulting* (St. Petersburg, 2018)
9. N. Pokrovsky, *Tourism: from social theory to management practice* (University Book, Logos Publ., 2008)
10. V. Fedorov, *Architectural text: essays on the perception and understanding of the urban environment* (Lenand Publ., 2021)
11. P. Rodkin, *Brand ID of regions. Regional branding: new pragmatic identity* (Sovpadenie Publ., 2016)
12. A. Leukhin, *Semiotic potential of the touristic space: the features of construction*, in: *Bulletin of Saratov University. New series. Series: Philosophy, Psychology & Pedagogy, Saratov*, **18(1)**, 41-46 (2018)
13. S. Rubtsova, *Urban evolution of Astrakhan. Book 2. Town-planning elements* (Pervaya Obraztsovaya Tipografiya Printing House, 2017)
14. E. Kryukova, *Economic framework of the territories of innovative-oriented development as the factor of regional strategy*, in: *Science Journal of Volgograd State University. Global Economic System, Volgograd*, **20(4)**, 38-46 (2018)

15. A. Leukhin, *The Capabilities of spatial visionics in revealing the semiotic potential of territories: by example of the city of Astrakhan*, in: Bulletin of Moscow Region State University. Series: Philosophy, **4**, 106-117 (2018)
16. E. Kryukova, E. Matsui, *Smart technologies in human resources management*, in: Lecture Notes in Networks and Systems, Springer Nature Switzerland, **155**, 580-588 (2021)

Economic aspects of ensuring regional integrated security

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Abstract. The article reviews some measures of state support for development of small and medium enterprises in European countries, the USA and Russia, focuses on the efficiency of these measures across countries, and identifies causes of the measures inefficiency in certain cases. An increased focus was put on financial support for small enterprises under crisis and pandemic conditions. The paper analyzes the small business development in the region, systematizes the measures of state support implemented in Astrakhan Region, and identifies possible causes of their inefficiency and possible ways to eliminate them.

Keywords: entrepreneurship, small business, small and medium entrepreneurship, state support, financial support, lending to small business, state regulation of development issues, administrative methods of regulation, small business entities.

1. Support for businesses in COVID-19 period

Issues of the development of territorial entities rightfully draw specific interest of researchers and are determined by the necessity to search for efficient tools to provide the regional integrated security in modern conditions. Moreover, business and entrepreneurship are generally considered to be among the main factors of the region sustainable development [16].

The current stage of the world economy development has aggravated all the key development issues, has shown impossibility of unipolar management obtrusion, and the COVID-19 pandemic has definitely confirmed such management inefficiency. The slump in volumes of foreign trade, production, curtailing of the whole sectors (tourism, transportation, services industry, etc.) are just a part of negative phenomena which the world community is facing now and which make the governments develop policies on ensuring the population security and health, on economy support and recovery.

Besides, it has happened that the mentioned challenges are relevant to the majority of states and, consequently, to their regions and territorial entities.

Specific features of the Caspian macroregion development are determined by uniqueness of each Caspian coastal state, but integration processes, volumes of interstate trade, productive and constructive communication experience demonstrate the possibility and necessity for joining efforts to develop conditions for rapid removal of the negative impact of the pandemic.

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Global experience shows that small business is one of the efficient factors for economy fostering and recovering, and it should be noted that the Caspian region countries are quite active in providing comfortable conditions for the development of small companies in the pandemic crisis situation. For example, the efforts of EAEU, which includes such Caspian region countries as the Russian Federation and the Republic of Kazakhstan, help adopt decisions that state the priority of eliminating barriers for business.

In addition, it should be pointed out that most countries have their own so-called “centers of attraction”, that is, cities and regions where the highest developmental indices (occupational level, job opportunities, average wages, per-capita income, etc.) attract the employable population, young people, graduates, etc., and thereby cause these people’s outflow from their home regions. This outflow, in its turn, intensifies the indicated problems, deteriorates the economic situation both in a certain region and in the country in general.

Naturally, this situation does not go unnoticed by the regional and state authorities; it motivates to search for mechanisms and tools to improve it, which include support for small entrepreneurship development.

This very economic sector has become especially vulnerable under the pandemic conditions. Restrictive measures aimed to protect public health have led to shutdown of a number of enterprises, sharp slowdown of profitability indices, and bankruptcy.

A specific feature of small entrepreneurship is that it’s almost impossible to ensure its positive development without state support (special legal, administrative and economic conditions), but the importance of small businesses for the economy, especially rapid adaptability to the fluctuating demand, market flexibility and, consequently, a positive impact on consumers’ market balance in the region, country, macroregion, etc., determines special focus that the State puts on this economic sector.

2. Current condition and challenges for small business in Russia

Analysis of entrepreneurship development dynamics and sociological survey results show a negative effect of the tax increase (by 0.2% per year) that has resulted in a sharp economic decline of small companies.

It is generally recognized that the USA experience exemplifies formation of comfortable conditions for small business development, where the small enterprise contribution to the gross domestic product has been firmly constituting 40%-50% for many decades since the 1950s.

In 1953, the USA Congress established the Small Business Administration (SBA), the main objectives of which include consulting and financial support for small enterprises.

Almost one third of the government subsidies on subcontracts are allocated to already functioning or newly established small enterprises; the SBA provides them with funding in the amount of approximately 10,000 million USD annually (target expenditures on working capital / fixed capital investment). In addition to it, the SBA invests (venture capital) about 2,000 million USD to support investment firms that allocate money to small enterprises.

At the same time, the SBA regularly arranges marketing research for export-oriented small enterprises; provides financial support for entrepreneurs who transfer their experience to newly established small firms or small firms facing difficulties; supports small business development centers that provide technical and managerial assistance to enterprises of this economic sector; provides firms that have suffered from natural disasters with available financial support (reducing an interest rate on loans).

It may be said that financial support through assistance in lending and guarantee provision is one of the efficient tools for supporting small businesses.

This practice is applied in many other countries; for example, financial support in Japan is provided through subsidies, interest rates reduction, tax benefits and preferences granting, investment in professional retraining, and the mentioned measures are primarily aimed at supporting and developing self-employment in all the territorial entities (prefectures) of the country.

In European countries, where the level of economic development is determined mostly by small enterprises that employ the major part of the employable and economically active population, financial support is allocated through target programmes that take into account resources redistribution by means of engaging small and medium businesses in new promising economic sectors.

Russia also pays much attention to supporting small and medium business development. An organizational and legal environment for small enterprises has been created; they are provided with financial support and consulting assistance, particularly in the forms of subsidies, free consultations and business operation training; reduced-rate lending and preferential lease terms are enshrined in law. However, small business contribution to GDP has been keeping the level of 20%-24% from the beginning of the 21st century.

3 Support for small and medium entrepreneurship in Astrakhan region as a factor of sustainable regional development

It should be noted that the incentive measures are mainly aimed at ensuring small and medium business participation in federal programmes on financial support.

These programmes include:

- UMNİK, with the funding of up to 500,000 RUB and with the age limit for participations (under 30 years old);
- Start, with the funding of up to 2.5 million RUB for developing new technological processes provided that the participant attracts investment of an equal amount;
- Development, with the funding of up to 15 million RUB for developing new scientific products at modernized enterprises;
- Commercialization, where the funding is determined individually; the programme is focused on enterprises that are ready to offer a new product that is to be at the final stage of research, design and testing;
- Cooperation, with the funding of up to 20 million RUB, but only if the participant provides a cooperation agreement between a small enterprise and a large one in the field of industrial production;
- Internationalization, provided that an enterprise has experience of working at the international market and a partner who intends to purchase the end product, usually a technologically advanced one [9].

Moreover, the Russian government has ensured an opportunity of implementing individual municipal programmes, depending on the budget amounts and characteristics of the regional development; however, as well as in the abovementioned programmes, priority is obviously given primarily to innovative activity, high-tech manufacturing, and HR development.

It should be pointed out that as early as in April 2020, being under the pandemic conditions, Russia developed a required legal platform for funding small firms, including lending institutions with regard to compensation of their lost loan income and the specificity of changes in lending contracts and loan agreements and stipulating conditions for repayment holidays [1].

In accordance with the abovementioned documents, the organizations that met the stipulated requirements managed to get interest-free loans (for 6 months) to pay salary to their employees. The next important step was adoption of Government Decree No. 696 “On Approval of the Rules for Providing Subsidies from the Federal Budget to the Russian Lending Institutions to Compensate Their Lost Income from Loans Granted to Legal Entities and Sole Entrepreneurs on Business Resumption in 2020” dated 16.05.2020.

Therefore, being under crisis conditions, Russian small and medium enterprises had the opportunity both to take out a loan on preferential terms and not to pay back the principal and interest to the banks, as the banks got the right to receive reimbursement subsidies.

The measures taken helped to restrain the slump in developmental indices of small and medium entrepreneurship, although it should be noted that the turnover rates of small enterprises (excluding micro enterprises) show negative dynamics in most regions.

Table 1. Small enterprise turnover dynamics by RF districts in 2017-2020 (excluding micro enterprises), in actual prices, million RUB [12]

Federal district	2017	2018	2019	2020	Dynamics, 2017/2020 (+/-), %
Central	13,029.9	14,719.8	13,826.8	11,167.4	-14
Northwestern	2,958.9	3,137.2	3,266.7	3,124.7	+5
Southern	2,209.3	1,911.1	1,995.6	1,808.9	-18
North Caucasian	442.0	420.0	413.9	380.8	-13
Volga	3,714.9	3,808.1	3,813.7	3,880.2	+4
Urals	1,916.1	1,932.8	1,923.1	1,786.7	-7
Siberian	2,299.7	2,316.6	2,238.4	2,226.8	-3
Far Eastern	1,025.4	1,179.9	1,233.8	1,244.3	+2

The Table shows that from 2017 to 2020, only three out of eight districts show an increase in the small enterprise turnover: Northwestern Federal District (by 5%), Volga Federal District (by 4%) and Far Eastern Federal District (by 2%). However, the rates for 2020 and 2019 (just before the pandemic) demonstrate the turnover growth only in the Far Eastern Federal District. The maximum turnover slump was recorded in Southern (-18%), Central (-14%) and North Caucasian (-13%) federal districts.

Although it is too early to assess efficiency of the governmental measures on strengthening and supporting small businesses during the pandemic, it is evident that the abovementioned measures helped avoid a more challenging situation.

The total number of small enterprises in Russia has drastically decreased over 2020 as a result of the general pandemic crisis.

Nevertheless, as it has been previously noted, the main factors repressing development of the small business sector of the country's economy include strong fiscal burden, economic uncertainty, domestic demand curtailing, loan interest rates, insufficient financial resources, etc.

For that reason, a number of government assistance programmes for business entities has been launched in Russia.

However, the current condition of the mentioned enterprises means that the specified measures of the assistance programmes have not achieved the declared objectives yet.

Let us consider the situation in the Southern Federal District, which includes Astrakhan Region as well, in more detail.

Table 2. Small enterprise turnover dynamics across the Southern Federal District in 2017-2020 (excluding micro enterprises), in actual prices, million RUB [12]

Region	2017	2018	2019	2020	Dynamics, (+/-), %
Adygea	35.5	40.5	40.2	42.3	+19
Astrakhan Region	55.7	57.5	55.7	51.7	-7
Volgograd Region	211.3	178.5	191.9	207.8	-2
Kalmykia	6.1	7.5	7.8	7.5	+23
Crimea	110.6	131.1	135.1	124.3	+ 12
Krasnodar Krai	1 190.8	857.9	881.0	723.6	-39
Rostov Region	567.2	602.3	647.0	615.3	+8
Sevastopol	32.2	35.8	37.1	36.4	+13

Within the period from 2017 to 2020, the following regions of the Southern Federal District showed positive turnover dynamics: Republic of Kalmykia (+23%), Republic of Adygea (+ 19%), Sevastopol (+13%), Republic of Crimea (+12%), but Kalmykia's contribution to the total turnover volume of the Southern Federal District is far from those of Krasnodar Krai, Rostov Region, and Volgograd Region. At the same time, all the district regions, except for Volgograd Region, showed negative dynamics from 2019 to 2020.

Astrakhan Region showed the strongest decline (-7%) over the analyzed period; according to preliminary estimates, at the end of the third quarter of 2020, the growth index of small and medium entrepreneurship in the region decreased by 1.6 points against the second quarter.

In this regard, it should be pointed out that for the period from 2019 to 2020, the population of Astrakhan Region sharply declined. According to preliminary estimates, the mortality rate exceeded the fertility rate by 2%, but the employable population outflow from the region – approximately 6,000 people – had the strongest effect in this case. Surveys demonstrate that young people and the economically active population prefer to find a job in such cities as Moscow, Saint Petersburg, Krasnodar, and Rostov-on-Don. The mentioned cities are the very “centers of attraction” with higher living standards.

Meanwhile, Astrakhan Region was one of the first regions in Russia to take measures for developing and implementing regional programmes aimed at supporting entrepreneurship development, reducing inspections, eliminating barriers at the stage of small enterprise establishment, developing business incubators and infrastructure centers that render assistance to small entrepreneurship.

Nowadays, the following regional institutions support businesses (Table 3).

Table 3. Institutions supporting small businesses in Astrakhan Region

Name	Establishment goals
1. SME Business Navigator – Internet-resource	To help entrepreneurs who are planning to create / expand a business (advice on profitable areas of the business being created, development of an approximate business plan, provision of information

	on small and medium business support measures, current guarantees and loan interest rates)
2. Astrakhan Small and Medium Entrepreneurship Supporting Fund (micro-loan company)	To grant loans to small and medium entrepreneurship
3. Astrakhan Collateral Fund JSC	To ensure availability of financial resources for small and medium entrepreneurship
4. Autonomous Institution of Astrakhan Region <i>Astrakhan Regional Innovation Center</i> – business-incubators, a cluster development center for small and medium entrepreneurship, a regional engineering center, etc.	To provide preferential lease terms for small and medium entrepreneurship
5. Centre for Coordination and Support of Export-Oriented Small and Medium Enterprises of Astrakhan Region	To provide informational, analytical, consulting, managerial, financial and other types of support for export-oriented small and medium enterprises, <u>assistance in entering the international market</u>
6. Multifunctional Center for Business	To provide assistance in collecting and drawing up documents, giving advice on reducing terms for administrative procedures on obtaining the required documents in Astrakhan Region
7. Federal State Budgetary Institution <i>Fund for Assistance to Small Enterprises Development in Science and Engineering</i>	To provide assistance to scientific and research institutions
8. Federal Corporation for Developing Small and Medium Entrepreneurship JSC	To provide necessary consulting assistance to the projects implemented by small and medium entrepreneurship

It should be noted that, in addition to the abovementioned institutions, the Astrakhan Fund for Supporting Small and Medium Entrepreneurship (micro-loan company) was created in 1996 in Astrakhan Region; it provides support for small and medium enterprises, and the Fund got the status of a microfinancial organization in 2011.

In order to ensure small business lending, Astrakhan Region implements a number of special programmes developed with regard to the market demand and updated on a regular basis (Preferential, The First Step+, Alternative, Farmer, Self-Employed, etc.). As of the end of 2020, the amount of more than 271 million RUB was allocated and spent on regional business support projects, and it constitutes 100 % of the national project planned funding.

However, according to analysis data, only a part of enterprises may get state support in the region, particularly those enterprises that fully meet the stipulated requirements. Moreover, in fact it is hard and even impossible for many small enterprises to take out a bank loan, as they do not always have required collateral assets. Many banks refuse to provide preferential loans for small enterprises explaining it with the lack of required and unconditional repayment guarantees; delays in considering applications and strict requirements make it even harder to get a loan. Banks actually refuse to provide small enterprises with long-term loans.

It is clear that new financing forms, such as crowdfunding, may provide additional opportunities for small and medium business development without State participation.

However, let us consider the entrepreneurs' opinions on business challenges in the modern conditions. Latest polls among Astrakhan entrepreneurs show that they have the same views as the ones of businesspersons all across Russia. For example, they mention the following main barriers for small business development:

- economic uncertainty;
- high taxation;

- declining demand at the domestic market;
- low income of the population;
- high prices for energy resources;
- quality of legal regulation of the economy.

Therefore, the presented analysis once again confirms that it is necessary and crucial for the State to provide conditions for business development. Within the territories of the Caspian macroregion countries, joining the member states' efforts on creating a favorable environment, infrastructure and other conditions would not only significantly contribute to increasing the indices of entrepreneurship efficiency in each country, but also positively influence the quality of development of the whole Caspian region.

Authors' contributions

Issues of the sustainable development of the Caspian region and studies on small and medium business issues represent the subject of the authors' research.

Acknowledgements

In the current situation, we would like to recall the Dutch economist J. Tinbergen, who pointed out that State regulation and support are efficient provided that certain conditions are met, under which it is important that the number of recorded developmental indices is not more than the number of governmental supporting tools [9]. In other words, the State cannot and should not undertake the obligations that cannot be fulfilled; the efficiency of the measures taken should be assessed through the balance of costs on the programme development and implementation and the total income growth through increasing the production output by small and medium enterprises that use the tools of this governmental programme.

References

1. "On Approval of the Rules for Providing Subsidies from the Federal Budget to the Russian Lending Institutions to Compensate Their Lost Income from Loans Granted to Legal Entities and Sole Entrepreneurs on Business Resumption in 2020": RF Government Decree No. 410 dated 02.04.2020 (as amended 24.04.2020)
2. RF Government Decree No. 575 "On Amendments to Several Legal Acts of the Russian Federation Government" dated April 24, 2020. [Online]. Available: <https://www.garant.ru/products/ipo/prime/doc/73853235/>
3. RF Government Decree No. 434 "On Approval of the List of the Russian Economy Sectors That Suffered Most of All under Deteriorated Conditions due to COVID-19 Spread" (with amendments and additions), dated April 3, 2020. [Online]. Available: <https://base.garant.ru/73846630/>
4. "On Amendments to the List of the Russian Economy Sectors That Suffered Most of All under Deteriorated Conditions due to COVID-19 Spread". RF Government Decree No. 657 dated May 12, 2020 [Online]. Available: <https://www.garant.ru/products/ipo/prime/doc/73909799/>
5. Federal Law No. 106-Φ3 "On Amendments to the Federal Law "On the Central Bank of the Russian Federation (Bank of Russia)" and Certain Legislative Acts of the Russian Federation Concerning the Specifics of Amendments to the Terms of Lending Contracts and Loan Agreements" dated April 3, 2020 [Online]. Available: <https://www.garant.ru/products/ipo/prime/doc/73742090/>

6. RF Government Decree No. 696 “On Approval of the Rules for Providing Subsidies from the Federal Budget to the Russian Lending Institutions to Compensate Their Lost Income from Loans Granted to Legal Entities and Sole Entrepreneurs on Business Resumption in 2020” dated May 16, 2020 [Online]. Available: <https://www.garant.ru/products/ipo/prime/doc/73933064/>
7. On Approval of the Strategy of Small and Medium Entrepreneurship Development in the Russian Federation until 2030 (together with “the Plan of Actions (“road map”) on implementing the Strategy of Small and Medium Entrepreneurship Development in the Russian Federation until 2030”) RF Government Order No.1083-p dated 02.06.2016 (as amended 30.03.2018).
8. Measures for business support [Internet resource] Стопкоронавирус.рф: an official Internet resource for informing the population about the COVID-19 issues, 2020 [Online]. Available: <https://xn--80aesfpebagmfb1c0a.xn-p1ai/what-to-do/business/>
9. N.V. Kovalenko, T.A. Suleymanova, Domestic and foreign experience of state support for small and medium-sized entrepreneurship [Online]. Available: <http://ma123.ru/en/2020/06/kovalenko-suleymanova/>
10. Nat.I. Morozko, N.I. Morozko, V.I. Didenko, *Financial and non-financial measures to support small and medium-sized businesses in 2021 and in the medium term*, in: *Economics, Taxes & Law*, **14(1)**, 31-40 (2021)
11. Official website of the Ministry of Economic Development of the Russian Federation. News section [Online]. Available: <https://www.economy.gov.ru/material/news/sov>
12. Official website of the Fira Rating Agency [Online]. Available: <https://fira.ru>
13. N.V. Ogorodnikova, L.M. Gokhberg et al. (Eds.), *Indicators of innovative activities: stat. collection* (Higher School of Economics, Moscow, 2015)
14. Statistics of innovations in Russia [Online]. Available: <http://www.gks.ru>
15. Strategy of Socioeconomic Development until 2020 [Online]. Available: <https://minec.astrobl.ru>
16. B.A. Chub, *Assessment of investment potential of the subjects of the Russian economy at mesolevel*, Ed. by V.V. Bandurin, (2013)