Development of the large cities in the context of the implementation of the ESG framework

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Abstract. The article is devoted to the formation of a conceptual model of sustainable development of large cities and the algorithm of its implementation in the ESG framework. The article aims to illustrate and justify of the authors' proposals in promoting the digital sustainable development management platforms in conditions of environmental challenges inherent in a group of the largest million-plus cities in the Russian Federation. The necessity and expediency of building digital platforms for managing the sustainable development of major cities is proposed and justified, which is caused by the growing volume of information in the conditions of sanctions and changes in foreign economic conditions. The importance of the formation of "smart" cities with the elements of "green" construction and with the allocation of zones of ecological well-being, the transfer of urban vehicles to electric vehicles, optimization of waste disposal of production and consumption in these cities is emphasized. The article proposes a methodological approach to the formation of an information panel for the sustainable development of the largest cities of the Russian Federation. Finally, the algorithm for implementing the construction of a digital platform for managing the sustainable development of the largest cities is presented in the form of a four-stage system of actions, the sequence of which takes into account the presence of distinctive conditions in different cities that characterize their environmental well-being, as well as infrastructure tasks to ensure energy saving and resource conservation regimes within the ESG agenda.

Key words: Sustainable development; ESG agenda; ESG strategy; Innovative development; Best available technologies (BAT); Ecology.

1 Introduction

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Currently, in the context of restrictions and growing environmental problems, it is necessary to develop the conceptual model for managing the sustainable development of the country's largest cities (million-plus cities), which would ensure dynamic development under in the context of new management decisions, create a smart ecosystem, comfortable and safe urban space to increase life expectancy, accumulated the intellectual and creative potential of large cities in order to increase their competitiveness at the international level, carried out a shift in the waste management system to the stage of their secondary use and complete processing. The most important role in this process is played by the implementation of mechanisms for energy saving and resource saving, ensuring sustainable development goals (ESG), greening the economy and increasing the level of ecological culture of the population. Therefore, it is necessary to introduce new sustainable development technologies into all components of the reproduction process, first of all, the best available technologies (BAT), which will be the drivers for balancing the economic, social and environmental components of sustainable development. Most Russian regions have a specialization of priority economic activity, providing an export orientation determined by natural, climatic and resource (labor, capital, investment) opportunities. In the strategic perspective, the Russian Federation is interested in the largest cities that have a significant potential for fulfilling national economic tasks, which can also be considered as potential growth points for the country's economy. In this regard, the formation of information platforms as illustrating the means of making managerial decisions on the sustainable development of million-plus cities, allowing to take into account the peculiarities of their economies, social and climatic conditions, the state and dynamics of changes in the external environment, actualize the processes of digitalization, greening, resource saving and energy saving and the development of interaction schemes state and business structures, and the active part of the population [1] on issues of ensuring comfortable living in various territories of the Russian Federation.

The idea of building digital platforms for managing the sustainable development of the largest cities was caused, first of all, by a large amount of information characterizing the economic, environmental and social aspects of the ESG agenda being implemented in today's dynamic conditions of changing external conditions and the processes taking place in these settlements [1]. The process of urbanization, intensified by the flow of population from rural municipalities and small towns, led to an increase in the pace of housing construction, an increase in the fleet of personal vehicles and increased the need to expand the area of highways. This, in turn, reduced the area of public urban spaces (yard areas, parks and squares, environmentally friendly areas), which increased the emission of harmful substances into the atmosphere. Thus, the topological problem of the largest cities of the optimization of public spaces' allocation has been actualized. The problem of landscaping, its qualitative solution (selection of planting material, new forms of its placement) comes to the fore, and new forms of reducing the carbon footprint in cities (carbon forms and landfills) appear. In the largest cities there are enterprises that produce strategic products, which employ most of the living population. The formation of an ecological framework within the areas of dislocation of enterprises has become one of the city's problems. Direct reform of economic entities in the direction of ensuring their sustainable development has determined the need for the introduction of BAT, which are considered by the authors in a number of publications [2, 3]. Thus, the implementation of the environmental policy of large cities required the digitalization of extensive information. An important point of modern socio-economic policy is the creation of "smart" cities, the regulation of which is explained by a large number of characteristics regarding "green" construction and housing and communal services, the greening of the urban economy, the planning of zones of ecological well-being, the transfer of vehicles in the direction of increasing electric vehicles and their promotion among the population. A special issue is the disposal of production and consumption waste as a reserve for obtaining additional secondary resources for the development of economic activity, the

priority of which is resource conservation and energy conservation. The purpose of the article is to generate an algorithm for implementing the ESG concept in the largest cities of the Russian Federation, based on the individual characteristics of their ecological and economic state with the help of information support for decisions made by government agencies in modern conditions with the priority of ensuring comfortable living for the population, in particular, along the trajectory of the development of "smart" cities.

2 The current state of the issue

The economic space of large cities is multidimensional, the study of its fundamental laws of development is based on a systematic analysis by various scientific schools of economics. At the same time, economic science in this analysis relies on the existing information base, institutional methodology for the study of socio-economic characteristics of urban space.

Today, the conceptual foundations of the methodology for the study of the socio-economic space of regions and large cities as complex system objects of observation and management are being actively developed, the features of which are revealed in spatial, socio-cultural, ecological development trajectories. Geoeconomics and spatial economics are represented by the basic theories of Izard, Lesh, Friedman, von Thunen, and the theory of regional economics by Granberg, which created the basis of the fundamental theory of spatial economics. An overview of the evolution of the spatial economy over the past two centuries is presented in the studies of Fujita.

Considering the current processes of both globalization and deglobalization, the decision-making of common socio-economic and natural factors is increasingly influenced by structural transformations occurring in conditions of social, environmental or political upheaval (Kurtit, Boshma, Martin). Researchers identify important aspects due to large-scale tectonic shifts in the economic and socio-cultural space: geopolitical (Bauman), social (Adedeji), demographic (Lee), cultural (Levitt), geographical (White), globalization and communication (Solimano, Pilyasov).

Much attention is paid to the concept of sustainability of economic territories (Healy, Bristow; Reggiani, de Graft, Nijkamp; Perrings, and others) [4]. At the same time, sustainability has become a popular concept precisely in regional studies (Bristow; Kurtit, Nijkamp, Scholten; Mirow, Shtulz et al.). The development of single-industry towns as special parts of the economic space also turned out to be the focus of attention of researchers (Zamyatina, Pilyasov, Uskova, Iogman, etc.), including the development of large cities in the Arctic zone (Kuznetsova, Zamyatina, Fesenko, Dmitrieva, Bury and others) [5-13].

At the same time, we note the insufficiency of empirically substantiated efforts for theoretical justification of the changes taking place in the context of the modernization agenda and sustainable development goals. The largest cities of the Russian Federation have specific spatial and institutional conditions. They are characterized by the processes of urbanization taking place in them, an increase in the consumption of various packaged foodstuffs and goods, leading to an increase in consumption waste, the growth of motor vehicles, which led to the emergence of urban "traffic jams" and, as a result, emissions of harmful gases into the air of the largest cities.

Rational nature management, green and circular economy «are reflected in the studies of Balatsky, Bobylev, Gusev, Zander, Novoselova, Pakhomova, Petrov, Porfiryeva, Potravny, Tikhomirova, Shevchuk, Shimova, Yashalova et al. Economic problems of regulation of subsoil use in waste management are studied in the works of Belashov, Kulagina, Mikheeva, Stoyanova, Tulupova, Fomenko and others. The works of Mongolian scientists Baatarkhuu, Narankhuu, Odontsetseg, Erdenetsogt, Enkhtuyaa, Oyuntsetseg, Chantsalmaa are devoted to the problems of economic regulation of the activities of mining enterprises. At the same time, many theoretical problems associated with management of natural resources in the conditions

of depletion of natural resources, the use of production waste as a new resource base of mineral raw materials, the assessment of environmental and economic costs of production in modern economic conditions have not been studied enough» [14]. The work of Lukyanchikov, Potravny "Economics and Organization of Nature Management" researched conceptual approaches and mechanisms for implementing environmentally sustainable economic development. In the monograph "Green Economy: Reloaded", Shevchuk discusses the economic and environmental foundations of the transition to a green economy, forecasts and indicators of green growth.

3 Methods and approaches to solving the problem

The methodological approach to the study of the process of forming an information panel (i.e., the dashboard) of sustainable development of the largest cities of the Russian Federation is based on the following basic principles:

1) synergy, which implies a close relationship and mutual influence between participants in economic activities and ensuring comfortable living for the population, i.e., between industrial, scientific, educational and financial and credit structures involved in ensuring the ESG agenda;

2) complexity, which determines the need for a deep analysis not only of the economy of the largest cities, but also of the individual components of the agglomeration associated with them by economic ties (cities, municipalities; industry complexes, infrastructure, social facilities, business and administrative structures, etc.), as well as their interaction within the framework of providing supply chains;

3) adaptability, which is manifested in the possibility of adjusting the actions and tools for developing a conceptual model of digital platforms in general and an information panel in particular for the sustainable development of the largest cities;

4) scientific validity of the document flow that regulates the process of forming a sustainable development dashboard using the basic provisions of institutional economics (contract theory, development institutions, game theory), methodological recommendations that will be aimed at improving socio-economic policy in the field of ecology and the introduction of renewable energy sources ; in addition, special attention is paid to the spatial principle of the formation of "green" clusters of the production sector, which is inextricably linked with the peculiarities of the socio-economic and environmental-economic development of cities and territorial entities, which implies an analysis of the state and dynamics of ongoing processes of socio-economic development of the region.

As part of the methodology for assessing the effectiveness of using the sustainable development digitalization model, the authors proposed to utilize the following methods and techniques:

1) economic and statistical methods and methods of qualitative analysis with subsequent formalization to assess the current state and identify trends in the development of the green economy in a particular city [1];

2) methods of multivariate analysis that will reveal latent interrelations in space of many risk factors that affect the balance of development of million-plus cities;

3) modeling methods, which will make it possible to identify the criteria for classifying participants in the reproduction process as effective and inefficient, by analogy with discriminant models for predicting bankruptcy, and also to determine the factors of economic stability.

In addition, it is important to pay special attention to the methodological tools of the typology of territorial entities in which it is advisable to form green clusters and based on a combination of formalized analysis methods to search for similar research objects in the field of quantitative (statistical) indicators with further adjustment of the selected clusters based

on additional qualitative information and professional judgment. Unlike a number of existing methods and techniques, the methodology proposed for development involves:

1) combining quantitative and qualitative methods at all stages of the study: assessing the degree of sustainable development and the state of the economy and ecology;

2) the use of multidimensional risk analysis, which will allow, unlike a number of applied methods that use published ready-made statistical indicators (for example, energy and resource efficiency) for integral assessment, to identify latent factors of development and sustainability.

Research methods could be divided into two groups: conceptual modeling of socio-economic processes with their further algorithmization in "binding" to specific objects - the largest cities of the Russian Federation; and analytical study of modern economic, environmental and social conditions for the development of major cities using analogy schemes and forecasting the possible consequences of the actions of the external and internal environment.

4 Results and discussion

The algorithm for implementing the idea of building a digital platform for managing the sustainable development of the largest cities could be represented as a four-stage system of actions, the sequence of which does not fit into the traditional understanding. The stages of actions intersect and are supplemented as a result of their implementation. In our opinion, at the first stage, an empirical and analytical study of the state of the environment in the largest cities should be carried out. There is no predetermined scenario for their implementation in all million-plus cities of the Russian Federation. This is due to the presence in different cities of distinctive conditions that characterize the ecological well-being of these territorial entities for a number of reasons. First of all, we note the difference in climatic and natural conditions, as well as in the diversification of the potentials that characterize the factors of production. In addition, the difference in the standard of living of the population and the specifics of consumer preferences led to a difference in culture and consumption opportunities, which, in turn, determined various formats for the formation of solid utility costs [1]. The industrial specializations of the largest cities have revealed "bottlenecks" in resource-saving policies and strategies for converting production and consumption waste into secondary production resources. The conceptual model presents the enlarged tasks of this stage. The second stage of the algorithm consists in a theoretical study of the problem posed. The existing publications of various domestic and foreign schools are extensive. We have carried out a schematization of works in the areas of sustainable development of large cities, in particular, which confirmed the existence of both territorial and sectoral approaches to the ESG agenda in modern conditions. The largest cities are characterized by the predominance of the humanitarian direction of sustainable development associated with ensuring comfortable living for the population. These circumstances led to the need for additional analysis on the mutually corrected actions of the first two stages of the algorithm. At the third stage of the algorithm, there was a need to digitalize the processes of sustainable development of the largest cities, taking into account possible external effects. Let us pay attention to the prevailing nature of modeling as a tool for studying the phenomenon of sustainable development (from empirical models to economic and mathematical models that take into account the different nature of resources and forms of interaction between participants in the economic life of million-plus cities). The final stage of the algorithm is to implement the methodology for digitalization of the management system of the largest cities as part of the ESG agenda.

The common logic of the model implementation is to identify the strategic goals of sustainable development based on the analysis of promising information regarding the state

of the economy of the country's largest cities, taking into account the environmental principles of socio-economic development in terms of the requirements of their sustainable and innovative development, based on the methods of interdisciplinary research, containing economic, social and environmental knowledge and their mutual influence on the key parameters of the transition of the economy to the fourth technological platform.

As part of our research, we paid great attention to the analysis of available information from state statistics affecting the dynamics of changes in the economy and the social sphere of the largest cities of the Russian Federation, existing promising territories for the formation of "green" integration structures, and, above all, substantiated the feasibility of forming "green" territorial and sectoral clusters and development of BAT. To form a complete economic picture of million-plus cities, data on ongoing environmental projects of federal and regional significance, which prevail precisely in the largest cities of the country, should also be involved.

The sustainable development management of the largest cities should eventually transform them into "smart" cities, which can be considered as centers for achieving a balance between the environmental, economic and social components of the territorial structure of life.

The sustainable development agenda involves «the transformation of the economy of large cities, taking into account social and environmental parameters, increasing transparency and quality of management, and introducing modern digital technologies. In addition, the implementation of ESG principles» [15] in such structures will ensure a favorable investment climate for the implementation of large infrastructure socially significant projects.

Let us dwell separately on the issues of managing the sustainable development of the largest cities in terms of the production of goods and services for consumption by the population: passenger transport, housing construction and housing and communal services. The replacement of environmentally dirty vehicles with environmentally friendly ones is promising in terms of the ESG strategy and consists in increasing the production of electric vehicles and electric cars with the possibility of developing the infrastructure for their operation - urban charging stations. Undoubtedly, the reduction in the cost of their production and the reduction in the prices of products sold will increase the interest of the population in their acquisition, which is realistic only with the financial support of the state. "Smart" cities contain, first of all, environmentally friendly construction and housing and communal services. "Green" clusters in this area should contain, in addition to construction companies, enterprises that supply environmentally friendly components for construction work - building materials, windows, doors, metal fittings, etc. Architectural solutions should be carried out taking into account noise reduction technologies and topological solutions for the location of courtyard areas equipped with green spaces and comfortable areas for recreation of the residents and their guests. Consequently, many city problems must be solved in full agreement with the producers of goods and services that provide comfortable living for citizens.

In conclusion, let us consider the infrastructural problems of ensuring energy saving and resource saving regimes as the main drivers of the economic sovereignty of the Russian Federation.

Optimization of waste management through compliance with the law will significantly reduce the negative impact on the environment and reduce the use of primary resources and energy carriers. Waste management is recognized as a serious problem on the way to the implementation of the strategy of sustainable development and "green growth" of the country's economies.

The most efficient and consistent use of waste as a secondary resource is a top priority for sustainable development in all countries. Therefore, taking into account the complex nature of this problem and the need to involve various economic entities to solve it, it is

advisable to create "green" clusters of resource conservation as a new form of sustainable development of large cities. In this regard, it is interesting to involve the active population of cities in this process of sustainable development in order to organize the separate collection of consumer waste, which will allow the efforts of business and government structures to be focused on developing a technological policy for the beneficial processing of individual waste components and their involvement in economic circulation as secondary resources. production.

The experience of using alternative and hydrogen energy in the Rostov region and the Republic of Kalmykia indicates the effective implementation of the carbon footprint reduction policy and can be transferred to other Russian territories. The role of scientific and educational organizations in the integration structures of the national economy is increasing, which consists in promoting innovative scientific developments in practice through the creation of BAT within the framework of clusters and industrial parks. Therefore, "green" clusters in the industrial and non-industrial sectors are becoming one of the main drivers of sustainable development of the economy of large cities and an important direction in the policy of ensuring the technological and economic sovereignty of the state.

5 Conclusion

The findings of the study could be formulated as follows:

− one should manage the sustainable development of the largest cities within the framework of a digital platform that allows taking into account the joint accounting of economic, environmental and social indicators that characterize the state and dynamics of changes in the face of external and internal challenges and the individual characteristics of these megacities. At the same time, preference should be given to innovative development strategies, in particular BAT, which are based on the study of large amounts of information;

− for large cities, the priority of the humanitarian direction of the ESG concept related to ensuring comfortable living for the population was noted;

− promising for the implementation of the conceptual model of managing the sustainable development of the largest cities should be their transformation into "smart" cities, which are considered as centers for achieving a balance between the environmental, economic and social interests of the reproduction process in these megacities;

− as institutions for the development of "smart" cities, "green" clusters are proposed as integration structures capable of implementing the ESG concept in the largest megacities and an important element in ensuring the technological and economic sovereignty of the state.

References

1. S.G. Tyaglov, N.D. Rodionova, Ya.V. Fedorova, V.Yu. Sergienko, Regionology **28**, 778 (2020) https://doi.org/10.15507/2413-1407.113.028.202004.778-800

2. N. Kuznetsov, S. Tyaglov, M. Ponomareva, N. Rodionova, K. Sapegina, Sustainability **14**, 1116 (2022) https://doi.org/10.3390/su14031116

3. N.G. Kuznetsov, S.G. Tyaglov, M.A. Ponomareva, N.D. Rodionova, Financial research **62,** 116 (2019)

4. K. Kortit, P. Naikamp, S. Suzuki, Asia-Pac J Reg Sci **5**, 149 (2021) https://doi.org/10.1007/s41685-020-00188-y

5. A.N. Bufetova, I.A. Vizhina, V.V. Vorobyova, Optimization of territorial systems (Institute of Economics and Organization of Industrial Production SB RAS, Novosibirsk, 2010), p. 630

6. O.V. Tolstoguzov, M.A. Pitukhina, Lecture notes on Networks and Systems **250**, 329 (2023) https://doi.org/10.1007/978-3-030-78083-8_32

7. V.N. Leksin, B.N. Porfiriev, The economy of the region **4**, 985 (2017)

8. B.N. Porfiriev, I.L. Vladimirova, A.N. Dmitriev, Psychological aspects **16,** 165 (2017) https://doi.org/10.1080/17477891.2017.1280000

9. A. Novoselov, I. Potravny, I. Novoselova, V. Gassiy, Sustainable Development **14**, 933 (2022) https://doi.org/10.3390/su14020933

10. P.Ya. Baklanov, L.A. Bezrukov, V.I. Blanutsa, Public Geography in Russia: A look into the Future (SFEDU Publ., Rostov-on-Don, 2022), p. 100

11. F.A. Bruges, Smart cities of the future: 7 things that make successful cities (Cities Today Review, 2021), https://cities-today.com/industry/smart-cities-of-the-future-7-things-that-successful-cities-do/. Accessed 17 February 2023

12. O. Burmatova, in Development of eco-cities through policy, planning and innovation: can it really work? Ed. by Management Association, Information Resources (Hershey, IGI Global, 2019), pp. 1-47

13. S.N. Bobylev, A.O. Verenikin, A.Yu. Verenikina, Sustainable development of territories (MSU Publ., Moscow, 2021), p. 427

14. N. Davaakhuu, I. Potravny, S. Tishkov, K. Kulakov, Gornyi Zhurnal **8**, 50 (2019)

15. A. Samokhin, SBER at SPIEF: ESG-index of mountains and regions, trends in the development of anonymity and standards in the world of AI (Baikalinform Portal, 2023), https://baikalinform.ru/novosti-kompaniy/sber-na-pmef-esg-indeks-gorodov-i-regionov-trendy-razvitiya-ekonomiki-i-standarty-v-sfere-ii. Accessed 20 June 2023