ABSTRACT

**of the dissertation for the degree of Doctor of Philosophy (Ph.D)
in the specialty “6D060900 – Geography”**

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Assessment of territorial differentiation of the quality of the urban environment of Almaty city.

The relevance of the research topic is determined by the fact that, in modern conditions, there is an increasing demand for the quality and comfort of life, especially in urbanized areas. The provision of openness, safety, resilience, and ecological sustainability of cities and settlements is addressed by the 11th Sustainable Development Goal, "Sustainable Cities and Communities."

It is important to note that there are challenges associated with the rapid growth of large cities and the net outflow of urban populations in some regions of the country, which is highlighted in the National Development Plan of the Republic of Kazakhstan until 2029 (section 1.4, Comfortable Environment) and requires timely reforms in urbanized territories. Additionally, the Strategic Plan for the Republic's Development until 2025 is built around seven major systemic reforms and seven priority policies to be implemented in the country’s economy and social life up until 2025. To measure the country's progress in joining the top 30 developed countries, key national indicators and international indices have been defined, among which item 5 is "Strong Regions and Urbanization." There are also specific government programs aimed at improving the accessibility and comfort of housing and developing housing infrastructure, such as "Nurlı Zher." The state's efforts to promote economic growth and improve the population's standard of living through the creation of effective and competitive transport infrastructure, as well as enhancing the operational and environmental safety of transportation, are addressed in the "Nurlı Zhol" state program for 2020–2025.

According to the "Almaty City Development Program until 2025 and Medium-Term Prospects until 2030," its main goal is to create a comfortable urban environment and improve the quality of life in all districts of Almaty. In this regard, the study of urban environment issues and the assessment of the quality of urban environments in Almaty is highly relevant today.

These government programs and initiatives are part of broader efforts to improve life in Kazakhstan's cities, contributing not only to economic growth but also to improving the environmental situation and the quality of life of the urban population.

In the Republic of Kazakhstan, the urban population accounted for 62% in 2024, with positive growth dynamics, as this indicator increased by 43% (or 3.7 million people) from 2009 to 2023. This leads to the need for improving urban environment management processes, including its modernization and adaptation to current socio-economic conditions. The specifics of such management are determined by the complex, contradictory nature of cities, as well as the extremely wide range of issues in urban infrastructure and economy, ecology, security, migration flows, construction,

life support infrastructure and communication, social sphere, spatial development, etc. These challenges require a comprehensive geographical analysis to identify the territorial differentiation of urban environment quality, and the need to address them is one of the key tasks in managing the development of large cities and improving their urban environment quality.

In this context, the question of the impact of the spatial distribution of urban resources on the quality of life of the population becomes especially relevant. Based on the above, a scientific question arises: What factors determine the territorial differentiation of urban environment quality in Almaty, and how does the spatial distribution of urban resources and services affect the territorial differentiation of the quality of life? This question forms the basis for further analysis and will help identify key aspects requiring detailed study and solutions.

The city of Almaty is the largest city in the Republic of Kazakhstan, with a population of 2.286 million (as of the end of 2024), and is a city of republican significance. It faces challenges such as an unfavorable ecological situation, high urbanization rates, intensive development of urban infrastructure, a shortage of green spaces, etc., which creates a diversity of urban conditions in different districts and makes it an interesting object for analyzing changes in the urban environment.

The scientific significance of the topic is due to the insufficient study of the territorial differentiation of urban environment quality in the cities of Kazakhstan and the absence of a unified system for assessing the quality of urban environments. Despite existing research in the field of urban studies, a comprehensive assessment of the territorial heterogeneity of urban environment quality using modern geographical methods and tools remains an unresolved issue. This research will identify key factors affecting the quality of the urban environment in different districts of Almaty and provide practical recommendations for its improvement.

The degree of scientific study of the problem. The issues of urban environment quality and territorial differentiation are subjects of scientific interest for many researchers within disciplines such as urban studies, social geography, ecology, economics, and sociology. A significant contribution to the development of the theoretical and methodological foundations of urban environment research has been made by both foreign and domestic scholars, such as Ancyferov N.P., Mamford L., Lappo G.M., Jane Jacobs, Nefedova T.G., Trevish A.I., I. Brade, A.G. Makhrova T.G., Harvey D., Aitkazina Z.N., Nadirov Sh.M., Nüsupova G.N., Sarsenova I.B., Peredery A.A., Harvey D., Castells M., Massey D., Florida R., Suvorov D.M., Suvorova L.A., Pestova I.V., Baibakova T.V., Garau C., Pavan V.M., Engelhardt A.E., Lipovka A.Y., Fedchenko I.G., Polyakova T., Tsurik T., Rouli J., Kusumastuti R.D., Hegazy I., Helmi M., Qurnfulah E., Naji A., Ibrahim H.S., Oppio A., Bottero M., Arcidiacono A., Antonina Shepeleva, Ksenia Shelest, Sergey Maksimov, Takhir Aliyev, Tatiana Zabolotskaya, Nurlanova N.K., Alzhanova F.G., Satpaeva Z.T., Kaimuldinova K., Aliaskarov D., Muzdybayeva K. and others.

These studies analyze key aspects of the urban environment, including ecological well-being, socio-economic development, and infrastructure provision. However, within the context of Kazakhstan, the territorial differentiation of urban

environment quality in large megacities, including Almaty, has not been sufficiently explored. This determines the need for applying adapted analytical methodologies that take into account the specific characteristics of Almaty's urban environment.

The aim of the dissertation research is to develop scientific foundations for the study of urban development and assess the spatial-temporal differences in the differentiation of urban environment quality in the city of Almaty.

To achieve this goal, the following tasks were set and solved during the research:

1. Analyze existing approaches to assessing urban environment quality and adapt them for use in the context of the city of Almaty.
2. Develop a methodology for comprehensive assessment of the quality of urban environment territorial differentiation using GIS technologies and methods of statistical and sociological analysis.
3. Identify key factors that determine differences in urban environment quality in the city of Almaty.
4. Conduct a comprehensive assessment of the territorial differentiation of urban environment quality in Almaty by district from 2010 to 2022 based on the results of the integrated assessment of urban environment quality and sociological surveys of the population.
5. Provide recommendations for improving the quality of the urban environment in Almaty by district, taking into account the identified disproportions.

The object of the research is the urban environment of the city of Almaty, including its natural, infrastructural, and social components.

The subject of the research is the territorial differentiation of urban environment quality in Almaty from 2010 to 2022 and its key determinants.

The methodological basis of the research is grounded in a comprehensive approach that includes methods of index analysis, spatial typology, SWOT analysis, mapping, and statistical analysis, as well as the use of geographic information technologies (GIS). Official data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the Ministry of Education of the Republic of Kazakhstan, the Ministry of Science and Higher Education of the Republic of Kazakhstan, the Ministry of Health of the Republic of Kazakhstan, RGP "Kazhydromet," the national reporting platform for SDGs from the Bureau of National Statistics, monographs, articles in scientific journals, online resources, legal acts of the Republic of Kazakhstan, results of sociological surveys of Almaty residents, and analytical materials reflecting the condition of the urban environment were utilized in this study.

The scientific novelty of the research lies in the development and application of a comprehensive approach to assessing the territorial differentiation of urban environment quality in the city of Almaty, using geospatial, statistical, and sociological analysis. The results of the research will allow for a more accurate identification of the main factors influencing the quality of the urban environment and will propose tools for managing these factors at the local level.

Theoretical significance of the research. The research contributes to the development of the theory of territorial differentiation of urban environments, enriching it with new methodological approaches and analysis tools. The developed methodology for assessing the quality of the urban environment can be used for further scientific research in urban studies, geography, and related disciplines, as well as serving as a foundation for the development of sustainable urban development concepts.

Practical value and significance. The obtained results can be used by government authorities and local governments for the development of strategies and programs aimed at improving and developing the urban environment, planning infrastructure projects, and can also serve educational and research purposes.

Key provisions to be defended:

1. The developed system of urban environment quality indicators, based on the integration of socio-demographic, economic, ecological, and infrastructural factors, provides an objective assessment of the territorial differentiation of urban environment quality in Almaty.

2. The spatial assessment of urban environment quality, through a comparative analysis of the results of objective and subjective research methods, identifies key disparities between the city's districts, which requires the development of targeted development strategies.

3. The developed recommendations for optimizing the urban environment, using geographic information technologies (GIS), allow for detailed monitoring of territorial differences, modeling urban environment development scenarios, and formulating strategic measures to improve the social, ecological, and infrastructural components of the city of Almaty.

Approval of the work. The main results of the dissertation research were presented and reported at the following scientific and practical conferences: International Student and Young Scholars Conference "FARABI ÄLEMI" (Almaty, 2018, 2019), International Conference "World Economy in the 21st Century: Globalization and Regionalization" (Moscow, 2020), International Conference "Digital Challenges for the Global Economy: The Eurasian Perspective Plus" (Moscow, 2020), International Youth Scientific and Practical Conference (Moscow, RUDN, 2021), Bulletin of Voronezh State University (Voronezh, 2023), Bulletin of Al-Farabi Kazakh National University (Almaty, 2023), International Scientific Conference "Urban Resilience: Challenges and Solutions" (Almaty, 2024), International Scientific Conference "City and Its Surroundings: Modern Challenges and Prospective Paths of Development" (Moscow, 2024), GIS CA 2024 (Bishkek. 2024)

Publications of research results. A total of 14 works have been published on the dissertation topic, including 3 articles in high-ranking journals indexed in Scopus and Web of Science, 3 articles in publications recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan, 7 articles in the proceedings of international

conferences, 1 monograph. The Act of Implementation of the Dissertation Results has been received.

Structure of the work. The dissertation consists of an introduction, three chapters, a conclusion, a list of references with 123 sources, and 6 appendices. The work is presented on 138 pages, including 44 figures and 17 tables.