

## Urban Spatial Metamorphoses: The Case of Kazan City With Using GIS-Technologies

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**Abstract :** The paper assessed the effectiveness of the use of urban functional zoning using the method of M.A. Kramer by the example of Kazan city (Republic of Tatarstan, Russian Federation) using geoinformation technologies. On the basis of the data obtained, the calculations were carried out to obtain data on population density, overcoming geographic determinism, as well as the effectiveness of the formation of urban frameworks. The authors proposed recommendations for the effectiveness of municipal frameworks in the period from 2018 to 2021: economic, social, environmental and social. The study of effective territorial planning in a given period allows to display of the dynamics of planning changes, as well as assessment of changes in the formation of urban frameworks. Based on the incoming data obtained from the master plan of the municipal formation of Kazan, in the period from 2018 to 2021, there was an increase in population by 13841 people or 1.1% of the values of 2018. In addition, the area of Kazan increased by 2419.6 hectares. In the structure of the distribution of areas of functional zones, there was an increase in such zones of the municipality as zones of residential and public purpose. Changes in functional zoning, as well as territories requiring reorganization, are presented using geoinformation technologies in open-source software Quantum Geographic Information System (QGIS 3.32). According to the calculations based on the method of functional zoning efficiency by M.A. Kreimer, the territorial-planning structure of Kazan City is quite effective. However, in the development of spatial planning concepts, it is possible to emphasize the weakened interest of the population in the development of territorial planning documents. Thus, the approach to spatial planning of Kazan differs from foreign methods and approaches based on the joint development of planning directions and development of territories of municipalities between the developers of the planning structure, business representatives and the population. The population plays the role of the target audience on which territorial planning is oriented. It follows that there is a need to satisfy the opinions and demands of the population.

**Keywords :** spatial development, metamorphosis, Kazan city, spatial planning, efficiency, geographic determinism., GIS, QGIS

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