

Are We Truly Exploiting the Potential of Geospatial Data? The Case of Territorial Differentiation in Lithuania

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Abstract:

Recently, the availability, quality, and potential applications of open data have significantly increased globally, particularly in Europe. The 2025 Open Data Maturity study indicates that European countries are consistently improving their open data policies, enhancing data quality, and modernizing portals to facilitate broader reuse of public sector information (European Commission, 2025). While past research often emphasized data scarcity and accessibility challenges, the current landscape is shifting: the volume of high-resolution open data is growing, and its accessibility is simplifying. Consequently, provocative questions arise – is data scarcity still the primary obstacle, or has the challenge shifted toward a lack of competencies and the inability to exploit these resources effectively? This is particularly relevant in Lithuania, which ranks 2nd in the 2025 Open Data Maturity assessment, significantly exceeding the European average.

Detailed geospatial data can be applied across various fields; however, this research focuses on territorial differentiation. In Lithuania, differentiation is traditionally based on administrative units and aggregated statistical indicators, even though the availability of granular geospatial data allows for more flexible and precise analytical methods. From a scientific perspective, it is crucial that territorial units and indicators are selected based on research objectives rather than pre-existing data structures. Therefore, there is a growing need to analyze primary, non-aggregated geospatial data and integrate them into the territorial differentiation process.

Territorial differentiation in Lithuania is most commonly performed using a single, well-known source: the Population and Housing Census. These data are analyzed within pre-defined administrative boundaries (usually settlements) and rely on a few key indicators, such as population count and, in some cases, residential building information. The update frequency of these datasets remains relatively low, meaning they do not always reflect current realities. Meanwhile, more detailed and frequently updated sources exist, such as the Real Property Register, the Georeferenced Base Cadastral Dataset or building permit data. These sources can provide additional insights into building morphology, territorial development, service concentration, and infrastructure accessibility. Despite this, their use in practical territorial differentiation remains limited, and many differentiation principles exist only at a theoretical or formal legal level (Republic of Lithuania Law on Administrative Units..., 2022).

Given this situation, this study aims to evaluate the potential of detailed geospatial data in the differentiation of Lithuania's territory, identify key data sources, and determine whether improving existing methodologies is sufficient or if a new methodological approach is required. The research analyzes available geospatial datasets, evaluating their granularity, update frequency, thematic content, and suitability for differentiation tasks. Furthermore, it explores the application of innovative GIS analysis methods, such as clustering and regionalization, to differentiate territories based on raw geospatial objects.

The findings suggest that integrating detailed geospatial data and applying multivariate analysis techniques create the prerequisites for a more accurate differentiation of Lithuania's territory and a more flexible definition of territorial units. Experimental differentiation methods allow for the evaluation of diverse territorial structures, comparison of their characteristics, and identification of optimal analytical approaches. It is expected that this approach will contribute to more precise calculation of statistical indicators, data-driven territorial assessments, and more effective decision-making in the fields of spatial planning, regional policy, and public administration.

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