Spatial Analysis Framework for Transport Infrastructure Planning

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Abstract:

This study presents a comprehensive spatial analysis framework for transport infrastructure planning and evaluation. The research integrates multiple analytical layers, including infrastructure mapping, policy interventions, and economic assessments, with a strong emphasis on geospatial components. The spatial analysis framework incorporates INSPIRE Metadata Implementing Rules and utilizes GIS-based approaches to process and analyze transport infrastructure data. The methodology includes the development of .shp files for various spatial components, including TEN-T core network corridors, multimodal terminals, and transport flow patterns.

The research employs an advanced hierarchical data structure integrating historical investments, planned developments, and modelled transport flows.

The resulting analysis facilitates investment planning and resource allocation strategies, providing a robust foundation for evidence-based decision-making in transport infrastructure development. The study develops an integrated economic-mathematical model that combines spatial data with econometric input-output analysis to evaluate policy interventions and infrastructure investments. The analysis discovered significant geographical and seasonal fluctuations in infrastructure utilization, demonstrating the importance of location-specific planning approaches.

The developed analytical tool allows for scenario analysis through spatial calibration and can be enhanced with additional geographical criteria.

Keywords:

spatial analysis, transport infrastructure planning, GIS mapping, policy evaluation.