

REFRAMING SUSTAINABLE MOBILITY IN POST-SOCIALIST CITIES: THE ROLE OF URBAN FORM AND WALKABILITY IN PUBLIC TRANSPORT INTEGRATION IN TETOVO

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Abstract

Post-socialist Western Balkans cities are increasingly experiencing mobility problems as a result of disorganized urban growth, weak governance, the automobile epidemic, and underdeveloped public transport. North Macedonia's Tetovo is an epitome of when these fast urban developments, informal urbanities, and scarce pedestrian infrastructures create an undermining force in reaching sustainable mobility goals. In this conference paper, we focus on how urban structure, walkability, and the integration of public transport in Tetovo are mutually reinforcing, such that spatial arrangement plays an influential role in transport efficiency and social service accessibility. By using a mixed-methods methodology – focusing on GIS spatial analysis, pedestrian audits, field observations, transport accessibility assessments, and policy review, the analysis shows major systemic barriers such as disjointed pedestrian networks, insufficient first-mile/last-mile connectivity, and dispersed land use, and limited multimodal planning. The results confirm that public transport efficiency, private vehicle dependence, and environmental and social injustice are greatly increased by urban form and inadequate walkability. From research to practice, the paper envisions an integrated planning process: walkability enhancement, transit-oriented development, multimodal connectedness, and context-sensitive policy changes. The study provides applied design strategies for Tetovo, offering lessons that can be transferable to other post-socialist urban settings for sustainable mobility transitions.

Keywords: sustainable mobility, post-socialist cities, walkability, public transport integration, urban form, transit-oriented development.

Introduction

1.1 Background: Urban mobility systems are critical for economic productivity, social inclusion, and environmental sustainability. In post-socialist cities, though, historical planning legacies mixed with market-driven urban transitions can result in fragmented development patterns that undermine integrated transportation systems. After centralized planning infrastructures collapsed, many Balkan cities experienced rapid and often unregulated urbanization marked by sprawl, an increase in private vehicle usage, and weakened investment in public infrastructure. Those challenges are perfectly illustrated in Tetovo. Tetovo, one of North Macedonia's fastest-growing urban centers, has transformed both demographically and spatially over the last several decades. Population growth, commercial expansion, and informal construction have significantly changed its urban form, but transport has not kept pace with it. Public transport is a largely underdeveloped industry, the pedestrian sector remains inconsistent, and urban growth has leaned more towards reliance on cars.

1.2 Research Problem In a city of growing urbanization, Tetovo does not have a sound mobility model integrated enough to deal with land use, pedestrian access, and public transportation systems. The present urban developments diminish the efficiency of transport and compromise sustainability objectives.

1.3 Aim of the Study This paper explores the extent to which the urban form and walkability impact the integration of public transport in Tetovo and outlines practical planning options in an attempt to move mobility systems towards sustainability.

1.4 Research Questions

- To what extent does the urban form of Tetovo affect the accessibility of public transport?
- What walkability deficiencies obstruct sustainable mobility?
- What practical applications can research findings offer for planning?
- What mobility strategies can we use to assist in the long-term sustainable transformation of post-socialist cities?

1.5 Significance Integrating spatial analysis with practical urban policy suggestions, this article is directed at the theme of the conference, "From Research to Application," by converting theoretical findings into applicable planning frameworks.

Literature Review

2.1 Sustainable Mobility Frameworks: Sustainable transport is much more than the transportation infrastructure itself; it embodies environmental impact, accessibility, social equity, and urban design. Newman & Kenworthy (1999) highlight the relationship between density and car dependency in cities, and Cervero (1998) presents transit-oriented development (TOD) to describe a model between transport and spatial planning.

2.2 Cities and the Urban Form and the Form of Transport: The form of cities plays an important role in travel behavior. Compact, mixed-use, and connected surroundings foster public transport and active mobility that are beneficial for cities, while dispersed urban forms encourage dependence on cars. Connectivity, block size, density, and land use diversity are critical drivers of sustainable mobility performance.

2.3 Walkability as a Mobility Driver: Walkability has been recognized as a basic need of public transport systems more than ever. This makes transit work, but effective transit relies on safe, accessible pedestrian infrastructure—especially for first-mile and last-mile connections. Subpar sidewalk quality, isolated access routes, and unsafe crossings detract from the appeal of transit.

2.4 Urban Post-Socialist Challenges: Often, the post-socialist cities now confront:

- fragmented planning systems.
- informal development.
- governance instability.
- aging infrastructure.

Such circumstances make sustainable transport implementation difficult and will require the implementation of context-sensitive strategies.

2.5 Research Gap: Few studies have focused on the effect of urban form and walkability on public transport in medium-sized Balkan post-socialist cities, especially in Tetovo among these.

Methodology & Results

3.1 Research Design: A mixed-methods methodology was employed to capture the spatial, functional, and policy dimensions of mobility integration.

3.2 Data Collection Methods:

Primary Methods: • Field observations. • Walkability audits. • Sidewalk and pedestrian network assessments. • Public transport stop accessibility surveys. • Urban photography documentation. Secondary Methods: • GIS spatial mapping. • Municipal urban plans. • Census and demographic data. • Transport policy analysis. • Comparative case studies.

3.3 Analytical Tools: • Spatial accessibility analysis. • Walkability scoring systems. • Street network connectivity analysis. • Land-use distribution mapping. • Comparative benchmarking.

3.4 Study Area. Tetovo, North Macedonia: was selected due to its rapid post-socialist urbanization and representative mobility challenges.

Results

Urban form features. Tetovo can be defined by the city structure:

- dispersed expansion.
- mixed formal and informal development.
- limited zoning consistency.
- traffic congestion.
- weak multimodal organization. These patterns diminish the efficiency of transport as well as engender accessibility inequalities.

4.1 Walkability Challenges: Key deficiencies include: • discontinuous sidewalks. • inadequate pedestrian crossings. • poor universal accessibility • unsafe street environments. • limited shading and comfort. • weak neighborhood-to-transit connectivity.

4.2 Integration Problems of Public Transport: Observed problems include: • limited route optimization. • poor service frequency. • insufficient transit stop accessibility. • lack of coordinated transport hubs. • weak integration with cycling or pedestrian systems.

4.3 Environmental and social impacts: Mobility systems currently in place contribute to: • air pollution. • congestion. • social exclusion. • reduced public health. • unequal access to services.

Planning framework — from research to application.

5.1 Effective urban strategies:

Proposed interventions:

- Rehabilitation and expansion of sidewalks.
- Safe pedestrian corridors.
- Transit-oriented development nodes.
- Mixed-use zoning improvements.
- Multimodal transport hubs.
- Bicycle integration.
- Smart mobility technologies.
- Accessibility retrofits.

5.2 Policy Recommendations:

- Integrated urban and mobility planning.
- Sustainable transport investment.
- Public realm prioritization.
- Regulatory reforms for informal growth.
- Community-inclusive planning processes.

5.3 Design Applications: Tetovo can improve mobility through:

- compact urban restructuring.
- enhanced pedestrian infrastructure.
- decentralized service distribution.
- sustainable neighborhood planning.

Conclusions

These insights illustrate how Tetovo's mobility issues are spatial in nature, rather than simply infrastructural. Fragmented urban form detracts directly from transport efficiency, while poor walkability threatens the viability of public transport. Sustainable mobility thus depends on integrated spatial and policy restructuring as opposed to isolated transport interventions. This study proves that post-socialist mobility sustainability depends on: • urban restructuring • pedestrian prioritization • multimodal integration • governance reform • long-term sustainability policy.

Tetovo's transition toward sustainable mobility requires reframing transportation as an urban design and governance issue rather than merely an infrastructural challenge. Through a comprehensive holistic approach considering walkability, urban form optimization, and public transport planning, the city can decrease automobile dependency, increase social integration, and elevate environmental performance. The developed approach presents a way to apply research to practical interventions, facilitating the conference aim of changing academic research to practical work. These results may have more wide-ranging implications for medium-sized post-socialist cities experiencing comparable mobility transitions.

References

- [1] Brand, S. (. (1994). *How buildings learn: What happens after they're built*.
- [2] Bullen, P. A. (2011). Adaptive reuse of heritage buildings. . pp. 411-421.
- [3] Cervero, R. (1998). *The Transit Metropolis*.

- [4] Commission, E. (2013). Sustainable Urban Mobility Plans. *Policy Framework/Official Planning Guide*.
- [5] Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.).
- [6] Doxiadis, C. A. (1968). Ekistics: An introduction to the science of human settlements.
- [7] Engels, F. (1872). The housing question. In *Progress Publishers*.
- [8] Friedman, A. (. (2006). Sustainable residential development: Planning and design for commercial development. . In *McGraw-Hill Education*.
- [9] Gehl, J. (2010). *Cities for People emphasizes human-centered urban design by prioritizing walkability, public spaces, and pedestrian-friendly environments*.
- [10] Grčo, M. (2016). Informal urbanism and the challenge of governance in the Balkans. *Journal of Urban Systems*, 45-58.
- [11] Kenworthy, P. N. (1999). *Sustainability and Cities: Overcoming Automobile Dependence*.
- [12] Michael Southworth. (2005). Designing the Walkable City.
- [13] Tetovo Urban Development Strategies (Recent years, M. S. (n.d.). *Tetovo Urban Development Strategie*. Retrieved from Municipal Strategic Planning Documents.
- [14] Tsenkova, S. (n.d.). Post-Socialist Urban Development Studies.
- [15] UN-Habitat, S. U. (n.d.). (Various years, *International Policy Reports*) establishes global frameworks for equitable, inclusive, and environmentally sustainable mobility systems.