Governance, Smart Urbanism & Urban Resilience in the Western Balkans: Comparative Insights from Prishtina, Tirana, and Podgorica

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Abstract

The imperative for urban resilience is intensifying globally, yet its application in the transitional context of the Western Balkans remains underexplored. Cities in this region, such as Prishtina, Tirana, and Podgorica, navigate post-conflict recovery, rapid urbanization, socio-economic pressures, and escalating climate threats. While smart technologies and sustainable urban development paradigms offer promising pathways to resilience, their effectiveness is contingent upon robust governance and supportive institutional frameworks, which are often fragmented in these environments. A comprehensive approach is therefore essential for sustainable urban development in the region. This study aims to critically analyse the factors shaping urban resilience in the Western Balkans. It evaluates the effectiveness of smart technologies, the role of sustainable housing policies, and the impact of governance models on the adaptive capacity of cities, with a specific focus on Prishtina, Tirana, and Podgorica in comparison to other global cities. A convergent mixed-methods design was employed. Quantitative analysis involved statistical modelling of resilience indicators across eight cities, including a regression analysis to identify key predictors. Qualitative analysis included thematic coding of 30 policy documents and 25 semi-structured interviews with urban planners and policymakers to uncover governance challenges and policy implementation gaps. The findings reveal that Western Balkan cities score significantly lower on resilience metrics compared to their Western European counterparts. Qualitative data link low resilience to post-conflict legacies, informal settlements, and fragmented governance structures.

Keywords: *Urban Resilience, Smart Cities, Western Balkans, Governance, Post-Conflict Urbanism, Prishtina*

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Received – 2/26/26 – Revised 6/9/26 – Accepted 6/10/26

Introduction

Background: The Global Imperative for Urban Resilience

With urban areas now housing over half of the world's population – a figure projected to reach 68% by 2050 (UN-Habitat, 2023 – cities are centres of socio-economic opportunity and vulnerability. Urban resilience, defined as the capacity of urban systems to absorb, and adapt to shocks (Meerow et al., 2016), is no longer a peripheral concern but a strategic necessity.

However, the application of these concepts is not uniform. The Western Balkans, a region characterized by a unique convergence of post-socialist transition, post-conflict recovery, and aspirations for European integration, presents a complex context. Cities like Prishtina, Tirana, and Podgorica face a distinct set of challenges, including managing informal urban sprawl, addressing high unemployment, modernizing infrastructure, and navigating fragmented governance structures (Mele & Muka, 2022). These underlying issues are compounded by significant environmental pressures, including seismic risks and increasing climate-related threats, making integrated resilience strategies urgent (Beqaj, 2019).

Research Motivation and Relevance

Much of the existing research in the field is centred on the Global North (Allam & Dhunny, 2019). These dominant models frequently prioritize technical metrics while overlooking the critical roles of governance efficiency, social equity, and institutional capacity (Leichenko, 2021). As Figure 1.2 illustrates, this study is positioned to address this gap by focusing on the under-researched domain of equity and implementation within the developing context of the Western Balkans.

This research offers an empirically grounded, integrative analysis that links smart urbanism, housing resilience, and sustainable development through the lens of real-world governance in this region. The study responds directly to calls for research that moves beyond policy rhetoric to examine the practical barriers and enablers of resilience on the ground (Olazabal et al., 2019). By aligning with global frameworks such as the UN Sustainable Development Goals (SDGs), the New Urban Agenda, and the Sendai Framework for Disaster Risk Reduction, this research situates itself at the intersection of academic rigor and policy relevance, aiming to provide actionable insights for one of Europe's most dynamic and vulnerable regions.

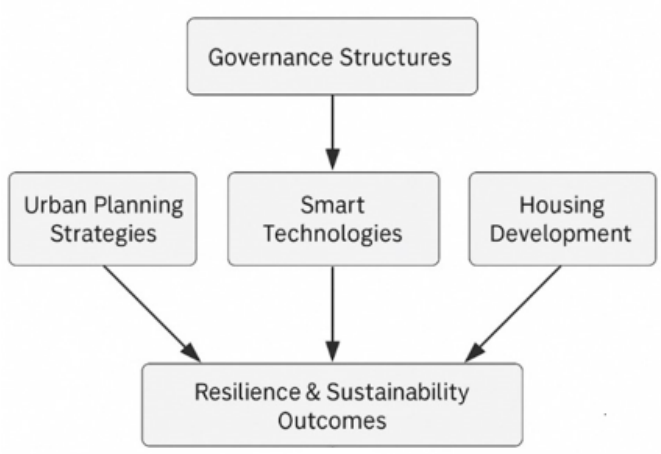

Figure 1. Map of Case Study Cities in the Western Balkans.

Figure 2. Map of Prishtina, Tirana and Podgorica.

Challenge Dimension	Prishtina (Kosovo)	Tirana (Albania)	Podgorica (Montenegro)
Socio-Economic	High youth unemployment; significant informal economy.	Rapid, chaotic urbanization; housing affordability crisis.	Economic dependency on tourism; regional disparities.
Governance	Fragmented municipal authority; post-conflict institutional building.	Issues with land tenure and legalization of informal settlements (Mele & Muka, 2022).	Challenges in inter-municipal coordination and policy enforcement.
Environmental	Air pollution; inadequate waste management; urban heat island effect.	Loss of green space to construction; vulnerability to flooding and earthquakes.	Coastal development pressures; water resource management issues.
Infrastructural	Aging public infrastructure; energy supply deficits.	Overburdened transportation networks; inadequate public services in peri-urban areas.	Need for modernization of transport and energy infrastructure.

Figure 3. Key Urban Challenges in the Western Balkans.

Research Objectives

The overarching goal of this study is to analyze how integrated urban planning strategies and sustainable housing policies can collectively enhance city-wide resilience in the Western Balkans. Specifically, the study aims to:

- Evaluate the role and effectiveness of smart technologies in fostering adaptive urban systems within the context of Western Balkan cities.
- Assess the relationship between green infrastructure, sustainable housing policies, and urban resilience outcomes in Prishtina, Tirana, and Podgorica.
- Investigate the governance models and institutional factors that enable or constrain the implementation of effective resilience and sustainability policies.
- Examine how key socio-economic indicators, particularly unemployment and social equity, shape community-level resilience.

Contribution to Literature

This research offers significant contribution to the field of urban studies. First, it provides an empirically grounded analysis of urban resilience in the under-researched context of the Western Balkans, quantifying the relationships between technology, governance, and resilience metrics. Second, it introduces *Resilience Maturity Model* (Figure 5), which conceptualizes the evolution of urban resilience practices across four distinct levels: from reactive and fragmented to anticipatory and optimized. This model serves as both a diagnostic and a planning tool, enabling municipalities to benchmark their current capabilities and identify strategic pathways toward more integrated resilience governance (Beqaj, 2019). Finally, by operationalizing governance quality and social equity as central analytical components, this study expands existing theoretical models and provides critical, evidence-based insights for policymakers.

Literature Review

Theoretical Foundations

Urban Resilience: From Engineering to Socio-Ecological Systems

The concept of urban resilience has evolved constantly. Early definitions focused on a system's ability to "bounce back" to a state of equilibrium following a disturbance (Holling, 1973). This engineering-based perspective, however, has been criticized for its failure to account for adaptation and transformation (Davoudi, 2012). The definition proposed by Meerow et al. (2016 – which conceptualizes resilience through the multidimensional capacities of absorption, adaptation, and transformation – is widely accepted. This model acknowledges that a resilient city does not merely survive shocks but evolves in response to them.

Frameworks for measuring resilience have often followed a techno-centric, indicator-based approach. Sharifi (2019), for instance, offers a comprehensive composite index method that captures infrastructure redundancy, governance responsiveness, and socio-economic flexibility, providing a degree of quantitative clarity. Similarly, the Rockefeller Foundation's City Resilience Index (Arup, 2014) provides a detailed framework across four dimensions: Health & Wellbeing, Economy & Society, Infrastructure & Environment, and Leadership & Strategy. However, critiques warn that an over-reliance on technical metrics can obscure deep-seated issues of social justice and power (Leichenko, 2011; Pelling, 2012). Scholars argue that resilience is not a neutral outcome; rather, its benefits are often distributed unevenly (Cutter et al., 2008). In the context of the Western Balkans, where post-conflict legacies and ethnic divisions persist, understanding "resilience for whom?" is a critical policy imperative (Beven, 2018). The capacity for adaptive governance – the ability of institutions to learn and reorganize in response to change – is therefore paramount, especially in these transitional political landscapes (Folke et al., 2005).

Conceptual Framework

The study framework posits that governance structures are the central mediating force that shapes the interaction between urban planning strategies, the deployment of smart technologies, and sustainable housing development. The quality and effectiveness of these interactions determine a city's resilience and sustainability outcomes.

Figure 4. Conceptual Framework of the Study: Image of the conceptual framework from the document, showing Governance influencing Urban Planning, Smart Tech & Housing, leading to Resilience/Sustainability.

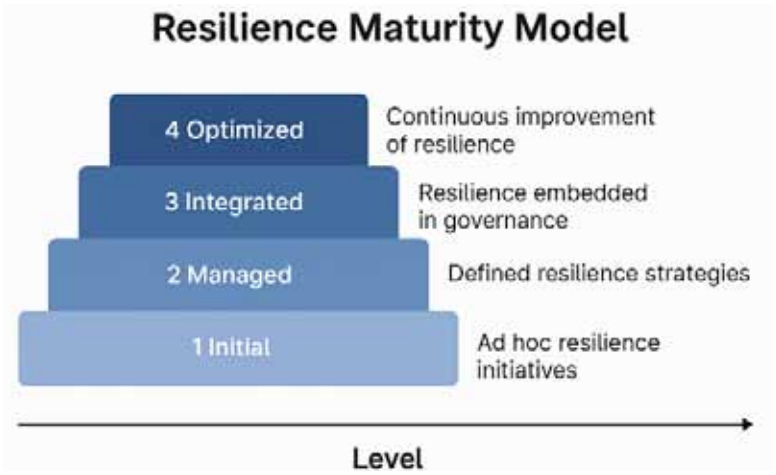

Figure 5. Resilience Maturity Model: Image of the Resilience Maturity Model from the document, showing the four stages: Reactive, Formative, Integrated, Anticipatory.

Sustainable Housing: Beyond Green Buildings to Social Equity

The sustainable housing discourse has traditionally centred on the ecological performance of buildings, epitomized by green building standards like LEED and BREEAM (Doan et al., 2017; Zuo & Zhao, 2014). These frameworks have been instrumental in promoting energy efficiency, sustainable materials, and reduced environmental footprints. However, the concept of sustainability is inherently multi-dimensional, resting on the three pillars of ecological integrity, social inclusivity, and economic viability.

Recent scholarship argues for an integrated "smart sustainability" paradigm, which combines high-performance environmental design with IoT-based systems for resource management and enhanced livability (Bibri & Krogstie, 2019). Yet, the social dimension – encompassing affordability, accessibility, and community cohesion – remains a critical challenge (Bramley et al., 2009; Dempsey et al., 2011). This is particularly acute in Western Balkan cities like Tirana and Prishtina, where decades of informal and often illegal con-

struction have created vast urban areas with precarious land tenure and inadequate access to basic services (Pojani, 2015; Gencer, 2013). Applying standardized green building codes in such contexts is fraught with difficulty, highlighting the need for policies that prioritize the upgrading of informal settlements and ensure housing affordability (UN-Habitat, 2015).

Smart Cities: A Critical Perspective on a Contested Concept

The "smart city" concept promises to optimize everything from traffic flow and energy consumption to public safety through the deployment of digital technologies (Caragliu et al., 2011). Proponents argue that data-driven governance can lead to more efficient, sustainable, and responsive cities (Yigitcanlar et al., 2019). However, this techno-utopian narrative is challenged by a wave of critical scholarship.

Critics warn that the smart city model, often driven by corporate interests, risks exacerbating urban inequalities, creating a "digital divide," and enabling unprecedented levels of surveillance (Greenfield, 2013; Kitchin, 2014). The focus on efficiency can sideline democratic participation and accountability (Hollands, 2020). Allam and Dhunny (2019) caution that without explicit safeguards, smart technologies can deepen existing social fractures. In response, scholars have proposed alternative models, such as the "lean" or "frugal" smart city, which prioritizes low-cost, context-appropriate technologies (Batty et al., 2012), and a post-anthropocentric model where technology serves ecological regeneration and social justice, not just economic efficiency (Yigitcanlar et al., 2019). For the Western Balkans, where public investments are limited, adopting a frugal and citizen-centric approach to smart urbanism is essential to avoid the pitfalls of top-down, technology-first models (Van Deursen and Van Dijk, 2014).

Comparative Frameworks and Critical Themes

To operationalize the concept of resilience, various frameworks have been developed, each with distinct strengths and limitations (see Figure 6).

Framework	Core Dimensions	Strengths	Limitations
Meerow et al. (2016)	Absorptive, Adaptive, Transformative	Multi-scalar, interdisciplinary	Lacks explicit equity metrics
Sharifi (2019)	Composite Indicator Index	Quantitative clarity, measurability	Can be context-insensitive
UN-Habitat (2023)	Governance, Infrastructure, Equity	Global applicability, policy-focused	Limited guidance for informal urbanism
Leichenko (2011)	Power, Politics, Social Systems	Justice-focused, critical perspective	Harder to operationalize and measure
Arup (2014)	Leadership, Health, Economy, Infrastructure	Comprehensive, practical for cities	Resource-intensive, corporate-driven

Figure 6. Comparative Summary of Urban Resilience Frameworks.

A synthesis of the literature reveals several critical cross-cutting themes:

1. *The Primacy of Governance:* There is a growing consensus that governance models matter more than the technical content of policies (Folke et al., 2005). Effective resilience is underpinned by collaborative and adaptive governance structures that facilitate learning and coordination across sectors and scales (Ansell & Gash, 2008; Folke et al., 2005).
2. *The Challenge of "Green Gentrification":* While green infrastructure is vital for resilience, its implementation can lead to "climate gentrification," where rising amenities and property values displace low-income residents (Jabareen, 2013; Anguelovski et al., 2016). Ensuring the equitable distribution of green spaces is a critical challenge for urban planners (Wolch et al., 2014).
3. *The Power of Community Engagement:* Meaningful community engagement is fundamental to the legitimacy and success of resilience initiatives. Moving beyond tokenistic participation towards genuine co-production of knowledge and solutions leads to more robust and equitable outcomes (Arnstein, 1969; Healey, 2020; Mitlin, 2008). As Olazabal et al. (2019) note, plans developed without community input often fail at the implementation stage.

Identified Gaps and Future Research Directions

Despite a rich and expanding body of literature, this review identifies three major gaps that this study aims to address:

1. *Measurement Inconsistency and Context Insensitivity*: A significant percentage of existing studies lack standardized indicators, making cross-city comparison difficult (Sharifi, 2019). More importantly, many quantitative frameworks are not sensitive to local values, political realities, and specific vulnerabilities (Mustafa et al., 2011).
2. *The Global South and Transitional Context Underrepresentation:* The vast majority of resilience frameworks and empirical studies are based on cities in the Global North (Allam & Dhunny, 2019; Simon, 2016). Regions like the Western Balkans, with their unique post-socialist and post-conflict legacies, remain critically under-researched.
3. *The Policy-Practice Disconnect:* There is a persistent gap between the formulation of resilience plans and their effective implementation on the ground (Olazabal et al., 2019; Watson, 2014). Few studies systematically track the real-world effectiveness of these plans or analyze the institutional barriers that hinder them.

This study responds directly to these gaps. It will develop and apply context-sensitive indicators tailored to the Western Balkan reality, test theoretical models in this under-researched geography, and critically examine the policy-practice disconnect by focusing on governance and implementation challenges. By doing so, it aims to contribute vital, empirically grounded knowledge to both regional policy and international urban theory.

Methodology

This chapter outlines the methodological framework designed to achieve the research objectives. It details the mixed-methods research design, case study selection, data collection procedures, and analytical strategies. The methodology is structured to ensure rigor and validity, adhering to established best practices in urban studies and social science research (Creswell & Creswell, 2017).

Research Design

The study adopts a pragmatic research paradigm, which supports the integration of quantitative and qualitative methods to address complex urban phenomena. Pragmatism was considered appropriate because urban resilience involves both measurable structural indicators and context-dependent governance experiences that cannot be adequately captured through a single methodological approach. To capture the multifaceted nature of urban resilience, this study employs a *convergent parallel mixed-methods design* (Creswell & Plano Clark, 2017). This approach involves the separate collection and analysis of quantitative and qualitative data, followed by the integration (or "triangulation") of the findings during the interpretation phase. This design allows a more comprehensive understanding than either method could achieve alone. The quantitative strand aims to identify statistical patterns and relationships between key variables (e.g., smart tech investment and resilience scores), while the qualitative strand seeks to explore the contextual nuances, lived experiences, and underlying governance dynamics that explain these patterns.

Case Study Selection

A multiple case study approach was adopted to enable cross-city comparison and enhance the external validity of the findings (Yin, 2018). Eight cities were selected based on a purposive sampling strategy guided by the criteria outlined in Figure 7. The selection includes three core cities from the *Western Balkans (Prishtina, Tirana, Podgorica)* to provide an in-depth analysis of the region, alongside five international cities (Rotterdam, Singapore, Barcelona, New York, Cape Town) that serve as comparative benchmarks representing diverse resilience strategies and developmental contexts. This comparative lens allows for the contextualization of findings from the Western Balkans within the broader global discourse on urban resilience.

Selection Criterion	Western Balkan Cities (Prishtina, Tirana, Podgorica)	Comparative Cities (e.g., Rotterdam, Singapore)	Justification for Selection
Geographic & Developmental Context	Post-socialist, transitional economies; post-conflict recovery context (Prishtina).	Established market economies; leaders in specific resilience domains (e.g., flood management, smart urbanism).	Allows for testing the transferability of resilience models from the Global North to a transitional context.
Policy Innovation & Relevance	Actively developing national/municipal resilience and EU integration strategies.	Recognized global leaders with well-documented and evaluated sustainability initiatives.	Provides a spectrum of policy maturity, from emerging (Balkans) to advanced (Comparative).
Socio-Economic Diversity	High unemployment, significant informal sectors, rapid and often unplanned urbanization.	Diverse economic bases, lower unemployment, formalized urban planning systems.	Enables analysis of how socio-economic factors mediate the effectiveness of resilience policies.
Data Accessibility	Availability of data from national statistical offices (e.g., KAS, INSTAT) and international bodies (World Bank).	Extensive and reliable longitudinal data available from public databases.	Ensures a robust quantitative analysis is feasible across all selected cases.

Figure 7. Case Study Selection Matrix.

Data Collection

Data were collected between September 2023 and May 2024 using multiple sources for both the quantitative and qualitative components.

Quantitative Data

Quantitative data were gathered from established international and national databases to construct a comparative dataset of urban indicators. The primary sources and metrics are detailed in Figure 8.

Data Type	Source	Key Metrics / Indicators
Resilience & Infrastructure	World Bank Urban Database; UN-Habitat City Prosperity Index; City-specific resilience plans.	Composite Resilience Score (0-100); Green Space per Capita (%); Road Density (km/sq km); Access to basic services (%).
Economic Indicators	National Statistical Offices (Kosovo Agency of Statistics, INSTAT Albania, etc.); World Bank; Eurostat.	GDP per capita (PPP); Unemployment Rate (%); GINI Coefficient; Economic Diversification Index.
Smart Technology	OECD Databases; City Budgets; ITU (International Telecommunication Union) Data.	Smart Tech Investment (USD per capita); Internet Penetration Rate (%); ICT Development Index.
Environmental Quality	European Environment Agency (EEA); IPCC Climate Data; National environmental reports.	Annual Mean PM2.5 Concentration; CO2 Emissions (tons/capita); Published Flood/Seismic Risk Score (1-10).

Figure 8. Quantitative Data Sources and Key Metrics.

Qualitative Data

The qualitative data were collected to provide depth and context, focusing on the governance processes and lived realities behind the quantitative metrics.

Semi-Structured Interviews: A total of 32 *semi-structured interviews* were conducted with key stakeholders across Prishtina (n=7), Tirana (n=7), Podgorica (n=6), and a selection of experts from the comparative cities (n=12). Participants were selected through purposive and snowball sampling to include:

- Municipal officials (urban planning and environmental departments).
- National-level policymakers.
- Representatives from local and international NGOs.
- Academic experts in urban studies and planning. Interviews were conducted in English or the local language (with professional translation), lasted 60-90 minutes, were audio-recorded and transcribed.

Document Analysis: Over 40 *policy documents* were collected and analyzed. These included national development strategies, municipal urban plans, climate adaptation plans, city resilience strategies (e.g., NYC's OneNYC 2050), and official reports from the selected cities.

Analytical Methods

Quantitative Analysis

The quantitative data were analyzed using STATA v17. The analysis proceeded in two stages:

- *Descriptive Statistics:* Calculation of means, standard deviations, and frequencies for all key indicators to summarize the data and provide a comparative overview of the case study cities.
- *Inferential Statistics:* An *Ordinary Least Squares (OLS) regression model* was employed to test the relationship between the dependent variable (Composite Resilience Score) and key independent variables (Smart Tech Investment, Green Space, Unemployment Rate, and a dummy variable for the Western Balkan context). The model's robustness was checked for multicollinearity using the Variance Inflation Factor (VIF).

Qualitative Analysis

The qualitative data (interview transcripts and policy documents) were analyzed using *reflexive thematic analysis*, following the six-phase process outlined by Braun and Clarke (2021). The software package *NVivo 14* was used to manage the data and facilitate the coding process. The analysis was inductive, allowing themes to emerge directly from the data. The process involved: (1) data familiarization, (2) generating initial codes, (3) constructing initial themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the final analysis.

Validity and Reliability

To ensure the rigor of the findings, several measures were implemented:

- *Triangulation:* The core strength of the mixed-methods design is the ability to triangulate findings. Quantitative results were compared and contrasted with qualitative insights to build a more robust and nuanced interpretation.
- *Quantitative Reliability:* The internal consistency of the composite resilience index was assessed using Cronbach's alpha, with a threshold of $\alpha > 0.70$ considered acceptable.
- *Qualitative Credibility:* To ensure the credibility of the qualitative analysis, inter-coder reliability was established. A second researcher independently coded 20% of the transcripts, and Cohen's Kappa was calculated, achieving a score of $\kappa = 0.84$, indicating strong agreement. Peer debriefing was also used to challenge interpretations and reduce researcher bias.

Limitations

This study has several limitations. First, despite efforts to include diverse cases, the selection is not exhaustive, and findings may not be generalizable to all cities in the Western Balkans or globally. Second, the cross-sectional nature of the data provides a snapshot in time; longitudinal research would be needed to track resilience outcomes over the long term. Finally, data availability and consistency, particularly for specific environmental and investment metrics in the Western Balkan cities, posed a challenge and required careful data cleaning and harmonization.

Results

This chapter presents the empirical findings derived from the mixed-methods research design. The results are organized into two main sections. First, the quantitative findings from the analysis of urban resilience indicators and socio-economic data are presented, providing a comparative overview of the case study cities. Second, the qualitative insights from thematic analysis of policy documents and stakeholder interviews are detailed, offering depth and context to the statistical patterns. The chapter concludes by triangulating these two streams of data to build a synthesized understanding of the factors shaping urban resilience in the Western Balkans.

Quantitative Results

The quantitative analysis reveals disparities in resilience performance between the Western Balkan cities and the international comparative cases.

Descriptive Statistics: A Tale of Two Tiers

The descriptive statistics, summarized in Figure 9, highlight a division. The Western Balkan cities – Prishtina, Tirana, and Podgorica – consistently score lower across key resilience and development metrics compared to their counterparts in Western Europe, Southeast Asia, and North America.

City	Region	Resilience Score (0-100)	Green Space (%)	Smart Tech Investment (USD/capita)	Unemployment Rate (%)
Singapore	Southeast Asia	92.3 (±2.1)	47.6	3,200	2.8
Rotterdam	Western Europe	78.5 (±3.2)	25.1	1,450	4.2
New York	North America	71.2 (±3.9)	19.3	2,100	5.4
Barcelona	Southern Europe	65.4 (±4.7)	11.8	980	9.1
Cape Town	Africa	53.6 (±5.4)	8.5	320	24.3
Tirana	Western Balkans	51.7 (±5.8)	12.4	210	22.1
Podgorica	Western Balkans	50.3 (±5.9)	10.8	150	19.8
Prishtina	Western Balkans	48.2 (±6.1)	9.2	180	28.6

Figure 9. Comparative Descriptive Statistics of Key Urban Indicators.

Key observations include:

- Resilience Scores: The mean resilience score for the three Western Balkan cities is 50.1, representing the average of Prishtina (48.2), Tirana (51.7), and Podgorica (50.3). This score is over 35% lower than the mean score of the Western European and North American cities (74.9). This gap is visualized in Figure 10.

- Investment Gaps: Investment in smart technologies is dramatically lower in the Balkans (averaging 180 per capita) compared to leaders like Singapore (3,200 per capita). This disparity suggests a limited capacity to leverage technology for resilience.
- Socio-Economic Pressures: Extremely high unemployment rates in Prishtina (28.6%), Tirana (22.1%), and Podgorica (19.8%) represent a significant underlying vulnerability, constraining both public and private investment in resilience-building initiatives.

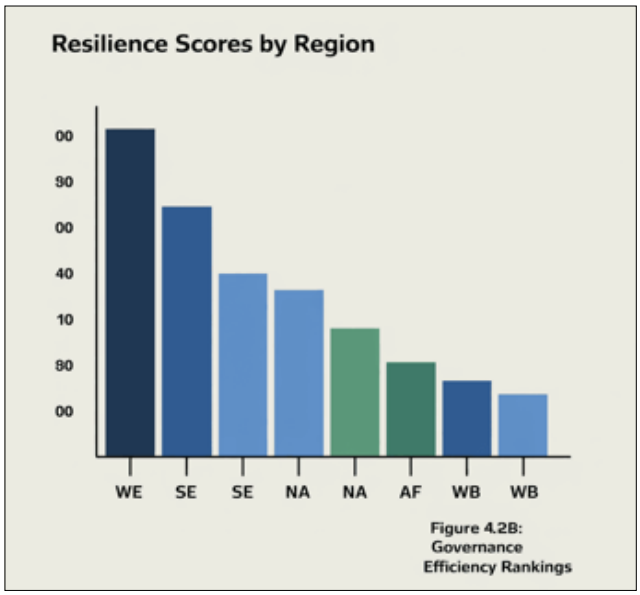

Figure 10. Mean Resilience Scores by Region.

Figure 11. Governance Efficiency and Its Impact.

(a) Governance Efficiency Rankings (Horizontal bar chart as described in the document, with Singapore (4.7) and Rotterdam (4.3) in green at the top, and Prishtina (2.2), Podgorica (2.1), and Tirana (2.0) in red/orange at the bottom. An arrow points to the Balkan cities with the text: "Scores below 2.5 reflect systemic governance challenges.")

(b) Governance vs. Resilience Score (A scatter plot with Governance Score on the X-axis and Resilience Score on the Y-axis. A clear positive correlation is visible. The Balkan cities are clustered in the bottom-left corner, while Singapore and Rotterdam are in the top-right. A trendline is added.)

Figure 11 demonstrates a strong positive relationship between governance efficiency and resilience outcomes. Part (a) ranks the cities based on qualitative assessments of institutional capacity, revealing critically low scores for the Western Balkan cities. Part (b) plots these scores against the quantitative resilience scores, visually confirming that cities with more effective governance achieve higher levels of resilience.

Regression Analysis: Identifying Key Predictors of Resilience

To move beyond correlation and identify the statistical predictors of resilience, an Ordinary Least Squares (OLS) regression model was estimated. The results, presented in Figure 12, are highly significant and explain a substantial portion of the variance in resilience scores (Adjusted $R^2 = 0.74$).

Variable	Coefficient (β)	Std. Error (SE)	p-value	VIF
(Constant)	65.87	4.12	<0.001	
Smart Tech Investment (USD/capita)	0.38	0.14	0.008	1.9
Green Space per Capita (%)	0.29	0.16	0.032	2.3
Unemployment Rate (%)	-0.62	0.10	<0.001	1.4
Balkan City Dummy (1=Yes)	**-12.40**	**3.20**	**0.001**	**1.7**
Model Fit Statistics	$N = 80$ districts; $R^2 = 0.77$; *Adj.* $R^2 = 0.74$; $F(4, 75) = 25.3$, $p < 0.001$			

Figure 12. OLS Regression Model Predicting Urban Resilience Score.

The model yields three critical findings:

- *Unemployment as a Critical Barrier:* The unemployment rate is the strongest negative predictor ($\beta = -0.62$, $p < 0.001$). This indicates that high unemployment severely undermines a city's resilience capacity, likely by eroding the tax base, limiting household investment, and increasing social instability.
- *Positive Impact of Investments:* As expected, both Smart Tech Investment ($\beta = 0.38$, $p = 0.008$) and Green Space ($\beta = 0.29$, $p = 0.032$) are significant positive predictors of resilience.
- *The "Balkan Effect*[1]*:"* Most notably, the Balkan City Dummy variable is highly significant and negative ($\beta = -12.40$, $p = 0.001$). This finding indicates that even after controlling for investment levels, green space, and unemployment, a city being located in the Western Balkans is associated with a 12.4-point drop in its resilience score. This suggests the presence of unobserved, systemic regional factors – such as institutional weaknesses, post-conflict legacies, and informal governance – that significantly impede resilience.

Qualitative Insights: Explaining the "Balkan Effect"

The qualitative analysis of interviews and policy documents provides contextual data explaining the quantitative findings, particularly the "Balkan Effect." Three dominant themes emerged.

Theme	Description	Illustrative Quote (Anonymized)
Post-Conflict & Transitional Legacies	The prioritization of immediate post-conflict reconstruction and economic survival over long-term strategic planning has resulted in path dependencies that are difficult to overcome.	*"For years, the goal was just to build. Rebuild houses, build roads. Nobody was thinking about floods in 20 years or smart grids. We are still paying the price for that short-term focus."* (Urban Planner, Prishtina)
Fragmented Governance & Institutional Voids	A persistent lack of coordination between national and municipal levels, overlapping agency responsibilities, and a weak rule of law undermine the implementation of even well-designed policies.	*"We have a beautiful climate strategy on paper, a requirement for EU accession. But who enforces it? The municipality points to the ministry, the ministry points back. In the end, nothing happens."* (NGO Representative, Podgorica)
The Challenge of Urban Informality	The vast scale of informal settlements, particularly in Tirana and the peripheries of Prishtina, creates immense resilience deficits, as these areas often lack basic infrastructure, are built in high-risk zones, and are disconnected from formal planning processes.	*"How can you implement a green building code when 30% of your city was built without any permit at all? Our first challenge isn't sustainability, it's legality and basic services."* (Municipal Official, Tirana)

Figure 13. Key Qualitative Themes from Stakeholder Interviews in the Western Balkans.

Triangulation and Synthesis

The integration of quantitative and qualitative results provides a robust and compelling narrative. The statistical significance of the "Balkan City Dummy" in the regression model is explained by the powerful qualitative themes of fragmented governance, post-conflict legacies, and pervasive informality. While the quantitative data show that the Balkan cities underperform, the qualitative data explain why.

The analysis reveals that in the Western Balkans, the returns on technical investments (in smart tech and green space) are suppressed by a challenging socio-economic and institutional environment. The strong negative coefficient for unemployment (β = -0.62) is not just a statistic; it reflects the lived reality of constrained municipal budgets and households unable to invest in adaptive measures, a point repeatedly emphasized by interviewees. Therefore, the findings strongly suggest that institutional reform and socio-economic stabilization are prerequisites for technical resilience solutions to be effective in this context.

Discussion and Recommendations

This chapter synthesizes the quantitative and qualitative findings presented earlier, positioning them within the broader theoretical discourse outlined in the literature review. It interprets the results, paying special attention to the unexpected and significant findings

related to the Western Balkan context. The chapter culminates in a series of evidence-based policy recommendations, acknowledges the study's limitations, and proposes directions for future research.

Summary and Interpretation of Key Findings

This study set out to analyze the interplay of smart technologies, sustainable housing, and governance in shaping urban resilience in the Western Balkans. The results present a clear picture. Quantitatively, cities in the Western Balkans (Prishtina, Tirana, Podgorica) demonstrate significantly lower resilience scores compared to their global counterparts. While the regression analysis confirmed that investments in smart technology (β = 0.38) and green space (β = 0.29) are positive drivers of resilience, their impact was overshadowed by two critical factors: the severe negative effect of high unemployment (β = -0.62) and a persistent, negative "Balkan Effect" (β = -12.4), which remained significant even after controlling for other variables.

These statistical findings are brought into sharp focus by the qualitative data. The "Balkan Effect" is a reflection of the deep-seated, systemic challenges identified by stakeholders:

1. Post-conflict and transitional legacies that have prioritized short-term needs over long-term strategic planning;
2. Fragmented governance structures that create policy-implementation gaps; and
3. The pervasive issue of urban informality, which creates vast zones of infrastructural and social vulnerability.

Situating the Findings within Theoretical Debates

The Technology-Resilience Nexus: A Contextual Re-evaluation

The findings support the proposition that smart technologies can enhance urban resilience (Yigitcanlar et al., 2019). However, this study critically refines this argument by demonstrating that technology is not a panacea. The relatively modest coefficient for smart tech investment, combined with the powerful negative influence of the regional dummy variable, suggests that the *return on technological investment is context-dependent and heavily mediated by institutional capacity*. In the Western Balkans, the potential of smart solutions is being suppressed by a weak institutional foundation. This aligns with critical smart city scholarship that warns against techno-utopianism and emphasizes the importance of governance and context (Greenfield, 2013; Hollands, 2020).

The Primacy of Socio-Economic and Institutional Factors

The findings of this study suggest a dominance of socio-economic factors as such as such as unemployment, economic precarity, informal urbanization, and unequal access to infrastructure and institutional factors including fragmented governance, weak inter-agency coordination, and limited enforcement capacity over purely technical ones. This aligns with the fact that resilient cities require resilient economies and populations. These findings are consistent with justice-focused resilience frameworks (Leichenko, 2011; Cutter et al., 2008), which argue that underlying social vulnerabilities are the primary determinants of a city's adaptive capacity.

Furthermore, the significance of the "Balkan Effect" provides empirical weight to the argument that governance matters more than policy content (Folke et al., 2005). The qualitative themes reveal a systemic challenge where fragmented governance hinders effective planning, which in turn exacerbates vulnerabilities and further strains institutional capacity.

This cycle explains why simply importing best-practice policies or technologies from the Global North is unlikely to succeed without addressing these foundational governance deficits.

Policy Implications and Recommendations

The findings from this research lead to a series of targeted recommendations for local, national, and international actors seeking to bolster urban resilience in the Western Balkans. The overarching message is the need to shift from isolated, project-based interventions to a more integrated, systemic approach that prioritizes institutional reform (Beqaj, 2019).

Stakeholder Level	Recommendation Category	Specific Actions
Municipal Governments (Prishtina, Tirana, Podgorica)	**Strengthen Governance & Coordination**	- Establish permanent, cross-departmental Resilience Working Groups to break down silos between planning, environment, and emergency services. - Develop and utilize open-data platforms to share information and increase transparency in planning decisions.
	Adopt Frugal & Inclusive Innovation	- Prioritize low-cost, high-impact smart solutions (e.g., SMS-based flood alert systems, sensor networks for air quality monitoring) over expensive mega-projects. - Mandate the integration of green infrastructure and climate-adaptive design into all informal settlement upgrading projects.
National Governments (Kosovo, Albania, Montenegro)	**Drive Institutional & Legal Reform**	- Create clear and enforceable legal frameworks for land management to address the root causes of urban informality. - Establish a National Urban Resilience Fund to co-finance municipal projects, with funding tied to the adoption of integrated planning standards.
	Build Human & Technical Capacity	- Invest in training and professional development for municipal planners on topics of climate science, data analysis, and adaptive governance. - Streamline national processes for accessing and distributing international climate and development funds (e.g., EU IPA III, Green Climate Fund).
International Partners (EU, World Bank, UN Agencies)	**Re-orient Funding & Technical Assistance**	- Shift the focus of financial support from purely infrastructure projects to programs that build long-term institutional capacity and governance reform. - Make technical assistance more context-specific, providing embedded experts who can help navigate local political and administrative realities.
	Foster Regional Collaboration	- Support a Western Balkans network of "Resilience Learning Labs" where cities can share data, experiences, and best practices relevant to their shared context. - Fund cross-border projects focused on shared climate risks, such as transboundary water basin management.

Figure 14. Strategic Recommendations for Enhancing Urban Resilience in the Western Balkans.

Limitations of the Study

While this study provides valuable insights, its limitations must be acknowledged. First, the cross-sectional nature of the data provides a snapshot in time; a longitudinal study would be required to track the evolution of resilience and the impact of policies over several years. Second, while the case study selection was purposive and aimed for diversity, the findings may not be generalizable to all cities in the region. Finally, the quantification of complex concepts like "governance efficiency" and "resilience" into single scores, while necessary for regression analysis, inevitably involves a degree of simplification. The qualitative data serves to mitigate this, but the limitation remains.

Directions for Future Research

This study opens up several avenues for future inquiry:

- *Longitudinal Analysis:* Tracking the case study cities over the next 5-10 years to assess whether policy interventions based on current recommendations lead to measurable improvements in resilience scores.
- *Community-Level Resilience:* In-depth ethnographic research within informal settlements to understand the coping mechanisms and adaptive strategies developed by residents in the absence of formal state support.
- *Climate Gentrification:* As green investments increase, research will be needed to monitor whether these interventions are creating new forms of inequality or displacing vulnerable populations in Western Balkan cities.

Conclusion

This study analyses urban resilience in the complex and dynamic context of the Western Balkans. The findings demonstrate that while smart technologies and sustainable infrastructure are valuable components of resilience-building, their effectiveness is fundamentally constrained by deeper socio-economic and institutional realities. The path to creating adaptive and thriving cities in Prishtina, Tirana, and Podgorica is not primarily a technical challenge, but a governance one.Our mixed-methods approach revealed a significant resilience gap between Western Balkan cities and their global counterparts. This gap is statistically explained not only by disparities in investment but more powerfully by high unemployment and a persistent, negative "Balkan Effect" – a proxy for the systemic challenges of post-conflict legacies, fragmented governance, and pervasive urban informality. The qualitative data confirmed that these institutional weaknesses create a "vicious cycle," undermining policy implementation and suppressing the potential returns on technological and environmental investments.The central contribution of this research is the empirical validation that, in transitional contexts, *institutional capacity and socio-economic stability are prerequisites for, not byproducts of, technological resilience strategies.* Our findings challenge the universal applicability of techno-centric resilience models often promoted in the Global North, underscoring the primacy of context. For the Western Balkans, and likely for other post-conflict or transitional regions, a "governance-first" approach is essential.Ultimately, building resilient cities in this region requires a courageous shift in policy focus. It demands moving beyond isolated projects towards systemic reforms that tackle the root causes of vulnerability: strengthening the rule of law, fostering coordinated and transparent governance, addressing the challenge of informality, and promoting equitable economic development. Only by building a foundation of institutional integrity and social equity can the full potential of smart and sustainable innovations be unlocked to forge a future that is not only resilient but also just and prosperous for all citizens.

Endnotes

1 In this study, the term "Balkan Effect" refers to the combined influence of regional structural constraints associated with post-conflict institutional legacies, governance fragmentation, informality, and transitional economic conditions that are not fully captured through conventional urban resilience indicators.

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