A vision for Tirana's Traffic Mitigation
Theoretical Approach to Traffic Decongestion through Decentralization

DOI: 10.37199/o41011109

Tommaso Paolo Emiliano RANDAZZO
PhD IDAUP / University of Ferrara

Abstract - *Recent economic, social, and political transformations have significantly reshaped Tirana's urban landscape. Rapid urban expansion has created emerging challenges related to sustainability in construction, urbanisation, and socio-economic and environmental development. Mobility plays a central role in establishing a resilient urban network and supporting the future growth of both infrastructure and the city itself. In Tirana, deficiencies in public transport and mobility infrastructure, combined with the concentration of vehicular traffic towards the historic city centre, have resulted in persistent congestion zones.*

This study proposes a theoretical framework to mitigate traffic congestion in Tirana, exploring decentralisation as a strategy to reduce reliance on the city centre. The approach envisions a network of connections between multiple points and neighbourhoods, integrating peripheral areas into a more compact urban fabric, fostering the development of new decentralized urban centres, and offering solutions for traffic decongestion.

To illustrate the practical potential of this framework, the urban core and surrounding suburban areas are examined as candidate locations for new centres, functioning as "pulling powers" capable of redistributing flows and alleviating pressure on the main highways leading to the historic centre.

Overall, the paper highlights innovative urban planning and design strategies aimed at addressing the complexities of Tirana's growth, supporting sustainable mobility, and guiding the city towards a more balanced and resilient urban future.

Keywords - Traffic Mitigation, Decongestion, Decentralization, Urban Center, Pulling Power.

Introduction

This study explores traffic mitigation in Tirana through a formal reconceptualisation of the city's urban structure. Adopting an interdisciplinary approach, it addresses housing, planning, and land development within the broader context of urban history, architectural typologies, innovation, energy efficiency, resilience, and environmental sustainability. Tirana's historical core, centred on the old bazar, shaped the urban fabric later formalised through Gherardo Bosio's Piano Regolatore, which established the city centre as the main attractor for economic, institutional, cultural, and social activities. Originally designed for a smaller population, the existing infrastructure is now insufficient. Concentrated urbanisation, combined with limited public transport, has generated unsustainable traffic congestion. The axis linking Tirana to Rinas International Airport, part of the Tirana–Durrës corridor, constitutes a strategic route for business, commercial, and touristic flows. Intersections with secondary roads along this axis create major congestion points, particularly during peak hours. The concentration of vehicular flows toward the city centre reflects a highly centralised settlement pattern, intensifying pressure on central areas. This critical route underscores the need for targeted interventions to strengthen the road network, reduce travel times, and mitigate CO_2 emissions.

Alongside population growth and increased vehicle use, Tirana is expanding into its peripheries. Supporting this development requires infrastructure and urban projects that integrate socio-economic, cultural, and morphological considerations. Addressing traffic congestion, therefore, demands the design of an efficient and sustainable mobility system aligned with anticipated patterns of urban growth. The concept of urban requalification, enhancing existing mobility infrastructure while establishing new centres in peripheral areas, offers a pathway to decentralise flows of people and services. This strategy consolidates new territorial nodes as emerging centres of attraction. Future interventions should aim to expand the network of connections between neighbourhoods, integrate peripheral areas into a more compact urban fabric, and provide sustainable solutions for traffic decongestion. To guide this investigation, the following research question is posed: "How can the implementation of new functional nodes and a polycentric urban model redistribute traffic flows in Tirana and reduce congestion pressure on the historic city centre?" This question frames the study's focus on decentralisation as a strategic approach to mitigate traffic, integrate peripheral areas, and promote a more balanced and sustainable urban structure.

Literature review

From 1945 to 1990, Albania endured one of the harshest authoritarian regimes of the Cold War era. In the aftermath, the country embarked on a process of transformation that reshaped its socio-economic structure, achieving significant growth over the past decades compared to many Balkan states (Aliaj, 2015). Until the 1990s, Albanian society largely adhered to a rural model, with only 35% of the population residing in urban areas. Urban centres differ from rural settlements not only in demographic scale but also in function (King, 2020). Their functions are linked to diverse economic activities, agricultural, commercial, and industrial, as well as to the presence of political, religious, and social organisations and the provision of cultural, healthcare, and transport services. Consequently, the urban centre exerts a strong pulling power, attracting people, resources, and capital, and extending its influence over a wide surrounding area. Since the 1990s, Albania's urban centres have experienced significant growth, with annual rates ranging from 5% to 10%. This process was driven by the introduction of private property, which triggered a major wave of urbanisation (Aliaj, 2015). Tirana, in particular, underwent rapid and largely unregulated expansion between the late 20th and early 21st centuries, disrupting the relationship between infrastructure and urban form. This connection was effectively broken, giving rise to new neighbourhoods lacking a coherent architectural identity. The evolving interaction between infrastructure systems and urban morphology has eroded the formal identity of linear urban settlements while simultaneously reinforcing the consolidation of nucleated urban aggregates (Kumaraku, 2023). Tirana's urban development has taken shape as a quadrant extending from the city centre towards the Rinas area near the international airport. The morphological features of the territory (Figure 1) have favoured expansion along three main infrastructural corridors: the Tirana–Durrës highway, the parallel railway, and the Kamza axis extending north of the airport (Stella, 2015). Within this system, the Tirana–Durrës corridor has emerged as a strategic axis, particularly for its role in urban mobility and its direct connection to the international airport (Ymeri, 2015). Current railway plans include the construction of a new multimodal station and a light rail link to the airport, intended to improve passenger mobility and connectivity (Municipality of Tirana, 2014). At the same time, the peripheral areas of Kashar and Kamza are projected to become new urban centres, supporting decentralisation through the reinforcement of the secondary road network and the application of integrated planning and architectural strategies informed by the concept of Archipuncture, defined as small-scale interventions with large urban impacts (Hoogduyn, 2014). Today, Albania is navigating a complex and evolving urban planning process while simultaneously positioning itself as an attractive destination for investors and experiencing a steady increase in tourism. According to Thomson, urban structure is shaped by four main factors: geographical morphology, relative accessibility, development control, and dynamic processes. Geographical configuration provides the structural foundation, accessibility determines spatial attractiveness, development control is effective only in contexts of strong governance, and dynamic processes include both the evolution of the urban core and the self-reinforcing tendencies of residential and commercial locations. Within this framework, the transport system plays a decisive

Fig. 1. Area of Tirana
source/ National Council of the Territory

Fig. 2. Aerial view of Tirana settlement
source/ Tommaso Paolo Emiliano Randazzo

role in shaping relative accessibility (Thomson, 1977). Building on these structural determinants, the concept of the urban project offers a framework for careful design, aimed at ensuring both variety and quality in urban morphology. Morales defines it as a process through which urban geography can be critically examined, engaging with the city's complexity via an inductive approach that transforms local specificities into broader strategic and generative principles (Morales, 1989).

The implementation of urban planning strategies is crucial to promoting sustainable development over time. This can be illustrated by the case of Athens. Chorianopoulos argues that the intervention agenda promoted through infrastructural investments for the 2004 Olympic Games intensified unsustainable development dynamics, thereby compromising the city's sustainability and long-term growth. These dynamics are currently evident in uncoordinated urban expansion, low-quality infrastructure, and a strong reliance on private cars (Chorianopoulos, 2015).

In Singapore, commercial decentralisation was introduced with the 1991 Concept Plan as a land-use policy designed to alleviate urban congestion by bringing economic activities closer to residential areas, balancing jobs and housing, reducing transport costs, and enhancing the use of suburban resources within a complex urban system (De Souza, 2016).

In Barcelona, polycentrism has been conceived as an alternative strategy to urban sprawl, replacing the monocentric model with multiple interconnected employment centres supported by coherent transport and land-use policies. Subcentres emerging from recent decentralisation display limited self-sufficiency, whereas those with historical roots are more consolidated and exert a stronger influence on the urban structure (Muñiz, 2005).

Masip-Tresserra examines decentralisation in the Barcelona Metropolitan Region, demonstrating its effectiveness as a planning strategy. Empirical evidence shows that polycentrism enhances urban performance: proximity to centres reduces mobility-related externalities, such as travel distance, commuting time, and CO_2 emissions, while encouraging the use of sustainable transport modes. This evidence-based approach is therefore essential for achieving the social, economic, and environmental objectives of territorial planning (Masip-Tresserra, 2017).

Li analyses urban patterns in China, highlighting the population's tendency to concentrate in city centres, reflecting a predominantly monocentric model. In contrast, a decentralised and polycentric strategy distributes population and employment more evenly between the main centre and subcentres. Comparing these models, Li concludes that the most effective form of development, both economically and demographically, is one that combines the advantages of concentration, by reducing dispersion, with those of decentralisation, marked by a strong degree of polycentricity (Li, 2020). In recent decades, urban planning has increasingly focused on the creation of new urban centres, with urban design playing a key role in redefining vacant spaces. Although Tirana has now consolidated its status as a metropolitan area within the Albanian national territory, it continues to present significant potential for further development (Stella, 2015).

In "The Image of the City", Kevin Lynch observes that the urban environment is often perceived as a collection of sequential parts, arranged to avoid interference and linked by a sense of continuity. Within this framework, particular zones may hold greater meaning for individuals, yet the region as a whole remains mentally traversable in any order. A city, he argues, is inherently multipurpose: its urban form must remain flexible, adaptable to the evolving needs and perceptions of its inhabitants (Lynch, 1960).

Building on this perspective, the redesign of transport infrastructure and the development of new urban centres offer effective means of alleviating congestion within Tirana's road network. By decentralising traffic flows, services, and activities towards peripheral neighbourhoods, and by redistributing vehicular and pedestrian movements away from critical nodes, the city can more effectively address its escalating traffic problems, which have intensified significantly in recent years.

Tools and methodology

This study follows a structured, step-by-step approach to explore traffic mitigation in Tirana from a theoretical perspective. The methodology is organised into sequential stages:

- Urban Structure and Settlement Analysis: Assessing the morphological and typological characteristics of Tirana to understand the spatial configuration and identify areas of centrality and peripherality.
- Traffic Congestion Assessment: Identifying key congestion nodes and understanding the main factors driving traffic, based on theoretical evaluation and urban patterns.
- Decentralisation Strategy: Proposing mobility redistribution and the establishment of peripheral urban centres based on the urban and traffic analyses.
- Decongestion Strategy: Optimising traffic flows through secondary road integration, subcentre development, and strategies tailored to radial and nucleated settlement patterns.
- Strategic Objectives: Synthesising the aims of the proposed interventions within the framework of sustainable urban growth.
- Kashar Case-Study: Applying the decentralisation strategy to a specific area to illustrate potential interventions and spatial organisation.

The framework can be operationalized using analytical tools such as GIS mapping (Campbell, 2019), Voronoi diagrams (Nowak, 2015), and transport modelling (Willumsen, 1981) for future empirical validation.

Analysis of Tirana Urban structure and settlement

This step, aligned with the general methodological framework, examines Tirana's morphological and settlement typologies to provide insight into the city's spatial structure. Strategically located in a valley near the Adriatic Sea at the intersection of major trade routes, Tirana became Albania's capital in 1920 (Figure 2). Bosio's urban plan established a formal city layout, with the historic centre, centred on Skanderbeg Square, serving as the main hub for economic, cultural, social, and religious activities. This centrality generates significant flows of traffic and people, with surrounding streets forming a radial, "pizza-slice" pattern that reflects the legacy of past architectural design. The historic centre exhibits a linear settlement pattern. Prior to Bosio's intervention, development was largely informal and unplanned, with construction concentrated along main routes. Today, the urban fabric, particularly along the Tirana-Durrës highway from Kamza to Yrshek, predominantly accommodates commercial and service functions rather than residential uses (Kumaraku, 2023). Fundamentally, Tirana's urban structure developed before the advent of the automobile. Its layout aligns with Thomson's description of a city with a radial road network serving a small urban core, where a relatively high proportion of workers commute by car (Thomson, 1977). Most employment is located in suburban and peripheral areas, accessed primarily by private vehicles and supported by high-capacity ring roads. This strategy can be considered transitional and exhibits hybrid characteristics: while the city centre remains stable and activity is concentrated there, growth simultaneously extends into peripheral areas, generating urban sprawl. The approach is predominantly car-oriented, offering limited opportunities for public transport (Banister, 2015).

In parallel, the city developed a nucleated settlement pattern, characterised by clusters of small urban centres connected via interurban roads. The design of this infrastructure did not anticipate the high traffic volumes of today. Consequently, the nucleated layout, defining areas beyond the historic centre, features streets perpendicular to the main road, creating small-scale built-up concentrations that form localised centres and interrupt the otherwise linear urban pattern (Kumaraku, 2023).

Analysis of Key elements of Traffic congestion in Tirana

Within the methodological framework, this stage identifies critical congestion nodes and the key factors influencing traffic flow in Tirana.

Traffic congestion in the Albanian capital arises from multiple factors. Tirana attracts flows from cities across the country and functions as a central hub at

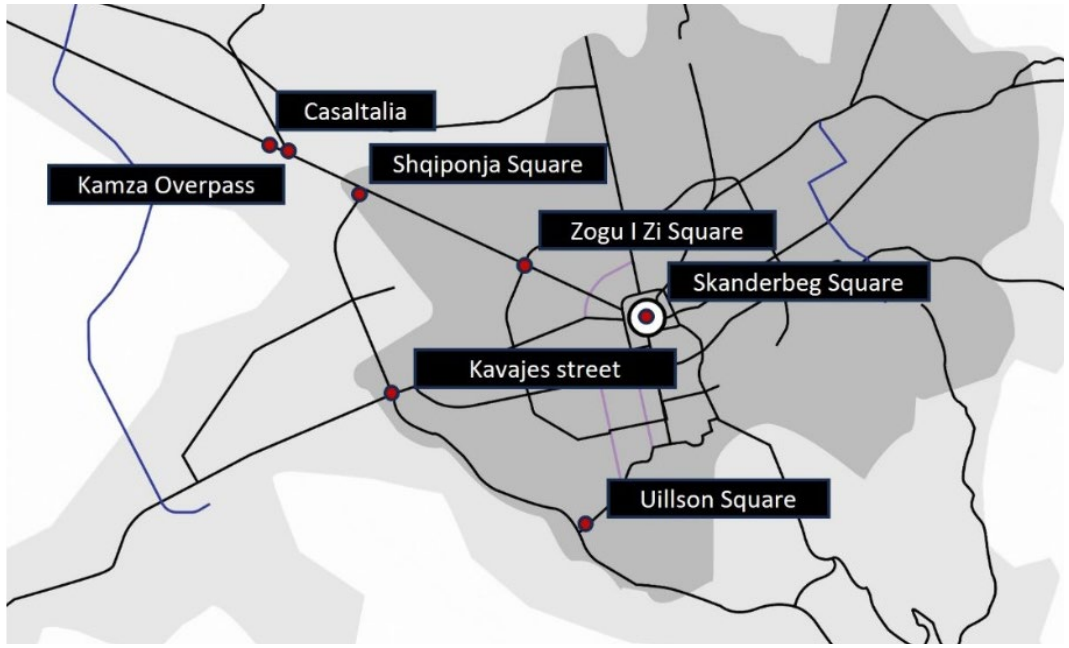

Fig. 3. Congestion node of Tirana
source/ Tommaso Paolo Emiliano Randazzo, Morika Kakinuma DeAngelis, Ersi Rryci, Fulvio Papadhopulli

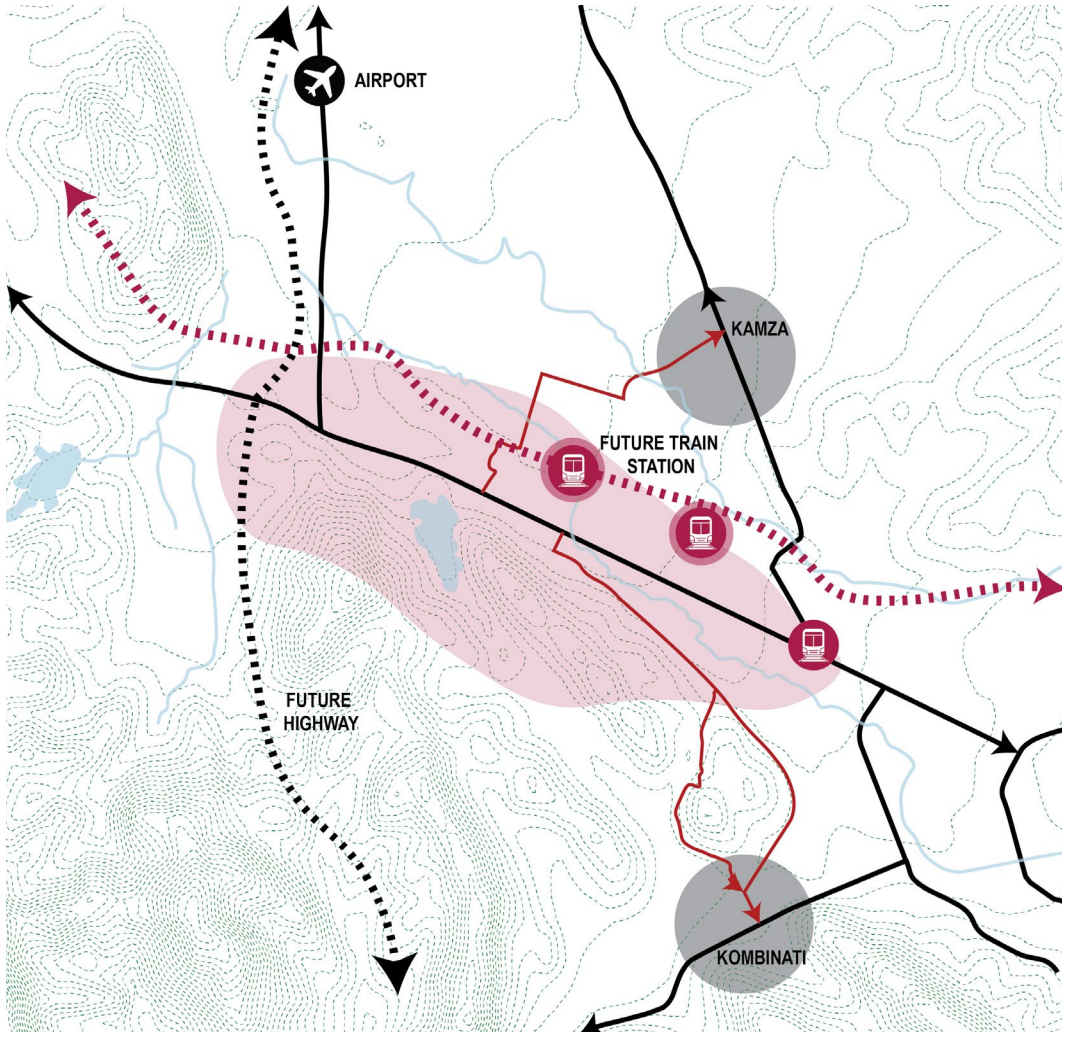

Fig. 4. Decongestion strategy of Tiran- intervention in the radial urban layout
source/ Tommaso Paolo Emiliano Randazzo, Morika Kakinuma DeAngelis, Ersi Rryci, Fulvio Papadhopulli

the intersection of interregional routes. Additionally, a high volume of vehicles converges on the city centre, while most public institutions and private workplaces open simultaneously, generating intense flows of people in specific areas. Current public transport and mobility infrastructure exhibit significant deficiencies and require comprehensive upgrades to provide adequate service and support sustainable urban development. The urban layout, characterised by numerous intersections, further concentrates flows at specific points, exacerbating congestion. Key congestion nodes (Figure 3) include Skanderbeg Square, Zogu I Zi Square, Shqiponja Square, Uillson Square, Casa Italia, and the Kamza overpass. Despite the opening of the new Tirana Ring Road, designed to divert traffic from the city centre, congestion persists, partly due to incomplete connections to neighbourhoods such as Kinostudio, Babrruna, Paskuqan, and Laprakë. The relationship between public transport and private mobility is central to urban dynamics. The expansion of the road network encourages car use, reducing the attractiveness of public transport and intensifying congestion. According to the Mogridge Conjecture, "the average speed of the road network is conditioned by the speed of public transport" (SACTRA, 1994): as public transport slows down, users initially switch to private cars, perceiving them as more advantageous (Mogridge, 1990). However, rising traffic progressively erodes this benefit, eventually reaching a new equilibrium between the two systems, which is often inefficient (Banister, 2015). This analysis is based on traffic assessment and theoretical evaluation in order to identify critical congestion points and understand the underlying causes and patterns that most strongly influence the concentration of vehicular flow at specific times of the day.

Decentralization strategy

Building on the structural and congestion analyses, this step proposes theoretical strategies for redistributing mobility and urban functions. By directing flows toward alternative urban centres, the approach fosters the development of functional peripheral hubs and supports Tirana's transformation into a polycentric city, reinforcing the broader metropolitan framework. Decentralisation is preferred over purely monocentric or ad-hoc interventions because it distributes activities and mobility across multiple centres, mitigates congestion, promotes balanced urban growth, and draws on lessons from successful polycentric and hybrid models in cities such as Barcelona, Singapore, and China. The proposed strategy establishes a flexible and adaptive framework prioritising fluidity and responsiveness over rigid master plans. It facilitates equitable, accessible, and sustainable growth, coordinating the development of multiple areas of Tirana through strategic infrastructural interventions. Urban decentralisation involves redistributing functions and resources from the city centre to surrounding neighbourhoods, improving governance, service efficiency, and citizen participation within an integrated urban fabric. Traffic mitigation is thus achieved through the reallocation of flows, identification of new development nodes, and enhancement of connectivity. Spatial, morphological, and geometric analysis of the urban fabric is essential to identify potential new centres. According to Purini, road axes function as "vectors of visual and energetic flows," creating a dialectical relationship between streets and buildings that defines the character of the traditional city (Purini, 2000). Voronoi diagrams (Nowak, 2015) can support this analysis by identifying areas of geometric centrality, capable of redistributing flows and guiding the development of new urban centres based on the spatial distribution of services and travel distances.

Decongestion strategy

Aligned with the methodology, this stage focuses on optimising traffic flows and integrating secondary

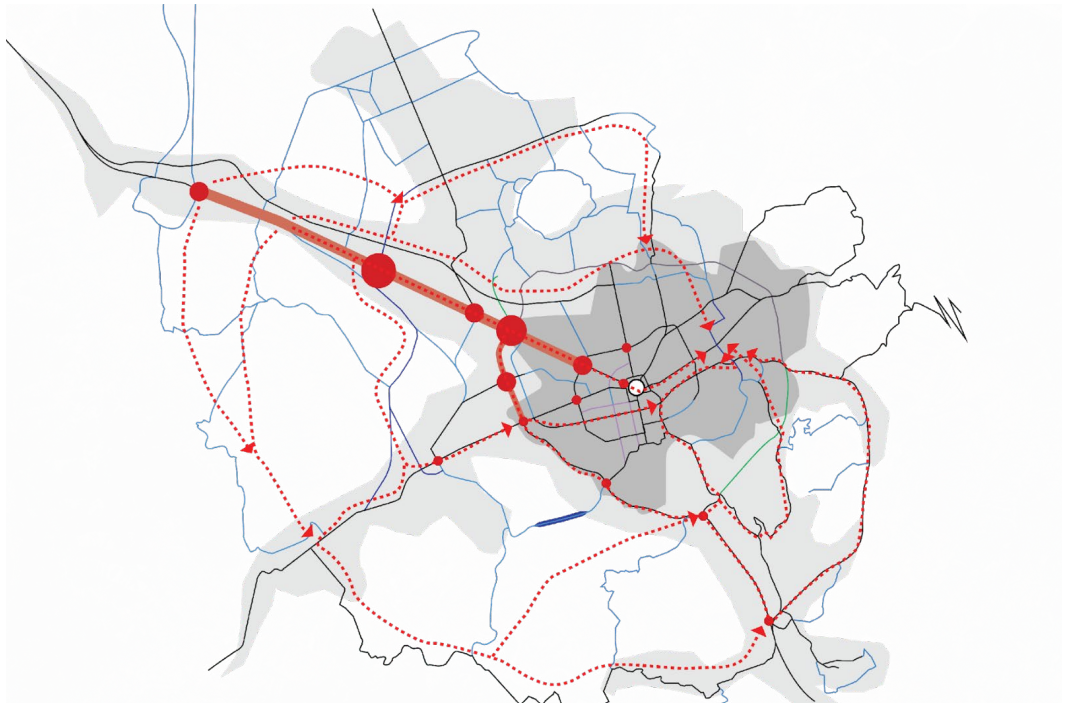

Fig. 5. Decongestion strategy of Tiran- intervention in the nucleated urban layout
source/ Tommaso Paolo Emiliano Randazzo, Morika Kakinuma DeAngelis, Ersi Rryci, Fulvio Papadhopulli

roads to mitigate congestion. By analysing key congestion nodes and the factors driving traffic, targeted strategies can be designed. Adopting a human-centred perspective, it is evident that Tirana's residents often rely on alternative and secondary routes to avoid bottlenecks. Improving connections between primary access routes and redefining the role of secondary roads can establish a more efficient and cohesive transport network, optimising natural traffic flows.

In areas with a strong radial network (Figure 4), introducing public transport services can enhance development at key intersections and subcentres along the main axes. These points can host multiple similarly sized subcentres, accommodating economic activities while functioning as local hubs (Banister, 2015). In districts of Tirana with a nucleated settlement pattern, a skipping-settlement approach (Figure 5) is applicable. Here, road infrastructures are designed to allow traffic to bypass the urban core, alleviating congestion within inhabited areas and reducing long travel distances. This approach reflects an urban planning strategy aimed at minimising travel times to destinations (Kumaraku, 2023). Integrating the secondary road network also improves the organisation of the adjacent urban fabric, currently fragmented relative to the historic centre. The establishment of new urban centres further supports the redistribution of traffic, reducing pressure on the city's main access routes. Beyond mitigating congestion, these centres provide residential, commercial, recreational, and cultural spaces, fostering a more balanced and sustainable urban development model that acts as a pulling power for both mobility and urban activity.

Objective of Decentralization

This part synthesizes the aims of the proposed interventions within the overall framework of sustainable urban growth. The main objective is to promote resilient and adaptable spatial expansion through strategic infrastructure projects that integrate social equity, economic viability, and environmental sustainability. Within this framework, the creation of new functional nodes capable of generating urban centrality is essential. These nodes act as catalysts for a broader, more integrated network of urban connections, supporting a decentralised model of expansion.

This approach prioritises the redevelopment and revitalisation of underutilised or segregated areas through high-impact architectural interventions, enabling the redistribution of essential services across zones with high growth potential. Precise identification and spatial placement of these emerging urban centres is therefore pivotal for achieving effective traffic mitigation while advancing balanced and inclusive urban development.

Kashar Case-Study

Building on the strategic objectives outlined in the previous paragraph, this section applies the decentralisation framework to the Kashar area. Strategically located along the Tirana–Durrës corridor, Kashar is identified as a potential peripheral hub capable of redistributing mobility flows and supporting polycentric development. Proposed interventions include a multimodal station integrating regional rail lines and local transport, along with mixed-use, multi-storey developments and circular road infrastructure. These measures aim to alleviate pressure on central nodes, enhance connectivity, and foster a sustainable urban fabric accommodating residential, commercial, and recreational functions.

The multimodal station could integrate the Rinas–Tirana–Durrës railway line and connect Thumanë–Kashar with the Kashar–Vaqarr axis, establishing Kashar as a strategic infrastructural node. Surrounding development should feature continuous architectural forms and circular infrastructure to promote circulation that avoids the urban core. Existing nucleated settlements could be integrated through mixed-use multi-storey buildings with residential areas and expanded services. Preliminary theoretical estimates suggest activating decentralized urban centres, including Kashar, could reduce traffic at critical nodes (e.g., Zogu I Zi Square) by 10–15%, providing a basis for future quantitative validation using traffic modelling and GIS analysis.

This approach positions Kashar as a strategic element in Tirana's metropolitan development and decentralisation strategy, capable of regulating flows while supporting residential, commercial, and recreational functions.

Conclusions and recommendations

Tirana is evolving toward a flexible urban system, supported by the creation of distributed centres that reduce overconcentration in the city core, enhance mobility, and promote a balanced, strategically planned expansion.

Planned interventions aim to preserve territorial identity, safeguard cultural and landscape values, and improve connectivity through infrastructure such as the Great Ring Road, which also stimulates economic and social development while alleviating congestion.

Effective traffic mitigation requires not only improved transport infrastructure but also the creation of new urban centres that redistribute flows and integrate residential, commercial, and recreational functions within a sustainable urban fabric.

However, the practical implementation of decentralization may face political and logistical challenges, including institutional coordination, stakeholder resistance, and administrative fragmentation. Addressing these barriers is crucial to ensure that the proposed interventions achieve their intended objectives and foster long-term, sustainable urban development.

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