Strengthening Tirana's Infrastructures to Reduce Traffic Congestion

Possible solutions, best practices and success stories

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Abstract - *Traffic congestion in Tirana has become a critical urban challenge shaped by multiple interrelated factors, including inadequate public transport, fragmented urban development, insufficient road infrastructure, weak traffic management, poor parking regulation, limited pedestrian accessibility, and inconsistent enforcement of the Highway Code. This article examines these structural deficiencies and proposes an integrated roadmap for reducing congestion through coordinated spatial, institutional, and transport interventions. The study is developed within the theoretical framework of the UPT – Urban Planners' Toolset project, which aims to support urban planning processes through software-based analytical tools. Methodologically, the article is based on an extensive literature review of both Tirana-specific studies and international best practices, focusing on infrastructure and governance-related dimensions of congestion rather than motorisation growth itself. The analysis identifies several priority measures: implementation of the planned electric Bus Rapid Transit (eBRT) corridors; redesign of the public transport network through a hierarchical model and performance-based contracts; deployment of adaptive traffic signal systems; establishment of a metropolitan mobility governance authority; transition from a monocentric to a polycentric urban structure; formalisation and infrastructural upgrading of informal settlements; stronger parking management; and improvements in pedestrian safety and road rule enforcement. The findings suggest that congestion in Tirana is not merely a transport issue, but a manifestation of broader urban and institutional fragmentation. Therefore, effective mitigation requires a multidimensional and phased strategy combining quick wins, medium-term reforms, and long-term structural transformation. Despite data limitations and the absence of scenario modelling, the article contributes to defining planning requirements for UPT and provides a policy-oriented framework for addressing traffic congestion in Tirana.*

Keywords - Tirana; traffic congestion; public transport; urban fragmentation; metropolitan governance

Introduction and Diagnosis of the Current Situation

The main causes of traffic problems in Tirana can be summarised as: the rapid growth in vehicle ownership has outpaced the development of infrastructure and road network capacity (already discussed in another article); the inadequate public transport on all fronts, i.e. quantity, quality and reliability; the insufficient road infrastructure and the inefficient use of existing capacity; parking shortages and dysfunctional parking management; a weak and inconsistent traffic policing services; an unplanned urban development and severe multidimensional fragmentation; deficiencies in pedestrian infrastructure and significant road safety issues; road construction and maintenance works that further worsen the situation. In light of this summary, this article proposes several solutions. The main ones are listed below. The first is the development of three main electric transport corridors for e-BRT rapid buses, already planned, which will serve as high-frequency, high-speed backbones to connect secondary lines in a hierarchical model. Another one is the use of performance-based contracts for public transport rather than per-kilometre contracts. Then, the use of adaptive traffic light signalling systems for optimal traffic control at critical junctions. Also, the reorganisation of the metropolitan traffic governance authority for Tirana and surrounding cities, in particular Kamëz, Vorë, and Durrës, is creating a single entity with management and coordination tasks. Mandatory is also a comprehensive improvement that formalises informal settlements by creating roads, services, and utilities. At the urban form level, the transition from a monocentric Tirana to a polycentric structure, with 5-7 secondary centres, follows a transit-oriented development (TOD) approach. Finally, much stronger, more efficient and effective management of parking and, in general, compliance with the Highway Code, including through automatic enforcement tools, and the implementation of road safety programmes for pedestrians and cyclists.

Objectives and Methodology

This article is part of a theoretical framework of a larger project named UPT-Urban Planners' Toolset. The UPT project aims to develop a set of software tools to support urban planners in their work. It will be grounded in solid theoretical foundations in both urban planning and computer science. A main analysis of the reasons for traffic in Tirana is conducted to support the definition of requirements for some modules of the UPT project (mobility and traffic measurement, crowd measurement, public participation and citizen engagement, etc.). This article also proposes best practices and potential solutions to reduce traffic congestion in Tirana. The rapid growth in motorisation is not considered in this document, as it has already been discussed in another article that also analysed congestion charging. This document focuses on the infrastructure that must be strengthened to reduce traffic congestion. The methodology followed has been a deep literature review to identify both prior studies on issues and on solutions. This literature review has focused on research on infrastructure deficiencies in Tirana and potential solutions, while also considering the lack of available data at the outset of the research. The literature has been selected to focus on the main causes discussed in section 1.1, excluding rapid motorisation growth. For each item, an analysis of the context in Tirana has been conducted, considering both past and planned projects, success case studies, and best practices. After the literature review, the gathered information has been organised and summarised in the results section. Then a discussion of these results was held, and conclusions were drawn.

Analysis

Inadequacy of public transport

A factor significantly affecting traffic congestion in Tirana is the urban public transport system, which is almost entirely based on buses and is characterised by limited capacity, coverage, comfort, and reliability (Transformative Mobility Foundation, 2024; GIZ, 2025). According to analyses conducted by the Transformative Mobility Foundation, in 2024, the urban service operated approximately 314 buses in a metropolitan area of over one million inhabitants, corresponding to one bus for every 2,800-3,000 residents (Transformative Mobility Foundation, 2024). The average operating speed was approximately 11 km/h, with speeds dropping to 5-7 km/h during peak hours and on certain sections of the network (Transformative Mobility Foundation, 2024). Waiting times on many lines typically range from 10 to 30 minutes, with significant service irregularities, a lack of real-time information, and frequent overcrowding, which often makes it impossible for some passengers to board at the busiest stops (Transformative Mobility Foundation, 2024). A significant part of the fleet consists of second-hand diesel buses, which are generally old and are characterised by high pollutant emissions and recurring technical reliability problems (Transformative Mobility Foundation, 2024).Passenger information systems and network maps are incomplete and not fully integrated. User satisfaction surveys indicate that approximately 80% of users rate public transport services as poor or very poor, while only 6% are satisfied (Transformative Mobility Foundation, 2024). These critical issues encourage the use of private cars among potential users who can afford them, thereby exacerbating urban traffic congestion or, at best, preventing any reduction in it.

Electric Bus Rapid Transit - eBRT

One element that could significantly reduce urban traffic congestion in Tirana is the electric Bus Rapid Transit (eBRT) project, known as Green Transport Tirana. The initiative is supported by the European Union, the German development bank KfW and the Western Balkans Investment Framework, in collaboration with local institutions (Western Balkans Investment Framework, 2024; Albanian Daily News, 2024). The project involves constructing three main corridors by 2029 (Western Balkans Investment Framework, 2024; Balkan Green Energy News, 2023).The eBRT infrastructure will feature physically separated lanes in corridors with the highest demand and the introduction of intelligent transport systems

Fig. 1. Public transport service in Tirana

(ITS) to ensure traffic light priority at intersections (Western Balkans Investment Framework, 2024; Albanian Daily News, 2024). The service will be provided by modern, high-capacity electric buses equipped with level platforms and rapid, integrated ticketing systems. Stops will also be equipped with real-time information systems and high standards of accessibility and comfort (Western Balkans Investment Framework, 2024; Transformative Mobility Foundation, 2024). According to the project specifications, the intervention, which will begin in 2023–2024 and is expected to be completed by 2029, should enable an increase in average operating speed to around 20 km/h, the transport of approximately 60,000–80,000 passengers per day along the three corridors, and a substantial improvement in the reliability and comfort of the service, thereby encouraging a modal shift from private cars and private s to public transport (Western Balkans Investment Framework, 2024; Transformative Mobility Foundation, 2024).

Redesign of the urban public transport network

A second element of intervention is the redesign of the network. This redesign of the network must account for the introduction of eBRT lines, which will form its high-speed, high-capacity backbone, within a hierarchical network model (ITDP, 2017).
Starting from the main corridors served by eBRT, feeder lines will be created to connect neighbourhoods and secondary centres to eBRT stations (ITDP, 2017). At the same time, the structure of the lines will need to be rationalised to reduce overlaps and serve the main demand hubs: schools, universities, hospitals, business and commercial districts (Crozet, 2020). This approach is essential for effectively reducing congestion (Crozet, 2020). In this context, the bus fleet should be expanded and modernised to reach 450-500 buses, with a clear transition path towards European and electric vehicles (European Commission, 2020; Transformative Mobility Foundation, 2024). As already mentioned, it is essential to move from contract models based mainly on a cost per kilometre to performance-based gross cost contracts, in which operators are paid per kilometre but receive incentives through bonus and penalty mechanisms linked to the quality, reliability and punctuality of the service (Crozet, 2020). To maximise the efficiency of such contract forms, it is essential to draw on similar experiences, for example, in London, Hordaland County, Norway, New Zealand, and the Copenhagen metropolitan area. In London, the introduction of Quality Incentive Contracts in the urban bus transport system has shifted from cost-based to gross-cost contracts with incentives for service quality. Following their introduction, there was a reduction in excess waiting time from 2.1 to 1.1 minutes and an increase in demand from 1.3 to 1.8 billion journeys per year, as well as an improvement in the economic performance of operators, with a shift from penalties to positive bonuses (Transport for London, 2008; Greater London Authority, 2006). Costs per kilometre also remained virtually unchanged, despite increases in wage and energy costs (Greater London Authority, 2006). In Hordaland County, Norway, the quality contracts system is strongly performance-oriented, setting compensation based on kilometres, hours of service, and passengers carried, while leaving operators considerable autonomy in setting timetables, fares and route configuration (Bekken et al., 2006; Aarhaug & Fearnley, 2016). In New Zealand, another success story, public transport has been reformed under the so-called Patronage Funding Scheme, which comprises three elements: a base rate, initial contributions, and demand-related incentives. This approach made it possible to quantify the social benefit in terms of internalisation of benefits: 8–13 pence per passenger-kilometre during normal hours and 40–50 pence during peak hours. This result was achieved through the link between operator incentives and the number of passengers carried. This policy has encouraged operators to attract customers by improving their service, thereby persuading people to reduce their car use (New Zealand Transport Agency, 2014).
In the Copenhagen metropolitan area, contracts are awarded through a highly competitive process based on service quality. The tender specifications include multidimensional evaluation criteria based on variables such as cleanliness, punctuality, safety, and customer service quality. The systematic, combined use of bonuses and penalties has enabled the maintenance of high service standards over time and led to continuous improvement in operational performance (Nielsen et al., 2005). These experiences, like others not reported in this document, demonstrate how performance-based gross cost contracts improve the efficiency and effectiveness of public transport, triggering a virtuous cycle in which improved service leads to increased use, reducing urban congestion. In Tirana,

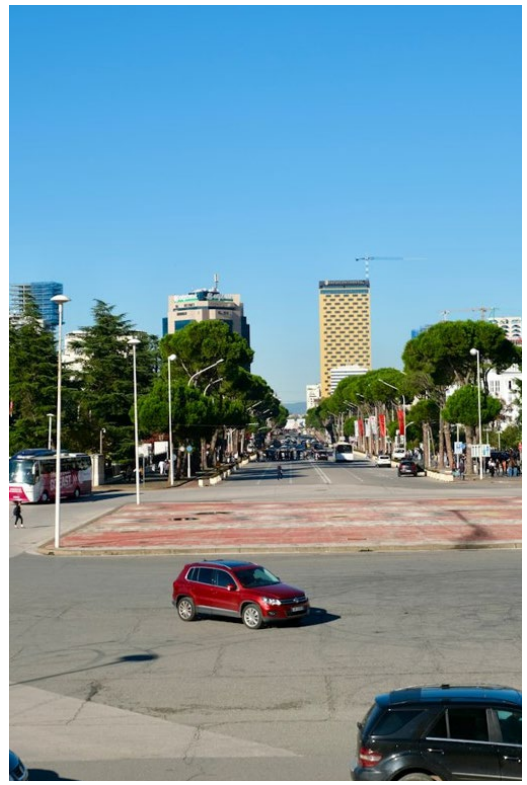

Fig. 2. Tirana as a monocentric city
Source/ Anil Baki Durmus

a combination of elements from these models could be envisaged rather than a single model. In addition, a gradual rollout would be appropriate, accompanied by data collection that, over time, would allow the initial scheme to be refined to reflect Tirana's specific characteristics. The main risks associated with the reorganisation of the network and the introduction of performance-based contracts can be summarised as operator resistance to change, the quality of the data collected, limited institutional capacity and the technological challenges of location, monitoring and interoperability systems (Crozet, 2020; World Bank Group Independent Evaluation Group [IEG], 2017). These risks can be mitigated through the early and organised involvement of operators, the adoption of independent monitoring and data auditing systems, the use of international technical assistance, the definition of competition- and quality-oriented tendering procedures, the strengthening of transparency mechanisms, and the allocation of part of the revenue from congestion charges and paid parking to the financing of public transport (Crozet, 2020). Furthermore, in order to fully leverage investments in eBRT, it is necessary to develop a unified Mobility as a Service (MAAS) platform that integrates buses, eBRT, future rail lines, bike sharing and possibly car sharing, complementing them, as will be seen later, with large car parks in strategic areas (entry points to the city) (OECD/ITF, 2021; European Commission, 2020). An integrated ticketing mechanism with smart cards and mobile apps will also need to be introduced, including daily and monthly fare capping, real-time multimodal journey-planning services, and service-disruption alerts (European Commission, 2020; Transport for London, 2020).

Urban Fragmentation

Tirana has inherited a post-socialist transition morphology that significantly impacts traffic. Starting from a structure based on centralised planning, the post-communist period has, to a large extent, seen rapid development driven mainly by the free market, with a high degree of informality and deregulation (Pojani, 2010; Aliaj et al., 2003). Also, as a result of this transition, the city of Tirana shows clear signs of fragmentation across multiple levels. The first level is administrative fragmentation, combined with governance of the metropolitan area that still has weaknesses that limit its capacity for coordination and territorial planning, as well as for infrastructure and mobility (Aliaj, 2014; IEG, 2017).
There is also spatial and morphological fragmentation, characterised by the spread of numerous informal settlements, with high central densification and unplanned polycentric development in the suburbs (Pojani, 2010; UN-Habitat, 2017). Tirana also experiences socio-economic fragmentation: the northern suburbs have a higher concentration of low-income households, while the southern and south-eastern areas are predominantly home to more affluent groups (Aliaj et al., 2003; Pojani & Stead, 2015). Finally, there is infrastructural fragmentation due to the uneven distribution of the road network, public services and urban facilities. Infrastructure development has largely been reactive rather than coordinated with demographic and territorial evolution. All these factors compromise the effectiveness of the urban system and exacerbate congestion problems (IEG, 2017; UN-Habitat, 2017). A further element of fragmentation is spatial and morphological. In Tirana, there is simultaneous central densification, with infill development and vertical extensions, the conversion of courtyards and green spaces, and uncontrolled suburbanisation, characterised by low-density development along access roads (Aliaj et al., 2003; Pojani, 2011; UN-Habitat, 2017). This results in the coexistence of planned socialist-era superblocks and spontaneously evolving informal areas, along with large commercial complexes and gated communities. All these elements are often loosely connected (Hirt, 2012; Stanilov, 2007).
In practice, Tirana presents itself as a monocentric but unplanned city, overwhelmed by traffic that, as already mentioned when discussing the increase in private vehicles, makes it practically ungovernable, especially during peak hours (World Bank Group Independent Evaluation Group [IEG], 2017; Pojani & Stead, 2015). Poorly connected networks result in limited route choices, creating bottlenecks and making it difficult to design efficient public transport routes, as well as challenging the design of safe routes for pedestrians and cyclists (IEG, 2017; OECD/ITF, 2021). Due to this multidimensional fragmentation, the problem of urban congestion presents numerous and complex variables to manage. From a strategic perspective, fragmentation should be addressed by establishing a single metropolitan authority with jurisdiction over strategic transport planning and territorial and infrastructure development for Tirana and adjacent areas, including the Tirana-Durrës functional area. This authority would be able to define policies for high-speed, high-capacity public transport corridors and to coordinate investment in roads and, more generally, network connections, linking these to urban and territorial development. In this way, public transport would be coordinated with the development of the urban network. To facilitate this process, the metropolitan authority should comprise representatives of the various municipalities, the central government, and other stakeholders, primarily citizens (European Commission, 2020; OECD/ITF, 2021). A second vitally important element is the development of a polycentric urban structure. It is therefore necessary to plan and develop secondary centres, such as Khamez, Kashar, Kombinat and Lapraka, creating a local micro-economy, services and infrastructure,

with high-quality public transport hubs, public spaces and adequate civic facilities. This type of organisation, by virtue of the local micro-economy, also involves decentralising the flow of people and, as a result, facilitates reducing flows to and from the central core. The load removed from the original central hub would consist of much shorter routes that cross the suburbs and are therefore more practicable. Consequently, creating multiple centres would reduce congestion, relieve the centres, and shorten routes. A further strategic element is the formalisation of informal situations and the fight against uncontrolled urbanisation, while also strengthening informal settlements. It is necessary to activate legalisation processes alongside infrastructure retrofits, thereby regularising property rights; building or upgrading local road networks according to geometric standards that respect the optimal morphology for the local spatial context; and deploying infrastructure for water,

Dimension	SCOOT	SCATS
Control philosophy	Fully traffic responsive, optimises splits, offsets, and cycle time continuously using on-street detectors.	Adaptive, plan-based; selects and tunes timing plans from a library based on real-time volume/occupancy data.
Typical delay reduction vs fixed/coordinated plans	About 10–20% average delay reduction; some case studies report 17–38% reduction in vehicle delay on specific corridors.	Around 15–20% average delay reduction; case studies report consistent reductions in stopped delay at major intersections.
Travel time improvements	5–20% reduction in journey times on corridors; up to ~8% in Toronto trials and >20% during incidents.	Measurable travel time reductions on major routes in field deployments (e.g., Park City, Mashhad), with best gains in peak periods.
Stops and queues	Strong performance under non-recurring congestion; adapts to incidents and can cut delay 6–25%+ during lane closures.	More robust under detector or pattern changes, but incident responsiveness depends on configuration and plan set; generally, improves recovery vs fixed timing.
Detector requirements	Typically, dense detector deployment (loops or equivalent) on approaches; higher data dependency.	Can work with more limited detection (key approaches), somewhat less detector-intensive in many deployments.
Tuning and maintenance effort	Requires careful calibration but then self-optimises; more engineering effort up front, less need for periodic retiming.	Emphasises central rule-based logic and automatic calibration; marketed as reducing the need for recurring field surveys and retiming visits.
Typical strengths	Very good along busy corridors, where continuous optimisation yields strong delay and travel time savings; strong bus priority integration.	Very good network-wide robustness, especially where patterns shift over time; often praised for operational stability and reduced retiming effort.
Typical limitations	Benefits diminish once the network is fully saturated; requires reliable detectors and communications.	Performance varies by site and time of day; improvements at major intersections can be mixed and depend on configuration.

Tab. 1. Quick SCOOT vs SCATS comparison table
Source/ Authors

sewerage, electricity, and public lighting services. At the same time, it is necessary to introduce public transport routes with appropriate manoeuvring and stopping spaces, and to allocate space for schools, clinics, hospitals, parks and other community centres. The decentralisation strategy requires close coordination, making the metropolitan authority even more vital. In practice, Tirana should aim to become a polycentric city which, while maintaining strong inter-centre communication links, would significantly reallocate traffic at the local level and relieve the other centres.

Road infrastructure and traffic management

Tirana's road network was largely designed for a much smaller, monocentric city and has not kept pace with population growth, suburbanisation and private motorisation, as already analysed above (Aliaj et al., 2003; Pojani & Stead, 2015; World Bank Group Independent Evaluation Group [IEG], 2017).
The main features are a radial structure centred on the city centre and a low degree of completion of road rings or ring roads. Ongoing upgrades to the Tirana-Durres motorway are not yet complete, making the separation between local and through traffic inadequate (IEG, 2017). Bottlenecks are frequently encountered at large roundabouts, at-grade crossings and intersections of arterial roads. Finally, the lack of grade-separated junctions at critical points and, in some cases, poor intersection design increase congestion. This structural deficit is exacerbated by inefficient traffic light management and illegal parking (IEG, 2017; Pojani & Stead, 2015).
To address road infrastructure and traffic management problems, it is necessary to complete and rationalise ring roads and bypasses, creating a functional system such as Milan's, with radial and ring roads and the completion of large ring road segments. This process of infrastructure upgrading should be coordinated with the polycentric evolution described in the previous section (OECD, 2012; European Commission, 2020).
To provide alternatives that do not cross the city, the development of slip roads would allow long-distance traffic, including freight, to be diverted from the centre (Nugmanova, 2019).
Another element of relief is to design intersections that minimise conflict between traffic flows, ensuring safe and efficient entry and exit routes (ECMT, 2007). Another highly effective measure would be to adapt intersections to the use of adaptive traffic light control technologies. Better management of traffic flows and traffic light timing would reduce a major factor of congestion: conflict between traffic flows at intersections (Papageorgiou et al., 2003; European Commission, 2020). Traffic light coordination along corridors is weak or nonexistent, causing queues to build upstream and blocking earlier intersections in a domino effect.
Regarding advanced traffic light systems, two solutions of proven maturity can be proposed. The first is SCOOT (Split Cycle Offset Optimisation Technique), developed in the United Kingdom and based on real-time adaptive models. SCOOT is based on data measured by field sensors, allowing traffic light cycles to be adapted at high frequencies (Department of Transport, 1999). The second is SCATS (Sydney Coordinated Adaptive Traffic System), developed in Australia, based on a library of pre-calculated schedules, selected according to conditions observed in real time (Roads and Maritime Services, 2010). At Tirana's urban, congested, and dynamic intersections, SCOOT is potentially the most suitable, especially along corridors with high-frequency bus lines (Stevanovic et al., 2009). Of course, whatever technology is chosen will have to integrate with the ITS planned for eBRT lines.

Poor enforcement of the Highway Code

Another very critical issue is the poor enforcement of the Highway Code. Although there is a significant regulatory framework for penalties, the enforcement of the Highway Code rules is often inconsistent and heterogeneous across the territory (World Health Organisation [WHO], 2023).
The most common violations are speeding, particularly on arterial roads; failure to give way to pedestrians; running red lights; illegal parking; and distracted driving, for example, due to mobile phone use (WHO, 2023; European Commission, 2020).
Accident data in Albania indicate that road accidents are among the leading causes of serious injury or death, with a high incidence among young male drivers, high speed and alcohol use (WHO, 2023).
A strategic approach to enforcing compliance with the Highway Code should be based on a city-wide network of automatic enforcement systems, such as fixed and mobile speed cameras, cameras to monitor red light running at high-risk intersections, cameras to monitor bus lanes and illegal parking, integrated with ANPR automatic number plate recognition systems, and a modern traffic control centre for centralised data processing and automatic notification of penalties (World Bank, 2020; NCSL, 2022; City of Ottawa Auditor General, 2024; Unity5, 2024). At the same time, it is also necessary to professionalise and supervise the traffic police, for example by introducing body cameras and GPS tracking for patrols, providing advanced training on road safety, professional ethics and how to interact with vulnerable road users, as well as performance evaluation based on safety results rather than quantitative targets for fines, also to avoid excessive penalties, which are not only often ineffective but could also undermine the relationship of trust with drivers.
Obviously, this enforcement should be accompanied by road safety education programmes in schools, national and local campaigns on key behaviours, such as the use of seat belts and right of way at crossings, and the creation of partnerships with non-governmental organisations to promote road safety education at all levels (WHO, 2018; European Commission, 2020).

Pedestrian infrastructure and accessibility

Another critical issue is the lack of pedestrian infrastructure in Tirana. The pedestrian environment in Tirana is often unsafe, uncomfortable and incomplete, with a continuous presence of architectural barriers and poor accessibility (World Health Organisation [WHO], 2018). Many roads have no pavements, forcing pedestrians to walk on the carriageway. Existing pavements are often occupied by parked cars, vendors or physical barriers (UN-Habitat, 2013; WHO, 2018).
Crossing opportunities are often insufficient, and when present and signposted, compliance is low: fewer than half of drivers give way to pedestrians at crossings (WHO, 2023; European Commission, 2020). Traffic speeds and road design often favour vehicles over people, even in densely populated areas and near schools. This dramatically reduces walking, increases the risk of injury and discourages the use of public transport and walking (WHO, 2018). One strategy to address this problem would be to build continuous pavements with a minimum width of 2 m, and wider in commercial areas, along all urban roads. In addition, accessibility ramps on pavements, tactile paving and adequate lighting should be provided (APTA, 2010; WHO, 2018).
Surfaces should be kept in good condition, free of potholes, obstacles, or sudden changes in level, as is often the case. The network of safe crossings with traffic calming measures should also be greatly expanded, with pedestrian crossings or, where appropriate, pedestrian traffic lights, raised crossings and pavement extensions at corners to slow down turning vehicles and reduce crossing distances (APTA, 2010; European Commission, 2020).

Roadworks management

Another critical issue is frequent delays in Albania's road construction and maintenance (International Monetary Fund, 2018; World Bank, 2018). These delays are due to design changes, disputes over land expropriation, and problems with contractor tendering (Centre for the Study of Democracy and Governance, 2020; Ministry of Infrastructure and Energy, 2020; Western Balkans Investment Framework, 2019). Cost overruns and prolonged disruptions are common (International Monetary Fund, 2018; World Bank, 2018; Western Balkans Investment Framework, 2019). Finally, temporary traffic management during construction is often inadequate (Strnad, 2019). It is therefore advisable to strengthen project management and procurement procedures by improving preliminary studies, including geotechnical surveys and mapping of underground utilities, introducing more stringent pre-qualification requirements for contractors, using performance-based contracts with penalties for unjustified delays and payments based on work progress, with independent monitoring of quality and timeliness (Western Balkans Investment Framework, 2019; Ministry of Infrastructure and Energy, 2020; World Bank, 2023). They should also define accelerated approval procedures for strategic

infrastructure, thereby streamlining administrative processes for approving projects, such as those designated as of national or metropolitan importance, while maintaining environmental and social safeguards (International Monetary Fund, 2018; World Bank, 2018; World Bank, 2023). This streamlining can also be achieved by reducing duplication of expertise and documentation through a mechanism for public communication and coordinated traffic management during the construction phase (Strnad, 2019; Western Balkans Investment Framework, 2019).
Consequently, comprehensive traffic management plans should be developed and implemented during construction periods, clearly communicating schedules, diversions, and phases of work through a variety of channels, minimising total closures, including by dividing the work into phases that do not necessarily require closures (Strnad, 2019).

Parking Management

Another problem plaguing Tirana is the chronic discrepancy between parking demand and regulated supply. This is due to several factors, in particular, the limited number of parking spaces relative to the number of vehicles on the road (OECD, 2012). As a result, there is a widespread habit of illegal parking on pavements, at intersections and even on traffic lanes, reducing effective capacity and severely hindering traffic flow, which becomes turbulent (Shoup, 1997; ECMT, 2007).
Garages and underground or multi-storey car parks are underused due to costs, access problems or unattractive management models (Shoup, 1997).
To address this problem, intelligent parking management should be implemented and strictly enforced. On-street parking zones should be clearly defined, with dynamic, demand-based pricing: higher costs in the centre and lower costs in the suburbs, and multiple payment methods, including parking meters, mobile apps, and SMS (Shoup, 1997; OECD, 2012).
Strict no-parking zones should also be established near intersections, bus stops, and narrow streets, and control mechanisms should use automatic number plate recognition to remove obstructing vehicles. All this can reduce traffic caused by parking searches and generate revenue to be reinvested in public transport and adaptive traffic signal timing (ECMT, 2007).
A second way to address chronic parking shortages is to build multi-storey underground car parks at strategic locations. Parking facilities should be upgraded at major public transport hubs, such as BRT stations, city entry points, near central business districts and new secondary centres, if the focus is on polycentric development (European Commission, 2020). Differentiated parking rates should be established, with higher costs in the central area and lower costs in peripheral park-and-ride areas; good pedestrian connections and clear signage should also be provided.
Finally, demand should be reduced through the policies outlined above (OECD, 2012; European Commission, 2020).

Discussion

As the analysis shows, Tirana's public transport is inadequate, and it is essential to implement the planned eBRT to improve it, along with performance-based contracts to drive better service.
Urban fragmentation increases traffic congestion, converges traffic in a single centre, and leads to uncoordinated development.
The existing road network is inadequate, too, in both capacity and quality. It is also weakened by numerous road construction sites and illegal parking, which further reduce available capacity and seriously impact traffic flow. The absence of coordination among signalling systems (semaphores) also leads to inefficient traffic flow management, with fixed policies and the need for human intervention (policemen) to avoid traffic jams.
Pedestrians and cyclists are at risk in an unsafe urban environment with a serious lack of protected lanes. Low respect for the Highway Code and weak law enforcement, along with other factors, further degrade safety and traffic.
These results confirm that rapid motorisation growth has only been a trigger for evidence of a systemic issue that must be addressed through a multidimensional, coordinated approach.
As a roadmap to reduce traffic congestion, congestion charging cannot be used alone; it must be paired with the other actions described below.

Local Public Transport and eBRT

It is mandatory to develop the eBRT as a high-speed, high-capacity backbone for the LPT and integrate it with the normal bus transport mode. In addition, reducing informality in taxi services can lead to further coordination and improvement. The LPT service must be designed considering attractive nodes for passengers (schools, hospitals, ...). A good LPT service will encourage its use, reducing circulating vehicles.
Performance-based contract schemes must be designed and implemented to support service improvement and shift users from vehicles to LPT.
This approach will increase the average commercial speed of LPT vehicles, improve LPT service reliability, and reduce car use.

Polycentric Urban Form and Metropolitan Governance

Identifying different centres and creating local economies, also decentralising public services (like hospitals, public offices, schools) will lead to long-distance traffic reduction by creating shorter paths to travel locally, subtracting traffic from the centre and reducing overall congestion, with significant benefits for the population in terms of fuel saving, pollution reduction, shorter travel times and more.
Creating a central metropolitan entity to coordinate urban development and reduce informality will result in greater efficiency, effectiveness, and the recovery of degraded urban areas. With this central entity, future development will be harmonious and will be able to support the transition from monocentric to polycentric.
This approach will reduce average path length, reduce radial traffic, and increase network resilience.

Road network, ITS and Construction

Intelligent Traffic Systems must be implemented at least on arterial corridors to speed up eBRT. The road network must be planned in coordination with neighbouring municipalities, and its realisation must be managed to minimise impacts on existing traffic flows by reducing closure times, providing sufficient advance notice, and providing well-signalled alternative paths. The ITS should rely on the SCOOT system for semaphores, as it is better suited to Tirana's environment. Improving in these directions will reduce bottlenecks and improve traffic flow. However, if not adequately planned and monitored, it can even induce further congestion (a domino effect at intersections due to incorrect semaphore policies, for example).

Pedestrian, safety and parking

Improving sidewalk quality and implementing protected lanes for pedestrians and cyclists can reduce car use for short-distance travel, thereby amplifying the effect of polycentric reshaping.
Enforcing the Highway Code will reduce incidents, traffic jams, and bottlenecks. At the same time, increasing parking capacity, especially at the city's gateways, will encourage multimodal mobility (car + bus, car + bicycle, ...), further reducing traffic congestion.

A possible roadmap

A possible sequence of implementation could be quick wins, followed by medium-term interventions, and then long-term projects.
Quick wins with low cost and high visibility include automated enforcement (speed cameras, automatic detection of illegal parking, ...), reorganisation of semaphore policies on main corridors, continuous, high-quality sidewalks in critical areas, and parking restrictions near intersections.
Medium-term structural interventions could include eBRT, LPT network reorganisation, pilot performance-based contracts, and interchange parking at the city's gateways.
Long-term reforms could include the Metropolitan Authority for Mobility, the full formalisation of urban tissue, rings, and connectors.
ITS and congestion charging can be considered related from a technological perspective and can benefit from each other. They can be thought of as a mid-term milestone for pilot projects and, in the long term, as a final realisation.

Enabling conditions and risks

Institutional capability to design and manage is one of the most important elements. The empowerment process, which began with GIZ support, must continue and be extended to other areas, including law enforcement, planning, construction site management, and more. Institutional coordination is compulsory and should be realised first as a committee that will work as a pilot for the final Metropolitan Authority for Mobility. Political resilience, i.e. the ability to survive political changes at both the municipal and government levels, is also vital.
Effective financing schemes, efficient business models and social acceptance are also essential. Tensions that could emerge between political consensus and tariffs, congestion charges and paid parking must be anticipated and managed with complete and adequate information.
Technical and technological limits must be considered and managed.
One risk to consider is being locked into suboptimal solutions, such as road network empowerment, without strengthening LPT or creating territorial inequity.

UPT Implications

The results suggest that UPT's requirements should be focused on providing data to support both eBRT and bus network planning and monitoring.
An important component could be law enforcement to enforce the Highway Code and support measures for unsafe conditions, such as pedestrian flows in critical areas or accident detection.

Conclusions

Reducing Tirana's traffic congestion requires a multidimensional and coordinated approach. Despite the absence of secondary data, the severe scarcity of primary data, the lack of quantitative modelling of possible scenarios, and a single-case-study focus, this article supports the definition of UPT requirements. It identifies possible solutions and proposes a feasible roadmap.
Further research is needed to overcome these limitations.

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