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THE PARADIGM OF PUBLIC TRANSPORT IN MODERN CITIES

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Abstract.
The rapid growth of urbanised areas and increasing demand for mobility present considerable pressure for urban transport systems, particularly in terms of congestion, energy consumption, and environmental impact. The aim of this study was to identify effective strategies for sustainable transport planning, considering their applicability in various urban contexts. The research gap addressed in this article lies in the limited cross-contextual, source-traceable assessment of how integrated public transport models used in mature U.S. urban systems can be adapted to a post-socialist and resource-constrained city such as Yerevan, while maintaining a logistics-systems perspective on capacity, infrastructure, transport resilience and mobility efficiency. The study hypothesised that a shift from fragmented route networks to integrated mobility models, specifically through multimodal coordination, public transport prioritisation, and the modernisation of technical and financial infrastructure, can substantially improve urban transport efficiency. The study employed a comparative analysis of transport solutions in New York, Portland, Minneapolis, Los Angeles, San Francisco, and Yerevan, using data from 2020-2024. Methods included descriptive-analytical

design, economic and statistical modelling, spatial analysis with GIS, and quantitative methods to assess passenger flows and infrastructure changes. Key results showed that cities with integrated systems, such as New York and Portland, demonstrated increased public transport use and reduced private car use. The study concluded that strategies such as Bus Rapid Transit and multimodal systems, combined with smart mobility and electrification, can adapt to cities with varying resource availability. This research offers recommendations for optimising urban transport systems and improving mobility planning based on successful international practices.
Keywords:
urban mobility; public transport; transport planning; environmental efficiency; energy consumption

Introduction

Rapid urbanisation and rising population mobility have put pressure on urban transport infrastructure, creating spatial, economic, and environmental issues that severely strain city-level logistics. Rising private car use has increased traffic, energy use, and greenhouse gas emissions, causing critical bottlenecks in urban transit networks and supply chains (Maduekwe et al. 2020; Gallo and Marinelli 2020; Musa et al. 2023). Integrated mobility management models grounded in sustainable development are needed now to optimise these complex logistical systems. Key challenges include transport accessibility, infrastructure rationalisation, and environmental impact reduction, all of which require a systemic logistics approach to ensure resilience, dynamic adaptability, and operational efficiency, principles that are foundational to broader logistics and system studies, including military logistics. The main constraints include insufficient digitisation, limited municipal resources and weak coordination among transport stakeholders. Public transit methods often lack flexibility and efficiency. The cases of Minneapolis, Portland, New York, Los Angeles and San Francisco provide useful comparative material.

Urban transport systems face pressure to become more sustainable as congestion, emissions, and unequal access reduce mobility efficiency (Gallo and Marinelli 2020; Mavlutova et al. 2023; Papadakis et al. 2024). The selected US cases illustrate diverse reform tools: New York applies digital fare and monitoring systems; Portland and Minneapolis report bus/BRT ridership growth; Los Angeles expands bus-priority corridors; and San Francisco recorded 158 million Muni passenger trips in 2024 (MTA 2025; TriMet 2024; Metro Transi, 2025; LA Metro 2025; SFMTA 2025). These examples align with research on sustainable mobility, MaaS, and BRT cost-effectiveness (Basso et al. 2019; Gallo and Marinelli 2020; Vitetta 2022). BRT may also improve Yerevan's mobility if supported by route integration, priority infrastructure, and stable financing (MacDonald 2024; Nyazabe et al. 2025).

Spatial planning strengthens transit strategies. Iqbal et al. (2025) discuss Portland's Complete Neighbourhood strategy, while Jin et al. (2024) show that US cities use zoning revisions to promote walkable neighbourhoods. Yet transport justice remains unresolved: accessibility gaps persist despite improvements in New York and Los Angeles (Papadakis et al. 2024). For Yerevan, fragmented minibus networks, subsidies, and delayed reforms remain barriers. Creutzig (2021) stresses public-private partnerships and international cooperation for modernisation and electric buses.

Research problem: Rapid urban growth and rising private vehicle use are causing severe traffic congestion, higher energy consumption, and increased greenhouse gas emissions, while existing public transport models often fail to meet the criteria of flexibility and efficiency. Research hypothesis: The transition to integrated mobility management models, driven by public transport prioritisation (e.g., Bus Rapid Transit), structural defragmentation of route networks, and modernised financial and technical infrastructure, significantly improves urban transport efficiency.

Materials and methods

The study employed a descriptive-analytical and comparative design to assess structural changes in urban public transport systems. To address the study's objectives, specific variables and performance indicators were systematically analysed. The primary quantitative variables included annual passenger volumes by transport mode, the number of active routes, fleet and route-network indicators, and agency-reported ridership measures. Subsidy percentages and passenger-per-hour capacity values were not used as harmonised comparative indicators because the selected sources do not report them using a uniform methodology. Data collection for Yerevan was based on official statistical information from the Yerevan Transport Department (2025) and the Statistical Committee of the Republic of Armenia (2025). A dynamic dataset was constructed to reflect the evolution of Yerevan's public transport structure from 2020 to 2024.

Agency-level statistical data from MTA (2025), TriMet (2024), Metro Transit (2025), LA Metro (2025), SFMTA (2025), the Yerevan Transport Department (2025) and the Statistical Committee of the Republic of Armenia (2025) were used to compare Yerevan with New York, Portland, Minneapolis, Los Angeles and San Francisco. The selected US cases were included because they represent different combinations of BRT-oriented measures, integrated digital mobility services, active-mobility policies and spatial accessibility planning. The conceptual basis for this selection is supported by research on BRT efficiency (Basso et al. 2019), Mobility-as-a-Service and digital transport integration (Vitetta 2022; Mavlutova et al. 2023), sustainable mobility policies (Gallo and Marinelli 2020; Papadakis et al. 2024), and 15-minute-city/accessibility approaches (Allam et al. 2024; Jin et al. 2024; Iqbal et al. 2025).

Because the selected US transit agencies publish city-specific ridership, operational and financial indicators through official reports, annual summaries and open-data dashboards (MTA 2025; TriMet 2024; Metro Transit 2025; LA Metro 2025; SFMTA 2025), they provide a range of resource availability and structural options that can serve as practical, measurable benchmarks. Instead of absolute numbers, the research used standardised relative metrics to compare the selected US cities and Yerevan, despite major disparities in population, geography, and municipal budgets. These standardised metrics, modal share distributions, percentage trip time changes, and proportional municipal subsidies, enabled cross-contextual transport efficiency measurement. Several methodological limitations affect these cross-city comparisons. Principally, the statistical materials used covered different time frames (2020-2024), complicating city dynamics reconciliation. Limited detail in official materials, particularly those on infrastructure cost structures and private financing, restricted financial analysis (MacDonald 2024). Using structural, financial, and spatial analyses with quantitative indicators, this study creates a replicable framework for cross-contextual urban mobility evaluation despite these limits.

There were three steps in the analysis from source data to conclusions. Using dynamic series and averages, descriptive quantitative methods were employed to assess modal share shifts and evaluate passenger travel by mode in Yerevan between 2020 and 2024. QGIS 3.28 was used to overlay georeferenced passenger flow data onto street networks to identify spatial bottlenecks, transport concentration zones, and territorial imbalances. Finally, systemic deficiencies identified in Yerevan during the first two steps (e.g., outdated rolling stock, route fragmentation) were mapped against regulated and infrastructural interventions in New York, Portland, Minneapolis, Los Angeles, and San Francisco. Step-by-step synthesis of descriptive statistics, spatial mapping, and comparative case evaluation supported the study's conclusions.

Results

In modern urban systems, public transport ensures spatial, social and economic connectivity (Small et al. 2024; Vuchic 2007; Pojani and Stead 2015). It influences population mobility, accessibility of services and economic processes. The transformation of the transport paradigm involves a shift from car-centred models to concepts focused on sustainable development, social integration and rational use of resources. Transport is viewed as a tool for economic optimisation and for ensuring access to labour, education and healthcare services (Gallo and Marinelli 2020; Lättman and Otsuka 2024; Papadakis et al. 2024; Pojani and Stead 2015). The development of digital platforms and the implementation of Mobility-as-a-Service concepts integrate different types of transport into a single system, optimising flows and improving resource use (Vitetta 2022; Mavlutova et al. 2023). These changes are manifested in zoning principles inspired by the 15-minute city (Allam et al. 2024; Jin et al. 2024), the expansion of micromobility (Ignaccolo et al. 2022) and digital transport management services. These processes form the basis for comparative analysis of cities. Comparative characteristics of the traditional transport model and the modern mobility paradigm are presented in Table 1.

Table 1. Comparative characteristics of transport paradigms in urban economies

Criterion	Traditional transportation model	Modern paradigm of sustainable mobility (Mobility-as-a-Service)
Orientation	By private car	On the user and their mobility
Main goal	Fast movement	Efficient access to services at minimal cost
Infrastructure type	Roads, parking lots, intersections	Integrated platforms, multimodal hubs, public transport priority
Ownership model	Private property	Sharing, subscriptions, car sharing, public transport
Control type	Administrative, hierarchical	Flexible, digital, real-time data (Big Data)
Environmental impact	High CO_2 emissions, noise, pollution	Reducing environmental impact, electric transport, active mobility
Social inclusion	Low accessibility for vulnerable groups	High inclusiveness, access for all categories of the population
Economic efficiency	High infrastructure maintenance costs	Cost optimisation, reduction of externalities

Source: compiled by the authors based on Gallo and Marinelli (2020), Vitetta (2022), Mavlutova et al. (2023), and Lättman and Otsuka (2024)

A comparative analysis of the traditional transport model and the Mobility-as-a-Service concept reveals a shift in priorities from car-dependent solutions to user-centred, digitally integrated systems. Data from the Yerevan Transport Department (2025) show that changes in passenger transport structure in Yerevan during 2020-2024, against the background of the new mobility paradigm, illustrate the adaptation of the city's transport system to emerging mobility demands. A shift has occurred from excessive reliance on minibus services towards a gradual rebalancing among different transport modes. The dynamics of changes in the number of serviced routes and passenger traffic in Yerevan during 2020-2024 are presented in Table 2.

Table 2. Main indicators of Yerevan public transport passenger traffic (2020-2024)

Years	Bus		Minibus		Metro		Trolleybus	
	Number of routes served	Passenger flow	Number of routes served	Passenger flow	**Number of stations**	**Passenger flow**	**Number of routes served**	**Passenger flow**
2020	39	37,682,034	59	34,126,011	10	19,747,624	5	5,813,456
2021	39	73,068,642	81	106,127,823	10	20,465,681	5	7,301,648
2022	39	77,667,849	79	99,961,423	10	22,353,992	5	7,369,876
2023	41	82,160,974	72	92,782,241	10	24,233,346	5	7,923,647
2024	40	82,950,004	71	88,790,210	10	26,300,000	5	8,847,634

Source: compiled by the authors based on data (Yerevan Transport Department, 2025)

An analysis of these indicators reveals that total public transport passenger traffic experienced substantial growth, increasing from 97,369,125 trips in 2020 to 206,887,848 trips in 2024. This represents an increase of approximately 112.5%, calculated by the authors on the basis of the passenger-flow values presented in Table 2. The modal structure changed unevenly during the same period. The minibus share, calculated as minibus passenger flow divided by total passenger flow across buses, minibuses, metro and trolleybuses, was 35.0% in 2020, peaked at 51.3% in 2021, and then declined to 42.9% in 2024.

Therefore, the previous statement that minibuses carried 65% of all passengers was removed because it could not be directly traced to the data in Table 2. Bus passenger traffic more than doubled, rising by approximately 120.1%, from 37,682,034 trips in 2020 to 82,950,004 trips in 2024. Metro use also increased, rising by approximately 33.2%, from 19,747,624 trips in 2020 to 26,300,000 trips in 2024. In the context of Yerevan, this interpretation is supported by Sargsyan (2024), MacDonald (2024), and the Yerevan Transport Department (2025), which point to route-network reform and transport-system modernisation as key directions for improving urban mobility.

An assessment of street infrastructure capacity revealed an insufficient density of the road network, amounting to approximately 4.24 km per 1 km² of urban area. For a city with a population exceeding 1 million, such a level of road-network provision indicates pressure on the transport system and supports the need for route optimisation and public-transport prioritisation (Sargsyan 2024; MacDonald 2024; Yerevan Transport Department 2025). The growth in private car ownership recorded for 2020-2024 indicates that, without route optimisation and public-transport priority, the transport load on infrastructure may outpace its expansion capacity (Yerevan Transport Department 2025). Figure 1 presents a map of the average load on public transport stops (radius – 500 m). A significant proportion of passengers commute from densely populated districts to the city centre for education, employment, and other daily activities. Connecting these zones through multiple transport options – both traditional and alternative – would also help restrict private car access to central Yerevan. While zones 3, 4 and 5 are served by two transport modes (surface and underground), zones 1 and 2 currently rely exclusively on surface transport.

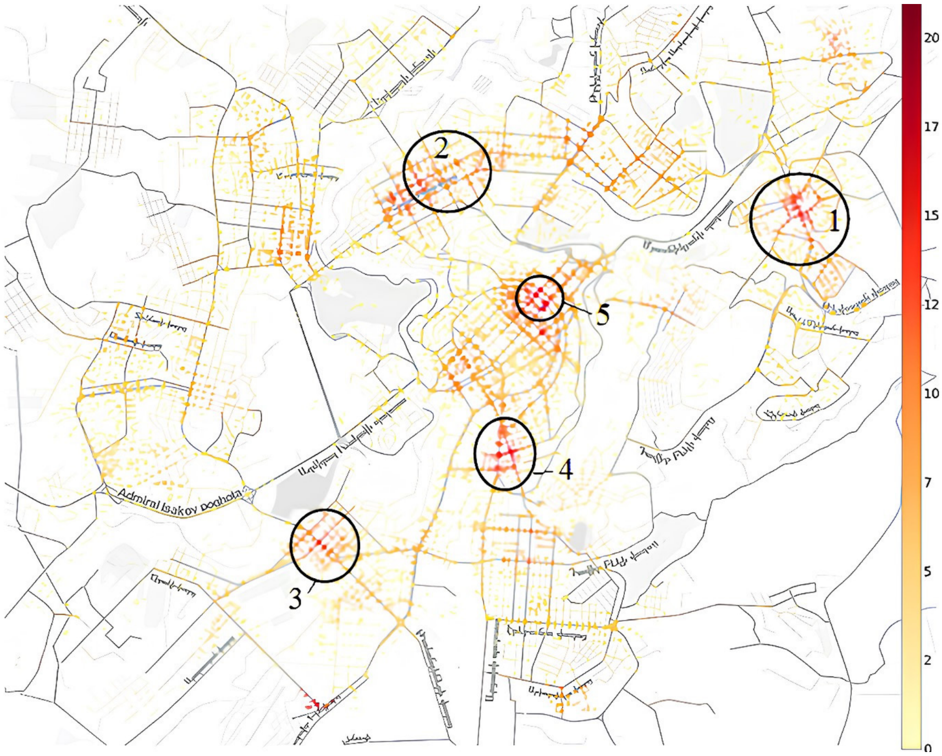

Fig. 1. Distribution of passengers by stops in Yerevan
Source: compiled by the authors in QGIS 3.28 based on data (Urbanista 2025)

Passenger traffic indicators demonstrate a gradual shift in mobility towards metro and bus transport. Demand for minibuses and trolleybuses has declined, largely due to the physical and technical deterioration of their rolling stock. Between 2020 and 2024, metro passenger traffic increased by more than 33% (Yerevan Transport Department 2025), while minibus ridership fell. The reduction in the number of minibus routes indicates the gradual displacement of inefficient and economically unviable transport modes. According to Statistical Committee of the Republic of Armenia (2025), municipal budget expenditure on transport infrastructure maintenance in Yerevan increased from 3.2 billion AMD in 2020 to 3.9 billion AMD in 2024 – an increase of 22%. The main expenditure categories were road maintenance and repair (34%), bus and minibus maintenance (28%), infrastructure development and fleet modernisation (21%) and administrative costs (17%). The share of transport costs in the total municipal budget remained at 12-13%. The average fare in 2024 was 150 AMD for buses, 120 AMD for minibuses and 180 AMD for the metro, representing 1.2-1.5% of the average monthly income. A system of subsidies for socially vulnerable groups is in place, covering approximately 18% of passengers.

On the one hand, the growth in private car ownership and the continued reliance on minibuses impose an additional burden on road infrastructure, raising accident risks, as reflected in the safety indicators in Table 3 and in studies of transport process safety and dangerous situations in road infrastructure (Dolzhenko et al. 2025; Smailov et al. 2025). On the other hand, fluctuations in accident frequency and variability in fatality and injury rates reflect the complex influence of the transport system on social safety. Table 3 summarises the main trends in these processes, providing a basis for assessing the effectiveness of transport policy and traffic safety management in Yerevan.

Table 3. Number of vehicles registered in Yerevan and road accident rates for 2020-2024

Years	Buses	Mini-buses	Trol-ley-buses	Private cars	Acci-dents	Fatalities		Injured	
						N	**Per 100 ac-cidents**	**N**	**Per acci-dent**
2020	380	920	40	313,660	1,554	74	4.8	2,005	1.29
2021	390	1,260	48	330,465	-	-	-	-	-
2022	415	1,220	48	368,097	1,417	74	5.2	1,781	1.26
2023	420	1,100	48	379,490	1,544	72	4.7	2,052	1.33
2024	390	1,000	45	380,856	1,832	83	4.5	2,447	1.34

Source: compiled by the authors based on data (Yerevan Transport Department, 2025)

The data in Table 3 indicate a trend towards increasing individual motorisation against the backdrop of relatively stable or only slightly changing volumes of public transport use, which has heightened the risk of road accidents. For a structured overview of systemic public-transport constraints, Table 4 provides a qualitative, source-traceable comparison of six cities: Yerevan, New York, Minneapolis, Portland, Los Angeles and San Francisco. Approximate passenger-per-hour capacities and subsidy percentages were removed because the available agency sources do not publish these indicators using a uniform and directly comparable methodology.

Table 4. Source-traceable systemic characteristics of public transport in selected cities

City	Infrastructure	Organisational	Technical	Financial
Yerevan (Armenia)	Surface network under reform; about 1,200 stops; 10-station metro; bus-lane and pedestrianisation concepts under development	New route network; unified electronic ticketing introduced in 2025; minibus reduction ongoing	Fleet renewal in 2020-2024; trolleybus renewal; GPS and digital passenger-information tools expanding	Public fleet renewal; limited private investment; no harmonised subsidy share stated
New York (USA)	472 subway stations; 238 local bus routes, 20 Select Bus Service routes and 75 express routes; persistent peak congestion	Integrated subway-bus system; OMNY/MetroCard fare integration; formal ridership methodology	Digital fare payment, digital tracking, passenger information and bus-priority measures	Large public capital and operating programmes; no harmonised subsidy share used
Minneapolis (USA)	31.9 million bus rides, nearly 15.5 million light-rail rides and about 8.3 million BRT rides in 2024; selected dedicated bus lanes	Metro Transit/ Metropolitan Council coordination; pass programmes; BRT network expansion planned	NexTrip, rider alerts, digital service tools and improved service frequency	Regional public funding and affordability-oriented pass programmes
Portland (USA)	64.7 million fixed-route boardings in FY2024, including 40.5 million bus and 24.1 million MAX boardings; high-capacity bus projects under development	Centralised TriMet management; bus, MAX, WES and paratransit integration	Zero-emission fleet transition target; renewable diesel use; rail-fleet replacement	Payroll-tax, grant-revenue and capital-contribution funding reported

Los Angeles (USA)	311.3 million boardings in 2024; 2,000 low-emission buses and six electric rail lines; major infrastructure programme	Metro as county-level transport planning and funding agency; regional connectivity measures	Service reliability and frequency improvements; low-emission bus fleet; reconfigured A and E Lines	Public planning and funding model; major capital programme
San Francisco (USA)	158 million Muni passenger trips in 2024; average weekday boardings of 486,000 and weekend boardings of 318,000; frequent high-performing routes	Centralised SFMTA/Muni management; multimodal municipal network	Fast, frequent service investments; customer-service monitoring; digital passenger tools	Municipal and external funding; no harmonised subsidy share used

Source: developed by the authors as a qualitative comparative synthesis based on city-specific official sources: Yerevan Transport Department (2025), MTA (2025), Metro Transit (2025), TriMet (2024), LA Metro (2025), and SFMTA (2025). Exact passenger-per-hour capacity and subsidy-percentage values are not reported here because they are not available in a harmonised and directly auditable form across all selected cities

The analysis of Table 4 indicates substantial differences in the structure and maturity of urban transport systems, shaped by infrastructural, organisational, technical and financial factors. The revised table is limited to indicators traceable to city-specific official sources, including route-network structure, ridership, fleet renewal, digital services and fare integration. Yerevan demonstrates route-network reform, fleet renewal and unified electronic ticketing, but remains constrained by incomplete modal integration, the residual role of minibuses and limited private investment. US cities show more mature multimodal integration, wider digital services and stronger agency-level reporting, confirming the need for integrated mobility planning without non-auditable capacity or subsidy estimates (MacDonald 2024; Sargsyan 2024; Yerevan Transport Department 2025).

US cities increasingly apply Sustainable Urban Mobility approaches integrating environmental and social goals, consistent with Gallo and Marinelli (2020), Papadakis et al. (2024), Vitetta (2022), and Lättman and Otsuka (2024). Portland illustrates public and active mobility integration, New York fare-payment integration, and Minneapolis proximity-based accessibility planning. For Yerevan, BRT is relevant because it is efficient under congestion conditions (Basso et al. 2019; Nyazabe et al. 2025). The Los Angeles case is used only comparatively (Chen 2024; Papadakis et al., 2024). Yerevan carried approximately 206.9 million passenger trips in 2024, with minibuses still significant (Yerevan Transport Department 2025). Its compact structure supports public and non-motorised transport, but low institutional capacity and subsidy dependence constrain investment readiness (MacDonald 2024; Sargsyan 2024). Sustainable transformation requires fleet renewal, centralised route management, unified ticketing, institutional reforms, and GPS-based systems. BRT principles could improve peak-period speeds and reduce inefficient minibus reliance, but effects require corridor-level modelling (Basso et al. 2019; MacDonald 2024; Nyazabe et al. 2025). Table 5 therefore summarises relevant US strategies and their applicability to Yerevan.

Table 5. Application of integrated transport strategies: comparative cases of Yerevan and developed US cities

Country/ city	**Main activities**	**Features/benefits**
USA (Portland)	Public transport priority, cycling infrastructure, bus and light rail integration (MAX Light Rail, operated by TriMet)	Restraining motorisation, sustainable mobility, improving intermodal accessibility, increasing the share of public transport in the travel structure
USA (New York)	Mobile apps, payment integration, access to micromobility	Improved user convenience through fare-payment integration and digital mobility services
USA (Minneapolis)	Zoning under the "15-minute city" model	Localisation of services, reduction of transportation needs
USA (Los Angeles)	Bus Rapid Transit and metro, integration with bus routes, digital services	Potential improvement of corridor performance through bus-priority measures, route integration and digital service coordination
USA (San Francisco)	Multimodal system: metro, trams, buses, integrated digital services	Integrated transport management, increased accessibility, adaptation of infrastructure for dense urban development
Armenia (Yerevan)	Fragmented route transport system, limited integration of services, and gradual introduction of digital ticketing and passenger-information tools	High dependence on minibuses, congestion in the central part, low institutional capacity, and a compact urban structure that creates prerequisites for public and non-motorised transport development

Source: developed by the authors based on the Statistical Committee of the Republic of Armenia (2025), the Yerevan Transport Department (2025), MTA (2025), TriMet (2024), Metro Transit (2025), LA Metro (2025), SFMTA (2025), Basso et al. (2019), Vitetta (2022), Mavlutova et al. (2023), Papadakis et al. (2024), and Allam et al. (2024)

The selected US cases also demonstrate measurable, city-specific transport outcomes documented in official agency sources. New York recorded 1,195 million subway rides and 409 million bus rides in 2024, confirming the scale of an integrated high-capacity public transport system (MTA, 2025). Minneapolis Metro Transit provided more than 47.5 million rides in 2024 and reported an almost 14% increase in BRT-corridor ridership, indicating the relevance of corridor-based bus-priority measures (Metro Transit 2025). Portland TriMet reported 40.5 million FY2024 annual bus boardings (TriMet, 2024), while Los Angeles Metro recorded 311,261,332 boardings in 2024 (LA Metro 2025). San Francisco Muni recorded 158 million passenger trips in 2024 (SFMTA 2025). These indicators are not used as direct equivalents to Yerevan's system, because the cities differ substantially in population size, network scale and institutional capacity. Instead, they serve as source-specific comparative benchmarks for assessing how integrated planning, BRT-oriented measures, digital services and multimodal coordination can support public transport performance.

Comparative analysis of Yerevan, New York, Minneapolis, Portland, Los Angeles and San Francisco reveals differences in infrastructure, governance and financing. Yerevan's network remains fragmented and its fleet outdated (MacDonald 2024; Sargsyan 2024), while New York shows stronger digital and managerial integration despite congestion (Small et al. 2024; Gallo and Marinelli 2020). Minneapolis and Portland prioritise lanes, active mobility and digital services (Allam et al. 2024; Jin et al. 2024; Lättman and Otsuka 2024), whereas Los Angeles and San Francisco rely on multimodality, bus priority and clean-transit programmes (Chen 2024; Jeffers et al. 2022; Papadakis et al. 2024). In Yerevan, BRT effects require corridor-level modelling (Statistical Committee of the Republic of Armenia 2025; Basso et al. 2019; MacDonald 2024).

Discussion

This study assessed the state and trends of public transport in modern cities, with particular emphasis on the economic dimension. The findings reveal structural imbalances between demand for and supply of transport services, reflected in rising private mobility and declining public transport efficiency. They confirm links between infrastructure capacity, motorisation and urban ecological instability. Strategic models for a sustainable transport paradigm produce heterogeneous effects depending on digital integration, funding and adaptive capacity (Gallo and Marinelli 2020; Mavlutova et al. 2023; Vitetta 2022; Papadakis et al. 2024; Radkevich et al. 2020). Small et al. (2024) support the study's focus on capacity optimisation, subsidies, pricing, externalities and urban transport economics. Sargsyan (2024) contextualises congestion, route organisation and infrastructure pressure in Yerevan, while Myronenko et al. (2023) link motorisation with declining public transport demand. Maduekwe et al. (2020) justify modelling transport energy use and emissions within sustainability assessment.

Allam et al. (2024) connect 15-minute city planning with service accessibility and liveability. Ahmed et al. (2021) show that emotional and cognitive barriers shape public transport choices. Guzman et al. (2020) address congestion-oriented mobility planning. Vuchic (2007) frames capacity and modal organisation, while Tuvikene et al. (2024), Sargsyan (2024) and MacDonald (2024) support the interpretation of fragmented post-socialist urban transport. Wu et al. (2020), Deng et al. (2023), Nyazabe et al. (2025) and Ignaccolo et al. (2022) further substantiate inclusion, equity, intelligent systems and micromobility planning. The comparative analysis confirmed the relevance of the results to contemporary approaches to studying public transport in urban areas. The findings highlight the importance of optimising tariff policy, deploying digital demand management technologies and expanding micromobility in shaping a sustainable transport model, as reflected in the work of Vitetta (2022), Mavlutova et al. (2023) and Ignaccolo et al. (2022). Further interdisciplinary research into resilient urban mobility systems remains necessary.

Conclusion

The study demonstrates that sustainable urban mobility depends on the transition from fragmented, car-centred transport systems to integrated, digitally supported and multimodal public transport models. The comparison of Yerevan with selected US cities shows that route coordination, fare integration, public transport priority, fleet renewal and spatial accessibility planning are decisive for improving system efficiency. Yerevan has made visible progress in route reform, bus ridership, metro use and digital ticketing; however, dependence on minibuses, ageing rolling stock, limited modal integration and financial constraints continue to restrict performance.

The findings support the research hypothesis in a qualitative-comparative sense: public transport prioritisation, route-network defragmentation, and technical-financial modernisation are shown to be necessary conditions for improving urban transport efficiency. However, because the study is based on descriptive and comparative data rather than causal modelling, the results should be interpreted as evidence of a strong, practical relationship rather than statistical proof of significance.

The findings indicate that BRT principles, unified management, GPS-based control, electrification and proximity-oriented planning can strengthen public transport, provided that they are supported by institutional capacity and stable investment. The main limitation of the study is the reliance on non-uniform city-level statistical data, while future research should include corridor-level modelling and passenger-behaviour analysis to assess the expected effects of proposed reforms.

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