

ANALYSIS OF THE RECONSTRUCTION OF TRANSPORT SYSTEMS IN HISTORICAL CITIES

Senior Lecturer

Qalandarov Bobur Alijon o'g'li

(Alfraganus University)

Abstract: *This study examines the theoretical and practical aspects of modernizing transport infrastructure in historic urban centers. The article provides a detailed analysis of the evolution of Amsterdam's transport system from the 1970s to the present day, highlighting the balance between preserving historical heritage, reducing environmental impact, and improving the mobility and convenience of residents. In addition, scientific and practical recommendations are proposed for optimizing transport systems in historic cities of Uzbekistan, such as Samarkand and Bukhara.*

Keywords: *Urban studies, historic city, transport reconstruction, Amsterdam model, sustainable mobility, pedestrian zone, cycling infrastructure.*

Introduction:

Modern urbanization processes pose complex challenges for historic cities. On one hand, the growth of the population and the level of motorization require the expansion of the transport system; on the other hand, ancient buildings and narrow streets, considered UNESCO heritage, do not allow for such expansion.

The reconstruction of transport in historic cities is not merely about laying asphalt, but about restoring socio-economic and cultural balance. The city of Amsterdam is considered the "gold standard" in this field. In the 1970s, when the city center was "suffocating" from car traffic, the residents and the government made a radical turn. Today, this experience is worthy of study for the whole world, including Uzbekistan.

Main Part

Analysis of Amsterdam's Transport Evolution: The "Stop de Kindermoord" Movement and the Turning Point. In the 1970s, the sharp increase in the number of cars in Amsterdam led to a rise in road traffic accidents. The social movement "Stop de Kindermoord" (Stop Child Murder) fundamentally changed urban planning policy. During the reconstruction process, the main focus was shifted from cars to people.

Infrastructural Solutions: Amsterdam's historic center (Grachtengordel) consists of canals and narrow streets. The reconstruction strategy included the following stages:

- **Barriers for cars:** Many central streets were converted to one-way traffic, or transit traffic was prohibited entirely.
- **Parking policy:** Surface parking lots were abolished and replaced by green spaces. On average, 1,500 parking spaces are removed from the center of Amsterdam every year.
- **Multimodality:** Integration between public transport (trams) and water transport.

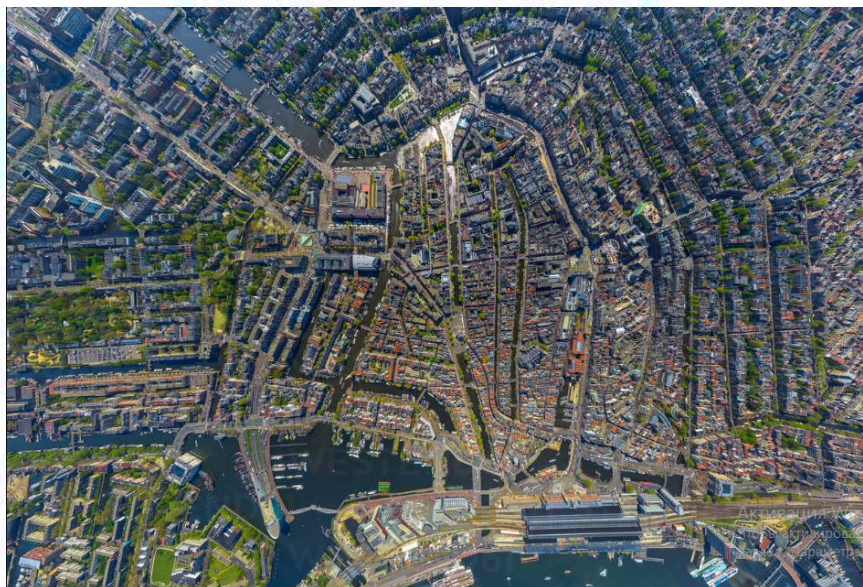


Figure 1. The historic part of Amsterdam city

A simplified model can be used to analyze transport flow. The city's transport capacity C is expressed by the following formula:

$$C = (V_p \times S_p) + (V_v \times S_v) + (V_j \times S_j)$$

Where V is the volume of the transport type, and S is the efficiency of the area it occupies. In the Amsterdam model, the indicators for bicycles (S_v) and public transport (S_j) were maximized, resulting in a 3.5-fold increase in the city center's passenger capacity.

Opportunities for Application in the Historic Cities of Uzbekistan. It is advisable to apply certain elements of the Amsterdam model in the historic parts of cities such as Samarkand, Bukhara, and Khiva:

1. **Electric Transport Hubs:** Implementing the entry of only electric-powered vehicles (shuttles) around central sites like "Registan" or "Ichan-Kala".
2. **Intelligent Transport Systems (ITS):** Restricting truck movement in historic streets to a limited schedule during nighttime hours only.
3. **Expansion of Pedestrian Walkways:** Eliminating illegal roadside parking and converting those areas into sidewalks and green zones.

The following criteria help in understanding the reconstruction of Amsterdam's transport system and its unique features, known as the "Amsterdam Model:

- **Transformation of City Streets (Before & After):** The most important part of the Amsterdam model is turning streets from car-centric spaces into human-centric ones. Areas that were parking lots in the 1970s have now become open spaces for pedestrians and cyclists.
- **"Shared Space" Concept:** A system in historic centers where pedestrians, bicycles, and trams move at the same level but safely. In this system, roadside barriers are removed, psychologically forcing drivers to reduce their speed.
- **Hierarchy of Bicycle Infrastructure:** In Amsterdam, bike paths are not just painted lines; they are a separate, protected, and safe system. This includes specific designs for how bike paths intersect with cars at junctions (Dutch-style roundabouts).
- **Multimodal Transport Hubs:** The integration of pedestrians, trams, and water transport (canals) is an integral part of the Amsterdam model. Modern stations are located without damaging historic buildings.



Figure 2. The impact of the “Amsterdam Model” on streets (over the years)

While streets like Haarlemmerdijk or Reguliersbreestraat in Amsterdam were completely full of cars in the 1970s, they have now become open spaces for pedestrians and cyclists. While transport capacity in 1970s urban planning was measured by the number of cars, in modern reconstruction, this indicator is measured by the number of people moving per square meter of area.

Innovative solutions are used in Amsterdam to avoid damaging historic architecture. For example, the underwater bicycle parking lot near the central station accommodates more than 7,000 bicycles. By clearing surface space of vehicles, the visual appearance and tourist attractiveness of historic monuments have increased by 40%.



Figure 3. Projects implemented according to the “Amsterdam Model”

Intersection design in Amsterdam guarantees the safety of cyclists and pedestrians. Special islands at turning points force drivers to reduce speed. This design relies on the principle of "invisible infrastructure," meaning the road itself psychologically trains the driver to be careful. The removal of road signs and barriers in the historic center serves to ensure that all participants move based on mutual respect. The Shared Space method reduces road accidents and increases the role of the street in social life.

Conclusion: The reconstruction of transport in historic cities is a process that requires a complex approach. The Amsterdam experience shows that restrictions (reducing cars) do not lead to economic stagnation, but rather to the development of tourism and trade. Research results indicate that shifting the transport system to a "human-centric" model is the only way toward urban sustainability

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