Urban Planning and Transportation: A Tale of Three Cities

New York - A City of Grids

Tokyo - A city of Hubs

Paris - A city of Circles

Outline

Introduction

Public transportation systems are critical for urban mobility, economic efficiency, and sustainability. As global cities, New York, Tokyo, and Paris offer some of the most complex and well-developed transportation networks, but they differ significantly in terms of design, operational efficiency, and user experience. This research paper aims to:

- Examine the structural and functional characteristics of each city's network.
- Analyze their performance based on criteria such as coverage, reliability, cost, and sustainability.
- Explore how these systems meet the transportation demands of their respective populations and urban environments.

Introduction

Scope of the Research:

- Focus on airport, railway, and subway systems in New York, Tokyo, and Paris.
- Comparative analysis of functionality, usefulness, and sustainability
- Evaluation of technological integration (smart cards, apps) and sustainable practices (electrification, green energy).

Research Objectives:

1. To identify strengths and weaknesses in each system’s efficiency and accessibility.
2. To determine the role of cultural, economic, and geographic factors in shaping each city's transportation infrastructure.
3. To provide insights into potential improvements and lessons cities can learn from one another.
4. To identify recurring themes in the development of networks and what they can mean for the future

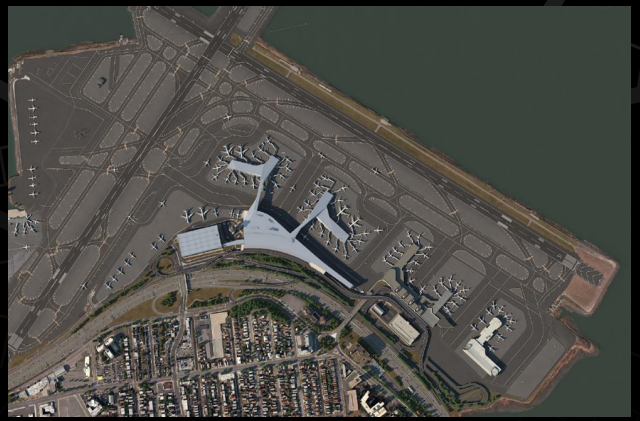
New York City

A City of Grids

Airports

How does NYC deal with air traffic?

New York City manages air traffic through a network of major airports—JFK, LaGuardia, and Newark Liberty—that accommodate both domestic and international flights. Laguardia is undergoing a $8 billion renovation to improve passenger experience, as its presently regarded as one of the worst airports in the US. The main terminal is set to be overhauled completely



What about the largest airport?

Serving 55 million passengers annually, JFK is one of the busiest airports in the country. Yet, it is also riddled with problems like overcrowding. To cope for the 100 million figure by 2050, there has been a large investment to build new terminals and sustainable systems

Railways

Penn Station

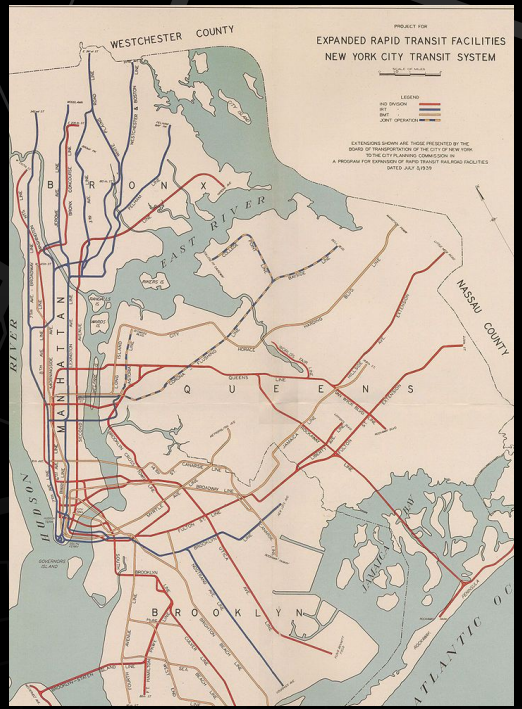
Penn Station, originally built by the Pennsylvania Railroad in the early 20th century, was a grand above-ground terminal that influenced the development of its surrounding area and other U.S. train stations. Declining rail travel led to the station's controversial demolition in the 1960s, sparking the historic preservation movement and leading to the construction of an underground Penn Station beneath Madison Square Garden.

Grand Central Station

Grand Central, opened in 1913, spurred development in the surrounding area, especially Terminal City, and holds the record for the most platforms of any station in the world. The East Side Access project, connecting Queens to Manhattan, was finally completed after decades of delays, promising significant reductions in commuter travel time.

Subways

History



The New York City Subway, opened in 1904 as the Interborough Rapid Transit (IRT), is one of the oldest, most extensive, and busiest public transit systems in the world, with 472 stations and 244 miles of track. Serving around 5.5 million riders daily, it plays a critical role in the city's transportation infrastructure. After decades of evolution and challenges, including a rough period in the 1970s and 80s, the system saw a major recovery in the 1990s with improvements in infrastructure and service.

Network

The densest area on the map is Lower Manhattan because most bridges and tunnels to cross the East River are located there. Most lines in Manhattan follow certain avenues-wide roads parallel to each other that run up and down the island. This is made clear from the vertical orientation of many of the subway lines.

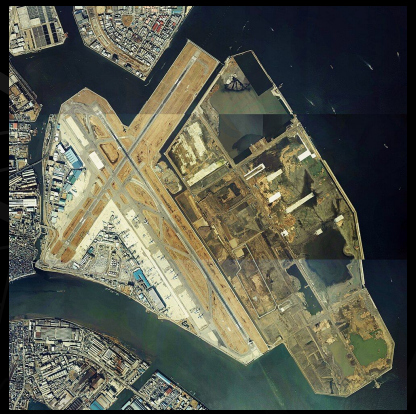
Tokyo

A city of hubs

Airports

Haneda Airport

Haneda Airport, located 14 kilometers from central Tokyo, is one of the busiest airports globally, handling 78.7 million passengers in 2023. Originally serving domestic flights when it opened in 1931, it became Japan's main international airport after World War II and has undergone numerous expansions, including major land reclamation projects. With parallel runways designed for operational efficiency and safety, Haneda continues to be a crucial hub for Japan's two largest airlines, Japan Airlines and All Nippon Airways.



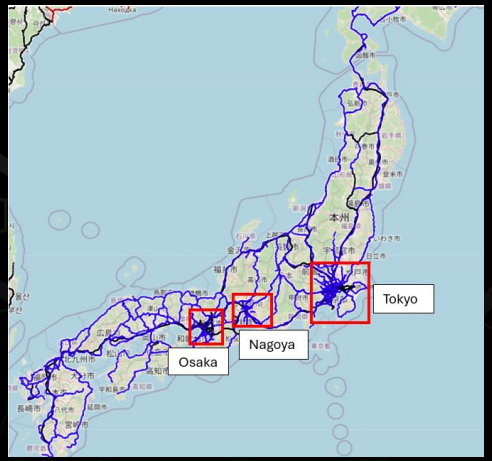
Narita Airport

Narita Airport, located 60 km east of Central Tokyo, was built in response to the growing demand for international air travel in the 1960s, following Haneda Airport's capacity limits. Despite significant local opposition, construction began in 1971, and the airport opened its first terminal in 1978. A major challenge for Narita is cross-winds, as the runways are misaligned with prevailing wind directions, leading to frequent go-arounds during landings.

Railways

Hubs

Japan has one of the world's most advanced railway systems, essential for daily transportation and connecting urban and rural areas, all operated by the Japan Railway Group (JR) since 1987. The network follows a hub-and-spoke model centered in Tokyo, with most lines radiating from the capital, and includes the renowned Shinkansen high-speed trains.



Shinkansen

Shinkansen trains, known for their high speed and punctuality, play a vital role in Japan's railway system by significantly reducing travel times between major cities. They facilitate efficient intercity transportation, making it convenient for passengers to commute for work or leisure. Additionally, the Shinkansen's advanced technology and safety features have set global standards for rail travel, showcasing Japan's commitment to innovation in transportation.

Subways

Mini-city design

Tokyo's urban structure consists of multiple smaller cities integrated into one vast metropolis, which led to the establishment of the Tokyo Metro to enhance connectivity among these areas. This system has been remarkably successful, as evidenced by the low car ownership rate of 0.54 cars per household in Tokyo compared to higher rates in western cities. Additionally, the introduction of a comprehensive smart card system allows seamless travel across all transportation networks in Japan, further emphasizing the importance of connectivity for Tokyo's residents.

History

The Tokyo Metro, consisting of the Tokyo Metro and Toei Subway systems, is renowned for its efficiency, serving billions annually with 304km of track, 13 lines, and 286 stations. The subway's history dates back to 1872, with the Ginza Line opening in 1927, leading to rapid expansion and advancements like air-conditioning and automatic train control systems in the following decades, culminating in the establishment of the Tokyo Metro corporation in 2004.

Paris

A city of circles

Airports

Charles de Gaulle

Charles de Gaulle Airport, located 25 km northeast of Paris, is France's largest airport and the third busiest in Europe, serving over 67 million passengers annually with extensive international connections. Opened in 1974, the airport is undergoing significant upgrades, including terminal mergers and a new automated luggage sorting system, with the CDG Express rail link set to open in early 2027. In 2023, it was recognized as the best European airport for the second consecutive year and ranked fifth among the world's top 100 airports.

Orly Airport

Paris Orly Airport, opened in 1932 and originally known as Villeneuve-Orly Airport, is the second major airport serving Paris and has a complex history, including use by the Nazi air force during their occupation. A redevelopment project initiated by Groupe ADP aims to merge the airport's terminals and implement environmentally sustainable practices. Additionally, the new metro line 14 will significantly improve access to the airport.

Railways

National Geography

Paris has five major railway stations—Gare de Lyon, Gare du Nord, Gare de l'Est, Gare Montparnasse, and Gare Saint Lazare—that collectively serve over 700 million passengers annually. These stations are strategically located to optimize train traffic across France, making Paris the central hub for all TGV and LGV lines. Each station connects to different regions of the country, with specific routes departing from stations based on their geographical orientation relative to Paris.

TGV

France's TGV was first proposed in the 1960s, shortly after Japan's Shinkansen, and has since undergone continuous development, reaching a top speed of 574 km/h in 2007. The first public TGV run in 1981 reached 300 km/h, surpassing the initial Shinkansen speed, and each subsequent model has improved in terms of passenger capacity, power-to-weight ratio, and average speed. Paris serves as the central hub for France's TGV and LGV lines, with each station connecting to different regions of the country based on geographical orientation.

Subways

History

The Paris subway, officially known as the Métro, began construction in 1898 and opened its first line in 1900, quickly becoming a vital part of the city's public transport system. Initially designed to alleviate traffic congestion, it expanded rapidly throughout the 20th century, incorporating various lines and stations. Today, the Paris Métro is renowned for its efficiency and extensive network, serving millions of passengers annually.

Automation

The Paris Métro features automated trains on certain lines. The most notable is Line 14, which operates entirely with automated, driverless trains since its opening in 1998. Additionally, Line 1 has been fully automated since 2012, enhancing efficiency and reducing wait times for passengers. These automated systems are part of a broader effort to modernize the subway network and improve overall service.

Conclusion - themes

Rising demand for travel

Rising urbanization and population growth are driving increased demand for public transportation globally, as more people seek efficient and sustainable commuting options in densely populated areas. Additionally, growing concerns about traffic congestion, air pollution, and climate change are prompting governments to invest in and promote public transit systems as viable alternatives to private vehicle use. Innovations in technology and infrastructure, such as smart card systems and real-time tracking, further enhance the appeal of public transportation, making it more accessible and user-friendly.

Increased investment

Governments and private investors worldwide are recognizing the critical role of public transportation in promoting sustainable urban development, leading to increased funding for transit infrastructure projects. Initiatives aimed at reducing traffic congestion and greenhouse gas emissions are driving investments in modernizing existing systems and expanding networks, particularly in rapidly growing cities. Additionally, advancements in technology, such as electric buses and smart transit solutions, are attracting investment to enhance the efficiency and appeal of public transportation systems.

Heading towards sustainability

Public transportation systems globally are increasingly adopting sustainable practices by transitioning to electric and hybrid vehicles, which significantly reduce greenhouse gas emissions and improve air quality. Many cities are implementing integrated transit solutions that promote multimodal transport options, encouraging the use of public transit over private vehicles. Additionally, investments in renewable energy sources and eco-friendly infrastructure, such as bike-sharing programs and pedestrian-friendly designs, are further enhancing the sustainability of public transportation networks.

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Thank you