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Public Transportation in Developed Countries

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ABSTRACT

In developed countries, public transportation systems, including buses, trains, subways, and trams, are important for efficient urban mobility and economic development, with many cities prioritizing their expansion and integration. Public transportation in developed countries is a well-established cum essential component of urban infrastructure that is providing millions of people with safe, efficient, and environmentally friendly transportation. High-quality public transportation must need to have comprehensive networks, integrated services, and smart technologies. This comes with some economic, environmental and social benefits, including reduced greenhouse gas (GHG) emissions, increased productivity, and improved mobility. The futuristic directions for public transportation in developed countries are to include the adoption of sustainable technologies, mobility-as-a-service (MaaS), and smart infrastructure. The paper delves into the benefits, challenges and future trends to public transportation in developed countries.

KEYWORDS: *Public transportation, developed countries, sustainable transportation, Mobility-as-a-Service (MaaS), smart infrastructure, interchanges, mobile apps, greenhouse gas (GHG) emissions, time-tables*

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INTRODUCTION

Public transport (also known as public transportation, public transit, mass transit, or simply transit) is a system of transport for passengers by group travel systems available for use by the general public unlike private transport, typically managed by a schedule, operated on established routes, and may charge a posted fee for each trip [1-3], as shown in Figures 1, 2, and 3. Some examples of public transport include city buses, trolleybuses, trams (or light rail) and passenger trains, rapid transit (metro/subway/underground, etc.) and ferries, as shown in Figures 4 and 5. Public transport between cities is dominated by airlines, coaches, and intercity rail. High-speed rail networks are being developed in many parts of the world [4]. Most public transport systems are known to run along fixed routes with set embarkation/disembarkation points to a prearranged timetable, with the most frequent services running to a headway (e.g., "every 15 minutes" as opposed to being scheduled for a specific time of the day) [4].

HISTORICAL BACKGROUND

Public transportation in developed countries is said to evolve from horse-drawn carriages, as shown in Figure 6, and early steam-powered railways to electric streetcars, modern systems likes buses, trains, and subways, which were driven by urbanization, economic growth, technological advancements, and need for efficient mass transit of people and goods, as shown in Figures 7 and 8.

Conveyances designed for public hire are as old as the first ferry service. The earliest public transport was water transport [5]. Historical forms of public transport include the stagecoaches traveling a fixed route, and the horse-drawn boat carrying paying passengers, which was a feature of European canals from the 17th century onwards. The Chinese also built canals for water transportation as far back as the warring States period [6], which began in the 5th century BCE

The early forms or beginnings (18th – 20th Centuries) [4, 7-11]:

- Horse-drawn carriages: The first organized public transit systems emerged with horse-drawn carriages , like the "Carrosses a cinq sols" (five-sol coaches) in Paris in 1662, even though it was a short-lived service for only 15 years.
- Omnibuses: These were carriages designed to carry multiple passengers, it gained popularity in the early 19th century, with Nantes, France, introducing the first public bus system in 1826.
- Railways: The Swansea and Mumbles Railway in 1807 was the first passenger-carrying public railway, using horse-drawn carriages on existing tramlines. The steam-powered railways, like the Stockton and Darlington Railway in 1825, revolutionized long-distance travel.
- Steam-powered underground railways: The world's first steam-powered underground railway opened in London in 1863.
- Streetcars and trams: With the advent of electricity, streetcars and trams became popular in the late 19th and early 20th centuries, providing efficient and affordable transportation in cities like San Francisco, Boston, and Berlin.

Expansion and Development (Early 20th century):

1. Subway systems: The first subway systems were built in the early 20th century, with London's Underground (1906) and New York City's Subway (1904) being two notable examples.
2. Bus networks: Bus networks expanded rapidly in the early 20th century, with cities like Paris and London developing comprehensive bus systems.
3. Railway systems: These systems also expanded with many cities developing commuter rail systems to connect suburbs to city centers.

Post-War Developments (Mid-20th century):

1. Motorization and suburbanization: Following World War ll, car ownership and suburbanization significantly increased, leading to a decline in public transportation usage in many developed countries.
2. Highway construction: Highway construction and motorways further contributed to the decline of public transportation, as people increasingly relied on cars for transportation.

Modernization and revitalization (Late 20th century-Present):

1. Light rail and metro systems: Many cities invested in modern light rail and metro systems, such as the Bay Area Rapid Transit (BART) system in San Francisco and the Washington Metro in Washington, D.C.
2. Bus Rapid Transit (BRT) Systems: These systems combine with the efficiency of rail with the flexibility of buses, have become increasingly popular in cities like Curitiba, Brazil, and Ottawa, Canada.
3. Sustainable transportation: The focus is on sustainable transportation, with many cities investing in electric and hybrid buses, as well as promoting cycling and walking infrastructure, as shown in Figure 9.

Luxembourg in March 2020 abolished fares for trains, trams and buses and became the first country in the world to make all public transport free [12].

MODES OF TRANSPORT

There are however different modes of transport which are:

Land Transport:

1. Buses: These are common mode of transportation, widely used for short and long distances [13], as shown in Figure 10.
2. Trains: Trains are a popular and common mode of transportation for the passengers and freight, offering efficiency and comfort [14].
3. Taxis: This offers door-to-door service, and as well as convenience and flexibility [15].
4. Ride-hailing: This provides services such as Uber and Lyft, and offers on-demand transportation [16].
5. Cycling: Cycling is a sustainable and healthy mode of transportation, ideal for short distances [17].
6. Walking: Walking is a zero-emission mode of transportation, suitable for short distances too [18].

Water Transport: Under which are –

1. Ferries: Ferries provide transportation over water, connecting islands and coastal communities [19]
2. Ships: They are used for the transport of goods and passengers over long distances [20], as shown in Figure 11.
3. Boats: They offer recreational and transport services, ranging from small sailboats to large yachts [21].

Air Transportation: Under this are –

1. Airplanes: Airplanes provide fast and efficient transportation over long distances [22].
2. Helicopters: Flexible and versatile transportation is provided by helicopters, which is suitable for short distances and emergence services [23].

3. Drones: Drones are increasingly used for transportation, surveillance, and recreational purposes [24, 25].

Pipeline Transport: Under which are –

1. Oil pipelines: These are used to transport crude oil and petroleum products over long distances [26].
2. Gas pipelines: They are used to transport natural gas, providing energy for households and industries [27].

Cable Transport: Under which are –

1. Cable cars: Cable cars provide transportation in hilly or mountainous areas, offering scenic views [28].
2. Funiculars: Funiculars are cable-propelled transportation systems, often used in urban areas [29], as shown in Figure 12.

Space Transport: Under this are –

1. Spacecraft: This is used for transportation to space, including crewed and uncrewed missions [30].
2. Rockets: Rockets provide propulsion for spacecraft, launching them into space [31].

Hyperloop Transport: Under this is the –

1. Hyperloop: This is a proposed ultra-high-speed ground transportation system for passengers and cargo, conceived by Elon Musk, using vacuum-sealed tubes (low-pressure tubes) and magnetic levitation to achieve extremely high speeds [32, 33].

HOW TRANSPORTATION OPERATES

Infrastructure: All public transport runs on infrastructure, either on roads, rails, airways or seaways, as shown in Figures 13 and 14. The infrastructure can be shared with other modes, like freight and private transport, or it can be dedicated to public transport, this can be due to where there are capacity problems for private transport. The investments in infrastructure are very expensive making up a substantial part of the total costs in systems that are new or expanding. Furthermore, once built, the infrastructure will require operating and maintenance costs, which adds to the total cost of public transport. Sometimes governments subsidize infrastructure by providing it free of charge, just as is common with roads for automobiles [4].

Interchanges: The interchanges are locations where passengers can switch from one public transport route to another. This may be between vehicles of the same mode (like a bus interchange), or between bus and train. It may as well be between local and intercity (such as at a central station or airport).

Time-tables: Timetables or schedules are provided by transport operator so as to enable users or commuters to plan their journeys. They are supplemented by maps and fare schemes to help travelers coordinate their travel. Online public transport route planners help make planning easier. Moreover, mobile apps are available for multiple transit systems that provide timetables and other service information and, in some cases, allow ticket purchase, some allowing you to plan your journey, with time fares zones e. g. clock-face scheduling or cyclic scheduling [4, 34]. Often, more frequent services or even extra routes are operated during the rush hours in the morning and evening.

Financing: The major or main sources of financing are ticket revenue, government subsidies and advertising. The percentage of revenue from passenger charges is known as the "farebox recovery ratio." Limited income also comes from land development and rental income from stores and vendors, parking fees, and leasing tunnels and rights-of-way to carry fiber optic communication lines.

Fare and ticketing: Most – but not all – public transport requires the purchase of a ticket to generate revenue for the operators. Commuters may buy tickets either in advance, or at the time of the journey, or the carrier may allow both methods. Passengers may be issued with a paper ticket, a metal or plastic token, or a magnetic or electronic card (smart card, contactless smart card). Sometimes a ticket has to be validated, e. g. a paper ticket needs to be stamped, or an electronic ticket has to be checked in. Tickets could be valid for a single (or return) trip, or valid within a certain area for a period of time (transit pass or travel card) [35]. The tickets may have to be shown or checked automatically at the station platform or when boarding, or during the ride by a conductor. It can also be by a proof-of-payment system. There are also the multi-use tickets (carnet ticket), zero-fare public transport within the city (as done in the three capital cities in Europe: Tallinn, Luxembourg, and Belgrade), period tickets, free travel pass sometimes granted to particular sectors such as students, elderly, children, employees (job ticket) and the physical or mentally disabled [4].

Revenue, profits and subsidies: Governments frequently opt to subsidize public transport for social, environmental or economic reasons. The motives would include the desire to provide transport to people who are unable to use an automobile and to reduce congestion, land use and automobile emissions [36]. The subsidies may take the form of direct payments for financially unprofitable services, or also by indirect subsidies.

Safety and security: Relative to other forms of transportation, public transit is safe (with a low crash risk) and secure (with low rates of crimes) [4].

IMPACT OF PUBLIC TRANSPORTATION SYSTEM

Under impact are the following:

Accessibility: This is the means of independent transport for individuals (without walking or cycling) such as children who are too young to drive or walk, the elderly without access to cars, those not holding or have a drivers license, and the infirm (the wheelchair users). Kneeling buses, low-floor access boarding on buses and light rail has also enabled greater access for the disabled in mobility, as shown in Figure 15.

Environmental: Mass transit is generally regarded as significantly more energy efficient than other forms of travel, despite the ongoing debate as to the true efficiency of different modes of transportation. Studies have shown that "private vehicles emit about 95% more carbon monoxide, 92% more volatile organic compounds and about twice as much carbon dioxide and nitrogen oxide than public vehicles for every passenger mile traveled" [37]. Supporters of the "green movement" usually advocate for public transportation, because it offers decreased airborne pollution compared to automobiles, as per the study conducted in Milan, Italy in 2004 during and after a transportation strike, which showed the impact that mass transportation has on the environment [38].

Land use: Dense areas with mixed-land uses promote daily public transport use while urban sprawl is associated with sporadic public transport use [39]. If public transport planning is at the core of urban planning, it will force cities to be built more compactly to create efficient feeds into stations and stops of transport [40, 41]. Therefore, inefficient land use and poor planning leads to a decrease in accessibility to jobs, education, and health care/other essential services [42].

Societal: "A developed country is not a place where the poor have cars; it's where the rich use public transport" – says Enrique Penalosa, former mayor of Bogota [43].

The consequences for wider society and civic life, is that public transport breaks down the social and cultural barriers between people in public life. The "Automobile dependency" policy is a name given by policy makers to places where those without access to private vehicle do not have access to independent mobility – this causes and contributes to the "transport divide" [44].

Social issues: With respect to the impact of COVID-19 pandemic, this was said to have a substantial effect on public transport systems, infrastructures and revenues in various cities across the world [45]. The pandemic negatively impacted public transport usage by the imposition of social distancing, remote work, or unemployment in the United States, as it led to a 79% drop in public transport riders at the beginning of 2020. This trend continued throughout the year with a 65% reduced ridership as compared to previous years [46]. Other countries impacted by COVID-19 pandemic were also London, Cairo in Egypt, Nairobi in Kenya, Kampala in Uganda, Kigali in Rwanda, and Addis Ababa in Ethiopia [4].

CONCLUSION

Innovative mobility services are expanding travel choices and are being widely embraced by millions of commuters/travelers. The rapid or fast growth in the use of these new services is due to the upswing in travel by taxis and public transit which started more than a decade ago. The apps-enabled transportation services are among the most remarkable urban transportation innovations; the technologies being deployed for these services are improving mobility in ways that have been proposed and discussed for decades but never before realized on a large scale. While the Transportation Network Companies (TNCs) have received the greatest media attention to date, car- and bike-sharing, employee shuttles, micro transit services, and apps that aggregate all travel options are growing, evolving, and affecting travel behavior for many users in profound ways, for example, in America where car- and bike-sharing has led to the reduction of personal vehicle travel, emissions, and vehicle ownership.

Public safety in public transportation is a central regulatory concern. However, public entities at the municipal, regional, and state levels are now implementing public safety regulations for TNCs and other shared mobility services, as well as regulations addressing helmet wearing among bike sharing users. There is also the challenge of TCN drivers' heavy reliance on smartphones that can lead to distracted driving – which must be systematically examined to ensure the safety operations of vehicles, the drivers, and the allocation of the costs imposed by the risk of crashes that must be settled or resolved.

Innovative mobility services are already enhancing mobility for millions of commuters and have the potential to yield even greater benefits and also serving other societal goals. For the potentials of these services to be realized, policy makers and regulators must need rise to address and proffer solutions to the challenges raised in this paper.

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Figure 1. Transport in Singapore

Source:https://en.wikipedia.org/wiki/Transport_in_Singapore

Figure 2. Public transportation in the United States

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=yKp07fkZe0I_HM&vssid=mosaic

Figure 3. Public transport

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=dhegZqEuDo940M&vssid=mosaic

Figure 4. Bus Rapid Transit

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=AVOjGdG_c6sBXM&vssid=mosaic

Figure 5. Rapid transit

Source: https://en.wikipedia.org/wiki/Rapid_transit

Figure 6. Carriage

Source:https://www.google.com/search?q=images+of+horsedriven+carriages+by+wikipedia&sca_esv=70fea88cd35d1211&udm=2&biw=1036&bih=539&sxsrf=AHTn8zrY2r0ti0VT63RBLSo0oRS7jomOvA%3A1742287232438&ei=gDHZZ40GquKhbIPnrTgQY&ved=0ahUKEwiP9NfcnZOMAxUrRUEAHR4aOG8Q4dUDCBE&oq=images+of+horse-driven+carriages+by+wikipedia&gs_lp=EgNpbWciLWltYWdlcyBvZiBob3JzZS1kcml2ZW4gY2FycmlhZ2VzIGJ5IHdpa2lwZWRpYUiA5QFQwQVYuK4BcAJ4AJABA5gBmwmgAbRvqgEQMC4xLjEzLjcuMS4xLjQuNLgBDMgBAPgBAZgCAaACI8ICBxAjGCcYyQKYAwCIBgGSBwExoAf7CrIHALgHAA&sclient=img#vhid=mPcJnB5aakDkcM&vssid=mosaic

Figure 7. Public transport bus service

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=NSABUm_Y5OW-TM&vssid=mosaic

Figure 8. Autonomous Rail Rapid Transit

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0

KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSO yyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD 9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZv JH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR 4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExA B&biw=1036&bih=539&dpr=1#vhid=P8pPV-HD6zV7aM&vssid=mosaic

Figure 9. Intelligent transportation system

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=Zg2eWhZDE2z8eM&vssid=mosaic

Figure 10. Metropolitan Transportation Authority

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=9UDuzP8x9hETrM&vssid=mosaic

Figure 11. Public transport

Source:https://www.google.com/search?sca_esv=a9a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M20y5B2xafRzCGW62A:1742256530490&q=images+on+public+transportation+in+developed+countries+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJBpcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSOyyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZvJH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=qjjYo1K0343-oM&vssid=mosaic

Figure 12. Funicular

Source:https://www.google.com/search?sca_esv=70fea88cd35d1211&sxsrf=AHTn8zqDI0hylAGOQzTBO6qHEdEgGF3awg:1742287224728&q=images+of+funiculars+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpAdk4wpBWOGso

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Figure 13. Rail Transport

Source:https://www.google.com/search?sca_esv=a9 a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M2 0y5B2xafRzCGW62A:1742256530490&q=images +on+public+transportation+in+developed+countrie s+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP 1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJB pcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0 KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSO yyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD 9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZv JH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR 4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExA B&biw=1036&bih=539&dpr=1#vhid=RYIjEffAgj gSaM&vssid=mosaic

Figure 14. Road

Source: https://en.wikipedia.org/wiki/Road

Figure 15. Paratransit

Source:https://www.google.com/search?sca_esv=a9 a17715c624a2d7&sxsrf=AHTn8zrKx4Rc50m9M2 0y5B2xafRzCGW62A:1742256530490&q=images +on+public+transportation+in+developed+countrie s+by+wikipedia&udm=2&fbs=ABzOT_CWdhQLP 1FcmU5B0fn3xuWpAdk4wpBWOGsoR7DG5zJB pcx8kZB4NRoUjdgt8WwoMuWnuS7DI2S6srcfL0 KzJZNRasn6Cq3KUYuprxiyJLyIg0jLgL2PszFrSO yyGhhWLk8BVlBIfJenYp2kcj1gYGkd_2dLHTyD 9El2IgmpjC3BDu9g05rxtyKajWlRIHaDpv7vPqZv JH5gl1se1kQbnLAmmQ&sa=X&ved=2ahUKEwjR 4e2sq5KMAxVcU0EAHSWRKkUQtKgLegQIExA B&biw=1036&bih=539&dpr=1#vhid=ATKSijcszA ppnM&vssid=mosaic