

Needs and expectations from public transportation

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I will be using the terms "Public transport", "Public transportation", "Public transit", "transit", and "PT" interchangeably in this course.

What is public transportation?

Definition (American Public Transit Association). Transportation by bus, rail, or other conveyance, either publicly or privately owned, which provides to the public general or special service on a regular and continuing basis.

Definition (Merriam-Webster dictionary). A system of trains, buses, etc., that is paid for or run by the government.

Definition (Cambridge dictionary). A system of vehicles such as buses and trains that operate at regular times on fixed routes and are used by the public.

Definition (Jarrett Walker). A passenger transport service focused on travel within a region, open to all passengers, with the ability to carry multiple passengers who may have different origins, destinations, and purposes.

Definition (Daganzo and Ouyang). The basic goal of public transit is to enable the mass movement of passengers from their origins and destinations in an efficient manner.

Why do we need public transport?

- ▶ Population is growing in cities. Not enough space for everyone to drive.
 - New Delhi's population \sim 32,941,000 (second largest after Tokyo)
 - PT can offer mobility to passengers in much smaller space
- ▶ Automobile accidents (innocent lives are lost which are expected to be normal!) are more frequent than PT accidents.
- ▶ Many people (poor, disabled, some elderly, and young) cannot drive
 - Not everyone can hire a driver.
- ▶ PT can serve multiple passengers in fewer veh-km as compared to automobile.
 - PT is more environmental-friendly (less emissions)
- ▶ Provides employment
 - efficient use of labor

Take a look at this picture



Source:mikkosmostlyharmless.blogspot.com

Motivating example from Newell (1994)

Consider a square-shaped Central Business District (CBD) with no residences (e.g., Southern Manhattan). Assume the following:

- ▶ All workers reside in the periphery of CBD.
- ▶ Workday starts approximately at the same time for everyone.
- ▶ They can move freely and park once they enter the CBD.
- ▶ A : area of CBD (2 km^2)
- ▶ p : fraction of CBD area occupied by buildings (0.5)
- ▶ n : average number of floors (10)
- ▶ $a \ll A$: size of one-person office space including common spaces such as staircases, corridors, and lavatories ($200 \text{ ft}^2 \sim 2 \times 10^{-5} \text{ km}^2$)
- ▶ s : spacing between adjacent streets ($300 - 500 \text{ ft} \sim 0.16 \text{ km}$)
- ▶ Streets are bi-directional with 2 lanes in each direction
- ▶ q : maximum no. of cars that each lane can carry in one direction in 1 hour (500 veh/hr)
- ▶ k : average car occupancy (2)

Evaluate the total passenger demand and CBD perimeter capacity. Further, evaluate for how long the rush will last. Compare this with the situation when 25% of population start using buses (equivalent to 2 cars)

Expectations from public transit

- ▶ Better accessibility¹
- ▶ Better mobility²
- ▶ Affordable
- ▶ Civility, safety, and comfort
- ▶ Reliable
- ▶ Equitable
- ▶ Sustainable

¹Number of opportunities one can reach from a location in a given travel time budget.

²Average distance that passenger can travel in unit time

Jarrett Walker mentions seven demands from PT

1. It takes me wherever I want to go.
 - Are there stops near my origin and destination? Are both connected?
2. It takes me when I want to go
 - How frequent is the service?
 - What is the span of its service (determined by scheduled time of first and last trip)?
3. It is good use of my time
 - Short travel times
 - Have basic amenities such as internet, reading lights, electric outlets, etc. to help in doing activities.
4. It is good use of my money
 - What is the fare?
5. It respects me in the level of safety, comfort, and amenity it provides
6. I can trust it
 - Reliable service
7. It allows me spontaneity to change my plans.

Thank you!