STUDY ON IMPLEMENTING THE EFFICIENT TRANSPORTATION SYSTEM

INTRODUCTION

- India is poised for rapid economic growth
- India growth largely come from secondary& tertiary sectors (industrial& service sectors)
- Economic activities of these sectors primarily taking place in urban areas
- To develop the urban areas transportation services play predominant role
- Berlin has excellent traffic and communication infrastructure
- Efficiently using the railway modern technology over the globe

Berlin transportation

	Number of lines	Lengths [kms]	Number of stops	Number of vehicles	Passengers in 2000(mio)
Underground	9	144.2	170	1379	400
Tram	28	187.7	371	572	139
Bus	165	1267	2736	1369	360

Feature of Berlin transportation

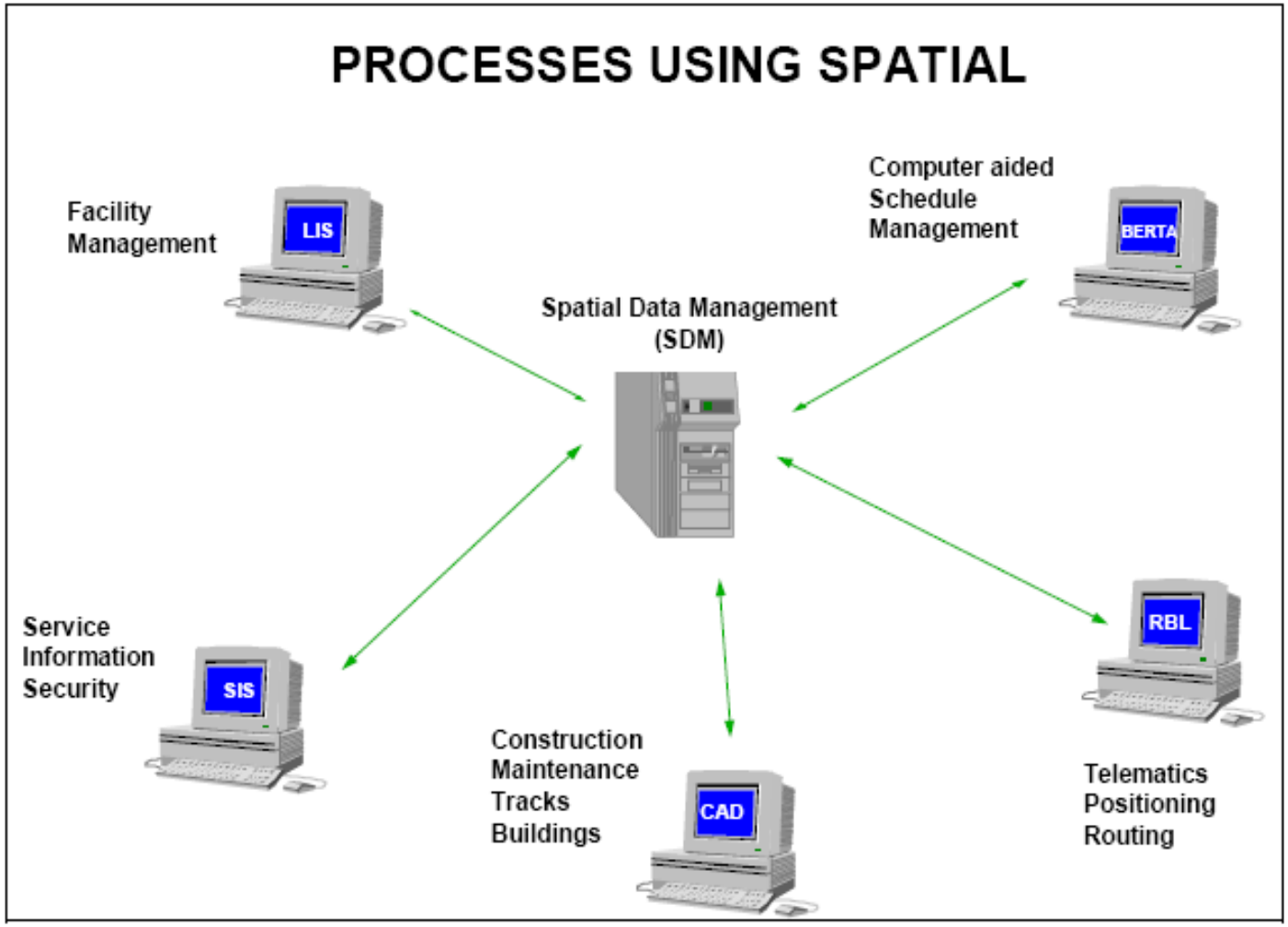


Fig.1: Harmonisation of GIS-applications

Features of Berlin transportation

- Berlin transportation system is harmonizing and combining different spatial data sources supported by modern inter net/intranet –technologies

Spatial data management:

- It coordinates the operations of the construction maintenance, track buildings, service, information security, Telematics, positioning, routing, computer aided schedule management, facility management.
- It acts as a control room of the whole system.

Service information security:

- It provides additional precautionary information well before commuting the commuter .
- It collects the data about security measurements in under tunnels and sends to spatial data management.

FEATURES OF BERLIN TRANSPORTATION SYSTEM

Facility management:

- It facilitates the information to commuter such as which route is shortest route and gives the additional information whatever required.
- This system is more useful to avoid traffic obstructions well before and also saves the valuable time of passengers.

Computer aided schedule management:

- It makes the schedule of the public transportation system
- It manages and provides information of the automobiles

Construction maintenance and track buildings:

- It maintains the track well before passing the vehicle trough the path, gives the information time to time to the S.D.M.

Telematics positioning routing:

- This also called passenger guidance system . This system in the uniform corporate design and special display in the vehicles, such as route indicators.

ADVANTAGES OF SPATIAL DATAMANAGEMENT

- Road net work can only monitored by computer .
- This is the only way to fulfill high requirement placed on modern transport system in terms of punctuality ,reliable connections and rapid information services.
- Passengers benefit from reliable connections the prevention of early departures, and shorten the travel time.
- It optimizes the operation control centre and display actual traffic proceedings

FEATURES OF BERLIN TRANSPORTATION SYSTEM

- Modernization of public transport vehicles has been carried out continuously since reunification.
- BVG has introduced soot filters for 1000 of 1400 buses.
- New buses which already fulfill Euro standards are in now in service.
- Tram have been refurbished.
- New-low-floor trams have been introduced.
- Tram track have been renewed
- Infra structure measures in the tram network focus on links with other forms

MODES OF TRANSPORTATION

Railways: The rail transport is classified into surface transport (S-Bahn) and under ground (U-Bahn).

S-Bahn:

- It is mainly an urban means of transportation.
- Total length 327km,of which 250km are within the city of Berlin.
- It operates at quite dense intervals (every 3 or 4minutes) along the central routes.
- Biggest part of S-Bahn net work has existed for 100years.
- S-Bahn serves the city area of Berlin.

MODES OF TRANSPORTATION

- Connects it with the surrounding region
- Rapid city transport system provides high transport capacities
- It is able to move large flows of traffic over large distances at higher speed
- About 1 million passengers use the 16 lines everyday.

U-Bahn:

- U-Bahn started in1902 one of the most modern subway system in all of Europe
- Well known for its high level of performance
- Nine subway lines and 152 km.

MODES OF TRANSPORTATION

Bus transport:

Berlin has a wide network of buses .It is also connected to many European cities by bus. **The Berliner Verkehrsbetriebe(BVG)** operates the bus service in Berlin. The buses run in all parts of the city .

They run daily from 06.00 to 23.00 hours.

Taxis:

- Taxis are a popular and comfortable means of transport in Berlin.
- The standard taxi charge is 2.50 Euros and is rises 1.50 Euros for the initial six kilometers.
- A unique type of taxi called Velotaxi is found in Berlin.
- They seat two people and are ideal for short distance travel.

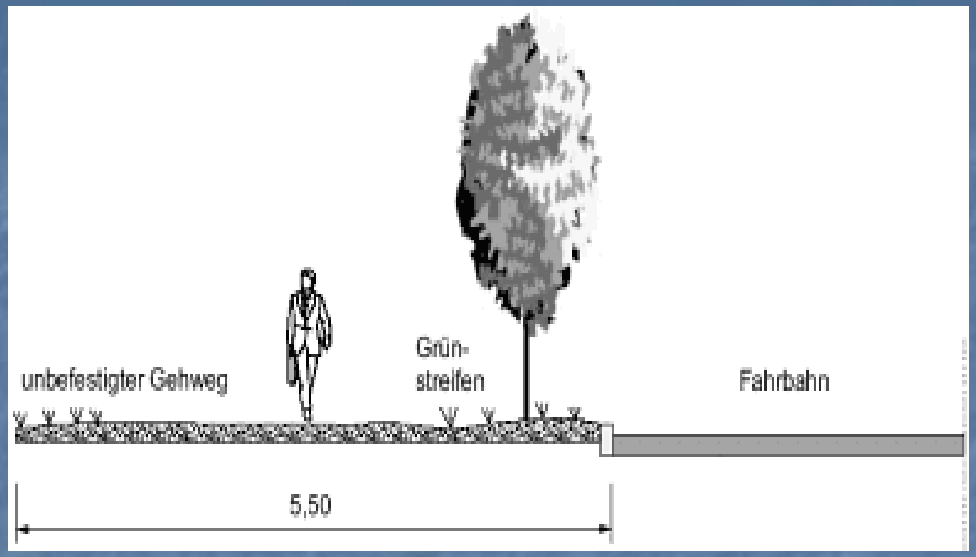
MODES OF TRANSPORTATION

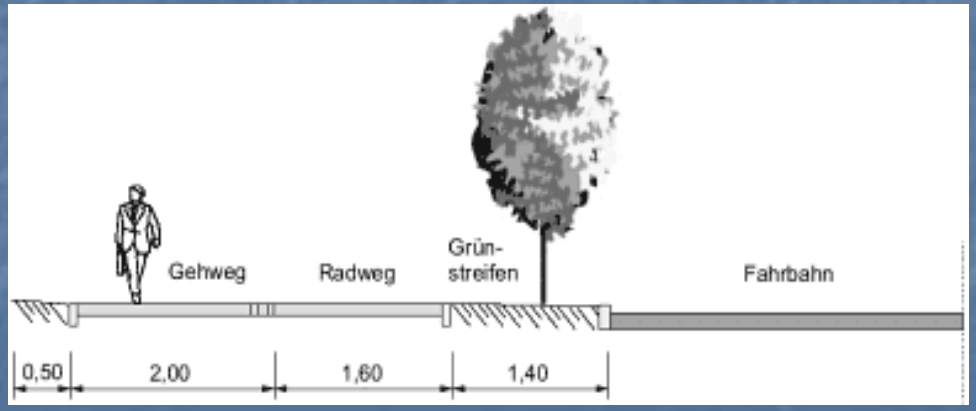
Cycling:

- Bicycle route net work is 800km.
- On the roads ,there are well marked lanes that allow for safe cycling.
- You are also allowed to take your cycles on the U-Bahn and S-Bahn.

Ferries:

- Berlin has many seasonal and all year round ferries that travel to various ports.


unbefestigter Gehweg
Grün-
streifen
Fahrbahn
5,50


Gehweg
Radweg
Grün-
streifen
Fahrbahn
0,50
2,00
1,60
1,40

MODES OF TRANSPORTATION

Trams:

- Trams are the major feature of land scope in many parts of the city.
- There is 187.7km of tram tracks in Berlin.

Tram features:

- out standing speed
- Safety
- punctuality
- reliability.
- The environmental friendliness of trams is especially important for the highly polluted inner city.

ADVANTAGES OF BERLIN TRANSPORTATION

- Dense public transport networks enable residents to reach their destinations in the city quickly and reliably.
- Excellence of transport system.
- Capital regions offer excellent transport connection in all directions.
- 766km of motor ways and 3400 km of railways ensure a high level of mobility.
- Excellent transport links and logistic structure.

INFERENCE FROM STATISTICAL DATA

Zone	1993	1999	2004
Berlin inner city	1.044.000	979.000	994.000
Berlin beyond the S-Bahn inner ring	2.431.000	2.408.000	2.394.000
Brandenburg inner commuter belt	781.000	917.000	992.000
Brandenburg outer development area	1.757.000	1.684.000	1.576.000

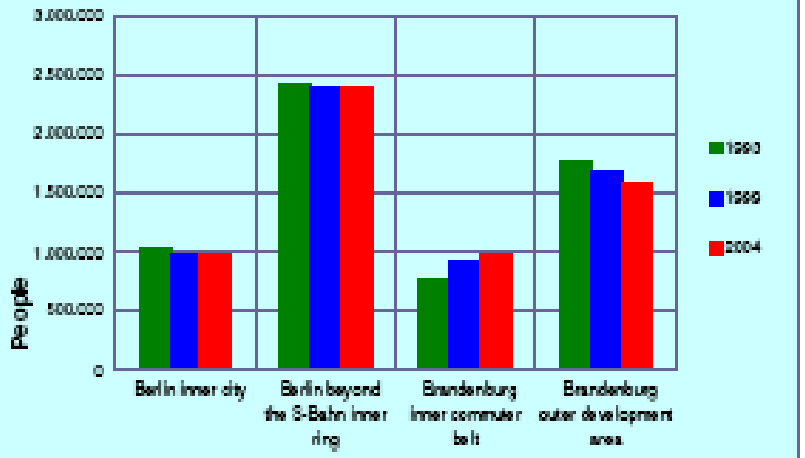


Figure 1-4: Population trends by zones[1)]

Sources: Berlin State Office of Statistics 2005; Brandenburg State Office of Data Processing and Statistics (data rounded off)

1) see map 1-3

	1999	2000	2001	2002	2003	2004
Incoming commuters	166.400	179.900	189.000	191.000	193.300	195.500
Commuters from Brandenburg	123.900	132.600	140.200	144.650	146.300	148.600
Outgoing commuters	105.900	111.600	114.900	112.900	111.000	112.950
Commuters to Brandenburg	54.200	55.300	54.900	56.200	54.800	57.300

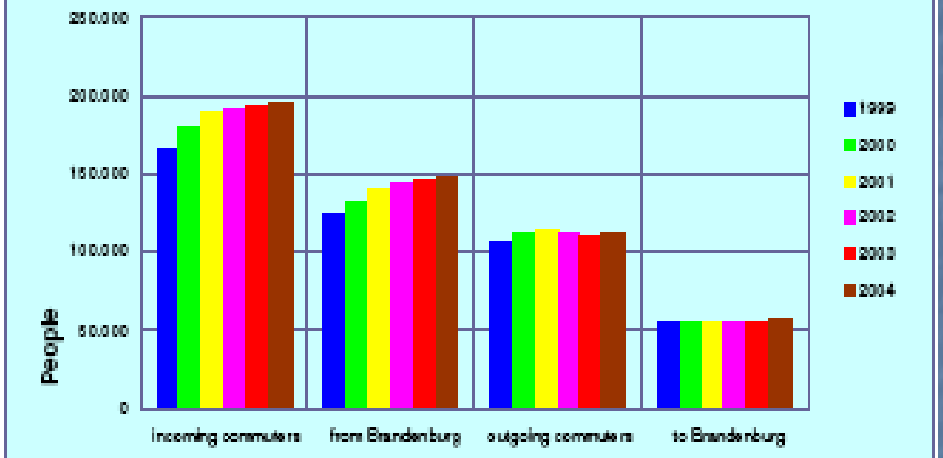


Figure 1-5: Commuters to and from Berlin

Source: Berlin State Office of Statistics

** Basis: employed people subject to social security contributions in Berlin on reference date 30.06. (data rounded off)

Passenger traffic by mode of transport and purpose of journey

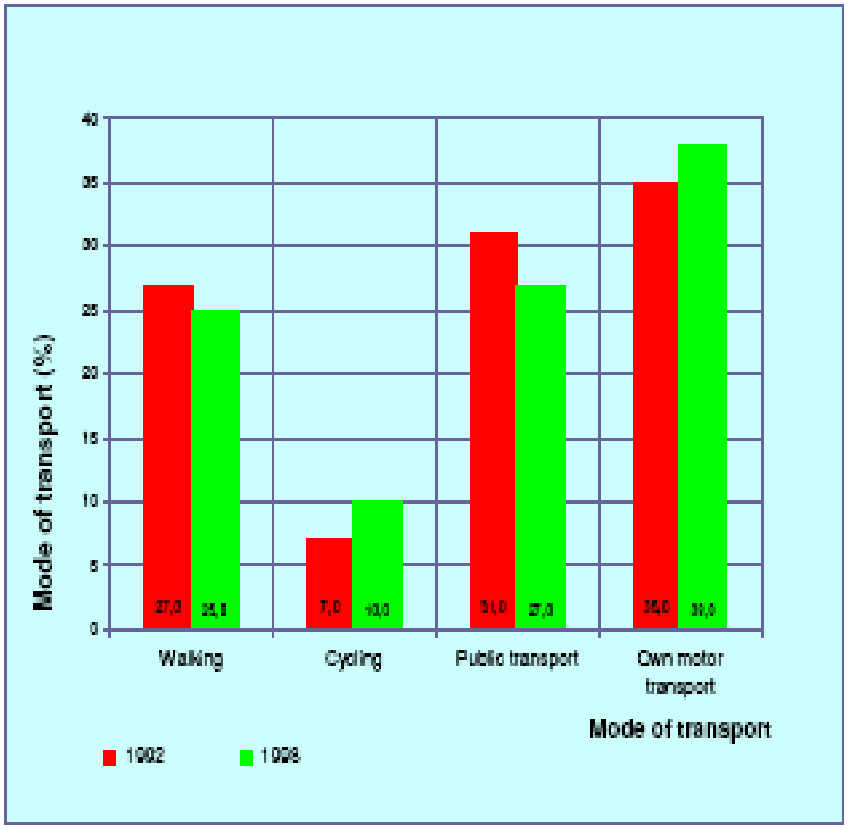


Figure 2-1: Passenger traffic by mode of transport

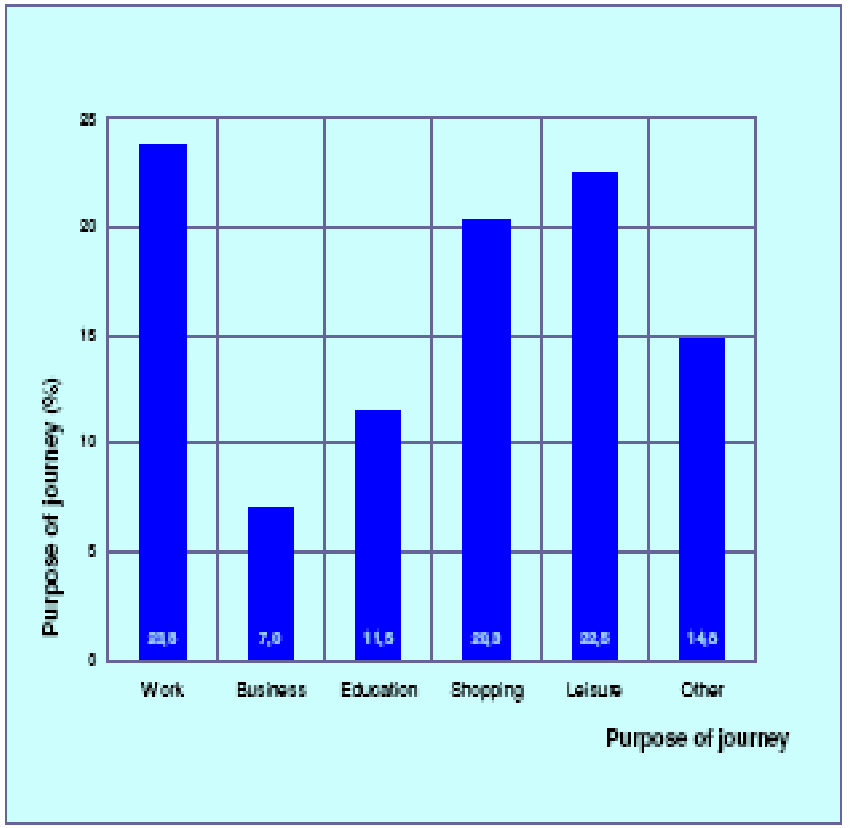


Figure 2-2: 1998 passenger traffic by purpose of journey

	1994	1996	1998	2000	2002	2004
Total population of Berlin [1]	3.477.227	3.466.524	3.414.293	3.394.146	3.390.291	3.387.545
Total vehicles on the roads [2]	1.274.955	1.277.847	1.265.630	1.289.919	1.291.409	1.272.151
of which passenger cars	987.952	976.325	969.564	1.013.130	1.026.956	1.027.702
estate cars	132.333	139.013	124.499	100.869	82.147	63.735
Total car numbers	1.120.285	1.115.338	1.094.063	1.113.999	1.109.103	1.091.437
Total car numbers/1000 inhabitants	322	322	320	329	327	322

Table 2-4: Vehicles on the Berlin roads in 2004

Total [3]	1.263.203
of which	
passenger car	1.024.287
estate car	59.759
bus	2.328
lorry	72.676
tractor	3.594
special vehicle	16.549
motorcycle/scooter	84.021

Source: Berlin State Office of Statistics 2005 (official population update)
LABO Berlin (State Office for Citizens and Order), motor vehicle section

1) average population of Berlin

2) mean annual number of vehicles on the road

3) number of vehicles on the road on 31.12.2004

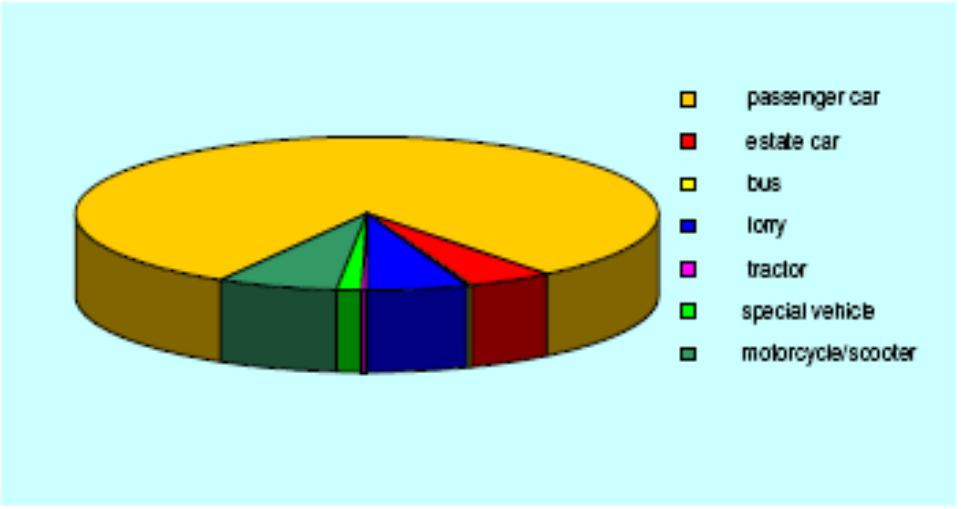
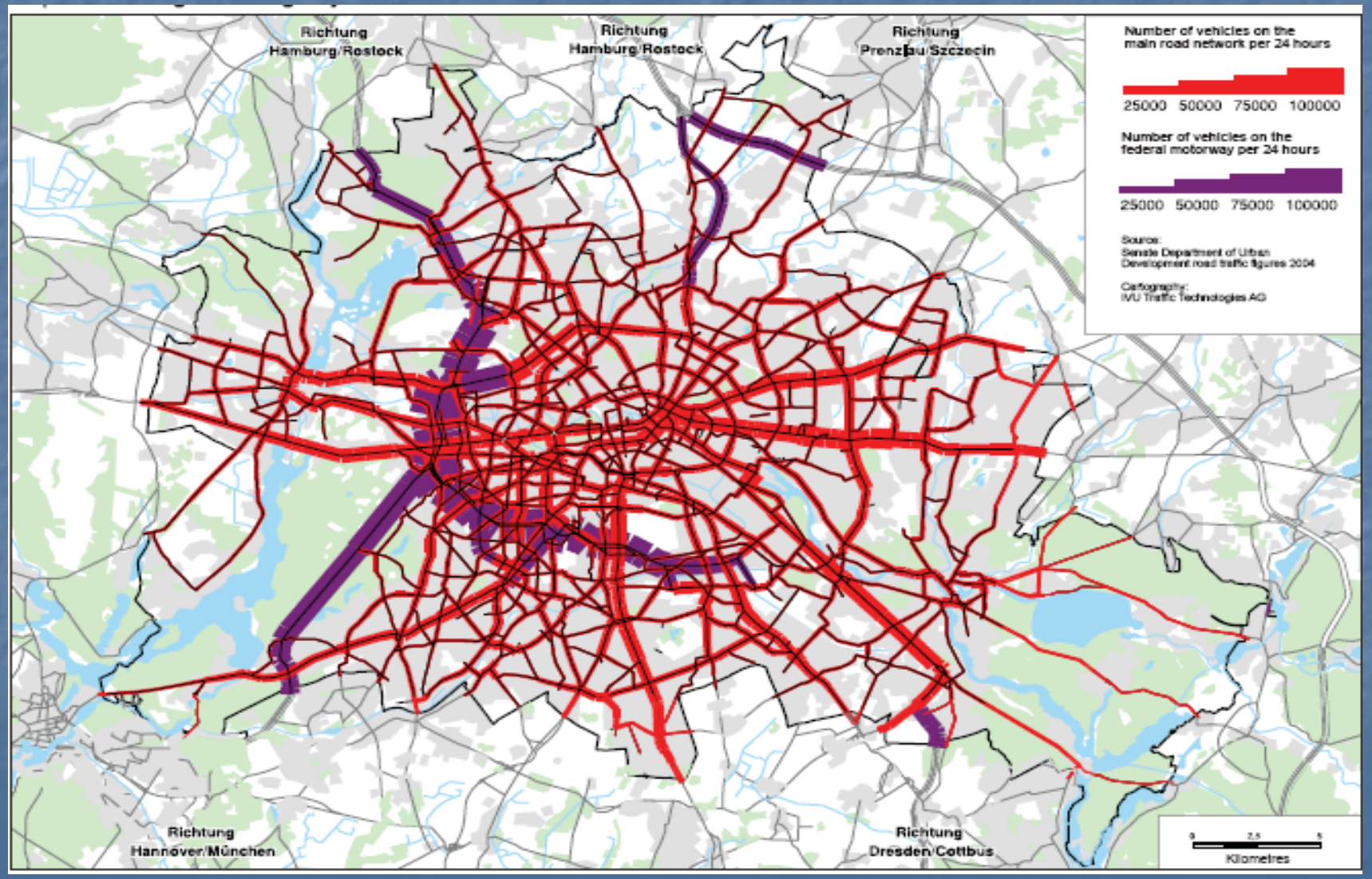


Figure 2-5: Proportion of vehicles on the Berlin roads in 2004

INFERENCE FROM THE STASTICAL DATA



Mumbai transport system

Mumbai transportation

Roads:

- The road length in Mumbai is about 2000km, comprising about 1950km of MCGM maintained road and about 50km of state highways
- All the roads in city are surfaced in which 17.5% concretized and reaming black topped.

Types of road surface	Island city (km)	Western suburbs (km)	Eastern suburbs (km)	Total (km)
Concrete	115.747	127.663	107.413	350.823
Block topped	390.721	799.990	399.638	1590.349

Public transport operations in mumbai(2002-03)

Road –based public transport:

- Buses service over 42 % of the average daily traffic operated BEST.
- The average trip length by bus is about 5 to 6 km.
- About 25% of the total bus trips are feeder trips to the suburban railway system stations.

Rail based public transport:

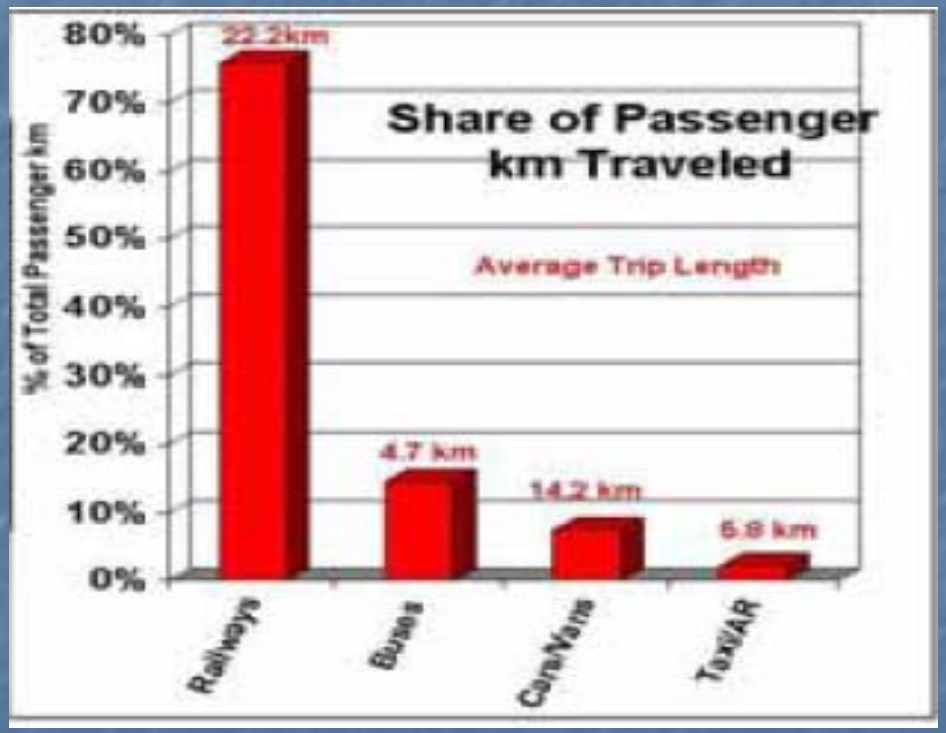
- The suburban railway systems operated by central and western divisions of Indian railways, Government of India cater to over 6 million one-way passenger trips per day.
- The total passenger traffic in suburban rail system of Mumbai has increased six-folds since its inception, while capacity has been augmented by only about 2.3 times.

Public transport operations in mumbai(2002-03)

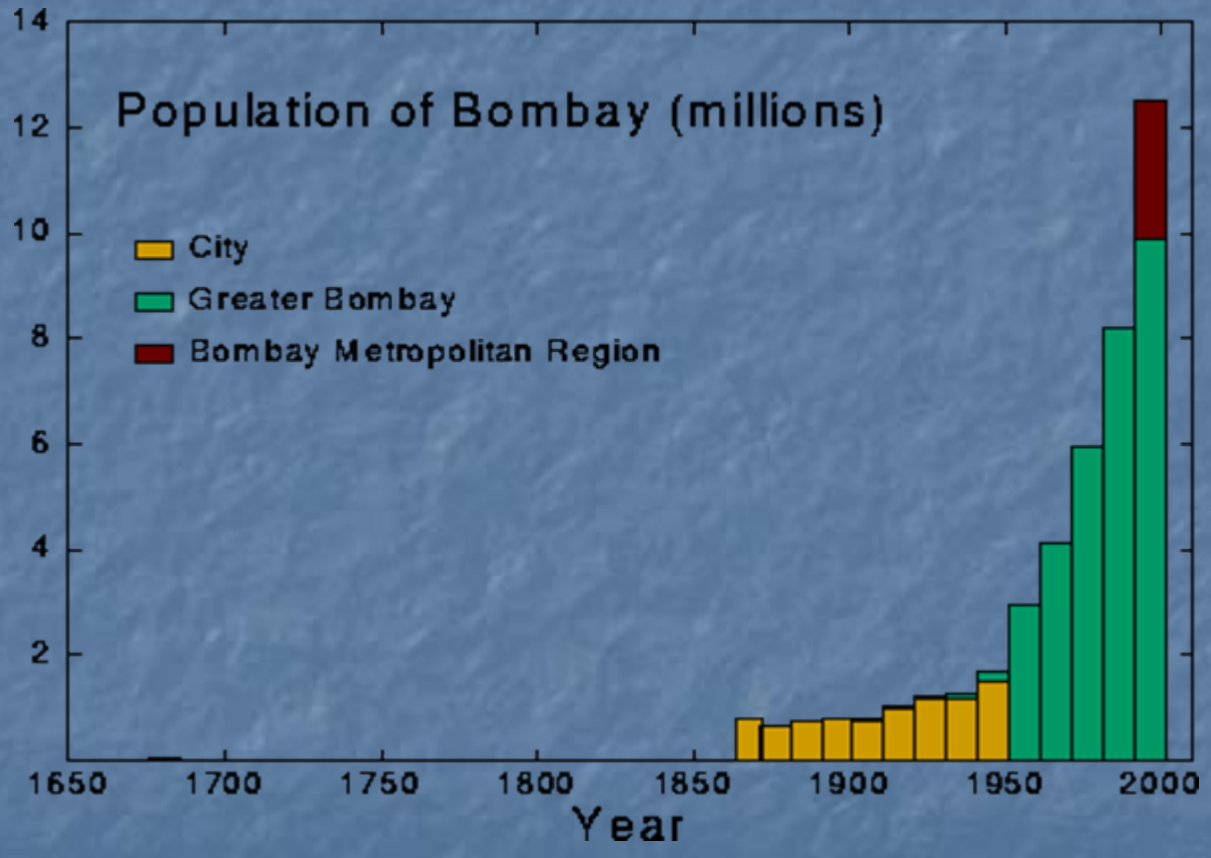
Intermediate public transport:

- Average trip lengths of about 3 to 5km.
- Majority of the taxi cabs(99%) are of the premier make, which is off the production line these days the average age of the taxis on road is about 12 years.

Trip length


Share of Passenger km Traveled
Average Trip Length
% of Total Passenger km
80%
70%
60%
50%
40%
30%
20%
10%
0%
22.2km
4.7 km
14.2 km
5.9 km
Railways
Buses
Cars/Vans
Taxi/AR

population


Population of Bombay (millions)
City
Greater Bombay
Bombay Metropolitan Region
14
12
10
8
6
4
2
1650
1700
1750
1800
1850
1900
1950
2000
Year


Mumbai
City Map
N
Vasai Creek
NH8
Ulhas River
Bhayandar
Uttan
Thane West
Dahisar East
Dahisar West
Borivali West
Borivali East
Patlipada
Essel World
Manori Creek
Borivali West
Sanjay Gandh National Park
Thane Brihan Mumbai
Thane West
Manori
Kandivali West
Kandivali East
Thane West
Ulhas River
Sai Nagar
Tulsi Lake
Marve
Malad West
Malad East
Kalyan
Thane East
Film City
Mulund East
Erangal
Malad Creek
Goregaon West
Western Express Highway
Goregaon East
Viher Lake
Mulund Airoli Road
Versova
Jogeshwari West
Bhandup East
Andheri West
Jogeshwari East
Powai Lake
Powai
Vile Parle West
Andheri East
Vikhroli West
Kopar Khairane
ARABIAN SEA
Vile Parle East
Juhu
Airport
Ghatkopar West
Vikhroli East
Thane Creek
Santacruz West
Santacruz East
Kurla West
Ghatkopar East
Vashi
Khar West
Bandra East
Govandi
Bandra West
Kurla East
Chembur
Mahim
Sion
Anushakti Nagar
Navi Mumbai
Matunga West
Shastri Nagar
Trombay
Dadar West
Prabha Devi
Dadar East
Worli
Parel
Brihan Mumbai Navi Mumbai
Tardeo
Harbour
Butcher Island
Nhave
Elephanta Island
Kalbadevi
Malabar Hill
Raj Bhavan
Church Gate
Back Bay
Nariman Point
Gateway Of India
ARABIAN SEA
Cuffe Parade
Colaba
Oyester Island
Major Roads
Railway Line
Airport
Map not to Scale
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Features of Mumbai public transportation system

- The travel demand in Mumbai is estimated to be about 20 million person trips per day, next only to delhi(22 million ptpd) in India.
- About 85 percent of the total trips are carried out through mass transport systems.

Public transport operations in mumbai(2002-03)

SI	Mode of public transport/operator	Daily passengers	Passenger kilometers
1	Western railways entire MMR)	2,856,235	75,244,186
2	Central railway entire MMR)	2,785,460	89,187,115
3	Best	4,275,000	27,909,863
	total	9,916,695	192,341,164

Mumbai transportation

Type of bridges	Numbers
Flyovers	11
Road over bridges	47
Bridges	104
Foot over bridges	68

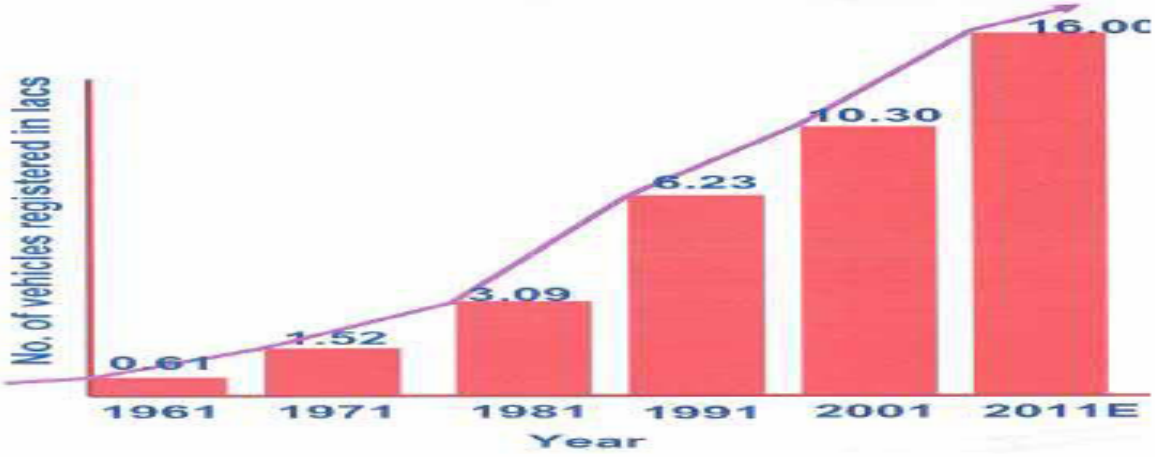

Figure 3-2: Vehicular growth choking the road corridors

The vehicular growth in the in the last 4 decades increased from 0.06 to1million.

Though the number of vehicles registered is less compared to other metropolitan cities.

Due to its geographical constraint.

The road net work expansion could not keep pace with demand.

Over Burdened transport system

- Mumbai city due to its geographical constraints has extended in a linear manner.
- Due to the residential locations being pushed north wards.
- Present population is about more than 15 millions.
- About 88% of the total trips catered by suburban rail way and public transport bus services.
- Average lead being 22.15kms for rail and 4.67kms for buses.

Congested traffic

- Suburban rail traffic increased by 6 times while the capacity increased by only 2.3 times.
- The commuters are subjected to most severe over crowding in the world with 9 car rakes carrying over 4500 passengers at 11 to 13 persons per sq.m against normal capacity of about 1750 passengers.

Congested traffic

Figure 3-1: Heavy congestion in rail during peak hours

Key issues

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- Traffic density during peak hours in some areas of the city is so high that the average speeds climbing down to as low as 6 to 8 km per hour.

- Inadequate capacity of existing arterials linking the CBD of greater Mumbai to the rest of MMR –the existing arteries, viz. eastern and western express highways are proving inadequate for the increasing traffic volumes. there is a need to enhance the capacities of these arterial roads and also to identify and develop alternate routes modes of public transportation to cater to the growing traffic demands.

- poor riding surfaces in internal roads, especially post monsoons every year, necessitating prompt routine maintenance.
- Traffic bottlenecks in the form of narrow right of ways, choking intersections, etc.
- Resulting in slow traffic and environmental pollution.

Future planned proposals by Government of Maharashtra

- **Mumbai urban transport project (MUTP):** project covers road and rail components and is being implemented under world bank funding. The thrust of the project is to improve suburban rail system with moderate investments in bus fleet augmentation, construction of rail over bridges and pedestrian grade separators and station area traffic improvements.
- **Mumbai urban infrastructure project (MUIP):** It envisages strengthening and widening of existing roads.
- **Mumbai metro rail project:** To augment the suburban rail system capacity by constructing about 146 km of additional rail network.
- **Mass rapid transit system:** For a length of about 64km about at enhancing public transportation capacity.
- **Development of western sea link:** A north –south link connecting worli end of Bandra – worli sea link now under construction to Nariman point with a dispersal link connecting Cuffe parade. The alignment runs as a major sea bridge about 13.75 km long, abutting the western shoreline at about 150 to 200 meters.

Future planned proposals by Government of maharashtra:

- **Development of freeways:** Eastern freeway, Eastern Express Highway, Western Express Highway and link road.
- Urban reengineering of sion - panvel Highway.
- **Development of Mumbai trans harbor link (road and rail):** To augment the capacity of arterials linking greater Mumbai to the rest of MMR
- phase 1: bridge from Sewree to Nava sheva (22km).
- Phase 2: broad gauge double track fro Sewree to Nhava sheva.
- Development of truck terminus at wadala with an inter-state bus terminus.
- **Passenger water transport:** During the past two decades the existing rail and road corridors in Mumbai have become highly congested and the traffic levels having reached saturation conditions requiring immediate measures to augment capacity of transport system. passenger water transport facility is envisaged to go a long way in relieving pressure on the other wise over loaded commuting systems operating in Mumbai. The objective of the proposed water transport system is to provide alternative mass transport system on sustainable basis at an affordable cost to the passengers.

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RECOMMENDATIONS AND CONCULUSION

The proposal of Government of Maharashtra has the following draw backs:

- No segregation of traffic.
- No implementation of GIS OR GPS system.
- No dedicated lanes for public transport .
- No encouragement for bicycles routes.
- No integration of road and rail transport.

In view of the above drawbacks, it is expected that the proposals will increase private transportation and decrease use of public transportation. in future this will lead to the saturation of the proposed facilities as well . This will lead to more transportation problems. So we suggest that features of Berlin transportation system should be incorporated in the proposals.

Thank you