Chapter - XI

Decentralised Mass Transport Planning, Critical Appreciation of the Policies and Conclusion
11.1. Introduction:

The city of Kolkata is gradually emerging as a polycentric urban structure that requires gradual expansion of urban mass transport services to ensure balanced and sustainable growth. The urban fabric of Kolkata exhibits a steady state mass transport flow more in the city centre than the peripheral areas. The early decentralized urban development plans are still struggling to keep pace with the growing demand for mass transportation in the peripheral urban centres (Asri, D. M., 2005). Considering the past and extant growth trend of major travel generating parameters like – population, economic activities and land uses, it is now of utmost requirement to generate mass transport services with Mass Rapid Transit Systems (MRTS) in order to develop an integrated and fast transportation network within the Kolkata Metropolitan Area (KMA) for intense interaction with its hinterland. Surprisingly the present decentralized traffic strategy of expansion of rail, road and water ways to cater to both the CBD and outer urban nuclei zones is showing a unique paradox. Individually bus, tram, ferry and metro services in the city core area represent a clear distance decay pattern from the CBD zone whereas in the greater Kolkata area the sub–urban railway and some irregular bus services barely connect and balance the decentralized urban growth for the majority of the passengers. In this context, a detailed study should be made on assessing future population growth and travel demand pattern in greater Kolkata and its peripheral regions and whether proper availability of mass transport services helps in maintaining normal urban expansion process.

11.2. Urban Expansion Pattern in KMA Region and Associated Plans by KMDA:

The Kolkata Metropolitan Area (KMA) that extends over 1851 sq. km. is essentially the metropolitan outfit of the city of Kolkata. Kolkata Metropolitan Area is identified as a conurbation having a linear pattern along the east and west bank of river Hooghly. The rural areas are lying as a ring around the conurbation and act as protective green belt. This greater Kolkata consists of three Municipal Corporations and 38 Municipalities, 77 non-municipal urban areas or census towns, 16 out growths and 445 rural areas. The Kolkata Municipal Corporation is the largest urban component with 11.07 percent of total land area and 31.79 percent of population of KMA in 2011.

From 2001 to 2011, the city of Kolkata exhibits a negative population growth rate mainly due to occurrence of a counter-urbanization process from core city to the peripheral suburbs. This process is the cumulative effect of continuous rise in land price, high congestion, urban pollution etc. in the city core and comparatively low land price, open space, less environmental pollution, availability of urban amenities etc. in the suburban areas. While the core city still has maximum urban facilities and intense urban functions, people are more interested to stay away from the hearth of the city and prefer to commute if required. A strong inclination to reside in the peri-urban zone with all modern living facilities in multi-
storied buildings is observed in the young generation couples and in case of first generation migrants. Development of new industrial and IT Hubs, opening of new Townships, expansion and improvement of road network, provision of better urban amenities like drinking water, sanitation and sewerage facilities, waste disposal facilities etc., presence of shopping malls and other recreational centres, well known schools, colleges and Universities etc. attract people to inhabit in the suburban areas. The population growth pattern in the last decade exhibits a strong positive trend in the peripheral areas than in the core city (Table 11.1).

Table 11.1 Decadal Population Growth Rate Pattern in Municipalities and Municipal Corporations (2001-2011)

<table>
<thead>
<tr>
<th>Decadal Growth Rate in percentage (2001-2011)</th>
<th>Number of Municipalities and Municipal Corporations</th>
<th>Name of the Municipalities and Municipal Corporations</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.00 - 50.00</td>
<td>1</td>
<td>Rajarhat- Gopalpur</td>
</tr>
<tr>
<td>30.00 - 40.00</td>
<td>1</td>
<td>Bidhannagar</td>
</tr>
<tr>
<td>20.00 - 30.00</td>
<td>4</td>
<td>Rajpur - Sonarpur, Madhyamgram, Barasat, Kalyani</td>
</tr>
<tr>
<td>10.00 - 20.00</td>
<td>6</td>
<td>Baidyabati, Bally, Maheshtala, Baruipur, Dum Dum, North Dum Dum</td>
</tr>
<tr>
<td>0.00 - 10.00</td>
<td>19</td>
<td>Hooghly - Chinsurah, Chandernagore Municipal Corporation, Champdani, Rishra, Konnaagar, Uttarpura - Kotrong, Howrah Municipal Corporation, Uluberia, Pujali, Budge Budge, South Dum Dum, Kamarhati, Panihati, Barrackpore, North Barrackpore, Garulia, Naihati, Halishahar, Gayeshpur</td>
</tr>
<tr>
<td>-10.00 - 0.00</td>
<td>9</td>
<td>Bansberia, Bhadreswar, Serampore, Kolkata Municipal Corporation, New Barrackpore, Baranagar, Khardah, Titagarh, Kanchrapara</td>
</tr>
<tr>
<td>-20.00 - -10.00</td>
<td>1</td>
<td>Bhatpara</td>
</tr>
</tbody>
</table>

*Data Source:* Census of India and West Bengal, 2001 and 2011

The spatial variations in population growth pattern of the Municipalities and Municipal Corporations represent that except 10 urban centres all the remaining 31 centres have experienced positive urban growth. Maximum growth is observed in Rajarhat - Gopalpur municipality (48.21 percent) due to the formation of New Town and IT industrial hub. Due to the growth of sector V (Nabadiganta) as IT hub in Salt Lake area, a significant population growth has been noticed here. Apart from these two municipalities, five municipalities in North 24 Parganas exhibit population growth above 10 percent. Majority of the municipalities have population growth between 0 to 10 percent whereas most of the municipalities located in the northern part of KMA show negative population growth. Noticeably, municipalities adjacent to KMC and Baranagar municipality, have high population growth rate which reveals that people are interested to stay near the core city and commute daily for various purposes (Fig 11.1).
The entire KMA region is now expanding at a rapid rate due to certain reasons, like:

- It is acting as a national centre of economic activities like industry, trade and commerce
- It is acting as the main centre of capital market for the entire eastern region
- It is functioning as a very important regional, national and international node for traffic and transportation for both passengers and goods
- It is providing the location for regional head quarters for several central government organizations
- It is acting as the nerve centre for higher education, specialised health services, cultural and recreational activities
- It is providing a principle centre for the eastern region as well as of the nation for utilization of human potential in high technology and modern methods of research and development and
- It is acting as the gateway of international tourist traffic from South East Asia.

The decentralised urban growth can also be assessed from the distance decay analysis in relation to existing and future urban growth pattern (Bobrovitch, D., 1982). To determine the future potentials of urban population growth, ‘spread effect analysis’ has been conducted based on the last ten years’ population data in each of the 38 Municipalities and three Municipal Corporations, which is derived as —

\[ \text{Index of Spread Effect} = \left( \frac{P_{G_H}}{P_{G_M}} \right) \times 100\% \]
where, $\text{PG}_H = \text{annual rate of passenger growth in the hinterland, and}$

$\text{PG}_M = \text{annual rate of passenger growth in the Metro city.}$

From the core city four distance zones have been delineated with 15 km radius to identify the degree of clustering of urban centres away from the core city. Noticeably it is found that maximum urban centres (18 municipalities) are located in the 15 -30 km radius zone whereas the immediate zone of the core city has only 10 urban centres. That is mainly due to urban dominance concentrated in the core city. The third (30 - 45km) and fourth (45 - 60 km) distance zones have comparatively low urban centres viz. 8 and 5 municipalities respectively. While the spread effect of the urban centres have been superimposed on the distance decay map of KMA (Fig 11.2), it is found that within the immediate distance zone two centres have maximum potentials for future urban growth with highest spread effect values. These are Rajpur - Sonarpur Municipality in South 24 Parganas district and Dum Dum Municipality in North 24 Parganas district. Most of the urban centres have spread effect value ranges from 0 to 10 and are concentrated in the third zone and only one municipality i.e. Garulia has negative spread effect (Table 11.2).
Table 11.2 Pattern of Decentralised Urban Centres

<table>
<thead>
<tr>
<th>Distance Zones in km from KMC</th>
<th>No. of Urban units</th>
<th>Spread Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&gt;20</td>
</tr>
<tr>
<td>0 – 15</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>15 – 30</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>30 – 45</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>45 – 60</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Derived by the author

It is evident that Kolkata is gradually expanding in terms of population and urban centre growth. Considering the rapid rate of urban growth, the entire KMA region is categorised into four urban centres by KMDA (Table 11.3).

Table 11.3 Proposed Metropolitan Structure of the KMA Region

<table>
<thead>
<tr>
<th>Spatial Units</th>
<th>Number</th>
<th>Name of the Centres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metro Centre</td>
<td>1</td>
<td>Kolkata</td>
</tr>
<tr>
<td>Metro Sub-Centre</td>
<td>1</td>
<td>Howrah</td>
</tr>
<tr>
<td>Trans Metro City System</td>
<td>5</td>
<td>Kalyani, Barasat, Salt Lake - Rajarhat, Baruipur, Uluberia - Bagnan</td>
</tr>
<tr>
<td>Major Centres</td>
<td>15</td>
<td>Dankuni, Sonarpur, Naihati - Bhatpara, Barrackpore, Baranagar - Kamarhati, Dum Dum - South Dum Dum, Garia - Jadavpur, South Suburban, Budge Budge - Maheshtala, Kona - Unsan, Bally - Jagachha, Serampore, Bhadreswar - Champdani, Hooghly - Chinsurah, Bansberia</td>
</tr>
</tbody>
</table>

Source: Master Plan of Traffic and Transportation in KMA, 2001 - 2025

There is also a plan to develop 14 new settlement areas and New Townships based on the rate of urban growth, these are - Bansberia, Chandernagore, Baidyabati, Dankuni, West Howrah, Sankrail - Abada and Bauria on the west bank and Bhatpara, Barrackpore, Nata Gachhi, Bon - Hooghly, Jagadishpur, South Suburban and Maheshtala on the eastern bank of river Hooghly. Here emphasis is given on the urban development of both the western part and southern part of KMA region (Fig 11.3).

There have also been signs of structural changes in the economy of KMA with the share of Primary sector falling and those of Secondary and Tertiary sectors increasing. Both the Secondary and Tertiary sectors of KMA had exhibited remarkable growth in SDPs in the period between 1993-94 and 2001-02. Manufacturing industries and construction activities constitute the core of secondary sector activities in this metropolitan area. The manufacturing industries within KMA have not only laid the foundation of economic strength of the state but also hold the key to a healthy economic future of the metropolis. Till now eight industrial parks have been developed in KMA and there are six other proposals for industrial growth centres. The existing industrial parks are leather complex, cement and garment park in south eastern part, Food Park, Foundry Park, Chemical Park, Industrial Park and Apparel Park in...
south western part and Rubber Park in western part. The proposed industrial growth centres will be located at Kalyani in Nadia, Champdani and Dankuni in Hooghly, Uluberia in Howrah, Barasat and Rajarhat n North 24 Parganas (Fig 11.4).

Hence, it is quite obvious that Kolkata city is expanding and people are moving outside the city boundary. The suburban zone of the Kolkata city has been developing at a significant rate and exhibits a mixed land use pattern with simultaneous growth of residential and economic functions.
11.3. Critical Assessment of Road Transport Development Plan in KMA Region by KMDA:

Despite such urban industrial growth, the road transport development scenario is quite poor here. The existing highway and street network within KMA is inadequate. The total road length of the highways and arterial roads within KMA was estimated to be about 500 km of which 400 km is in Metropolitan Centre and 100 km in the rest of the metropolis. The existing street and highway network may be categorised into two groups viz. Metropolitan Highways and State Highways and district roads connecting Hinterland and major arterial roads. There are plans regarding development and expansion of new Highways and construction of new arterial roads. The details of the existing roads are given in table 11.4.

Table 11.4 Existing Major Roads of the KMA Region

<table>
<thead>
<tr>
<th>Metropolitan Highways</th>
<th>State Highways and District Roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madhusudan Banerjee Road</td>
<td>Diamond Harbour Road</td>
</tr>
<tr>
<td>Barrackpur – Barasat Road</td>
<td>Garia – Sonarpur Road</td>
</tr>
<tr>
<td>Barrackpore Trunk Road – Ghoshpara Road</td>
<td>Benaras Road</td>
</tr>
<tr>
<td>Eastern Metropolitan By Pass</td>
<td>Dhaniakhal Road</td>
</tr>
<tr>
<td>Andul Road</td>
<td>Talpukur Road</td>
</tr>
<tr>
<td>Kazi Nazrul Islam Avenue</td>
<td>B. N. Dey Road</td>
</tr>
<tr>
<td>Cossipore Road</td>
<td>T.N. Mukherjee Road</td>
</tr>
<tr>
<td>Dum Dum Road</td>
<td>Sonarpur – Chakberia Road</td>
</tr>
<tr>
<td>Sodepur Road</td>
<td>Bandel – Polba Road</td>
</tr>
<tr>
<td>Budge Budge Road</td>
<td>Barasat – Taki Road</td>
</tr>
<tr>
<td>Barrackpore–Kalyani Expressway</td>
<td>Howrah – Amta Road</td>
</tr>
<tr>
<td>G.T. Road</td>
<td>Tarakeswar Road</td>
</tr>
<tr>
<td>Kona Expressway</td>
<td>Budge Budge Road</td>
</tr>
<tr>
<td>Foreshore Road (Howrah)</td>
<td>Lauhati Road</td>
</tr>
<tr>
<td>Jessore Road</td>
<td>Amtala Road</td>
</tr>
<tr>
<td>Krishnarampур Road</td>
<td>Kanchrapara – Haringhata Road</td>
</tr>
<tr>
<td></td>
<td>Hatalsal – Amta Road</td>
</tr>
<tr>
<td></td>
<td>Serampur – Antpur Road</td>
</tr>
</tbody>
</table>

Source: Master Plan of Traffic and Transportation in KMA, 2001 - 2025

The existing National Highways, Metropolitan Highways and major Arterial roads in KMA run mostly in north - south direction. To connect these north - south corridors and to serve the functions of a by-pass road avoiding the congested stretches of the north - south road network mostly within the metro-core area, the proposed ring road system consisting of Belghoria Expressway, Eastern Expressway, Southern Expressway, Bauria Connector, N.H.6 and Vivekananda Setu with approaches has been envisaged. There are nine proposed metropolitan highway networks in KMA region, viz. Belghoria Expressway, Dum Dum - Barrackpore Expressway, Eastern Expressway, Southern Expressway, Budge Budge - N.H. 6 Connector, Western Riverfront Expressway, Serampore - Barrackpore - Barasat Expressway, Chandernagore - Bhatpara Connector and Extended Belghoria Expressway (Fig 11.5).

The major proposed arterial roads in KMA region are as follows - Kamalgazi-Baruipur road, Pailan Jagadishpur road, Thakurpukur - Budge Budge road, Sankrail connector, Mukundapur - Chakberia road, Maheshtala connector, Central Howrah Arterial road, Sodepur connector, Rajarhat connector, Saltlake connector, Ballygunj connector, Mallickpur - Garia road, Barrackpore – Gayeshpur road, Kudghat Amtala road, Baidyabati – Mogra road, G.T. road - Delhi road connector at Chandanagar, Halisahar connector, Balidagahta - B.K.Expressway, BD Expressway-Old Kolkata road, Budge Budge Bypass and
Elachi-Pailan Road (Fig 11.6). There is also a proposal for construction of arterial roads in the metro core. These are Belgachia road - Ultadanga road connector, Extension of Central road, extension of Howrah Drainage Canal road, Moulali EMBP connector, D.H. road - D.S. road along boat canal, Howrah Drainage canal road up to Andul road, River front road in Howrah, Grand Foreshore road extension, Road connecting VIP.Road - Jessore road, B.T. road along Bagjola canal, D.H. road - D.S. road connector, Central Howrah arterial road, Drainage canal road, NH-6 connector, Southern Avenue & P.A Shah. road connector, extension of Lenin Sarani, Gobindo Khatik road extension to Canal East Road, River Front road in Kolkata.

Although the entire KMA region is connected by a well developed road system, but still the gap between KMC and rest of the KMA region is quite significant considering the road concentration pattern. For the assessment of spatial variation in road development in the entire KMA region, grid-wise road density is measured in relation to the spread effect of the urban centres (Fig 11.7). Despite rapid urban
growth in the KMA region, the core urban space still has maximum road density covering parts of KMC, Howrah Municipal Corporation (HMC), Baranagar, Konnagar, Uttarpara, Bally and Kamarhati. But this region does not have any further potentiality to grow; rather over urbanization often creates severe urban transport problems here. Apart from the extreme peripheral areas in almost all the directions except in south, the entire KMA region has moderate road density level with two urban centres with maximum potentials for future urban growth. Hence for the fullest utilization of spaces in KMA for urban expansion, emphasis should be given on the road network development.

11.4. Critical Assessment of Mass Transport Development Plans in KMA Region by KMDA:

The Surface Mass Transport System in KMA consists of the Buses, Mini Buses, and Trams. The Bus services are operated by both public sector agencies as well as private owners. The Bus services in KMA under the public sector are operated by the Calcutta State Transport Corporation (CSTC), West Bengal Surface Transport Corporation, Calcutta Tramways Company (CTC). In the year 2010-2011, the public sector agencies in KMA operated daily about 1460 Buses carrying a daily passenger volume of 38 lakhs. The private Bus operators operated about 6,000 Buses daily in the same year carrying an average daily passenger volume about 104 lakhs. The Mini Buses are also operated by private owners and in the year 2010-2011 about 1250 Mini Buses were operated daily, carrying a passenger volume of about 16 lakhs within the KMA. A number of Chartered Buses are operating within the KMA area on non-scheduled routes and are becoming popular particularly to the office going population. In 2010-2011 about 1200 Chartered Buses operated in KMA area carrying about 2.5 lakh passengers per day.

After delineating the routes of each bus route in the KMA region, a striking regional imbalance has been noticed between the core city i.e. KMC and the rest of the outer urban space. Maximum concentration of private and public bus routes have been observed in the south central parts consisting of KMC, HMC, Maheshtala, Sonarpur, Konnagar, Uttarpara.
and Bally region (Fig 11.8). These areas have high road density too which supports the incoming urban passengers from the outer spaces either within or outside the KMA region. This high route density zone covers only eight municipalities with moderate level of spread effect.

The situation can be illustrated further by showing the bus frequency map of KMA (Fig 11.9). Maximum availability of buses is observed in the south central part covering KMC and HMC. The extreme northern part of KMA has least bus frequency although this region has been experiencing huge urban growth. Similar condition is noticed for the south western part covering Uluberia, Budge Budge, Pujali and Maheshtala municipality and in the extreme south eastern part covering Baruipur municipality. All of these municipalities have spread effect value ranges from 0 to 20.

In this context the Calcutta Metropolitan Development Authority prepared a Master Plan for the improvement of mass transport services in KMA region. The major recommendations in respect of the upgradation of bus and tram transport are mentioned below.
11.4.1. Bus Transit Development Plan in KMA by KMDA:

- Coordination and control by a single authority for the bus services within KMA covering all the aspects starting from new routes, requirement of new fleet and replacement of old buses.
- Development of major infrastructure like roads, terminals, depots and workshops.
- Introduction of Express Bus routes connecting major centres within KMA which are not served adequately by existing bus and rail network.
- A hierarchy of bus terminals will be developed within KMA comprising Outer Ring Terminals, Intermediate Terminals, Inner Ring Terminals and Central Terminals. The proposed functions of these terminals with locations are given in table 11.5.

**Table 11.5 Details of Proposed Bus Terminals in KMA, 2011**

<table>
<thead>
<tr>
<th>Types</th>
<th>Functions</th>
<th>Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer Ring Terminals</td>
<td>Accommodate buses and mini buses originating from the peripheral areas of KMA. The average area of each terminal would be 1 - 1.5 acre.</td>
<td>Kalyani, Bhatpara, Barrackpore, Barasat, N.S.I., Airport, Rajarhat, Dhapa, East Calcutta, Garia, Thakurpukur, Maheshtala, Garder Reach, Budge Budge, Bauria, Andul, Kona, Bally, Dampune, Serampore, Chandernagore, Chinsura, Bansberis, Pujali, Baruipur and Uliberia</td>
</tr>
<tr>
<td>Intermediate Terminals</td>
<td>Accommodate the buses from the adjoining areas of KMA as well as the routes serving the local areas and intra-city routes. Average size will be 2 - 2.5 acre.</td>
<td>Nagerbazar, Bengal Chemical, Dhakuria, Santoshpur, Jadavpur, Chetla, Behala, Dakshineswar and Bally Khal.</td>
</tr>
<tr>
<td>Inner Ring Terminals</td>
<td>Accommodate mostly the private bus and mini bus routes operating within the metro core area. The average area of each terminal would be 1 - 1.5 acre.</td>
<td>Shyambazar, Bagbazar, Ultadanga, Karunamoyee, Sealdah, Ballygunge, New Alipore, Khidderpore, Botanical Garden, Salkia, Dum Dum Station, Shalimar, Vidyasagar Setu.</td>
</tr>
<tr>
<td>Terminals in Central Area</td>
<td>Accommodate mostly city and long distance bus routes.</td>
<td>Esplanade, Babughat, Howrah Station and Sealdah Station.</td>
</tr>
</tbody>
</table>

*Source: Master Plan of Traffic and Transportation in KMA, 2001 - 2025*

- Rationalization of private and mini bus routes should be taken into consideration in accordance with passengers’ demand and available infrastructure.
- For generating revenue apart from ticket sale, bus transport planners give emphasis on mobile advertisement on the body of both bus and trams. Even air conditioned buses use their window space for advertisement. This is a profitable source of income generation which is given thrust in recent days.
- The Kolkata Bus Rapid Transit System (BRTS) project was taken up by KMDA. Beginning at Ultadanga, the route will cover 15.5 km running along the E M Bypass to Garia. The route will cover places like Ultadanga, the Manicktala access to E. M. Bypass, Apollo Hospital, Narkeldanga, Salt Lake stadium, Beliaghata, Chingiriha, Metropolitan junction, Mathpukur, ScienceCity, Panchananagram, VIP Bazar, Tagore Park, Ruby...
Hospital, Mandir Para, Prince Anwar Shah Road, Singhabari, Mukundapur, Ajoynagar, Peerless Hospital, Vaishnavghata-Patuli, Dhala Bridge and Kumarkhal. Key junctions include Chingrihata, Paroma Island, Ruby Hospital and Prince Anwar Shah Road. The speed design for the BRTS corridor is proposed to be around 50 km/h. The project is under construction and was initially planned to be completed by 2013. But till date (July 2015) not much work has been done. It is not expected to be over before 2018. Like typical government projects, its status is not made public. On the contrary, 17 cities in India are now under the scheme of BRT system as implemented mostly by PPP model. 10 of the 17 are being funded through JNNURM (Table 11.6).

Table 11.6 City-wise Proposed BRTS Service Length Coverage, 2011

<table>
<thead>
<tr>
<th>City</th>
<th>BRTS km (Planned)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pune</td>
<td>101.77</td>
</tr>
<tr>
<td>Pimpri Chinchwad</td>
<td>42.22</td>
</tr>
<tr>
<td>Indore</td>
<td>11.45</td>
</tr>
<tr>
<td>Bhopal</td>
<td>21.71</td>
</tr>
<tr>
<td>Ahmedabad</td>
<td>88.50</td>
</tr>
<tr>
<td>Jaipur</td>
<td>39.45</td>
</tr>
<tr>
<td>Vijaywada</td>
<td>15.50</td>
</tr>
<tr>
<td>Vizag</td>
<td>42.80</td>
</tr>
<tr>
<td>Rajkot</td>
<td>29.00</td>
</tr>
<tr>
<td>Surat</td>
<td>29.90</td>
</tr>
<tr>
<td>Delhi</td>
<td>121.00</td>
</tr>
</tbody>
</table>


Public Private Partnership (PPP) is the method in which public and private sector cooperate and partner with each other to provide infrastructure and / or improved public services. PPPs are increasingly becoming the preferred mode for construction and operation of mass transport infrastructure projects in various cities of India. PPPs are expected to augment resource availability as well as improve efficiency of infrastructure service delivery. Time and cost overrun in construction of PPP projects are also expected to be lower compared to traditional public sector projects. PPP gives an advantage of exploiting the management qualifications and the efficiency of the private sectors without giving up quality standards of output, owing to appropriate control mechanisms from the public sector. The core principle of PPPs lies in the risk allocation between the two parties. Considering all the aspects of PPP model, the transport planners of Kolkata city intended the JNNURM bus project and other cooperative projects for the introduction of Light Rail Transport Services (LRTS) in peripheral Kolkata. The functioning level of the STUs is deteriorating day by day due to financial constraints. On the contrary, there are potentialities to improve the existing road based mass transport system by involving the private sectors which have strong financial base but limited infrastructural facilities to expand their business. In this context, introduction of PPP model based bus and Tram transport system can improve the extant situation which fulfils public expectations and economic upgradation of the government sector. Hence the reasons behind involving private sector in mass transport development can be assessed as -
i. To create capacities - many urban transport authorities do not wish to create legacy systems which create direct and indirect liabilities that generally turn out to be costlier.

ii. To bring in efficiency, cost effectiveness and productivity - as it is known that private sector has better record in transport areas based on their focus on viability and presence of incentives.

iii. Given the right set of incentives, private players could respond effectively to the passenger demand and towards high system efficiency. The efficient transportation system would attract higher ridership, generate surplus funds and assure sustainability of the urban transportation system.

iv. In general, a sustainable project with Private Sector Partnership would allow the implementing agencies, especially Urban Local Bodies, to spare funds for other developmental works.

- The details of proposed bus terminal locations is given in fig 11.10 where the locations are identified as numerical numbers like -

<table>
<thead>
<tr>
<th></th>
<th>Proposed Bus Terminals of KMA, 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bansberia</td>
</tr>
<tr>
<td>2</td>
<td>Kalyani</td>
</tr>
<tr>
<td>3</td>
<td>Chinsura</td>
</tr>
<tr>
<td>4</td>
<td>Chandannagar</td>
</tr>
<tr>
<td>5</td>
<td>Serampur</td>
</tr>
<tr>
<td>6</td>
<td>Barrackpur</td>
</tr>
<tr>
<td>7</td>
<td>Barasat</td>
</tr>
<tr>
<td>8</td>
<td>Dankuni</td>
</tr>
<tr>
<td>9</td>
<td>Domjur</td>
</tr>
<tr>
<td>10</td>
<td>Dakshineswar</td>
</tr>
<tr>
<td>11</td>
<td>Shalimar</td>
</tr>
<tr>
<td>12</td>
<td>Andul</td>
</tr>
<tr>
<td>13</td>
<td>Vidyasagar Setu</td>
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11.4.2. Tram Transit Development Plan in KMA by KMDA:

The tram service may be continued on the routes where exclusive right of way for trams is available with modernization of track, overhead system and the rolling stock. The routes need not penetrate through the CBD and should preferably be shuttle routes for serving the Metro Rail corridors. The tram services along Rashbehari Avenue, Bidhan Sarani,
Arabinda Sarani, Diamond Harbour Road, Judge’s Court Road, Khidderpore road may be considered for this purpose.

A detailed study should be undertaken to examine the feasibility of replacing the present tram system by a Light Rail Transit System (LRTS) on some selected corridors to act as an intermediate mode of mass transit. The prospective routes of LRTS (Fig 11.11) are -

i. Along B.T.Road from Shyambazar to Dunlop bridge
ii. Along E.M.Bypass
iii. Along B.K.Expressway - Dum Dum Barrackpore Expressway
iv. Along Foreshore road in Howrah
v. Along Diamond Harbour Rod to Joka
vi. Along Kazi Nazrul Islam Avenue

11.5. Critical Assessment of Implementation of National Urban Transport Policy, 2014 in Kolkata:

Ministry of Urban Development, Government of India (MoUD) issued the National Urban Transport Policy (NUTP) in 2006, to bring about comprehensive improvements in urban transport services and infrastructure. The policy focus is on moving people rather than vehicles (Government of India, 2006). Eight years have passed since then and several new initiatives have been taken by MoUD to promote good mobility in cities. A revised NUTP based on the forgoing was presented to a panel of urban transport experts, a national workshop (with 75 participants) and a roundtable discussion (with 53 participants) for validating the recommended modifications to the policy. Various suggestions received at
these three conclaves have been included in a revised and reorganized NUTP 2014 to make it user friendly and easy to implement.

Considering all the various problems faced by the daily passengers, four basic visions and nine objectives have been taken up in the NUTP, 2014 policy. The visions are -

To recognize that people occupy centre-stage in our cities and all plans would be for their common benefit and well-being.

i. To make Indian cities most liveable in the world and enable them to become the “engines of economic growth” that power India’s development in the 21st century.

ii. To allow the cities to evolve into an urban form that is best suited for the unique geography of their locations and is best placed to support the main social and economic activities that take place in the city.

iii. To encourage growth of urban transport along low carbon path (Government of India, 2014).

Taking into account all these visions the objectives were made for the comprehensive urban transport development. These are -

i. Incorporating urban transportation as an important parameter at the urban planning stage rather than being a consequential requirement.

ii. Bringing about a more equitable allocation of road space with people, rather than vehicles, as its main focus.

iii. Public transport should be citywide, safe, seamless, user friendly, reliable and should provide good ambience with well-behaved drivers and conductors.

iv. Walking and cycling should become safe modes of urban transport.

v. Introducing Intelligent Transport Systems for traffic management.

vi. Addressing concerns of road safety and trauma response.

vii. Raising finances, through innovative mechanisms.

viii. Establishing institutional mechanisms for enhanced coordination in the planning and management of transport systems.

ix. Building capacity (institutional and manpower) to plan for sustainable urban transport and establishing knowledge management system that would service the needs of all urban transport professionals, such as planners, researchers, teachers, students etc.

Lots of planning and policies had been developed for improving the urban transport system but nothing has helped in reviving the entire scenario. Most of the cities in India have been facing severe mass transport related problems daily which becomes difficult to solve. In this context, a paradigm shift is needed in approaches to urban transport policies with three key strategies viz “Avoid, Shift and Improve” in transport planning as advocated by the Asian Development Bank. This means avoid increase in demand for travel both by reducing the number and length of trips, promote a shift from personal vehicles to other Mass Rapid Transit (MRT) and Non-Motorized Transport (NMT) modes to reduce energy demand and hence pollution in cities, and improve strategy which includes the use of clean fuels and clean vehicle technology.
In the subsequent section, these basic strategies of improvement of urban transport in Indian cities in the NUTP, 2014 are analysed critically and their applicability is assessed in case of Kolkata city.

11.5.1. Urban Transport Planning:

11.5.1.1. Integrated Land use and Transport Planning:

The urban transport planning is intrinsically linked to land use planning and both need to be developed together in a manner that serves the entire population and yet minimizes travel needs. To enable this, all urban development and planning bodies in the States would be required to have in-house transport planners as well as representation from transport authorities in their management. Planning should include both the city and the peri-urban areas and the regions around the city, which for legal purpose should be notified as local planning or metropolitan area. Compact cities, redevelopment of inner city areas, mixed land use pattern etc. are some of the urban growth policies that will restrict transport demand. But in Kolkata city, no proper assessment of land use pattern is done for new bus or tram routes or for the reorientation of the existing routes. Route overlapping in the central Kolkata and deficiency of bus routes in peripheral city has been a long term problem but the transport authorities have not given any importance to this issue so far.

11.5.1.2. Comprehensive Mobility Planning (CMP):

Mobility in the city depends on several elements that can be broadly grouped into three categories i.e. services and modes of urban transport, roads and related infrastructure and other related matters such as planning, coordination and licensing. All the elements complement and supplement each other and hence should be planned in an integrated way. The Government of India would financially encourage cities to prepare Comprehensive Mobility Plan for the city and prioritize projects for implementation. Till date the central government has only promoted the JNNURM buses and provided financial assistance in Kolkata which again has faced several existential problems. There are serious lacunae in the comprehensive mobility plan in Kolkata which would not help in sustenance of both bus and tram services along with the mass rapid transit system and sub-urban rail services within the city core.

11.5.1.3. Modal Mix and Priorities:

Urban transport (UT) modes to be used and the modal mix will depend on the city population, city form and size, availability of road surface and the trip length. Needs of all category of users have to be catered to. Priority in transport planning for modes should be given in descending order like walk and Non - Motorized Transport (NMT), public transport based on road, rail and waterways and lastly personal motorized transport. But not only in Kolkata, but in the entire country, gradual dominance of personalised vehicles poses a great threat on the existence of public transport and environmental conditions.

11.5.1.4. Transit Oriented Development (TOD):

The major element of TOD is a congregation of housing, jobs, shops, and other activities around public transport stations/stops. The physical environment is often enhanced
with wide sidewalks, an absence of surface parking lots and large building setbacks. Thus TOD includes planning for: more people to live close to transit services and to use it, a rich mix of land uses within walking distance of a public transport station/stop, pedestrian facilities and multi-modal connectivity with focus on moving people, making public transport station/stop a gateway to the community etc. In Kolkata, such TOD planning has been started in the suburban region such as in New Town area but this locality is still devoid of any proper bus transport linkage system with the core city. Noticeably this area does not have any other mode of public transport for regional connectivity. Majority of the passengers have to depend on their personalised vehicles.

11.5.1.5. Transport Demand Management (TDM):

There is a need to control the growth in transport demand because there is a limit to the augmentation of UT infrastructure and services. TDM constitutes a set of policies that influence why, when, where and how people travel. Commuters need to be made aware of the available sustainable alternate modes of travel. They should be made aware of quantifiable benefits or dis-benefits of opting for specific mode in terms of travel time, convenience, comfort, price and emission rates. TDM aims to maximize the efficiency of UT by discouraging necessity of private vehicle use and promoting more effective, healthy and environment friendly modes of transport. But majority of the passengers in Kolkata do not prefer Tram services as the concerned government has not so far encouraged people to travel by tramcars. Most of the roads in Kolkata are usually congested by private vehicles which have not yet been controlled by the transport authority due to political hindrances. In this context it becomes difficult to apply the TDM process in this city in a proper way.

11.5.1.6. Controlling the Use of Private Vehicles:

Use of personal motorized vehicles and its significant contribution to air pollution, greenhouse gas emissions and fossil fuel consumption are well known. But the main reason for increasing use of personal vehicles is the gross deficiency in Public Transport (PT) facilities both in terms of quality and quantity. Thus the most important long term means of controlling the use of personal transport is to augment PT so that the commuter has a choice. Simultaneously, there is an urgent need to put a restraint on the use of personal vehicles. Government of India would support measures such as traffic calmed areas, pedestrianized areas, car limited zones, congestion pricing zones, no-emission zones, high parking charges, park & ride facility and other economic instruments to control the use of personal motorized modes. But such initiatives have not yet been taken in Kolkata city by the concerned authority.

11.5.1.7. Participatory Approach:

Public participation in planning increases the likelihood that actions taken or services provided by public agencies reflect the needs of the people and are accepted / adopted by people easily. The Government of India would encourage participatory approach which should be practiced at all levels – at city, sub area of the city, and community level. This may be done through an interactive website, issue of documents for consultation, workshop with citizen, advisory groups, public meetings, user group meetings and social/satisfaction
surveys. Recently the transport planning department of Kolkata started such passenger perception study on the assessment of bus route viability in the city core.

11.5.2. Public Transport:

11.5.2.1. Planning for Mass Rapid Transit (MRT):

MRT occupies less road space and causes less pollution per passenger-km than personal vehicles. As such, MRT compared to personal vehicles is a more sustainable form of UT. Therefore, the Government of India would promote investments in MRT as well as measures that make its use more attractive. Cities with population of less than a million should plan MRT based on a mix of buses of various sizes. All cities would be mandatorily required to prepare an integrated operation plan which should be reviewed every 5 years to update and rationalize PT routes. KMDA had first prepared MRT plans in 1966 and eventually various plans were implemented in the form of metro railway services. At present the Kolkata metro rail provides services in a north-south bound route from Noapara to Kavi Subhash in New Garia within KMC. But there are further extension plans in another six routes (Fig 11.12) viz. -

- i. Line - II : East - West Metro from Salt Lake city to Howrah
- ii. Line - III : Joka - B.B.D.Bag Metro
- iii. Line - IV : Noapara - Barasat Metro
- iv. Line - V : Noapara - Dakshineswar Stretch
- v. Line - VI : Baranagar - Barrckpore Metro and

11.5.2.2. Common MRT Technologies:

There is a wide spectrum of MRT technologies. At one end are high capacity, high cost, technologies like underground metro rail and at the other end are low capacity para-transit running on a shared right of way. Between these extremes are a range of intermediate possibilities, such as city buses in mixed traffic, buses on dedicated rights of way/ Bus Rapid
Transit (BRT), light rail transit, monorail and specialized electric trolley buses. It is of utmost requirement for the West Bengal State Government to search for alternate viable options for public mass transport on roads and rail ways. The transport department of Kolkata already planned for LRT and BRTS but has not yet implemented them on the urban space.

11.5.2.3. Promoting Technologies for Public Transport Modes:

It is recognized that there are several proven technologies for PT around the world that have yet to be adopted in India. In order to build up the necessary capacity to adopt such technologies within the country, the Government of India would facilitate joint ventures and collaboration agreements between such technology providers and suitable Indian companies. Necessary incentives would be provided to enable such technologies to get commercialized in India. But such condition is far away in case of Kolkata city.

11.5.2.4. Multi - Modal Integrated MRT Network:

All modes should be integrated to provide seamless journey to the commuter. Such a multi-modal system will have least cost with best possible financial viability and hence affordability and sustainability. Multi-modal integration means all modes work in unison to provide seamless connectivity to commuters. Multi-Modal Integration is not limited to integration of buses with Metro rail. It includes integrating private modes of transport i.e. walk, cycle, cars and 2-wheelers and para - transit modes i.e. tempos, autos, mini bus and cycle rickshaw to the mass rapid transit network. The cities/states would also be encouraged to adopt National Common Mobility Card named “More” which should be a fare payment medium across different operators, different modes including parking, toll, etc. in all cities in India.

11.5.2.5. Quality and Pricing of PT:

Fares of road based public transport in Indian cities have been kept low as a measure of social equity. This has resulted in most PT services being unable to recover their operating costs. It has, in fact, encouraged poorly operated services that have been financially sustainable only through serious compromises on the quality of the service they render. The cost of providing PT for the poorer section needs to be subsidized by other sections of society. In the present day context, however, PT serves another social purpose. It helps reduce congestion and air pollution, if users of personal vehicles can be persuaded to shift to PT. Users of personalised vehicles value time saved and comfort more than price in most cases. This passenger section is comparatively better off and would shift to PT if high quality systems are available to them. The cost of providing PT to them need not be subsidized and can be met from the fare revenues. As such, the Government of India would encourage the provision of different levels of services – a basic service, with subsidized fares and a premium service, which is of high quality but charges high fares and involves no subsidy. In Kolkata already air conditioned Volvo buses have started plying in various areas to cater to comparatively well-off passenger section and earn revenue sufficiently. Further development of such bus services can be expected to reduce private car utilization in future.
11.5.2.6. Use of Clean Fuel and Clean Vehicle Technology:

While petroleum based fuels are most commonly used today, other alternatives such as bio-fuel have been emerging, though slowly. CNG has been adopted in a big way for bus transport in Delhi and some other cities. Electric trolley buses are an alternative. Electric, battery-powered, Hybrid vehicles have already entered the market for cars, two wheelers and auto rickshaws. Such clean technologies need to be encouraged so that the problem of vehicular pollution can be more effectively dealt with. The Government of India would, therefore, encourage research, development, commercialization and implementation of clean technologies, clean fuel and renewable sources of energy through financial support. There are plans for introducing Trolley buses in Kolkata but no such plan has yet been implemented here.

Apart from these above mentioned policies related to urban Mass transport system, there are other plans regarding improvement of overall transport system. These are mentioned briefly.

11.5.3. Traffic Management:

This includes Traffic engineering and management, safety and security issues, Intelligent Transport Systems (ITS), disposing old vehicles etc.

11.5.4. Urban Transport Infrastructure:

Infrastructural development encompasses improvement of road network, provision of road transport facilities, equitable allocation of road space, parking system etc.

11.5.5. Non - Motorised Transport (NMT):

Here emphasis has been given on identifying importance of NMT like walking and cycling, safety issues for these, viability of cycle rickshaws, promotions of NMT etc.

11.5.6. Financing Urban Transport:

Government of India encourages the financing of modern green and mass transport technology, utilization of land as a financial resource for transport development, association of private sectors with the public sector, development of Urban Transport Fund (UTF) etc.

11.5.7. Governance:

Mainly urban governance system helps in improving transport institutional framework, empowerment of the urban trafficscape, development of legislation that cover the requirements of urban transport comprehensively etc.

Hence for holistic urban transport development emphasis should be given on capacity building and research, development and technological upgradation in favour of mass transport system mainly on roads. Future sustainable mass transport development in any Indian city should need proper coordination between bus transport on road and metro service on rail line in a comprehensive way.
11.6. Major Findings:

• Among the eight Mega cities, Kolkata is experiencing the poorest bus services in comparison to existing demand pattern.

• The gap between the fleet strength of public and private buses is rapidly increasing in India and West Bengal. But in Kolkata the gap has been reduced in the last decade due to confiscation of 15 years old buses which were mostly private and also due to introduction of more CTC and WBSTC buses.

• Andhra Pradesh, Gujarat, Maharashtra, Tamil Nadu and Karnataka and Uttar Pradesh play significant role in operating public bus services whereas Rajasthan, Kerala, Madhya Pradesh, Himachal Pradesh, West Bengal etc. are not able to fully utilize their STUs economically.

• The strength and progress of STUs vary greatly among the states and Union Territories where peripheral states have been suffering from poor public bus sector development.

• All the STUs, formed earlier, have better conditions than the newly emerged STUs in India.

• It is difficult to combine public and private bus operation for coordinated transport services in Kolkata due to administrative problems.

• Despite implementation of Nationalization of bus services in Kolkata, the prevalence of private bus sector over the public sector is common in all the districts of West Bengal along with Kolkata.

• The actual degradation of bus service quality started since 1970s due to unequal competition between public and private sectors.

• 2001 – 2011 was the most vulnerable phase for bus services in Kolkata city. All the STUs have experienced declining status in case of fleet strength, route variety, total length run, passenger strength etc.

• Poor infrastructural setup is the main cause of service inefficiency that leads to deprived economic performance. For the improvement of infrastructural effectiveness, all the bus depots should increase utilization of working buses with high kmpl. Regular checking and replacement of condemned buses can reduce breakdown rate whereas active buses can run maximum possible distance per day by increasing number of trips.

• Increased vehicle productivity can help in enhancing revenue generation not only by increasing working vehicles but by more trip generation with high frequency.

• By reducing route overlapping problems, introducing more routes on roads either not served or poorly served, increasing trips per day and using more vehicles can help in gaining more revenue from ticket sales.

• Route rationalization can upgrade the service quality of the STUs. Depots with high route variety for short distances with high trip numbers per day can get maximum possible profit from bus services.

• Enhanced trips per day on short profitable routes can reduce cost of operation and help in gaining more revenue as these bus routes can be operated in place of auto rickshaws.

• Ergonomically designed AC and non AC buses with good service quality can attract passengers to increase more sales per route per day.

• The increasing gap between EPKM and CPKM causes severity to the existence of the STUs which should be managed properly.
• Excessive staff is a major cause of high expenditures in the STUs and lowering of revenue generation. Identification and termination of excess or ineffective or part time or pseudo workers without authentic appointment procedures can be helpful to reduce expenditure and enhance workers’ utility level.

• Considering fleet strength, route variety, service length, passenger strength, earning level etc. among all the STUs, CSTC has the potentiality to compete with private bus sectors; hence emphasis should be given on qualitative improvement of this organization.

• Route variety with frequent bus services can upgrade the overall condition of the STUs, but for that bus condition and workers’ efficiency should be improved.

• The quality of CSTC long distance bus service has been degraded significantly in the last 20 years which should be revived by introducing more long distance route variety. Considering the emerging urban growth centers in KMA region, new routes for greater Kolkata can be promising for economic gain of CSTC.

• New AC bus service of CSTC should endeavor to cater to places within and adjacent to Kolkata which are not served and should not overlap with other AC bus routes of other bus organizations.

• To compete with other depots of CSTC, Kasba depot should introduce more city bus routes which would cover south eastern parts of Kolkata.

• Nilgunge depot of CSTC has very poor service quality both in case of city and long distance bus services. A totally new route rejuvenation plan is required for this depot. New bus routes can be introduced in northern parts of KMA and to connect Kolkata with northern suburban regions.

• The CTC has comparatively balanced bus service among six depots than any other STUs in Kolkata. Bus routes should be modified for both Ghashbagan and Park Circus depot. Ghashbagan depot should concentrate on linkage between various parts of Howrah with Kolkata city whereas Park Circus depot must increase both bus routes and trips to cover south eastern parts of KMC and outskirts.

• WBSTC has huge dependence on its franchisee part which has more than five times route variety than the main organization. Hence emphasis should be given on upgrading service quality of the WBSTC franchisee bus operators.

• Maximum termination of public bus routes have occurred between 1995 to 2010 due to recurring losses after competing with private sector. The new trend of introducing AC and non AC JNNURM buses seems to have rejuvenated the status of public bus sector but such service quality should be monitored on a regular basis.

• Core – periphery public transport service differentials is prevalent with poor parity between demand and supply sides.

• All the areas in southern, western and eastern peripheral regions have serious shortage of public and private bus routes. In the new route plan, over concentration of bus routes in central Kolkata should be reduced and new bus routes connecting extreme peripheral parts with the core city should be encouraged. Gardenreach, Akra, Metiabruz etc. area urgently need bus routes at least during the peak hours.

• Kolkata centric bus service should be expanded and decentralized bus service should be improved.
• Public bus transport is operating as a collection of uncoordinated routes and modes whereas private buses provide convenient, multidirectional and seamless travel to a wide range of passenger cohorts.
• The accessibility and availability of buses do not keep pace with the fast changing urban land use pattern on the city edge.
• The adjacent districts of Kolkata have STU bus routes but in a truncated manner. Most of the bus routes were closed in South 24 Parganas district whereas Howrah has maximum operated bus routes and termini.
• The concentration of city bus routes is confined within 12 to 20 km distance zone. A clear distance decay picture of the concentration of bus routes and fleet strength has been observed for all the three STUs in Kolkata.
• Upgraded high quality bus services do not spread out properly within the city to serve elite class and executive section of the daily passengers considering the changing residential pattern in various parts.
• Fragmented and desynchronized East – West and South – Central bound bus services are unable to make their existence economically viable.
• For strengthening the bus network efficiency, future peripheral traffic potential nodes require bus terminus development and rationalized depot location.
• Westward and southward city corridors have more bus services than north, east and north-eastward city corridors which should be equivalent in near future to correspond to the trend of urban expansion in these directions.
• The growth of regular private buses was constantly high up to 2009 whereas mini buses experienced several highs and hiccups in its development periods in Kolkata. But the status and functioning pattern of regular private and mini buses cannot be compared due to variations in service magnitude and fleet strength. Lack of regular monitoring of route orientation, demand - supply ratio or spatial demand pattern variations leads to mismanagement of private bus route operations.
• In private bus sector there is no coordination among the bus owners. Bus syndicates confine their functions to route and timing management and analysis of various problems faced by the stake holders. There is no recording of economic performance or service pattern of any bus route and thus leads to poor assessment of functioning pattern of private sector bus organizations.
• Although private bus routes expand gradually within KMC but extreme eastern and western parts have serious lack of private bus routes. Intra-city bus linkage is comparatively better in case of private buses than minibuses.
• The permitted bus fleet of a particular private bus route is now much higher than the actual fleet strength because of termination of bus services due to ongoing losses. Actually the demand has dropped for buses significantly in certain parts of Kolkata due to the introduction of auto services in various short routes.
• However, low bus fares are also financially unviable. So if bus services are to be made both profitable and also of a high quality the government needs to ensure that routes dominated by private buses will not face competition from auto-rickshaws and the same incentive may be used to force the bus owners to increase both frequency and quality of services.
For gaining the previous profitable business ground the private bus routes should be reoriented where emphasis should be given on enhancement of bus frequency on short routes connecting metro stations, rail stations or other major business centres. In that way passengers can opt for buses for the same route in lieu of autos. In many ways, buses are better than auto rickshaws due to high carrying capacity, spacious interiors, low fare rates and low risk of accidents.

Opening of new private bus routes or sanctioning buses in an existing route is not well planned in this city. Hence a significant lacuna is observed between the permitted fleet strength and actual functioning buses of many bus routes.

Beltala RTA provides maximum private bus routes for Kolkata city whereas Barasat RTA routes connecting Kolkata with North 24 Parganas and Howrah. Alipore RTA connects routes of Kolkata with South 24 Parganas.

In the last 10 years variety of new private bus routes have been created such as MM, MN, KB, JM series etc. but ply on the conventional roads rather to find new possible routes.

Both Beltala and Howrah RTA provide mini bus routes but the extent of area coverage and distribution of termini is much higher in number for Beltala RTA within KMC.

Bus route variety and traffic flow is significantly low in South Kolkata than North Kolkata. The entire stretch of western, southern and eastern Kolkata severely lacks bus route variety and has low accessibility by bus services.

Long wait time for a particular bus route is a serious problem for daily passengers, which is more prevalent in peripheral parts mostly in the western sections of KMC.

Most of the roads in central Kolkata have overlapping bus routes which causes lowering of ticket sales. Bus re-route plan should incorporate specific number of bus routes on a particular road with high frequency of services.

Tram service will sustain in this city but a revival plan should be incorporated where route management, service upgradation, infrastructural development should be taken for consideration.

The government needs to devise a plan through which it may distribute profitable and non-profitable bus routes equally among different public and private organisations so that while profitable routes will have enough buses and thus provide opportunities for revenue generation, non-profitable routes too will be mandatorily served, even if with less buses, lesser trips or with services limited to peak hours.

Roads in central Kolkata have maximum CSTC bus services while E.M. Bypass has more CTC and WBSTC buses. No regular private or mini buses ply on E.M. Bypass but their concentration is maximum in North and Central Kolkata. Tram cars ply on 24 roads in North and Central Kolkata.

Borough I, XI and XV have pathetic situations considering availability of bus routes and their fleet strengths. Hence passengers of these boroughs have to depend either on auto-rickshaws or have to experience recurrent modal splits to reach their destinations.

The bus fare rate should be fixed based on fuel cost as it has maximum effect on the economic profile of the service.

State Government should not withdraw subsidy abruptly from the STUs as it will only hinder the existing process of service upgradation. Transport planners should find out the specific problems of each depot of an organization and accordingly management plans.
should be implemented for each depot. Such micro level planning of the bus and tram organizations can reduce the problems in general and help in improvement of the overall status of the STUs.

- Potential measures and initiatives should be taken for improving network reliability, quality performance, route and network coordination and customised transportation services. Dedicated Right of Way, high occupancy vehicle lanes, Expressways and priority signalling system should be incorporated for long distance bus routes. Emphasis should also be given on improvement of bus stops, designing of new bus stations for city and long distance services, availability of better amenities like Wi-Fi system, automatic ticket collect process, park and ride facilities etc (Transport Canada, 2012). Branding and marketing system can help in further investment for the modernization of bus and tram services in Kolkata also.

- State Government should develop a comprehensive mobility plan where emphasis should be given on coordination of bus and tram routes with metro and sub-urban railway stations and a well developed mass transport linkage pattern should be developed within the entire KMA region.

11.7. Scope for Further Study:

The road based mass transport service analysis in Kolkata has immense future research scope as the topic is dynamic in nature. With the introduction of new routes, the network pattern will change considerably in future. A detailed assessment can be conducted by regular monitoring of the functioning pattern of private and mini buses. Whatever criteria have been taken for the performance analysis of the STUs can also be measured for the private and mini buses separately, although the private bus operators do not keep such details. Acquiring such data can help to compare the functioning pattern and reasons of preference of private sector buses than public sector. Detailed study of infrastructural condition, service pattern, economic performance and workers’ efficiency for the private sector bus organizations can be measured over a year to identify their quality of service. Another important scope can be identified in the network pattern assessment where inclusion of changing land use pattern significantly influences the level of network efficiency. The changing land use pattern of Kolkata city and its surroundings can be noticed over a significant time, may be for 30 or 40 years and then the changing network of bus and tram services can be assessed in relation to the changing land use pattern. Based on such combined land use and network pattern analysis, future projection of bus route network can be identified towards the direction of future urban expansion. Experiments on coordination of different bus routes in major TIPs in KMC can be another important task for future research on mass transport, based on changing movement pattern and purposes. Future study can also be conducted about the viability of location of the bus termini in different places within and outside Kolkata. The perception of the workers regarding their working pattern and problems can be compared between public and private transport sectors. Finally it can be said that there are three major arenas viz. economic functioning pattern, network assessment and perception of the stake holders where further research work can enlighten some unexplored aspects of road based mass transport services in Kolkata.
11.8. Conclusion:

In the present context, bus and tram transportation system at an affordable cost with reasonable comfort, safety and frequency and high degree of connectivity is extremely desirable in Kolkata. Since the number of people concerned is very high, a minor mistake in planning of mass transport modes will have amplified effect on various factors which cause enormous damages to the society including significant financial setbacks. While STUs in other states and cities are running profitably (like BMTC in Bangalore, BEST Bus in Mumbai etc) (Government of India, 2008), it is the duty of the State Government of West Bengal to formulate a competent master plan for the renovation of all the STUs not only by withdrawing the subsidy support but implementing development strategies. In reality, there is considerable scope for the improvement of the management efficiency in case of bus and tram transport sector in Kolkata, provided the public and private sectors are operated on strict business principles without any political interventions in their day to day management. Above all, it is of utmost requirement to strategically plan for an integrated mass transport system all over the city for the betterment of the present transport services. Such an effort can produce a relevant foundational background for the future transport development plans of this city.

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Web Media: