URBAN MASS TRANSIT SYSTEM FOR HYDERABAD: A COMPARISON OF MMTS AND METRO

SATYAM SHIVAM SUNDARAM
Doctoral Student, Public Systems Group, IIM Ahmedabad
sss@iimahd.ernet.in

G RAGHURAM
Professor, Public Systems Group, IIM Ahmedabad
graghu@iimahd.ernet.in

ABSTRACT:

Most of the cities have been struggling to provide adequate transport infrastructure to meet increasing travel demand and moderate the growth of personalized vehicles. Hyderabad is no exception where the two alternative transport systems, MMTS (Multi-Modal Transport System) and Metro, were discussed by various stakeholders over the years. This paper examines the relative strengths and weaknesses of the two proposals. The parameters used to compare the two are similar to those presented in earlier research studies (e.g. Advani & Tiwari, 2005). The parameters include accessibility (influence zone of the proposed system and distance between two consecutive stations), demand profile and socio-economic status of commuters, reliability, speed, frequency, current and future capacities of the proposed system, level of integration with other modes, parking area at the station, level of economic/financial gain, and implementation difficulties (e.g. land acquisition issues and number of institutions involved in coordination during planning and operation). These parameters broadly represent the major demand and supply side issues which affect the transport system and hence play a critical role in decision making. The paper concludes that though MMTS, with feeder services, may have provided nearly similar services to that of the metro with lower costs and less land acquisition issues, some factors such as coordination among institutions, integration, lack of commitment from private parties for resources due to higher perceived risk, inertia of organizations involved in the development of MMTS, and perceived status of a metro project vis-à-vis MMTS may have favored the metro proposal.

RÉSUMÉ:

Afin de rencontrer un demande croissante et de limiter la croissance du nombre de véhicules personnels, la plupart des villes s’efforcent de fournir une infrastructure de transport suffisante. Hyderabad ne fait pas exception et deux alternatives de transport y ont été évaluées ces dernières années : le MMTS (Multi-Modal Transport System) et le métro. Cet article étudie les forces et les faiblesses de ces deux systèmes. Les paramètres utilisés afin de les comparer sont similaires à ceux employés lors des précédentes recherches (i.e. Advani et Tiwari, 2005). Ils incluent l’accessibilité (zone d’influence du système et distance entre deux stations consécutives), profil et statut social des usagers, fiabilité du système, vitesse, fréquence, capacités actuelles et futures, niveau d’intégration avec les autres modes de transport, possibilités de parking aux alentours des stations, niveau de gain économique et financier et difficultés de mise en œuvre (i.e. acquisition des terrains, nombre d’organismes impliqués lors du planning et des opérations). Ces paramètres
incluent la majorité des problèmes qui affectent le système de transport et jouent donc un rôle critique dans la prise de décision. Cet article conclut que le MMTS aurait pu apporter un niveau de service similaire à celui du métro à un prix inférieur. Cependant, les problèmes liés à la coordination des différentes institutions, leur intégration, le manque d’implication du secteur privé, l’inertie des organisations impliquées dans le développement du MMTS et sa perception vis à vis du métro ont pu favoriser le choix du métro.

1. Introduction

Transport situation in most of the Indian cities is deteriorating due to increasing travel demands, inadequate infrastructure, and poor transport systems. Travel demand has been rising due to increasing economic activities and desire for higher mobility that has been boosted by the technological innovations related to transport modes resulting in affordability of personal transport to a larger segment of society and changing cultural values. Rapid expansion of Hyderabad over the last few decades along with changing travel patterns have led to increased congestion, longer travel time, and increased pollution. Hyderabad urban area (1905 sq. m) has a population of 6.38 million (27% of the total urban population in the state) as of 2001 census and an employment of 1.78 million. The urban area serves approximately 10.3 million trips per day (including walk trips). The current share of public transport is around 44% (Reddy et al, 2005).

Over the years various rounds of studies were carried out which culminated into two alternatives transport systems for Hyderabad: (i) MMTS by augmenting the existing rail corridors, modifying the bus routes to complement the rail corridors, and providing feeder bus services to increase the catchment area and (ii) metro system along high travel density corridors. The existing travel demand along with resource constraints would have favored development of only one of the systems. Before getting into the details of the two systems, we provide a brief of events which led to this stage.

2. Overview of Various Studies

Hyderabad Area Transportation Study (HATS) is often quoted as one of the important studies for the city’s transport planning. The study, in 1986, recommended a gamut of solutions which included development of a circular railway through Secunderabad, Nampalli, and Malakpet (Kachiguda), physical improvement of 66 major intersections, 111 traffic signals in seven major corridors, and four corridors for Light Rail Transit System (LRT). The corridors are: (i) L. B. Nagar to Kukatpalli via Dilsukhnagar, Malakpet, Mozamjahi Market, Nampalli, Secretariat, Khairatabad, Ameerpet, Sanathnagar, Kukatpalli, (ii) Falaknuma to Rangmahal Junction via Charminar, (iii) Mozamjahi Market to Airport via Abids, Basheerbagh, Tankbund, Sanigunj, and (iv) Khairatabad to Toli Chowki via Masab Tank, Mehedipatnam. This was followed by a study by Japan External Trade Organization (JETRO) in 1988. This study recommended development of mass rapid transit system (MRT) instead of LRT system. It argued that LRT may not be able to provide the desired capacity. The system was proposed to be developed by public sector. RITES, in 1989 suggested development of LRT system and not MRT system. The study recommended two phase development of LRT system. However, no action was taken till 1993, when IL&FS carried out a pre-feasibility study for the LRT system and decided against investing in the
In 1998, RITES carried out a study and proposed LRT along two routes to cater to the transport needs of the city. However, no decision was taken by the government in this regard. The Municipal Corporation of Hyderabad (MCH) appointed Campsax India Limited to prepare a concept plan for Hyderabad. The report was submitted in 2003, which discussed phased development of Hyderabad city. The MCH also studied development of MMTS by extending the existing rail linkages. The phase I of MMTS was developed with railways as a partner along two corridors. Though the transport system did not shape up in the same way as it was conceived originally, it became functional in 2003.

Meanwhile, L&T Ramboll Consulting Engineers Limited (LTR) was appointed as the consultant to carry out a comprehensive study and suggest a road map for the transport system of the city. The consultant suggested development of second phase of MMTS along the existing railway line by augmenting the existing first phase, providing complementary bus services, and feeder services. Reddy et al. (2005) provides the details of the proposed comprehensive plan according to which MMTS was proposed along the rail line in the north-south (Medchal to Shamshabad) and east-west (Lingampalli to Ghatkesar) directions with a project IRR of 12.8% to 22.9% on different routes and equity IRR of 15% to 35.4% of various routes.

During the same period, Delhi Metro Rail Corporation (DMRC) approached GoAP to propose a metro system in the city on similar lines to that of Delhi Metro. The metro proposal was accepted by the new government (change of government after the state elections) and the proposal of development of phase two of MMTS was discarded, reasons of which would be discussed in the later part of the paper.

3. Details of Proposed Systems

MMTS: MMTS proposal was to develop the existing rail links and augment them with different modes in an integrated manner. The proposal has been summarized in Table 1. The proposed network has also been shown in figure 1. RRT denotes the rail base service where as Tram is the road based proposed service. The financial returns of the proposed routes are shown in table 2. The project return varies from 12.8% to 22.9% whereas equity return varies from 15 to 35.4%. The equity returns seem to be just enough to attract investment in the project. The details of proposed investments have been discussed by Reddy et al. (2005).

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Period</th>
<th>Sections to be Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Frame II</td>
<td>2009-2011</td>
<td>Secunderabad - Shamshabad, Lingampalli – Patancheruvu</td>
</tr>
<tr>
<td>Time Frame III</td>
<td>2011-2016</td>
<td>Lingampalli - Nampalli - Koti – Uppal</td>
</tr>
<tr>
<td>Time Frame IV</td>
<td>2016-2021</td>
<td>Dundigal – Tankbund</td>
</tr>
<tr>
<td>Time Frame V</td>
<td>2021-2026</td>
<td>Shamsabad - Moula Ali</td>
</tr>
<tr>
<td>Time Frame VI</td>
<td>2026-2031</td>
<td>Shamsabad - Hafeezpet, Hafeezpet – Gowdavelli</td>
</tr>
</tbody>
</table>

*Source: Reddy et al (2005)*
Figure 1: MMTS Details

Table 2: Post Tax NPV and IIR for MMTS

<table>
<thead>
<tr>
<th>Route</th>
<th>NPV-Project (Rs. Million)</th>
<th>NPV -Equity (Rs. Million)</th>
<th>IRR-Project</th>
<th>IRR-Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secunderabad - Medchal</td>
<td>11,666</td>
<td>2,637</td>
<td>22.9%</td>
<td>35.4%</td>
</tr>
<tr>
<td>Secunderabad - Ghatkesar</td>
<td>1,574</td>
<td>56</td>
<td>13.3%</td>
<td>18.5%</td>
</tr>
<tr>
<td>Secunderabad - Shamsabad</td>
<td>6,205</td>
<td>(1)</td>
<td>15.0%</td>
<td>18.0%</td>
</tr>
<tr>
<td>Nampalli - Patancheruvu</td>
<td>3,172</td>
<td>(703)</td>
<td>12.8%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Ghatkesar - Lingampalli</td>
<td>10,293</td>
<td>831</td>
<td>16.5%</td>
<td>20.5%</td>
</tr>
</tbody>
</table>


Metro: DMRC proposed an alternative to MMTS in June 2003, which was to develop a Metro system, similar to Delhi Metro, on two corridors: (i) Miyapur – Chaitanyapuri along the old NH 9, and (ii) Secunderabad – Falaknuma Corridor (again along the road).
The Miyapur Chaitanyakpuri corridor was 26.27 km long whereas the Secunderabad-Falaknuma corridor was 12.48 km long. The recommendation was based on a preliminary study by DMRC. However, once the new government (at the state level) decided in favor of the project, the detailed project report was prepared and the corridors were modified and increased to three (figure 2). The details of the corridors are presented in Table 3. Since the decision of preferring Metro was taken based on the preliminary report which suggested development of only two corridors, we have carried out the comparison of MMTS with two metro corridors only.

### Table 3: Route Details of Present Metro System

<table>
<thead>
<tr>
<th>Section</th>
<th>Length (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miyapur–Chaitanya Puri</td>
<td>25.50</td>
</tr>
<tr>
<td>Jublee bus stand -Secunderabad- Charminar -Falaknuma</td>
<td>14.40</td>
</tr>
<tr>
<td>IICT –Secunderabad –Hitech City –Silparamam</td>
<td>20.80</td>
</tr>
<tr>
<td>Total</td>
<td>60.70</td>
</tr>
</tbody>
</table>

### 4. Parameters for Comparison

The parameters used for comparison are similar to those used by Advani and Tiwari (2005). These parameters broadly represent the major demand and supply side issues which affect the transport system and hence are critical towards making a decision.

**Accessibility:** Accessibility is an important parameter from the demand side considerations. It has been assessed here by estimating the influence zone of the proposed system and the average inter-station distance between two consecutive stations. The influence zone would provide details of the number of potential customers/trips residing within a certain bandwidth of each of the system.

**Demand profile and socio-economic status of commuters:** This parameter considers the travel pattern, and affordability issues related to a transport system.

**Reliability:** Reliability of the system is also critical from demand side consideration. Reliability has been assessed based on performance of similar systems in other cities.

**Speed and frequency:** Speed and frequency are important parameters both from demand and supply perspectives. Faster and frequent service will be a preferred choice as compared to slower and infrequent service. They have also been assessed based on similar systems elsewhere.

**Level of integration with other modes:** Level of integration with other modes is important both from demand and supply side considerations. Integration with other modes reduces the impedance for the commuters thereby increasing their desirability to use the system. Along with integration with other public transport modes, transport systems can also provide parking areas at the station so that influence zone of the proposed system becomes larger.

**Current and future capacities of the proposed system:** This parameter is from the supply side consideration. It considers the importance of current and future capacities of the proposed system. If the demand is expected to increase rapidly, a system with higher slack capacity may be more desirable.
Level of economic/financial gain: This parameter assesses the financial implications of providing a transport system. It may be desirable to have a transport system, which is financially viable.

Implementation difficulties: This parameter considers the importance of issues which may crop up during implementation stage and may become a critical issue as far as the success of a transport system is concerned. Land acquisition issues and number & inertia of various institutions involved in coordination during planning and operation of the proposed system have been assessed to understand the implementation difficulties.

5. Analysis

5.1. Accessibility

Influence zone: The influence zone has been calculated for the MMTS for 1 km and 4 km band from the proposed transit route. The commuters staying within 1 km band may utilize the system without any feeder services whereas commuters staying between 1 km and 4 km would need feeder bus services.

The population of commuters within 1 km and 4 km band of MMTS are 2.1 million and 5.5 million respectively. It is 31% and 78% of the total population residing in the area. In terms of employment, 0.7 million and 1.6 million people are employed within the 1 km and 4 km band, which is 38% and 84% of the total employment in the area. Given that the per capita trip rate for the area is 0.977 excluding the walk trips (1.5 including walk), the MMTS is within the reach of 2 million and 5.4 million trips which is 31% and 78% of the total trips generated within 1 km and 4 km bands respectively. The current share of public transport is 44% which means 0.9 million and 2.38 million trips within 1 km and 4 km band could have used MMTS, if the service was provided. The share could have increased further in the presence of a good service.

According to a DMRC estimate, total ridership on Metro system was estimated to be 1.1 million and 1.8 million in 2008 and 2021 respectively (www.itdpindia.org). The DMRC estimate appears to be on the higher side, given that Institute of Transport Development (ITDP) has estimated the ridership to be around 0.65 million and 0.87 million respectively and which is closer to estimates by other consultants as well. Hence, the two systems seem to have similar effect on the transport condition of Hyderabad.

Inter-station distance: The average inter-station distance between the two proposed systems was nearly the same and there is little to choose between the two.

5.2. Socio-economic status of commuters and demand pattern

Studies by LTR and ITDP provide details of education level and income distribution of the households in Hyderabad.

Figure 3: Education Level

Figure 4: Income Distribution
Table 4 provides the distribution of household based on the income level. The table suggests that most of the households spend very little amount towards their transport. The data suggests that the price elasticity of commuters should be high, given lower level of education (hence lower value of time) and low expenditure towards transport. According to an estimate of the price elasticity by DMRC (as presented in ITDP, 2005), the metro fare had been envisaged at least 50% higher than the prevailing bus service fare and would lead to reduction in demand by 25%. The proposed prices of the MMTS tickets were quite similar to those of current bus service. Hence based on the socioeconomic condition of the area, the need for an air conditioned Metro service may not be fully justified.

Table 4: Distribution of Households Based on Daily Expenditure on Transport

<table>
<thead>
<tr>
<th>Amount in Rs</th>
<th>MCH</th>
<th>Municipality</th>
<th>Semi-Rural Area</th>
<th>HDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than/equal to 3.30</td>
<td>4.60%</td>
<td>5.08%</td>
<td>10.98%</td>
<td>5.47%</td>
</tr>
<tr>
<td>3.30-10.00</td>
<td>11.59%</td>
<td>13.24%</td>
<td>22.60%</td>
<td>13.30%</td>
</tr>
<tr>
<td>10.00-16.60</td>
<td>22.00%</td>
<td>22.24%</td>
<td>28.64%</td>
<td>22.84%</td>
</tr>
<tr>
<td>16.60-23.30</td>
<td>16.58%</td>
<td>20.56%</td>
<td>20.68%</td>
<td>18.04%</td>
</tr>
<tr>
<td>23.30-33.30</td>
<td>21.42%</td>
<td>22.42%</td>
<td>10.25%</td>
<td>20.34%</td>
</tr>
<tr>
<td>Greater than 33.30</td>
<td>23.82%</td>
<td>16.46%</td>
<td>6.86%</td>
<td>20.00%</td>
</tr>
</tbody>
</table>

5.3. Reliability, speed and frequency

The reliability, speed, and frequency of the systems can be assessed based on the performance of similar systems in the other parts of the country. The perceived reliability of Metro system is higher than that of MMTS. The Metro services in Delhi and Kolkata run on schedule and face rare deviations from their schedule. Similar performance can be expected in Hyderabad also as the tracts are exclusive. MMTS were planned to share tracks with Indian Railways and the operation was to be carried by Indian Railways. Given, the priority to long distance trains and freight trains, urban transport service might have suffered. Though the peak speed of Metro service is higher than the MMTS, the average time taken between the two stations would not be much different for the two due to frequent stops. The frequency of the proposed MMTS was lower than the Metro service. However, the same could be increased for serving higher demands during peak hour.

5.4. Level of integration with other modes

According to an assessment by ITDP, the metro stations was farther away from the existing bus stops with regard to trip attraction points and hence the walking time would be higher for around 25% of commuters to reach the station. The proposed Metro was planned to be well connected with the Indian Railways long distance stations as well as the large bus depots. However, proposed level of physical integration was low with regard the
existing bus services. MMTS proposed to integrate the service with existing bus stops and other points of traffic generation through feeder bus services. MMTS had also planned for common ticketing service. Metro was expected to have their separate ticketing. Most of the MMTS and Metro stations had planned for parking facilities for both motorized vehicles and non-motorized vehicles. Parking was especially important as a substantial percentage of the trips have one of the generation points outside the network of MMTS or Metro. Since both the systems were planning to provide parking, there was little to choose between the two.

5.5. Current and future capacities of the proposed system

The current and future capacities of the systems in both the cases were planned to be higher than the optimistic demand estimates. Metro could carry commuters up to 40,000 PHPDT (per hour per direction trip). MMTS could carry traffic up to 20,000 PHPDT. However, the projected traffic for 2020 is around 14,000 (ITDP, 2005) which was much lower than the capacity of any of the two systems.

5.6. Level of economic/financial gain

The Metro service was expected to cost approximately Rs 42,040 million (ITDP, 2005) whereas MMTS was expected to cost approximately Rs 32,050 million. However, ITDP had estimated the cost to be Rs 51,700 million. The Metro service was expected to have an annual loss of Rs 1,610 million (ITDP, 2005) for an asset life of 20 years. Though the estimate may not be fair in assuming the asset life of the Metro to be only 20 years, it gives an indication that the returns are not expected to be lucrative. MMTS was expected to have an IRR of at least 12% as reported earlier. MMTS seems to have a slight edge over the Metro system.

5.7. Implementation difficulties

MMTS was proposed along the existing railway lines and the feeder buses were to be run along the existing roads, the land acquisition was expected to be very low for this project. Metro route was proposed along the road (mostly elevated) and hence required higher land acquisition. MMTS required coordination among Indian Railway officials, Andhra Pradesh State Road Transport Corporation, MCH, private bus operators, city traffic policy, and the concessionaire. It was expected to be the most difficult part. The number of organizations to be coordinated in case of Metro was lower (mainly MCH, concessionaire, and traffic police). The presence of Indian Railways as one of the partners to the MMTS project was also seen to increase the risk (especially political and revenue) for the private players. To add to this, the inertia of most of the organizations was expected to create further delay in the project. The new government (state level) was keen to showcase a project and the status of a metro project was good enough to get attracted. The opening of Metro at Delhi with financial investment/support from central government, state government, and Japan Industrial Development Bank on time indicated availability of finance as well as high chances of completion of such a project on time. MMTS project did not have similar investment commitments. The policy of central government to provide loan and grant encouraged the state government further to take a decision in favor of Metro project. Provision of grant/loan/counter guarantee for the loan encouraged city to go for heavy investment in the name of long term perspective. The Phase I of MMTS had not be a success due to various reasons such as poor implementation, infrequent service, lack of
accessibility (no feeder service was provided as the talks with private players had not reached a conclusion), and lack of integration. Indian Railways was not very keen to complement this service fearing poor performance. At the micro level, inertia of the organization for MMTS project can be attributed to the key individuals from different organizations who are involved in the project. The officials of Indian Railways and APSRTC did not move from their initial stand and adopted a non-cooperative behavior towards the other while discussions for feeder services were going on.

Figure 2: Metro Route Details
APSRTC did not agree to reroute any of their buses and Indian Railways/MMTS officials did not agree to discuss any compensation for the financial loss due to rerouting the buses. Transfer of a key Indian Railways officials who was pro-MMTS project, also made the rest of the officials reluctant in taking any softer stands due to the rumors that transfer was because of the stand taken. Thus the key officials (boundary managers) from different organizations did not take any out of the way step to move the project further. We perceive that the role played by the individuals (boundary managers) were critical towards success of any project. Similar conclusions have been derived by Nobel & Jones (2006) and Jones & Nobel (2008) while studying projects from Australia and UK.

6. Concluding Remarks

The study shows that though MMTS with feeder services may have provided nearly similar services to that of the metro with lower costs and less land acquisition issues, some factors such as coordination among institutions, integration, lack of commitment from private parties for resources due to higher perceived risk, inertia of organizations involved in the development of MMTS, role of boundary managers and perceived status of a metro project vis a vis MMTS may have favored the metro proposal. The study also indicates that the central government policy of providing grant/loan/counter guaranteeing loan may have had negative impacts as far as resource utilization is concerned.

References


