Urban Transport

The Problem

Vijayawada (the second largest city of the newly formed state of Andhra Pradesh) has witnessed rapid growth in vehicular traffic and air pollution in the last few years, especially after the announcement to develop Amaravati as the new capital of Andhra Pradesh. As per the census of 2011, the population of Vijayawada Municipal Corporation area was more than 10 lakhs with population density of 16,939 per square km. However, population density has increased significantly to 23,700 per sq. km in 2018.

The local economy of Vijayawada is expected to reach $17 bn by 2025, a six-fold increase over 2010 level. Between FY16 and FY17, the population of motorbikes and car in the city has increased by 73 percent and 40 per cent respectively. Also, vehicles used for transporting goods have seen a significant increase by 15 percent during the same period. Most importantly, the air pollution levels (PM10) in the city have increased consistently in the last five years from 90 ug/m3 in 2011 to 110 ug/m3 in 2015, which was almost double compared to the national average of 60 ug/m3. Further the city has limited public transport system due to high land cost and reluctance of the public to part with their lands. As a result, widening of roads to accommodate mass transit system (MTS) at road level is difficult.

This study is an attempt to test alternative options to examine development of comprehensive green urban mass transport network to reduce emphasis on low-capacity private modes, such as cars and motorcycles, and significantly bring down their share in passenger traffic to 20 percent by 2052. The two interventions analysed are Metro with Feeder Network and Dedicated Bus corridor with Electric Public Transport.

Solutions

Interventions	BCR	Total benefit (INR crore)	Total cost (INR crore)
Metro with Feeder Network	3.28	66,179.3	20,148.2
Elevated Bus Rapid Transit (BRT)	4.03	66,380	16,462.2

Total costs and benefits are discounted at 5%

The full paper by **Parijat Dey** of IL&FS with **Ankush Malhotra** of UMTC is available on www.appriorities.com/public transport.

Metro with Feeder Network

The Problem

Indian cities witnessed fast growth in the ownership of private vehicles, which resulted in increased road congestion, fuel emissions, and pollution. A number of initiatives were launched, including a national urban transport policy; shift towards mass transit projects to address the infrastructural and environmental issues related to increasing vehicular population and limited road space. Nevertheless, a number of concerns remain in governance of urban transport including the choice of mass transit projects and issues regarding financial viability and inclusiveness.

In addition to this absence of one central Rule or Act to govern the urban transport and nonexistence of an overarching set of rules that govern the functioning of the multiple agencies (e.g. Regional Transport Authority, Traffic Police, State Pollution Control Board, etc.) made the situation more complex.

A study by Pollution Control Board of Andhra Pradesh reveals that pollution levels are increasing due to increasing number of vehicles travelling on the city roads. It is estimated as many as 7.10 lakh vehicles (including floating vehicle population) are moving on city roads daily. The Suspended Particulate Matter (SPM) level in the city was 115 mg (micron grams) on an average in 2017, higher than the maximum permissible limit of 100 mg per cubic meter.

The Solution

Developing two metro rail elevated routes (Line 1 Pandit Nehru Bus Terminal to Penamaluru with 12 stations and Line 2 Pandit Nehru Bus Terminal to Nidamanuru with 13 stations) with total 26 km of length along with sufficient electric feeder bus services and electric intermediate public transport (IPT) to serve 50 percent of the city passenger traffic by metro rail services thereby serving a total 80 percent of passenger traffic by public transport by 2052. The project life is 30 years.

This intervention will address the major challenges such as traffic congestion, mounting pollution, etc. as development of comprehensive green urban mass transport network is crucial considering the rapid population growth of Vijayawada.

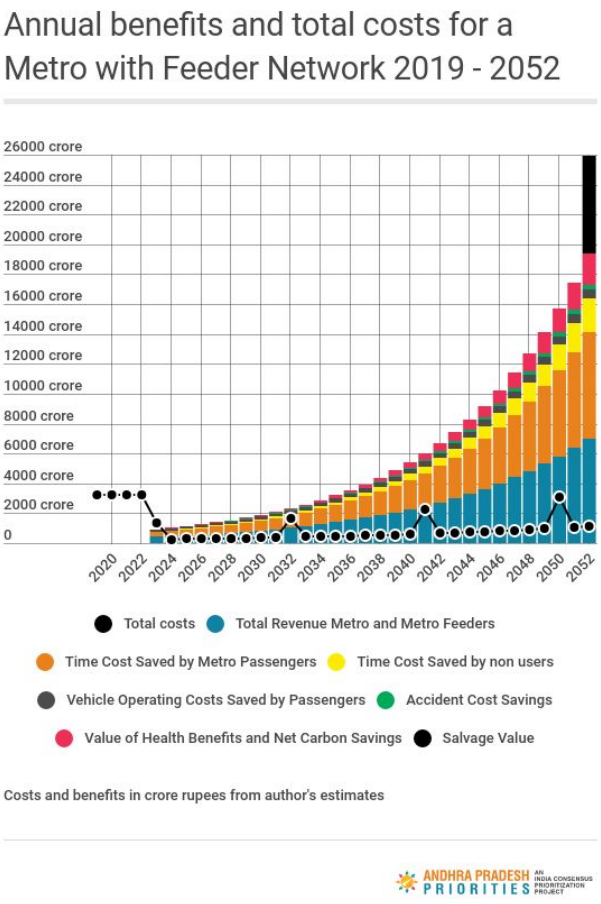
Costs

Key cost items include capex and opex cost of metro rail, feeder bus, carbon cost due to energy generation and social cost of disruption during the construction phase. The total estimated cost of this intervention is estimated at Rs. 20,148 crores at 5% discount rates.

Benefits

The potential direct benefits from the intervention include revenue (ticket and non-ticket) for metro and feeder bus and last-mile connectivity services, fuel cost savings of feeder bus and salvage value. Indirect Benefits include annual time cost saved by both metro passengers and non-users, annual vehicle operating cost (VOC) saved by metro passengers, value of Disability Adjusted Life Years (DALY) avoided due to air pollution emission reduction, savings due to accidents avoided, carbon cost savings of feeder bus and last-mile connectivity services.

Total estimated benefits of the intervention are Rs. Rs. 66,179 crores at 5% discount rates.



Elevated Bus Rapid Transit (BRT)

The Problem

Private cars and two-wheelers dominate road traffic in Vijayawada city creating congestion on roads. The city has historically been a pioneer in introducing CNG buses in South India and was one of the first to implement the system of Bus Rapid Transit System (BRTS). The city also has fourth largest and busiest bus terminals in India.

As per Vijayawada Metro Rail Detailed Project Report (DPR) prepared in 2015, the total number of vehicles registered in the district is 87,513. There are 9,700 goods vehicles, 1,598 taxi cars, 25,432 private cars, 42,300 two wheelers, 8,765 auto rickshaws and 1,674 buses. Of the above, in each category nearly 80% of vehicles operate within the city.

The Solution

Given that the Metro DPR by DMRC has already identified the high-density corridors for metro rail, we believe that elevated BRT on the same route could be considered as an alternative to metro construction.

The intervention seeks developing two elevated bus rapid transit (BRT) routes of 26 km, same as proposed metro rail routes, along with sufficient electric feeder bus services and electric IPT to serve 50 percent of the city passenger traffic by BRT thereby serving a total 80 percent of passenger traffic by electric bus and Intermediate Public Transport (IPT) services by 2052.

Costs

Key cost items include capex and opex cost of BRT structure, e-transport and social cost of disruption during construction phase. The total cost of this intervention is estimated at Rs. 16,462 crores at 5 % discount rate.

Benefits

The potential direct benefits from the intervention includes revenue (from BRT buses, other buses, and last-mile connectivity services), fuel cost savings from e-public transport and salvage value. Indirect Benefits include annual time cost saved by BRT passengers and nonusers, annual Vehicle Operating Cost (VOC) saved by BRT passengers, value of DALY avoided due to air pollution reduction, savings due to accidents avoided, and carbon cost savings of e-public transport.

The total benefits estimated due to this intervention are Rs. 66,380 crores at 5 % discount rate.