Bus Rapid Transit (BRT) System

A Way to the Sustainable Urban Transport in Nepal

Introduction

Population growth and economic development has spurred rapid increase in the number of motor vehicles with mark shift of travel from public transport, walking, cycling to private vehicles around the world. Further, urban sprawl and modern lifestyle have forced city dwellers to travel more frequently and for longer distances. Since transportation infrastructures & services play an important role in urban system, inefficient mobility paralyzes the sustainable functioning of the cities.

In adverse, the status of public transportation in Kathmandu valley is worsening each day. People have no choice than to endure inefficient and discomfort service, or to opt individual motorized transport largely motorbikes. High growth of private motor vehicles has contributed to air pollution and consequent health risks faced by the urban dwellers.

Kathmandu Valley: Population, Urban Transport & Air Quality

Traffic congestion is one of the chronic problems in urban core areas attributed to rapid increase in the ownership of private vehicles, limited transport infrastructures, poor public transportation and traffic management. And the situation is expected to worsen if there are no improvements in the existing transportation system.

570,145 vehicles were registered in the Bagmati zone by the end of last fiscal year. Private vehicles occupy the major percentage, most of which ply on the urban areas of the valley. The annual growth rate of vehicle is over 13% and valley's motorised travel demand has increased 8.7 fold in 2004 since 1989 (IGES 2006) .

Kathmandu Valley

- **Land area:** 666 Km^2
- **Population:** 2.5 million (National Population Census 2011)
- Consists of 30% of nation's urban population
- Estimated to exceed 4 million by 2020

Vehicular emission is a major source of air pollution in the valley, mainly because of the large number of vehicles on congested streets, poor fuel & vehicles quality and weaknesses in the emission inspection & maintenance system. It also contributes to GHGs emission and increasing foreign dependency on fossil fuel.

Less than 1% of vehicles are low or zero emission. Readings from monitoring stations in roadside indicates PM_{10} level exceeds WHO guideline by several times (MoPPW/ADB 2009). According to study by IGES, the volume of PM_{10} and CO_2 has increased by 4.5 and 5.2 times respectively in 2004 since 1989, which suggested the main cause to be remarkable increase in the number of private motor vehicles.

Ministry of Environment in 2005 estimated that ambient air pollution is responsible for the premature deaths of 1600 people per year in Kathmandu Valley. A study of World Bank, 2006/2007 showed the annual health cost of country attributed to urban air pollution is US$ 21 Million.

With the demise of public bus 'Sajha Yatayat' and trolleybus system run by government, now the public transportation services are entirely provided by private sectors. Without the proper standard and weak regulations, the private sectors are more into profit making than to provide standard services to the passengers. Smaller buses and micro-vans, primarily built for a family, are replacing larger ones for public service.

Based on the estimated population growth, in the current situation, the infrastructures of transportation should be doubled to fulfill the demand of the population unless we choose intelligent and efficient way of carrying people.

"Urban transport is a political and not a technical issue. The technical aspects are very simple. The difficult decisions relate to who is going to benefit from the models adopted."

-Enrique Penalosa, Former Mayor, Bogota

Bus Rapid Transit: An Affordable & High Quality Public Transport

Buses used to be the main mode of transportation in the cities, and still it's the only option of public transportation for many cities in developing countries. However, with gradual decline of reliability, convenience and safety of bus services coupling with the economic development have inspired or forced people to opt private motors for their daily mobility. But the advent of Bus Rapid Transit (BRT) system has shown hope for high quality, efficient and still affordable public transportation.

"The peculiar feature of BRT system is its exclusive or right-of-way lanes, thus making it competitive with car travel."

What is BRT ?

Bus Rapid Transit (BRT) system is a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing & customer service. (Bus Rapid Transit- Planning Guide 2007)

It combines the best features of rail with the flexibility and cost advantages of road transit system. The peculiar feature of BRT system is its exclusive or right-of-way lanes, which greatly increases the vehicle speed and reduces travel time, thus making it competitive with car travel.

The other significant feature is its lower development and operational cost, much lower compared to rail-based system, which attracted many cities for BRT. It further provides environmental co-benefits reducing GHGs emission and air pollutants.

Features of BRT system

- Segregated bus ways
- Rapid boarding and lighting
- Clean, secure and comfortable stations and terminals
- Efficient pre-board fare collection
- Effective licensing and regulatory regimes for bus operators
- Clear and prominent signage and real-time information displays
- Transit prioritization at intersections
- Modal integration at stations and terminals
- Clean bus technologies
- Sophisticated marketing identity
- Excellence in customer service

Development of BRT around the World

The origins of BRT system can be traced back to Latin America when the municipal planners were challenged to create a new transport paradigm to cater booming population with limited financial resources. These BRT systems built with the objective to swiftly, efficiently and cost effectively move people, rather than cars.

The first wide-scale development of BRT system started in Curitiba, Brazil in 1974. Since then Curitiba's experience has inspired other cities to develop similar systems. Especially, the success of TransMilenio project in Bogotá, Colombia (2000) drew attention of the world community as an example of the state of the art in BRT system. By 2010, BRT system is operating in around 120 cities with many of these are expanding and adding corridors. And in many other cities, it is under construction or planned.

BRT system in Jakarta: right-of-way lane makes public transport competitive to car travel

Benefits of BRT- Why BRT?

BRT system is more than just a bus and has wide arrays of benefits. Apart from inexpensive and efficient transfer of large volume of passengers, it provides environmental and socio-economic benefits, eventually contributing to sustainable urban development.

Better quality & better service: A well-designed BRT system performs better and provides better service in relatively lower cost compared to rail-based system. It can efficiently transfer large volume of passengers, up to 45,000 passengers per hour per direction.

Cheaper & faster to build: The cost of development of BRT system is relatively low: US$ 1-10 million per kilometer compared to the costs US$ 65-207 million per kilometer for underground metro system. Additionally, once constructed, BRT systems are typically self-financing. The planning process can be reasonably accomplished in 12 to 18 months and executed in 1-3 years. A BRT system will typically cost 4 to 20 times less than a tram or light rail transit (LRT) system and 10 to 100 times less than a metro system (ITDP 2007).

Environmental co-benefits: BRT system has provided co-benefits for mitigation of GHGs and restoring urban air quality. The combined BRT, traffic demand management (TDM), and non-motorised transport (NMT) projects in Bogotá reduced CO_2 emissions by 318 metric tons per day from 1997 (GIZ 2005). According to ITDP, TransJakarta had reduced CO_2 emissions by 37,180 metric tons in 2010, equivalent of taking 6,800 cars off the road. Recognizing the contribution in reducing carbon emissions, BRT in Bogotá was approved for Clean Development Mechanism (CDM) in 2006.

Land use benefits: Studies show that the BRT has contributed to compelling cases of transforming existing land use and provide co-benefits. It tends to discourage urban sprawl, contributes to transit orient development and raises property values of nearby residential and commercial areas. A reduction of 5 minutes walking time to BRT stations increased property prices 6.8% to 9.3% in Bogotá and by 20% in Brisbane.

Model shift from private automobiles: The other most significant is the model shift of passengers from private motor vehicles, a simpler solution to increasing traffic congestion. Different studies on BRT show that nearly 30% of trips to BRT systems come from private modes and taxis (CAI Asia 2010). Over 25% of passenger switched from using their private motorized vehicles for some trips in Jakarta according to ITDP. Similarly, approximately 90% of CO_2 reduction is the result of the modal shift from private car and taxi to bus and bicycle in Bogota.

Integrating Trolleybus and BRT system (e-BRT) in Kathmandu Valley

The studies have shown that the reintroduction of trolleybus is very feasible and contributes to environmental and socio-economic benefits. Kathmandu Sustainable Urban Transport Project (KSUTP) has recommended to reintroduce trolleybus system and provide service in at least 3 primary routes and the possibility in Ring Road and Bishnumati Link Road. However, reintroducing the system in the existing road infrastructures and mixed traffic may not be efficient and sustainable amidst increasing traffic congestion. The trolleybus system with right-of-way lane and integrated with other BRT features would certainly yield more efficient and customer friendly services that would prioritize public transport over private vehicles and have far-reaching environmental benefits.

"BRT provides high quality transit service comparable to light rail system at a fraction of the cost."

This kind of e-BRT is successfully operating in Quito, Ecuador since 1995 providing service to 80 million passengers per year and peak ridership of 6000 passengers per hour per direction. Express trolley buses with exclusive lanes are also operating in Merida and Barquisimeto in Venezuela.

Trolleybus with right-of-way lane in Quito, Ecuador

Challenges

BRT has already provided compelling cases in economic, environmental and social benefits. However there lie several hitches and challenges to the new concept on urban transport. Specifically, these challenges include:

Political will by far the most important ingredient in making BRT work. TransJakarta and TransMilenio are the typical examples to show how political will helped in successful introduction of BRT system.

Information on the BRT system hasn't yet disseminated widely which in somehow supposed to check giving a thought to this system. This lacks familiarity with BRT concepts: infrastructure, buses, operation technology, and more importantly its land use and environmental co-benefits.


Guangzhou BRT, China with direct service system


Ahmedabad BRT (Janmarg), India


Trolmerida- Trolleybus with dedicated lanes in Merida, Venezuela

Institutional & technical capacity on planning, development and operation of BRT system is supposed to be a major barrier of developing cities to opt the system. But in fact, this is learning by doing process and, there are institutions and individuals that can assist in strengthening capacity.

Finance is not typically a major barrier as its capital and operational costs are relatively low. However, if national/city government is unable to finance fully or partially, there are various accesses of funds within and outside the country: World bank, ADB, GEF, UNDP, bi-lateral assistance agencies, commercial banks, private foundations and organizations.

Geographical/physical limitations may include high land price and limited space for extension or space for segregated busways in already congested urban core areas.

Opposition from transport associations/ bus operators is likely to create problem on development of the system mainly due to their interest and business security. However, effective communication, integrating them in planning and securing their quota for operation will address the interest of both operators and public.

Current **energy crisis** (power outage and fuel shortage) may hinder development and operation of the system. However, if Nepal Electricity Authority and Nepal Oil Corporation can assure the continuous supply of electricity and fuels respectively, it would pave the way for the system.

Conclusions

"Do we dare create a transport system giving priority to the needs of the poor? Or are we really trying to solve the traffic jams of the upper income people? That is really the true issue that exists."

-Enrique Penalosa, Former Mayor, Bogota

There is absolute need of improving the public transport system and restore the air quality of the city.

BRT is excellent transit system ultimately subsidizing sustainable urban development. It has revolutionized the bus-based public transport system by providing affordable, high quality transit service comparable to light rail system at a fraction of the cost.

Kathmandu has a great potential in reintroducing trolleybus integrating with advanced BRT features in major corridors of the urban core areas. It is recommended to develop e-BRT system in Ring Road and primary corridors to ensure the sustainable urban mobility in the valley. A strong urban transport policy ensuring the right-of-way lanes for large occupancy public vehicles and long-term strategic plans for the implementation are of utmost necessary. Along with this, strong political commitment and advocacy programs to sensitize concerned authorities on BRT system and its benefits are inevitable.

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