

Summary & Conclusion



12.0 Summary and Conclusions

As mentioned in the 'Introduction' chapter, the present study documents ten urban transport initiatives/projects undertaken in ten cities of India. It covers four BRTS projects of Ahmedabad, Pimpri-Chinchwad, Visakhapatnam, Jaipur; five Modern City Bus Services (MCBS) of Jalandhar, Jabalpur, Surat, Vadodara and Jalgaon; and multilevel underground parking project of Kolkata. Apart from Jaipur Public Transport (through BRT and Modern City Bus Service) project, the remaining are PPP based projects. For each the study documents mainly description of the project including situation before implementation of the initiative, factors of success, budgetary implications, performance and impact of the project. Besides, it also identifies challenges / constraints, lessons learnt, and provide suggestions.

12.1 PPP in Case studies

PPP is the method in which public and private sector cooperate and partner with each other to provide infrastructure and / or improved public services. 'Public' is represented by SPV in the projects of Ahmedabad, Pimpri-Chinchwad, Jaipur, Visakhapatnam, Jalandhar, Jabalpur; Municipal Corporation in case of Surat, Vadodara, Kolkata; and Transport Committee in Jalgaon. 'Private' is represented by Private Sector Organizations / Companies involved in financing the project or for technical / engineering means or for management purposes. There are many PPP models available in which public and private sectors enter into the partnership such as Service Contract, Management Contract, Concession and Lease, BOT, BOOT, DBFOT etc.

12.1.1 BRTS Projects in Selected Cities

Ahmedabad Janmarg Limited is a SPV, constituted by the Ahmedabad Municipal Corporation, to manage the BRT project. It is responsible for planning, selection of operators, monitoring of service quality, fare revisions, future BRTS expansion plan etc. There are nine PPP arrangements (contracts), for bus procurement, operation and maintenance; ITS on BOT, development foot over bridges on DBFOT; supply and service of bus stations, sliding doors; management of pay and park facility; lease of advertisement rights; housekeeping and cleaning of buses; development and maintenance of landscape; and maintenance contract of bus stations (civil works), etc.

Table 12.1A: Highlights of Public Private Partnership in BRTS Projects of Selected Cities

Cities	Public-Private Partnership	
	Public Sector	Private Sector
Ahmedabad	<p>Ahmedabad Janmarg Limited, a SPV, for:</p> <ul style="list-style-type: none"> • Planning of services; • Selection of operators; • Monitoring of service quality; • Fare revisions; • Coordination with relevant departments; and • Future BRTS expansion plan. 	<p>PPP Arrangements(Contracts):</p> <ul style="list-style-type: none"> • Bus Procurement, Operations and Maintenance; • Integrated Information System including Automatic Ticketing and Vehicle Tracking System(BOT); • Supply & Service Contracts for Bus Station Sliding Doors, Turnstiles; • House Keeping & Cleaning of Bus Stations; • Management of Pay & Park facilities; • Lease of Advertisement Rights; • Development of Foot Over Bridges on DBFOT; • Development & Maintenance of Landscape; and <p>Maintenance Contracts for Bus Stations (Civil Works), Lighting of Bus Stations & Corridor, Monitoring and Maintenance of BRTS Corridor (Civil works), Signage.</p>
Pimpri -Chinchwad	<ol style="list-style-type: none"> 1. Pune Mahanagar Parivahan Mahamandal Ltd. (PMPML) responsible for managing facilities and services (operating buses). 2. PCMC Infrastructure Company, a SPV, to: <ul style="list-style-type: none"> • Plan, construct, operate and maintain the BRT corridor through funds generated by the Urban Transport Fund. Premium on loading of Transfer of Development Right (TDR) is a robust source of revenue. 	<p>Private Sector for Road Furniture:</p> <ul style="list-style-type: none"> • Bus stops; • Public toilets; • Landscaping; • General maintenance; and • Advertisement rights offered on Mumbai Pune road of 12Kms.
Jaipur	<ol style="list-style-type: none"> 1. Jaipur Development Authority responsible for: <ul style="list-style-type: none"> • Development of BRT infrastructure; and • Supervision of construction works of BRT corridors. 2. Jaipur City Transport Services Ltd., a SPV to: <ul style="list-style-type: none"> • Look after overall BRT projects; • Procurement of bus operators, collection agencies, ITS agency; and • Regulate, control and monitor BRT operation. 3. Unified Metropolitan Transport Authority deals with the policy level decisions, which are related to land use and transport. 4. PDCOR Ltd and STUP Consultant Ltd. are responsible for infrastructure designing, bus operation and supervision of Engineering works. 	<p>No private sector involved.</p> <p>In future, JDA would construct bus stops / shelters / stations in the city through PPP.</p>
Visakhapatnam	<p>Visakhapatnam Urban Transport Company Limited, a SPV, (with equity stakes through GVMC, APSRTC &VUDA) responsible for:</p> <ul style="list-style-type: none"> • Planning, designing, financing, developing constructing, maintaining, marketing operating; • Providing multi model transport services including owing, licensing and operating bus routes, passengers and other modes of transportation; and • Serving as a single agency which will facilitate, coordinate, control and monitor the activities of various public and private partners. 	<p>Private Sector is for:</p> <ul style="list-style-type: none"> • Implementing (financing, designing and executing) the bus shelters and foot over bridges on the corridors on BOOT model; • Operating and maintaining facilities for given Concession period; and • Transferring facilities to GVMC after Concession period.

In Pimpri-Chinchwad BRTS project, PCMC Infrastructure Company is a SPV to plan, construct, operate and maintain BRT corridor through funds generated by UTF. Premium on loading TDR is a robust source of revenue. Private sector is being involved for road furniture, viz. bus stops, public toilets, landscaping, general maintenance etc. Advertisement rights have been offered on Mumbai Pune road of 12 Km.

Visakhapatnam Urban Transport Company Limited has been constituted as a SPV, along with equity stakes through GVMC, APSRTC and VUDA, for implementation and operationalisation of the Visakhapatnam BRTS. Private sector is being involved for implementing bus shelters and foot over bridges on BOOT; operating and maintaining facilities on given concession period.

In case of Jaipur public transport (through BRT and modern city bus service), JDA is responsible for development of BRT infrastructure and supervision of construction works on BRT corridor. JCTSL is a SPV to look after BRT projects; procurement of bus operators, collection agencies, ITS agencies; and to regulate, control and monitor BRT operations. However, UMTA deals with policy level decisions. No private sector has been involved. It was reported that the private sector would be involved for constructing bus stops/shelters in the city areas (Table 12.1A).

12.1.2 Modern City Bus Services in Selected Cities

Surat and Vadodara are the two cities of Gujarat in which the Municipal Corporations represent the public sector and are responsible for identifying routes, bus stops, fixing up of fare structure and ensuring the quality of service. Private sectors are involved for procuring, owning, operating and maintaining buses; constructing bus stops / pick-up stands / queue shades on BOT, taking care of expenditure on rolling stocks etc.

In case of Jalandhar and Jabalpur, public sector is represented by SPVs to operate and manage public transport system. The SPV of Jalandhar city bus service provides differentially priced services and the Municipal Corporation of Jalandhar provides space for city bus depots and bus queue shelters on lease basis. In both the cities, private sectors are involved for operating buses, construction of bus queue shelters / bus stops on BOT; ITS system (GPS and PIS) etc.

Table 12.1B: Major Highlights of Public Private Partnership in Modern City Bus services of Selected Cities

Cities	Public Private Partnership	
	Public Sector	Private Sector
Jalandhar	<ol style="list-style-type: none"> Jalandhar City Transport Service Limited, a SPV, to: <ul style="list-style-type: none"> Operate and manage Public Transport system; Provide differentially priced services; and Municipal Corporation of Jalandhar to provide space for City Bus Depot and bus queue shelters on lease basis. 	Private Sector is for: <ul style="list-style-type: none"> Bus Queue shelters on BOT; GPS on BOOT; Monthly bus passes; Electronic ticketing machine; Five bus operators; and Public Information System (PIS).
Surat	<ol style="list-style-type: none"> The Surat Municipal Corporation is to: <ul style="list-style-type: none"> Identify routes, bus stops and fixing up fare structure; and Quality of service in terms of frequency and CNG fuel. Regional Transport Authority for sanctioning carriage stage permits providing statutory sanctions to these terms. 	Private Sector is for: <ul style="list-style-type: none"> Procuring, owning, operating and maintaining buses; Expenditure on rolling stock; Construction of bus stops on BOT; and Rights given to operators by SMC for collecting fares.
Jabalpur	Jabalpur City Transport Services Limited, a SPV, to operate and manage the public transport system in a PPP model.	Private Sector is for: <ul style="list-style-type: none"> Procuring and operating buses; Making passes; Constructing bus stops on BOT; and On line Vehicle Tracking System – GPS and PIS.
Vadodara	<ol style="list-style-type: none"> Vadodara Mahanagar Seva Sadan is the lead implementing agency to: <ul style="list-style-type: none"> Identify bus routes, bus stops and fixing of fare structure; Define quality of service in terms of frequency Determine the buses should run on CNG Regional Transport Authority for: <ul style="list-style-type: none"> Sanctioning stage carriage permits providing statutory sanctions to these terms. Providing technical assistance to VMSS in preparing proposal and tenders etc. Gujarat State Road Transport Corporation for providing route map. 	Private Sector is to: <ul style="list-style-type: none"> Procure, own, operate and maintain the buses; Take care of expenditure on rolling stock and operation and maintenance; Provided uniforms (with logos of VMSS and the VTCOS Pvt Ltd) to drivers and conductors; and Construct Pick- up stands / Queue shades on BOT.
Jalgaon	<ol style="list-style-type: none"> A Transport Committee, constituted by Jalgaon Municipal Corporation, for: <ul style="list-style-type: none"> Policy decisions; Levy of fares and charges of transport services has been decided by the transport committee with approval of the Municipal Corporation and R.T.A.; and Approval to the Routes Stages and Fare structures. Transport Manager for: <ul style="list-style-type: none"> Identification of routes stages and fares and charges; Submission of proposal to Appropriate Authorities; Management of Undertaking; and Execution and overall implementation of PPP Model. 	Private Sector is to: <ul style="list-style-type: none"> Procure, own, operate and manage buses; Erection of Bus shelters; Appointment and Training ; <p>Note: Municipal Corporation of Jalgaon has transferred the rights to the above mentioned transport company, in lieu of the royalty of ₹ 0.85 per km. The Corporation has also taken ₹ 25,000 per vehicle from the Operator as a guarantee in the form of bank deposit.</p>

In Jalgaon, a 'Transport Committee' represents public sector and is responsible for policy decisions, levy / fixing of fares / fare structure, identification of routes, execution and over all implementation. Private sector is to procure, own, operate and manage buses; erection of bus shelters, providing ITS etc. It is to be noted in this context that the Municipal Corporation has transferred the aforesaid rights to the transport company and in lieu of the royalty of ₹ 0.85 per Km. Moreover; the Municipal Corporation has also taken ₹ 25,000 per vehicle from the Operator as a guarantee in the form of bank deposit (Table 10B).

In Kolkata Multilevel Underground Parking Project, the Kolkata Municipal Corporation is representing 'Public' and has land rights but it may not have sufficient finance and engineering means to develop the project. It involved private sector, Simplex Private Limited to construct and lease out the commercial blocks (at Level-1) and car parking system on a double - concession BOOT basis (Table 10 C).

Table 12.1C: Major Highlights of PPP for Kolkata Multilevel Underground Parking at Lindsay Street

Public Private Partnership	
Public Sector	Private Sector
<p>Kolkata Municipal Corporation to:</p> <ul style="list-style-type: none"> • Offer the concessionaire, Simplex Pvt. Ltd. (private sector), the right to construct the parking system and commercial complex. Architectural designs and drawings were approved by the Corporation; and • Collect the basic rent directly from the lessee 	<p>Private Sector to:</p> <ul style="list-style-type: none"> • Construct commercial complex (at Level -1) on BOOT; • Construct underground car parking (at Level-2) on BOOT; and • Impose and collect parking charges and pay the Corporation.

After going through the above mentioned analysis, one can infer that public and private sectors enter into Public-Private Partnership through various types of agreements, contracts or concessions to meet their requirements. Public sector (SPV, ULBs, TC) usually do not have sufficient finances or technical expertise / means due to which they have to depend upon private sector for procuring, operating and maintaining of buses; erection of bus shelters / bus stops; providing ITS and other infrastructures.

However, the role of public sector, as mentioned above, is planning, designing, identification of routes, fixing of fares, over all supervision and monitoring of the project. In nutshell, this is all done for providing efficient and better quality services to the citizens.

It is expected that the PPP arrangements may help in making the project successful in terms of operational performance. As mentioned earlier, the operational performance largely depends upon financial performance, which itself is subject to management efficiency and fare structure. The system should initially recover its operating cost from its fare box (achieving breakeven point).

Capital cost is recovered in a fixed period of time either from fare box or revenue from other sources, like revenue from advertisements, rents etc. The following section of this chapter tries to identify success stories – best practices by evaluating overall performance of the case projects with the available data / information on the projects.

12.2 Success Stories – Best Practices

Out of ten urban transport projects, eight have been implemented and running successfully. However, Jalgaon City Bus Service has recently been started. Amongst eight implemented projects, two are the BRTS of Ahmedabad and Jaipur; five are City bus services of Jalandhar, Surat, Jabalpur, Vadodara, Jalgaon; and Kolkata Multilevel Underground Parking Project.

Following case studies may be treated as success stories in terms of their overall performance and impacts of the project:

Ahmedabad BRTS with new technological applications / innovations has been in operation for the past one year. It carries about 90,000 passengers daily with deployment of 45 diesel buses (30 AC buses out of 45, 12 meter long, 900mm floor height), with commercial speeds greater than 24 Kms per hour. A review of the two months progress of the Ahmedabad BRTS project, in terms of various parameters, indicates that the system is running successfully. Average passengers per day, average collection per day, average passenger per bus per day, average collection per bus per day have increased considerably during two months period. During the period, average rating giving to BRTS by users is 8.61 out of 10.

Besides the above, the operation 23 buses during first four month , reflects positive impacts, such as an increase in ridership (from 17,315 in first month to 69,759 passengers per day in eleventh month), increase in revenue (from ₹ 4,500 to ₹ 8,700 per bus per day), modal shift (shift of passengers from motor cycles, cars and 3-wheelers, which is about 50% of the total BRTS users), dependable service / reliability (95% departures are on time, 65% of arrivals were on time), improvement in travel speed (peak hour speed-24Kmph against 16-18 Kmph

of AMTS), improvement in the level of air pollution due to CNG buses, decrease in accidents rates etc.

The major reasons for the success (factors of success) of Ahmedabad BRTS may be attributed mainly to its good institutional structure, which maximize the quality of service, minimize the cost of service, and cost sharing using a PPP model. The project has been awarded by MoUD as the Best Mass Transit Project under JNNURM in the year 2008-2009. It was given 2010 Sustainable Transport Award for visionary achievements in sustainable transportation and urban livability in a function held at Washington.

Table 12.2: Overall Performance / Impacts of the Projects of Selected Cities

Performance / Impacts of the Projects							
Cities / Projects	Increase in Ridership	Increase in Revenue	Improvement in service frequency	Information Availability (ITS)	Reduction in Pollution	Reduction in Accidents	Users Satisfaction
Ahmedabad BRTS	✓	✓	✓	✓	✓	✓	✓
Jaipur Public Transport	✓	NA	✓	✓	✓	NA	NA
Vadodara City Bus service	✓	✓	✓	✓	✓	NA	✓
Surat City Bus Service	NA	NA	✓	✓	✓	NA	✓
Jalandhar City Bus Service	✓	✓	NA	✓	NA	NA	✓
Jabalpur City Bus Service	NA	✓	NA	✓	NA	NA	✓
Jaigaon City Bus Service	✓	NA	✓	✓	NA	NA	✓

NA – Not available

Jaipur Public Transport Service through BRT and modern city bus service is not a PPP based project. However, it may be treated as success story due to some changes, viz. improvement in travel speed (17 kms in 18 minutes at 25 Km / hr), increase in ridership (from 55,000 to 2,00,000), reduction in accidents (reduced by 12.65%), reduction in green house gas emission (complying with BS-III emission norms), reduction in air and noise pollution (complying with BS-III norms and engine is fitted at rear of buses), increase in

service frequency (7 to 15 minutes), more geographical coverage (grid system for route designing), reduction in energy consumption etc.

The reasons for the success of this project are attributed to planning and design: technical inputs like, low floor buses, AC buses, next vehicle display board / system, GPS, on board stop announcement, signal priority on specific signals, ticket system-prepaid / automated.

The **City Bus of Vadodara** is running successfully. Presently, approximately 101 buses are running on 41 routes providing cost effective and eco-friendly public transport with innovative features such as daily passes, students' passes and free travel for freedom fighters. The buses runs on CNG fuel which is proven environment friendly and makes improvement in ambient air quality leading to reduction in air pollution & better utilization of natural gas resources.

Passengers traveled by city CNG buses are 1, 50,000 per day which will be increased by 3, 50,000 in March 2010. There are a number of benefits to VMSS by Privatization, viz. income of VMSS increased with the offer premium of ₹ 18,55,000/- yearly from City Bus Service; income of VMSS increased with the offer premium of ₹ 82,58,400/- for pickup stands / Q – shades as per BOT; and the total income of VMSS has increased by ₹ 1 crore / year with 70 numbers of bus services and 124 nos. of pickup stands / Q shades and this amount would be utilized in the infrastructure development of the city.

The major reasons for the success of the project are attributed to private investment by operators for buses, infrastructure and operation and sharing of returns with operators against expenditure incurred. The Government of India has conferred an Award for Excellence in Urban Mobility on 5th December, 2008.

The **City Bus Service of Surat** is having a fleet of 116 buses, which are operating on 41 routes. These buses are efficient (in terms of frequency), cost effective and eco-friendly. Around 50,000 commuters travel by these buses daily. It issues daily passes, students' passes and allow free travel to freedom fighters. Besides, a system of weekly review by the traffic department of the corporation has been put in place to make the system more effective and efficient. Its success is attributed to the PPP model used for providing the service. It has received Best PPP Initiatives in Urban Transport award, by MoUD in the year 2008.

Jalandhar City Transport Service Limited (JCTSL), a SPV, to operate and manage the public transport system and provide differentially priced services. In the first phase, JCTSL have 16 buses having GPS and PIS system, which will expand very soon. Since it has started recently in the beginning of 2009, the operational as well as financial performance was not available.

However, the study team of the Institute interacted with the officials of JCTSL to know about its performance. They mentioned that the operating cost is being covered by fare revenue (from fair box). The team also interacted with the commuters who were traveling by these buses. It was found that the commuters, who were using Intermediate Public Transport (IPT) modes earlier, have switched over to these buses. The commuters were found satisfied with the services of these buses.

The **City Bus Service of Jabalpur** is running 28 Metro and 9 Mini Metro buses on 6 and 4 routes (July 2009) successfully. The financial performance of it is up to mark. Revenue is being collected as ₹ 26 per Km against operating cost of ₹ 24 per Km thus proving that Metro bus operation in Jabalpur is profitable under the PPP mode. Moreover, commuters were found to be satisfied with the service.

In **Jalgaon City**, around 30 Eco buses (Bharat II), equipped with GPS, PIS, modern ticketing and pass-system were being operated by Prassan Bus links Pvt Ltd under the overall supervision of Transport Committee constituted by Jalgaon Municipal Corporation (as on December 2009). The frequency of these buses is 5 minutes where the traffic density is high and after 10 minutes where the passenger load is moderate.

It was reported by the authorities that the ridership was increasing as it was attracting commuters who were travelling earlier by other modes of transport. Most of the commuters found quite satisfied with services in terms of frequencies and quality of the service (NIUA's study team interviewed with the commuters).

Kolkata Multilevel Underground Parking Project, having 250 parking slots in underground parking system at Level 2 and market complex at Level 1 with 200 shops on lease, may also be treated as successful project. The pedestrian plaza on the ground is a bonus for the pedestrians. Street parking is no longer allowed on Lindsay Street, the traffic jams have become a thing of past. This project is being replicated in many cities such as Mumbai, Pune etc. In this case also, the success of the project is attributed to PPP models used in it.

Performance parameters / assessment indicators of aforesaid projects are given in Table 12.2 for ready reference.

12.3 Major Challenges / Constraints and Lessons Learnt

It is to be mentioned that the aforesaid case studies are success stories in many respect but these have encountered many challenges or constraints, either at the time of planning or at the time of implementation. Challenges / constraints indicated in the case studies may be classified in following categories:

1) Related to Finance

- Financial constraints due to cost escalation (Pimpri-Chinchwad);
- Financial sustainability of overall operation (Jaipur).

Lesson Learnt: Financial viability of the project should be worked out keeping in view the trend of inflation rate.

2) Related to Planning

- Inadequate RoW in some areas (Jaipur);
- Availability of minimum ROW to achieve segregation of traffic on the corridors (Vishakhapatnam);
- Land acquisition of properties to produce RoW (Visakhapatnam);
- Acquisition of land for construction of depot, workshop and bus terminals (Jalgaon);
- Unavailability of lands for provision of parking near bus stops (Jaipur);
- Land acquisition delays the implementation process & land acquisition issues (Jaipur);
- Lack of interagency coordination (Jaipur and Vishakhapatnam); and
- Shifting of utility services (Jaipur) addressing drainage (Visakhapatnam).

Lesson Learnt: Land use planning should be integrated with transport planning in newly developing areas. NUTP also suggests the same.

3) Related to Operation of Buses

- Low frequency of buses (Jabalpur);

- Buses are time efficient but the frequencies of these buses are very low (Jalandhar); and
- Existing routes are not viable for profit to the Bus Operators (Jalandhar).

Lesson Learnt: Travel demand on different routes should be reviewed periodically.

4) Related to Technical Issues

- Problem of driving buses as the engine fitted at the rear side of bus and there is no automatic transmission system (Jabalpur); and
- Buses are big in size, operation on narrow road is not smooth having inadequate turning radius (Jalandhar);

Lessons Learnt:

- ❖ Automatic transmission is must not only to improve maneuvering but also to reduce the wear and tear of the buses; and
- ❖ Minibuses should be operated on such roads where widening of roads is not possible.

5) Socio-Economic Issues

- Agitation by auto rickshaws drivers;
- Poor knowledge of traffic sense of the citizens have created difficulties in day to day traffic despite efforts towards high standards of traffic engineering in the city (Surat and Vadodara); and
- Strategic locations of village settlements at Simhachalem, where property acquisition is rather difficult (Vishakhapatnam).

Lesson Learnt: Awareness Campaign should be organized to provide knowledge about the project as well as traffic rules.

12.4 Suggestions

Keeping in view the review of the case studies / projects, in terms of overall performance and impacts of the projects, PPP arrangements / models used, challenges / constraints encountered at the time of planning or implementation of the project and lessons learnt, some suggestions can be given to improve future planning and implementation of the urban transport projects:

- 1) The analysis of various case projects reveals that PPP is one of the factors, which is responsible for making the project successful. In the case projects, public sector has been represented by Municipal Corporation (Surat, Vadodara and Kolkata), SPV (Ahmedabad, Pimpri-Chinchwad, Jaipur, Visakhapatnam and Jabalpur) and Transport Committee (Jalgaon). The aforesaid Municipal Corporations have been performing their roles efficiently, however, it may be suggested that there should be a dedicated body, like SPV or TC, which could concentrate only on transport activities to make the project more successful.
- 2) The public sector should be responsible for planning, designing, identifying routes and locations of bus stops / bus queue shelters, fixing of fares etc (as indicated in many case projects). Moreover, it should be responsible for monitoring the operation of buses to ascertain as to whether the operators are operating buses as per the schedule or time table. It has been pointed in case of Jalandhar that the operators were operating their buses only on profit making routes and avoided operations on uneconomic routes. In such cases, the public authority should assess the commuters' volumes on uneconomic routes and fix up the frequency of buses accordingly.
- 3) As indicated earlier, the revenue from the fares or fare box is the major source of revenue, therefore, fixation of fares or preparing fare structure should be done by the public authorities. It is one of the important responsibilities of the public sectors as indicated in case studies also. In this context, it may be suggested that the fares should not be pegged at levels lower than that required to cover the cost. Moreover, the fares should be revised periodically to meet the operating cost. It has been reported that the operators in the some case projects provide concessional passes to certain sections of the citizens. In this regard, it may be suggested that the operator should not be forced to provide concessions. If special fares or concessions are given, the departments / local bodies concerned should compensate the operators. For example, the revenue loss as a result of issuing passes to students should fully be reimbursed by the Ministry of Education or any other concerned departments.
- 4) The authorities should explore alternative ways to generate revenues besides the fare box. PCMC has developed an innovative financial model (Annex VIII of the study) to create a new revenue stream to UTF to construct, operate and maintain BRT corridors. It has allowed TDR from other zones to BRT corridor on payment of premium, which

makes 59% of the total income potential of BRT corridor. The same model may be replicated in the BRT projects of other cities.

- 5) The analysis of various PPP arrangements / models, used in the case studies, reveals that the PPP depends upon the requirements of the public sector. The financial health of most of the Municipal Corporations / Municipalities or Urban Transport Undertakings is not sound to provide urban mass transport services as per increasing demand. In such cases, public sector should enter into PPP and engage the private sector (private companies) through service contract to procure, operate and maintain the buses (as in case of Ahmedabad, Jalandhar, Vadodara, Surat, Jalgaon, etc).
- 6) If a public sector does not have technical and engineering means, it may involve the private sector for specific purposes, viz. construction of bus queue shelters / bus stops on BOT (as in case of Jalandhar, Surat, Jabalpur, Vadodara and Jalgaon), construction of foot over bridges on DBFOT (Ahmedabad) or on BOOT (Visakhapatnam); and ITS - GPS, PIS etc on BOT (as in Jabalpur, Surat, Vadodara, Jalandhar, Ahmedabad). The Ahmedabad BRT project has introduced latest technological applications, which are classified in three broad areas, viz. wireless station and bus door operations by driver, RFID based Docking System; Integrated Transit Management System; and Area Traffic Control System. This system is operating successfully and may be replicated in other BRT projects of other cities.
- 7) In order to make the BRTS more successful, it may be suggested to identify nodal points at BRT corridors and provide 'feeder' services from these nodal points to important city areas. The alternative modes of transport, viz. mini buses, battery vans, tempos etc. may be used to provide feeder service. This practice is being done in case of Ahmedabad BRTS.
- 8) As indicated in some case studies, land acquisition for providing RoW in city area had become one of the major constraints. In such cases, the government should take a quick decision to release the land by giving appropriate compensations to the property owners. In newly developing areas of the cities, land use planning should be integrated with the transport planning (NUTP also suggests the same). The selection of public transport modes should be done keeping in view the characteristics of the city. For large cities metro is advisable while BRTS suits for medium size cities. Modern city bus service, equipped with ITS, is also one of the alternative modes for medium sized cities.

- 9) In case of Jaipur and Visakhapatnam, coordination problems have been faced with the agencies involved. In this regard, it may be suggested that the public body- SPV or transport committee should intervene to solve the coordination problem with the relevant departments or agencies involved. The NUTP has suggested constituting Unified Mass Transit Authority (UMTA) for the purpose.
- 10) As in case of Jalandhar, drivers are not driving buses smoothly as they find difficulty in changing the gears (from lower to higher or from higher to lower) because of the rear side fitted engine in the buses. Generally, the gears are changed by hearing the sound of engine, which is not possible in the aforesaid buses. It may be suggested that these buses should have automatic transmission not only to improve the maneuvering but also to reduce the wear and tear of the buses;
- 11) Technically sound projects are not successful in many instances due to not providing adequate project information for the general public. As indicated in Visakhapatnam BRT project, it is imperative to engage the public through the social assessment study and wide publication in the news media. In other words, the co-operation of citizens is imperative to make the project successful in real sense. Awareness Campaign should be organized to provide knowledge about the project. Moreover, citizens should be consulted at the time of planning of the project for seeking their feedback and opinion. They should be aware about transport service, which is to be given to them. People's participation in implementation of the project should also be encouraged.