



World Scientific News

An International Scientific Journal

WSN 116 (2019) 46-61

EISSN 2392-2192

Multi-pronged approach with synergisation of travel modes and institutional linkages – critical for sustenance of urban transportation

P. Ganeswara Rao^{1,*}, A. Arun Kumar², V. Shekhar³

¹PP MAN.0533, Research Scholar, Rayalaseema University,
Kurnool - 518001, Andhra Pradesh, India

²Post Doctoral Fellow, Department of Business Management, Osmania University,
Hyderabad - 500007, Telangana, India

³Professor, Department of Business Management, Osmania University,
Hyderabad - 500007, Telangana, India

*E-mail address: ganesh_iimb@yahoo.co.uk

ABSTRACT

Urban areas and metros are growing at a much higher rate than the rural areas. Urban areas play a significant role in the development of the nation by contributing 60% of the national income with only 27.78% of the population. Urban Transport is the most crucial (infrastructure) element in shaping urban development and living. The supply of transport is heterogeneous with a number of interacting and competing modes while the demand for it is derived from the overall pattern of urban activity. Urban Transport has a significant impact on the environment, land use, and land development patterns. In India, multiple institutions are responsible for urban transport and it is governed by multiple policies/ Acts/ legislations. While bus is the major mode of urban transport, local/suburban trains (Railway), Taxis/Autos and personalized transport makeup the rest. Lack of proper public transport has resulted in the increase of personal vehicles, causing problems of congestion, pollution and loss of productive time on travel delays. Study of urban transport systems across the world has revealed that well coordinated institutions with dedicated funding sources and proper planning ensure well functioning urban public transport systems, keeping the cities liveable and productive. Urban transport has to be a public good and be funded through public resources. Indian context have revealed a good beginning made in this direction but absence of institutional arrangements for planning at local level, lack of

coordination among various institutions and departments, lack of dedicated funding, lack of inter modal coordination, lack of patronage for new rail based systems are also glaring.

Keywords: Multi Pronged Approach, Travel modes, Linkage, Urban Transportation

JEL Classification: R42, R 41, R 49, R1, R2

1. INTRODUCTION

Urbanization as a phenomenon is irreversible. With the urban areas extending their frontiers, covering larger and larger proximity areas; accessible and widely connected urban transportation is sine qua non for sustenance of urban areas. The defining trait of urban areas is density: of people, activities, and structures. The defining trait of an effective urban transportation should be the ability to cope with this density, while moving urban populace. This paper analyses the issues involved in urban public transport and the strategies and long-term policy initiatives required for sustenance of urban areas.

1. 1. URBANIZATION TRENDS IN INDIA

It is pertinent to look at the urbanization trends. In India urban population is increasing at a faster rate though the extent of geographical area covered is limited.

Table 1. Population and trends of urban population growth.

Census Period	Total Pop. (In Crores)	Rural Pop. (In Crores)	Urban Pop (In crores)	Urban Population % of total pop
1971	54.825	43.528	10.911	19.91
1981	68.332	51.913	15.946	23.34
1991	84.630	62.281	21.761	25.71
2001	102.70	74.166	28.535	27.78
2011	121.02	83.31	37.71	31.16

Table 2. Growth Rate of Population (in %)

	1991-2001	2001-2011	Growth rate
India	21.5	17.6	-3.9
Rural	18.1	12.2	-5.9
Urban	31.5	31.8	+0.3

In the 2011 census; for the first time since Independence, the absolute increase in population has been more in urban areas than in rural areas. The Rural-Urban distribution has been 68.84% & 31.16%. The Level of urbanization has increased from 27.81% in 2001 Census to 31.16% in 2011 Census. The proportion of rural population has declined from 72.19% to 68.84%. In percentage terms, the urban population grew by 31.8 per cent, which was 2.6 times the corresponding decadal rise of 12.18 per cent for the rural population. The 12.18 per cent rural population growth during 2001-2011 represents a sharp dip from the 18.09 per cent increase over 1991-2001, whereas the growth rate for the urban population has seen a marginal rise from 31.47 per cent to 31.8 per cent over these two periods. All this suggests a rapid process of urbanisation taking place over the years.

As per available reports, the Percentage of urban population to the total population of the country as of October, 2018 stands at 32.5%. According to a survey by UN State of the World Population report in 2007; by 2030, 40.76% of country's population is expected to reside in urban areas.

The Million + cities which were only 9 in 1971 have gone up to 12 in 1981, 23 in 1991, 35 in 2001. According to the 2011 census, there were 27 million-plus cities in India, with Mumbai, Delhi and Kolkata having populations over 10 million. There are 53 urban agglomerations in India with a population of 1 million or more as of 2011 against 35 in 2001. Much of the urban growth is contributed by Mega cities like Greater Bombay, Delhi, Kolkata and Chennai etc.

2. METHODOLOGY

2.1. DATA COLLECTION

The urban public transport and the strategies and long-term policy initiatives required for sustenance of urban areas. The aim of this paper is to gain deeper insight into urban transportation of India. This paper is purely based on secondary data. The data was collected from internet, websites of institutions, periodicals, articles and related books.

2.2. OBJECTIVES OF THE STUDY

The objectives of the study are to assess the Synergisation of travel modes and institutional linkages- critical for sustenance of urban transportation.

- 1) To throw light on the urban transportation of India
- 2) To understand the Synergisation of travel modes and institutional linkages- critical for sustenance of urban transportation
- 3) To address the issues on urban transportation planning and services in India.

3. IMPORTANCE OF URBAN AREAS IN THE ECONOMIC DEVELOPMENT OF THE COUNTRY

Urban areas contribute substantially to the economic growth of the country. Urban India is the engine of productivity and growth in the country. This is manifested in the increasing contribution of urban sector to national income.

Year	Percentage of Urban to total population	Estimated contribution to national income
1951	17.3	29
1981	23.3	47
1991	25.7	55
2001	30.5	60
2011	31.6	63

As per Barclays report in 2014, Urban India could house 35% of India's population and contribute 70-75% of its GDP by 2020.

4. IMPORTANCE OF URBAN TRANSPORT

Urban transport is an important infrastructure essential for urban growth and sustainability. Services and manufacturing industries particularly concentrate around major urban areas, and require efficient and reliable urban transport systems to move workers and connect production facilities to the logistics chain. In India, transportation demand in urban areas continues to increase rapidly as a result of both population growth and changes in travel pattern. Globalization has its impact on urban growth and its planning. The competition between Bangalore, Chennai, Hyderabad etc. to attract capital and software industry is well known. Transport with its direct and indirect impact on environment, safety and energy considerations, has a vital role in the globalized city. To make a city competitive, livable and attractive, a well-functioning urban transport is very essential. A well-functioning urban transportation system can increase society's productivity and welfare by improving people's access to jobs, educational institutes and recreational activities.

The significance of urban transport in India also stems from the role that it plays in reduction of poverty, by improving access to labour markets and thus increasing incomes in poorer communities (Antonio Estache, 2007).

5. TRANSPORT DEMAND

Process of urbanisation has resulted in imbalance in the spatial distribution of population and economic activities necessitating large-scale intra-city movement of people, goods and vehicles. An important feature of urban transport is therefore, phenomenal growth of transport demand. Passenger transport demand is expressed in terms of daily vehicular passenger trips and depends on three main factors: (i) the number of people in an urban area moving around for various needs and causing demand for systems and services; (ii) the average trip per person, i.e. mobility rate; (iii) the increase in trip length caused due to expansion of the city's spatial frame.

Public transport systems are inadequate and are unable to cater to demand imposed on them. As a result, there is tremendous increase in the use of personalized vehicles but the carrying capacity of roads has not kept pace.

Table 3. Registered Motor vehicles in Major cities
(in thousands)

City	2002	2004	2006	2008	2010	2012
Ahmedabad	899	1075	1780	1586	-----	1682
Bengaluru	1680	1891	2617	2640	3491	4156
Chennai	1356	2015	2338	2701	3149	3767
Delhi	3699	4237	4487	5899	6747	7350
Greater Mumbai	1069	1199	1394	1605	1768	2029
Hyderabad	1241	1356	1522	2444	2728	3387
Kolkata	801	875	948	573	411	496

(Source: Ministry of Road Transport and Highways)

Since the transport infrastructure development and provision of public transport facilities have severely lagged behind, the roads in cities are now virtually suffering from explosion of personalised vehicle, acute traffic congestion, steeply increasing number of accidents and high levels of pollution. This situation is evident in the transport scenario of all big cities like Mumbai. Intermediate transport modes like mini-buses, taxis, scooter rickshaws and cycle rickshaws, falling in the category between private modes and conventional bus transport and mass transit systems, also fulfil travel requirements of urban areas of different dimensions. Use of individual motorcars creates a peak hour traffic problem both in space and time.

Private vehicles carry a small proportion of the total transport demand but dominate the available road space in urban areas. This is leading to congestion, continuous slowing down of average vehicular speeds, increasing air and noise pollution, increasing accident rates and excessive use of non-renewable energy. The increase in number motor vehicles (two wheelers in particular) is phenomenal. The road accidents have also been increasing causing loss of human lives.

There is an urgent need to divert traffic from the personalised modes to public transport and emphasise the need to improve availability through route rationalization and optimization of resources. In the absence of a good, convenient and efficient public transport system in urban areas, there has been an increasing trend towards more and more ownership and utilization of personalized motor vehicles to commute which is not only more energy intensive and polluting, but also more expensive to the economy. The cab aggregators like ola and uber services are also catering to travel needs for intra-city travel to a large extent. To reduce congestion; on personal level, individuals are going for pooled vehicles apart from such services being provided by cab aggregators. On larger scale, the only sensible and practical approach is the synoptic one in which not only are all forms of transport taken into account but also all aspects

of metropolitan planning and control. Towards this end, combined, co-ordinated and comprehensive effort is needed by all authorities like private, public as well as government and the coordinated effort of different disciplines and professions.

6. MAJOR URBAN TRANSPORT PROBLEMS

6. 1. ROAD CONGESTION

As populations increases, the average travel distances as well as intensity are expected to increase as there is a direct correlation between the two indicators. Average trips lengths for metro cities including Bengaluru are over 8 km, while it is 6 km or less for all other metro cities. This trend in trip length and frequency is only expected to increase with increasing income levels, migration, participation of women and a service-oriented economy. As more people travel over longer distances on regular basis for employment and education purposes, will inevitably lead to road congestion.

6. 2. PARKING PROBLEMS

The acute shortage of parking spaces both on and off the streets in Indian cities increases the time spent searching for a parking spot and induces traffic congestion. Available data shows that a high proportion of Indian streets are faced with on-street parking issue. This problem is especially acute in smaller, compact Indian cities. Even if cities invest in multilevel car parks in prime areas, the parking rates are not expected to recover the costs.

6. 3. DETERIORATING ROAD SAFETY

In most Indian cities, non-motorised modes like cycling and walking presently share the same right of way as cars and two-wheelers leading to unsafe conditions for all (National Urban Transport Policy (NUTP), 2008). The number of fatalities is also increasing in relation to the increasing motorization and higher slow-moving vehicles in the traffic stream. While progress has been made towards protecting people in cars, the needs of vulnerable groups of road users, primarily cyclists and pedestrians, are not being met.

7. COMPLEXITY OF URBAN TRANSPORT SCENARIO

Apart from the major problems elucidated above; in India, the present day urban transport systems are characterized by- obsolete network- inequity of access, poor public transport, low journey speeds and high travel times, increase in vehicle owner ships, scarce parking space, no co-relation with land use, risk of safety in travel, high consumption of fossil fuels, high pollution levels, rapid decline in productivity.

Present institutional arrangements are characterized by-multiplicity of authorities; everyone's interest yet no one's responsibility, a state of benign neglect, dispersed functions and conflict in operations, deterioration in quality of life etc. At present, institutional arrangement for planning and developing urban transport in the country are far from satisfactory. There are a number of acts like - Indian Railway Act, Metro Act, Trams way Act, M V Act, RTC Act and Metro Acts for various cities which are the governing laws of public passenger transport system. These fall under the jurisdiction of different ministries including

Ministry of Road Transport and Highway etc. But in Indian context, the following major challenges remain unanswered.

8. MAJOR CHALLENGES IN URBAN TRANSPORT

Generally, each city has its own unique history, characteristics and related problems, but problems in urban cities in India are characteristically similar to other cities in developing countries. Some salient issues and challenges identified that cause or compound the urban transport problems are as follows:

8. 1. GAPS IN LAWS AND REGULATIONS

There is no legislation at central, state or local level that comprehensively covers urban transport requirements of Indian cities. The current systems of laws, regulations and governance for urban transport are the legacy of an era when Indian cities were sparsely populated and had not yet witnessed the kind of transport problems they are encountering today. Many Acts that are in place today are the legacy of the British Raj and a few of these have evolved to address specific issues in urban transport resulting in fragmentation or overlap of jurisdictions.

For example, there are three Acts that are specific to metro systems in India which need to be examined and appropriately amended to be mutually consistent in their treatment of this transport mode

- 1) Tramways Act, 1886, is for operation of trams on the road surface within the municipal limits
- 2) Metro Railways (Construction of Works) Act, 1978, covers the needs of construction of metro railways in metropolitan cities and for matters connected therewith.
- 3) Delhi Metro Railway (Operation and Maintenance) Act, 2002, provides for the operation and maintenance, and to regulate the working of the metro railway in the metropolitan city of Delhi. Earlier, Kolkata Metro had enacted a similar act for operation and maintenance of Kolkata Metro as an adjunct to the Indian Railway Act: (This act was amended in 2009)

8. 2. FRAGMENTED INSTITUTIONAL FRAMEWORKS

Urban transport systems require several functions to be performed in a well-coordinated manner for seamless and comfortable travel experience for commuters. Unfortunately, these are performed by multiple agencies under the central, state and city governments which do not necessarily work together. According to the Seventh Schedule (Article 246) of the Indian Constitution, urban development, which includes urban transport, is in the State List.

8. 3. DISTORTED LAND MARKETS AFFECTING TRANSPORT INFRASTRUCTURE DEVELOPMENT

Very high costs of land acquisition along with arduous and time-consuming processes are a major barrier for planning integrated urban transport infrastructure. Significant amount of public lands keeps large portions of well-located land outside markets. An attempt to develop well-planned townships outside the existing city limits and eventually relocate major activity centres to decongest the city has met with limited success. In most cases, there is inadequate

transport infrastructure to serve these new suburban developments and the residences located around them.

9. WHO IS RESPONSIBLE FOR URBAN TRANSPORT PLANNING AND PROVISION?

The answers are always inconclusive. As explained above, all the institutions mentioned above play some or part role in urban passenger transport. But, none takes the coordinating or nodal agency role. Some of these Acts are also out dated and need considerable amendment in the context of present day requirements. Rationalization of such acts, therefore, is essential for the success of the mass transit system. But the substantive problem is that solutions are expensive and require massive mobilization of resources for investments that have long gestation periods. The ensuing table illustrates this clearly.

Table 4. Institutions responsible/involved in Urban Passenger Transport:

Organizations	Functions	Relevant Act
Urban transport planning Ministry of Urban Development	Over all responsibility for Urban transport policy and planning	Allocation of business rules
Land Development Authority, State Government	Land use allocation and planning	State development Acts
Roads		
Transport Department, State Government	Licenses and controls all road vehicles, inspection of vehicles, fixing motor vehicle tax rates	Motor Vehicles Act, 1988
Ministry of Surface Transport	Administer the MVAct and notify vehicle specifications as well as emission norms	Motor Vehicles Act, 1988
State Transport Undertaking, State Government	Operation of bus services	Road Transport Corporations Act, 1950
Public Works department, State Government	Construction and repair of state roads	VII Schedule of the Indian Constitution (Article 246), List II (State List), Item 13
Local municipality	Construction and repair of smaller roads, road signage, traffic lights, licensing and control of non-motorized vehicles, clearing of encroachments and land use planning	Constitution (74 th Amendment) Act, 1992

Regional Urban Development Authority	Planning (Area Master Plan), Regulation and Control, Development, Co-ordination.	Respective State Governments constitute these bodies through a bill.
Police	Enforcement of traffic laws and prosecuting violators	State Police Acts
Railways Ministry of Railways	Own and operate urban rail transit systems wherever they exist	Railway Act, 1989 Metro Railways Act, 1978 The Indian Tramways Act, 1886
Others		
Min. of Petroleum and Natural Gas		
Department of Environment, State Government		

(Source: Urban Transport in India)

10. POLICY RESPONSES TO ADDRESS URBAN TRANSPORT ISSUES

The role of the central government in urban transport is still confined to a few dimensions. Until the mid-1990s, connectivity of rural areas to urban centres of India remained the main focus of investment and transport policy direction, since a majority of the population lived in rural areas (Tiwari, 2011). Most large cities are able to make decisions and implement them at the local level. But they do not have the right incentives to make strategic decisions in the long-term interest of cities and its inhabitants. There are also no checks and balances to ensure that a good strategic plan gets implemented. Central monitoring and supervision is limited at the local level where planning and policy is carried out. This situation has created an institutional gap reflected in the slow transfer of powers and resources from states to local governments. The political constituencies of state and local institutions being different, the continued dominance of state produces transport policies that are not aligned with local interests. The following subsections highlight the main plans, strategies and programs initiated by the central government to address urban transport challenges in Indian cities.

10. 1. PLANNING COMMISSION

Urbanisation and urban development was a low-priority sector, urban transportation was still lower at the national level, until the NUTP in 2006. The plan documents, from the First Five-Year Plan onwards, laid stress on intercity transportation of different modes and created rail, road and air infrastructure to meet the demand. Since the Sixth Five-Year Plan, the Planning Commission had acknowledged the importance of transportation in India's sustained economic growth and development of various segments of the economy. But it was only in the Eighth Five-Year plan that the need for establishing a unified coordination body and a separate financial institution for addressing urban transport problems was emphasized. The Eighth Five-Year Plan also carved out a distinct role for the Ministry of Railways to plan and provide metro rail systems in spite of the fact that, in 1986, the responsibility of urban transport policy was handed to MOUD.

In the Twelfth Five-Year Plan, urban transport is included in a more comprehensive chapter titled “Managing Urbanisation” and addresses urban transport over a long-term vision of 20 years for the first time. The focus has been towards developing expertise in the metro rail systems and exploring land value capture options and private participation to fund such expensive projects. The measures recommended for urban transport sector were primarily aimed towards allocating budget for strengthening the MOUD and starting urban transport departments within each state, supporting transit (especially metro) and NMT infrastructure development, wider use of ITS technologies, commission for addressing safety issues and policies to finance transport infrastructure through PPP model.

10. 2. NATIONAL URBAN TRANSPORT POLICY (NUTP)

One of the major initiatives that triggered increased attention to sustainable transport in the cities was the formulation and adoption, in April 2006 (“NUTP,” 2006), of a National Urban Transport Policy. The central government, under the Ministry of Urban Development (MOUD), issued the National Urban Transport Policy in 2006 with specific policy objectives of achieving in India affordable, quick, comfortable, reliable and sustainable access to jobs, education, shopping and recreation and other such needs to an increasing number of urban residents within our cities. The policy acknowledged problems of road congestion and associated air pollution. To address these issues, the NUTP proposed four strategies primarily focusing on increasing efficiency of road space by favouring public transport, using traffic management instruments to improve traffic performance, restraining growth of private vehicular traffic and technological improvements in vehicles and fuels to reduce vehicle emissions. The NUTP recognized the states as the main facilitators in the process of policy implementation and the central government’s role was confined to supporting the states with the necessary financial support and technical expertise.

It has been well recognized in the NUTP that a solution to complex urban transport problems lies in the development of an efficient and affordable PT system. The fare issue is not addressed in a comprehensive manner that would allow a full range of options to be considered. This could be in the form of targeted user subsidies such as cash transfers or direct financial assistance to poor travelers. On the other hand, protecting PT service providers by setting a regulatory framework on fare-related decisions and provision of explicit subsidies. The NUTP did not propose any specific actions to resolve this issue but indicates provision of implicit subsidies which the operators would have to provide.

The major elements of the National Urban Transport Policy are the following:

- 1) Incorporating Urban Transport as an important parameter at the planning stage rather than being a consequential requirement
- 2) Reduced travel demand by bringing about better integration of land use and transport planning to improve access to jobs, education, etc.
- 3) Equitable allocation of road space
- 4) Encourage investments in public transport and non-motorized transport so that the dependence on personal motor vehicles is reduced.
- 5) Improved public transport-Offer the Central Government’s financial support to all the State capitals and other cities with a population of over one million, for setting up Mass Transit Systems
- 6) Introduction of Intelligent Transport Systems (ITS)

- 7) Support the principle that the Government provides the capital infrastructure, but the direct and indirect beneficiaries pay for the operating costs.
- 8) Innovative financing mechanisms, with greater involvement of private sector
- 9) Encourage a coordinated approach to the management of urban transport through the establishment of Unified Metropolitan Transport Authorities in all million plus cities
- 10) Offer support for better awareness and capacity building and knowledge enhancement urban transport planning at the State level- individual and institutional

10. 3. JAWAHARLAL NEHRU NATIONAL URBAN RENEWAL MISSION (JNNURM)

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was set up in December 2005 by the central government, and 63 cities were identified to be eligible for seeking central funds under this program for urban renewal and reforms in phase one. Its prime objective was to create empowered and financially sustainable Urban Local Bodies (ULBs) for successfully managing the local urban issues.

As of December 2012, 15,388 buses, at a cost of more than Rs47 billion, in 63 cities had been funded under the program. This has led cities to develop new bus services. Bus rapid transit projects have been initiated in 10 large cities. Some cities have also used central funding to improve traffic management. Most of the transport projects implemented under the JNNURM program were managed by parastatal bodies directly reporting to their state governments thereby bypassing city agencies. This resulted in reduced ownership of JNNURM funded projects by people. Many critics therefore claim that there is hardly any improvement in the condition of urban transport in these cities in spite of JNNURM programs.

11. GLIMPSE OF RECENT DEVELOPMENTS IN PUBLIC TRANSPORT

11. 1. SMART CITIES

Smart Cities Mission is an urban renewal and retrofitting program by the Government of India with a mission to develop 100 cities (the target has been revised to 109 cities) all over the country making them citizen friendly and sustainable. As part of the programme, Many cities have proposed investment in smart mobility projects including bike sharing network and smart card.

11. 2. INDIA'S FIRST HIGH SPEED RAIL

Government of India commenced the construction work of the High-Speed Rail (HSR) project between Ahmedabad and Mumbai, a distance of 508 km, out of which 55.6 km of the proposed alignment falls in Maharashtra, 350.5 km in Gujarat and 2 km in UT of Dadra and Nagar Haveli. The total cost of the project is estimated around US\$ 17 billion (INR 1.08 trillion).

The project is funded by JICA, committing about 85% of the total cost of the project as loan with an interest rate of 0.1% and a moratorium of 15 years and repayment period of 50 years. The remaining cost will be borne by the state governments of Maharashtra and Gujarat. The construction of the corridor is expected to be completed by August 2022 and the bullet train is expected to go on its first run on 15 August 2022 on the occasion of India's 75th Independence Day.

11. 3. METRO NETWORK DEVELOPMENT

In 2017, three (3) new cities - Kochi, Lucknow and Hyderabad got their first metro line. Further, metro network was expanded in Bangalore and Delhi with the opening of new lines. However, the major reform was initiated by Ministry of Housing and Urban Affairs (MoHUA) by unveiling new Metro Rail Policy 2017 was officially released on 15 September 2017. The new policy focused on 'development of integrated public transport network', 'Make in India and' and 'Private Participation' in metro rail projects.

11. 4. INTRODUCTION OF ELECTRIC BUSES

Government of India is aggressively pursuing the strategy for the introduction of electric vehicles in India. In September 2017, the government extended FAME (Faster Adoption and Manufacturing of Hybrid & Electric Vehicles) subsidy to electric buses. Shimla introduced the electric buses for commercial use in October 2017, followed by BEST Mumbai started the operation of 6 electric buses in Mumbai in November 2017. Further, Ola launched a pilot project in Nagpur, Maharashtra to operate multi-modal electric fleet operation. In December 2017, the government has selected 11 cities for pilot project for multi-modal public transport network.

11. 5. NEW MOBILITY SECTOR

Taxi aggregators (or TNCs or Ride-sharing apps) i.e. Uber, Didi, Grab and Ola are bringing new trends in urban transport. Meru Cabs is pioneer for creating organised taxi service in India with call center. The company is still one of the largest radio taxi companies in the world and has also adopted new technologies to provide on-demand service. However, the emergence of new technology players has changed the landscape of taxi market in India, as the market has grown from 100,000 trips/day in 2012 to 25 million trips/day in 2017.

12. IMPERATIVE POLICY REFORMS

The ultimate outcome of urban transport policy is how we achieve sustainability in urban transport delivery. Clearly, the problem lies in identifying, implementing and monitoring policy measures that are effective in addressing specific issues in a synchronised and coordinated way by the various agencies involved in urban transport. After a thorough assessment of expert suggestions and review of global best practices, policy interventions that were perceived as potentially effective are further detailed in the following sub-sections:

12. 1. RE-ALIGNING LEGAL AND REGULATORY INSTRUMENTS

Sustainable urban transport vision in India can occur only through an enabling constitutional and regulatory framework. A comprehensive urban transport act should be enacted by each state defining the roles and responsibilities of the multiple city and state level authorities with regard to public transport, land use and public transport integration, safety, NMT, IPT etc. For this purpose, a model law could be developed by the central government which could be adapted by state governments for their state. Eventually, the metropolitan and city authorities should take the responsibility for urban transport. This law should make it obligatory for all urban agglomerations with more than one million people to develop a

Comprehensive Mobility Plan (CMP) and integrate it with other statutory plan documents. The law should further stipulate the goals, general objectives and orientation of the CMPs. At the state level, the establishment of Unified Metropolitan Transport Authority (UMTA) along with its constitution, role, functions and powers should be enacted through appropriate state legislation by each state and union territory.

12. 2. INSTITUTIONAL RESTRUCTURING

Innovative ideas and integrated policies towards sustainable transport need strong supporting institutional and governance structures. Political will, sound leadership, transparency, adequate resources and accountability are essential in timely implementation of effective policy interventions that eventually ensure public trust. Also vital to the entire process are the capacities and professionalism within planning institutions as they create compelling visions of urban futures.

12. 2. 1. AT CENTRAL GOVERNMENT LEVEL

The main role of the central government for urban transport will be in financing urban transport infrastructure. It should supplement the financial support to cities on a predetermined basis to enable them to plan and implement major urban transport infrastructure projects. Secondly, the central government should house an empaneled set of experts, also called the Office of Transport Strategy (OTS). The role of OTS would be to create standards for urban transport performance as well as provide technical and managerial expertise to states and city authorities engaged in urban transport.

The central government should also prepare guidelines and manuals, including those for private sector participation; design, install and maintain standards for a common national database built from state and metropolitan databases; disseminate data; promote research in UT, including safety issues; and organize capacity building.

12. 2. 2. AT STATE GOVERNMENT LEVEL

Creation of a separate new Ministry of Urban Transport at state government/union territory level that is headed by the secretary is recommended. Land use and transport functions from other state departments at urban agglomerations should be transferred to this new ministry. Also, all parastatal bodies created for managing urban transport should be dissolved and their functions transferred to this new ministry. The roles of this new transport ministry will be to lay down state policies which are in sync with national policies, administer laws, rules and regulations, and ensure their enforcement.

12. 3. PLANNING REFORMS

NUTP 2006 highlights the intrinsic linkage of transport demand and land use planning, and the need to develop an integrated master plan for each city. An integrated approach to land use and transport planning requires an organic integration of multimodal mobility within a holistic land use system where synergies and interconnections are promoted. For an integrated planning system, it is proposed that the Comprehensive Urban Transport Act should mandate the integrated preparation of the following statutory plans:

- 1) Local Transport Plan (LTP) at the ward level form the most detailed urban transport and land use planning document to be prepared every 10 years and revised every five years. Ward committees should be responsible for preparation of LTPs with support from UMTA. LTPs provide the UMTA with an opportunity to set out studies of, and make recommendations to improve, locations of trip attractors (trip destinations) and residential locations (trip origins), along with a range of demand management and public transport measures, as well as supply measures to provide for balanced use of road space, public transport integration and appropriate patterns and forms of development.
- 2) Comprehensive Mobility Plan (CMP) should be prepared by UMTA and should review the land use patterns in the present master plan and mobility and land use measures proposed in the LTP from the city-wide mobility optimisation point of view, and select a preferred pattern of land use and transport integration through engagement with stakeholders and citizens. If the recommendation by the CMP on urban growth pattern differs from the one in the master plan, the CMP recommendation should be reflected in a future version of the master plan. For cities where a master plan is not available, a CMP must be prepared first and used as an input for the preparation of the master plan.
- 3) Master plans should continue to be prepared by the appropriate planning authority as per the Town and Country Planning Act of that state. However, it should be prepared such that the CMP forms an integral part of the master plan and the urban growth patterns in both these statutory plan documents should be in sync with each other.

12. 4. CORPUS OF URBAN TRANSPORT FUND

Ultimately, the success of planning process depends on the availability of funds. Regular inflows into it shall be planned through earmarked taxes, which is prevalent in all OECD countries. These will be dedicated and non-lapsable funds for urban transport growth.

13. CONCLUSIONS

Accessibility and urban mobility are critical for promoting sustainable urban economic development in Indian cities. They are also directly connected to urban stock and flows – in terms of spatial development and consolidation of the built form. However, urban mobility has not contributed to desired outcomes owing to car-centric policies adopted by successive plans and projects at the city level.

Urban mobility is multi-dimensional in terms of policy and operational implications.

Therefore, coherence in policy interventions and linkages among processes are essential. Improved accessibility is neither achieved by adding more roads, rail or vehicles, nor through ad hoc spatial interventions such as traffic management techniques in isolation to achieve delocalization and decongestion. In addressing complex urban mobility issues, a systems approach seems well suited for a thorough understanding of the issues and their causal linkages. Only after understanding the interdependencies between the system components that operate behind the symptoms can significant policy interventions be formulated to address it. For example, mispricing leads to overconsumption of roads in peak periods; sprawling settlement patterns render public transport systems ineffectual; urban design for machines rather than people creates cities for cars rather than people.

It is essential to understand that mobility is a derived demand that is derived from the need for people to meet their necessary social or economic interactions. Private vehicles, public transport or NMT are simply the means to achieve it. This realization envisages cities and mobility systems as tools that promote desired societal outcomes with transport playing the facilitating role. This can be achieved by compact city forms and mixed-use communities that dramatically reduce travel distances and sometimes travel needs. Compact cities not only put activity centres closer to each other, but also provide safe and efficient pedestrian and cycling corridors, along with affordable, high-quality public transport options. In conclusion, sustainable mobility is a key enabler of economic growth and towards eliminating poverty and shared prosperity in Indian cities.

Biography

P. Ganeswara Rao is a Doctoral Scholar in the Rayalaseema University, Kurnool. His area is Strategic Management. He is finished PGPPM form Indian Institute of Management, Bangalore (IIMB). He is presently pursuing Ph.D. on Strategic interventions at policy level and Inter-Institutional Linkages for sustainable urban passenger transportation systems in India, with special reference to Hyderabad Urban Agglomeration.

Dr. A. Arun Kumar is a Post-Doctoral Fellow in the Department of Business Management, Osmania University, Hyderabad. He finished his doctoral studies from Osmania University, Hyderabad. His area of interest is Knowledge Management. He has published several research papers and review articles in reputed Scopus indexed journals. He has presented research papers in various international and national conferences organized in India, Nepal, Bangkok, and Sri Lanka. He is a member of various research foundations. He is the only member from India in International Association for Knowledge Management.

Prof. Vedula Shekhar is an Eminent Professor in the Department of Business Management, Osmania University, Hyderabad. He has a teaching experience of 35 years. His core subjects are Marketing Management and Organizational Behaviour. He is a Visiting Professor at AIT Bangkok and Al Azhar University, Cairo, Egypt. He has several research papers and paper presentations to his credit. He has received the "Best Teacher Award" from Government of Andhra Pradesh. He has guided 28 students who have completed their PhDs successfully. Presently, he is guiding 10 scholars for Ph.D. and two Post Doctoral Fellows. He has several years of administrative experience and has worked in several capacities such as Dean, Head, and Principal of the University College of Commerce & Business Management. He is a member of several research and Government bodies.

References

- [1] Acharya, S. Motorization and Urban Mobility in Developing Countries: Exploring Policy Options through Dynamic Simulation. *Journal of East Asia Social Transportation Studies*, 6 (2005), pp. 4113–4128.
- [2] Calthrop, E., Proost, S. and Dender, K. Van, Parking policies and road pricing, *Urban Studies*, 37 (2000), pp. 63–76.
- [3] Cohen, B, Urbanization in Developing Countries: Current Trends, Future Projections, and Key Challenges for Sustainability, *Social Technology*, 28 (2006), pp. 63–80.
- [4] Hoehner, C.; Soares, J.; Perez, D.; Ribeiro, I.; Joshu, C.; Pratt, M.; Legetic, B.; Malta, D.; Matsudo, V.; Ramos, L.; et al., Physical Activity Interventions in Latin America: A Systematic Review, *American Journal of Preventive Medicine*, 34 (2008), pp. 224–233.

- [5] Kundu, A., Method in Madness: Urban Data from 2011 Census. *Economic and Political weekly*. XLVI (2011), 40.
- [6] Marsden, G.; Stead, D., Policy Transfer and Learning in the Field of Transport: A Review of Concepts and Evidence. *Transportation Policy*, 18 (2011), pp. 492–500.
- [7] Newman, P. and Kenworthy, J., Gasoline consumption and cities a comparison of US cities with a global survey, *Journal of the American Planning Association*, 55 (1989), pp. 24–37.
- [8] Paulose N. Kuriakose, National Transport Policy of India: Organization, Issues, and Bottlenecks for Implementation, Institute of Town Planners, *India Journal 10 x 4*, October – December (2013). pp. 59-70
- [9] Pojani, D.; Stead, D., Going Dutch? The Export of Sustainable Land-Use and Transport Planning Concepts from The Netherlands. *Urban Studies*. (2014), doi: 10.1177/0042098014562326.
- [10] Pucher, J., et al, The Crisis of Public Transport in India: Overwhelming Needs but Limited Resource. *Journal of Public Transportation*, 7 (2004), 4.
- [11] Pucher, J.; Buehler, R., Making Cycling Irresistible: Lessons from The Netherlands, Denmark and Germany. *Transportation Revaluation*. 28 (2008), pp. 495–528.
- [12] Pucher, J.; Dijkstra, L., Promoting Safe Walking and Cycling to Improve Public Health: Lessons from The Netherlands and Germany. *American Journal of Public Health*, 93(2003), pp. 1509–1516.
- [13] Sreedharan, Rail based Urban Transport, *Indian Journal of Public Administration*, 3, 8 (2001), pp. 45-57.
- [14] Stead, D.; de Jong, M.; Reinholde, I., Urban Transport Policy Transfer in Central and Eastern Europe. *DISP The Planning Review* 44 (2008), pp. 62–73.
- [15] Weinert, J.; Ma, C.; Cherry, C., The Transition to Electric Bikes in China: History and Key Reasons for Rapid Growth. *Transportation*, 34 (2007), pp. 301–318.