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INDIAN INSTITUTE FOR
HUMAN SETTLEMENTS

**Urban Transport in India**

# Challenges and Recommendations

**IIHS RF Paper on Urban Transport**

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# List of Abbreviations

| | |
|---|---|
| CAGR | Compounded Annual Growth Rate |
| CDP | Comprehensive Development Plan |
| CiSTUP | Center for infrastructure Sustainable Transportation and Urban Planning |
| CMP | Comprehensive Mobility Plan |
| CNG | Compressed Natural Gas |
| CoE | Center of Excellence |
| CPCB | Central Pollution Control Board |
| CRRI | Central Road Research Institute |
| CSIR | Council of Scientific & Industrial Research |
| DCR | Development Control Regulations |
| DPC | District Planning Committee |
| DULT | Directorate of Urban Land Transport under Government of Karnataka |
| EPCA | Environmental Pollution Control Authority |
| FAR | Floor Area Ratio |
| FSI | Floor Space Index |
| GEF | **UNDP's Global Environment Facility** |
| I&C | Inspection and Certification |
| IRC | Indian Roads Congress |
| ITS | Intelligent Transportation System |
| IPT | Intermediate Public Transport |
| IUT | Institute of Urban Transport |
| JNNURM | Jawaharlal Nehru National Urban Renewal Mission |
| KMC | Knowledge Management and database Centre |
| LTP | Local Transport Plan |
| MOUD | Ministry of Urban Development |
| MPC | Metropolitan Planning Committee |
| MTA | Mid-Term Appraisal |
| NMT | Non-Motorised Transport |
| No. | Number |
| NRSTMB | National Road Safety & Traffic Management Board |
| NUTP | National Urban Transport Policy |
| OTS | Office of Transport Strategy |
| PEARL | Peer Experience and Reflective Learning |
| PM10 / PM2.5 | Particulate Matter |
| PMC | Pune Municipal Corporation |
| PT | Public Transport |
| R/P ratio | Reserves to Production ratio |
| Rs | Indian Rupees |
| RTO | Regional Transport Office |
| Sq. ft. | Square feet |
| SRTU | State Road Transport Undertakings |
| TRIPP | Transportation Research and Injury Prevention Program |
| ULB | Urban Local Body |
| ULCRA | Urban Land Ceiling and Regulation Act |
| UMTA | Unified Metropolitan Transport Authority |

| UNDP | United Nations Development Programme |
|---|---|
| UT | Urban Transport |
| UTF | Urban Transport Fund |
| UTTIPEC | Unified Traffic And Transportation Infrastructure. (Planning & Engineering) Centre |
| WHO | World Health Organisation |

# 1. Introduction

**India's transport sector is large and diverse**, it caters to the transport needs of 1.1 billion people. In 2012-2013, the sector contributed about 5.2 per cent **to the nation's GDP, with** road transportation having a major share of it.[1] Good physical connectivity in urban and rural areas is essential for economic growth. Since the early 1990s, India's growing economy has witnessed a rise in demand for transport infrastructure and services. Efficient and reliable urban transport systems are crucial for India to sustain high economic growth. The significance of urban transport in India 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). 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.

Mobility flows have become a key dynamic in the rapid urbanisation process of Indian cities with urban transport infrastructure constituting the skeleton of the urban form (Amin et al., 2013). Despite the increasing levels of urban mobility in Indian cities, access to places, activities and services is becoming increasingly difficult in terms of convenience, cost and time. In fact, present levels of urban mobility are already generating a crisis situation characterized by high levels of congestion, environmental pollution, traffic fatalities and inequity eventually leading to a situation of undesired accessibility crisis (Pucher et al., 2005). With over a quarter of **India's** urban population below the poverty line, the mobility problems of the poor are of special concern (C Rangarajan et al., 2014). The unaffordability of private transport or the lack of public transit options forces this segment of the urban population to walk or cycle increasingly long distances, and, consequently, suffer severe pollution. As Indian cities continue to spread outward, those residents too poor to afford motorised transport will be increasingly  put at a disadvantage, and further cut off from employment, recreational, educational, medical and other activity sites they need to access in the city.

In spite of the large diversity in the urban size, form and growth patterns of the 468 cities in India, there are several common factors that contribute to the severity of urban transport problems. Within the scope of this study, the main objectives are as follows:

- To review the key trends in urban India that translate into negative externalities or problems in urban transportation;
- To identify major challenges that influence effective policy formulation and implementation in this sector;
- To review existing policy and programs in the urban transport sector in India;
- To identify gaps in the existing policies and programs as well as propose a set of recommendations to address the main challenges.

The authors acknowledge that there is no one-size-fits-all strategy or solution to the complex transport challenges facing the 468 cities. Therefore, the focus has been towards strengthening the existing governance mechanism in a way that it could respond decisively and effectively to the issues at hand and, at the same time, be in sync with the broader policy

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[1] PRESS NOTE ADVANCE ESTIMATES OF NATIONAL INCOME, 2012-13
http://mospi.nic.in/mospi_new/upload/nad_pr_7feb13.pdf

goals of achieving sustainable, environment-friendly and affordable transportation systems at the regional and national level.

The research findings are presented in this summary report in the following sequence: The methodology and scope of work is explained in Section 2. Trends observed in Indian cities that strongly influence mobility in Indian cities are identified and briefly explained with evidence in Section 3. In Section 4, the negative externalities as a consequence of urban transport, especially private transport proliferation, are explained. In Section 5, challenges in mitigating complex urban transport problems are discussed. **The government's** public policies and program initiatives to mitigate urban transport problems and mitigate challenges are briefly explained in Section 6. Section 7 covers recommendations for policy reform in legislation, planning tools, institutional frameworks and financing mechanisms to enable integrated land use, transport policy planning and decision making while ensuring clear accountability and responsibility, which is presently absent in this sector. The paper ends with conclusions in Section 8.

## 2. Methodology and Scope of Work

Through an extensive literature review process, the authors assimilated information on the evolution of urban transport systems in India since the economic liberalisation in the early 1990s. The review relied on national and international research articles, working papers, book chapters, planning commission reports, vision documents, publicly accessible plans including comprehensive mobility plans and comprehensive development plans, national and state policy briefs, relevant laws, regulations and notifications, publicly accessible consultancy reports published by industry, non-governmental organisations, independent think tanks, multilateral institutions. An extensive range of blog posts, news and magazine websites along with local, national and international publications were referred during the literature review.

After the literature review, key findings on common trends, problems and challenges were consolidated. This was followed by semi-structured interviews with key stakeholders in the urban transport space. Efforts were made to get adequate representation from a diverse set of stakeholders such as policy makers, think tanks, industry representatives and academia from across India in order to attain a wide spectrum of perspectives on urban transport in India.

The author was able to conduct interviews with 18 experts representing diverse backgrounds in Mumbai, Bengaluru and Delhi between 28 January 2014 and 14 March 2014. The interview questions focused on three aspects of urban transport in Indian cities: the evolution of urban transport in the last few decades in India, major challenges faced by Indian cities, and effective strategies to achieve sustainable transport in Indian cities. The interview responses were analysed and collated to identify common viewpoints and recommendations. Finally, the IIHS team reflected on the challenges and proposed strategies on the basis of its own experience working in different sectors within Indian cities over the course of the past five years. These different inputs together shaped a broad perspective on the present scenario which is presented in the following sections along with the major challenges and areas of strategic intervention.

# 3. Trends influencing urban mobility in India

The predominant trends influencing mobility of urban population in Indian cities are rapid urbanisation, rising motorisation and dwindling modal share of Non-Motorised Transport (NMT). These factors have resulted in a sudden rise in the demand for travel. At the same time, the rapidly increasing levels of motor vehicle ownership and use has resulted in an alarming increase of negative externalities such as road congestion, air pollution, road fatalities, and social issues of equity and security.

## a) Rapid Urbanisation

Urbanisation trends and patterns present unprecedented challenges to urban mobility systems. In 1951, there were only five Indian cities with a population greater than one million and 42 cities with a population greater than 0.1 million, much of India effectively lived in villages. In 2011, there were 468 cities with population above 0.1 million and 53 cities with population greater than 1 million (See Table 1).

| Cities as per population | No. of cities |
|---|---|
| **>10 million** | 3 |
| **5 − 10 million** | 5 |
| **2 − 5 million** | 10 |
| **1 − 2 million** | 35 |
| **Total million-plus cities** | 53 |
| **0.5 − 1 million** | 43 |
| **0.1 − 0.5 million** | 372 |
| **Total number of cities** | 468 |

**Table 1: Number of cities as per population; Population figures as per 2011 census**

Between 2001 and 2011, India's urban population increased from 286 million to 377 million. Of these, nearly 50 per cent lives in small cities (> 0.5 million). Fastest decadal growth was observed in cities with population between 100,000 and 1 million, such as Surat, Nashik and Faridabad, while metro cities like Mumbai, Delhi, Kolkata, Chennai, Hyderabad and Bengaluru experienced slower peripheral growth with neighbouring villages surrounding the core city merging with the larger metropolitan area. According to 2011 census data, there are three cities with population of above 10 million and another 53 cities with an urban population greater than 1 million (Revi et al., 2012). The top 10 Indian cities with 8 per cent of the total Indian population are estimated to contribute 15 per cent to the country's GDP output while the remaining 53 cities with a million-plus population contribute 31 per cent of the Indian GDP (Revi et al., 2012). About 377 million people now live in 8,000 cities and towns in India constituting almost 38 per cent of the Indian population and together contribute more than 50 per cent to the country's GDP. This rural to urban demographic transition is expected to result in a jump in urban population to around 600 million people by 2031, which constitutes almost 40 per cent of the Indian population. In the coming decades, cities and towns are expected to increasingly become dominant drivers of the country's economic growth.
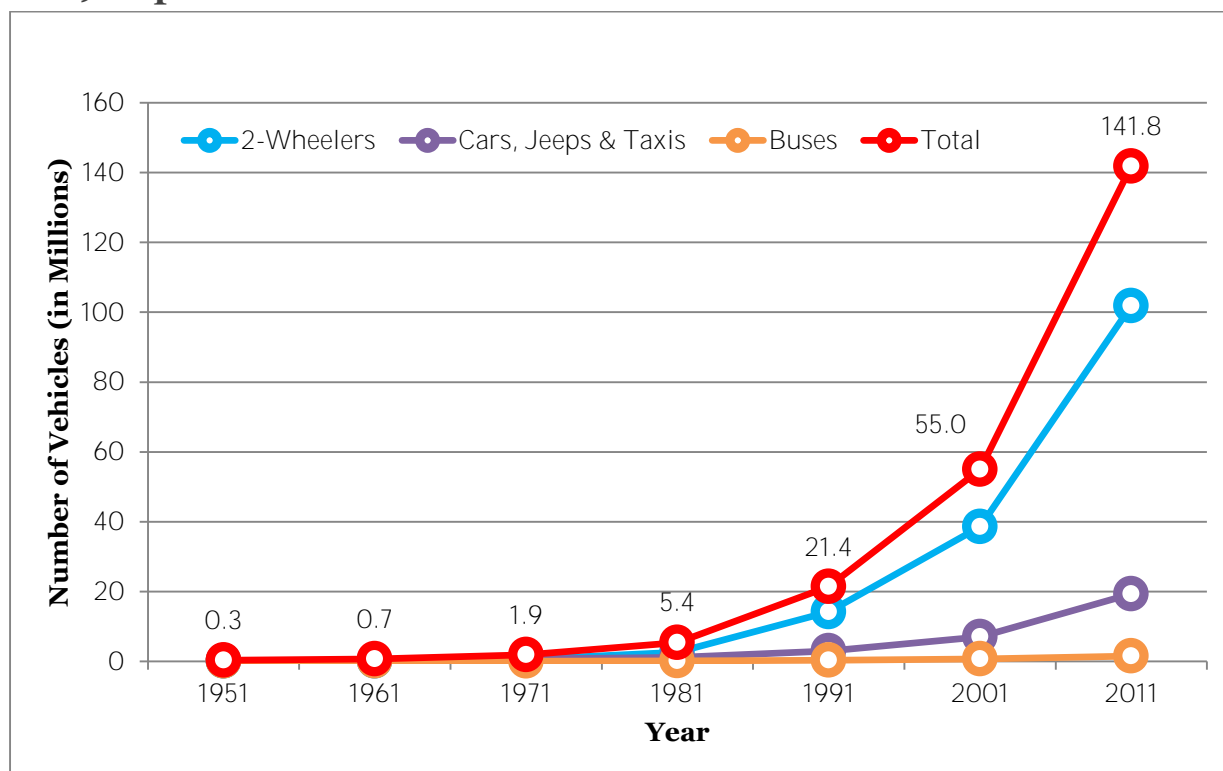
## b) Rapid Motorisation



**Figure 1: Growth of registered vehicles in India in Millions[2]**

Since 2001, the number of vehicles per 1,000 people in Indian metropolitan cities have grown significantly. The total registered vehicles in the country grew at a CAGR (Compounded Annual Growth Rate) of 9.8 per cent between 1991 and 2009. Personalised private vehicles like cars and two-wheelers grew at CAGR of 9.6 per cent and 10.3 per cent per annum. The growth of registered vehicles in cities with population more than a million is significantly higher than the rest of India. Meanwhile, vehicle registrations in metro cities grew at almost double the rates than that of million-plus cities. In 2011, 22 cities posted a CAGR of 8.7 per cent in the total number of vehicle registrations or a share of nearly 28 per cent (39.7 million) of the total vehicles in the country (141.8 million) (Sarma et al., 2011).

Five metro cities have vehicle registration rates in excess of 500 per 1,000 people and account for 54 per cent of the total vehicles in the metropolitan cities as of 2011 (Sarma et al., 2011). Delhi had the highest vehicle population with almost 6.3 million vehicles (See Figure 2). In 2011, with nearly 17 million vehicles, the four big cities—Delhi, Bengaluru, Chennai and Hyderabad—alone constituted 12.3 per cent of the total number vehicles in the country. Delhi, which has around 1.4 per cent of the Indian population, accounts for nearly 5 per cent of all motor vehicles. According to the statistics provided by the MORTH (Ministry of Road Transport and Highways), the annual growth rate of motor vehicle population in India has been around 10 per cent during the last decade (Mohan, 2014b). Two-wheelers are a dominant form of private transport on Indian roads constituting about 71.8 per cent of the 141.8 million registered vehicles in 2011 (See Figure 1). Two-wheelers are unsafe,

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[2] Road Transport Yearbook (2009-10 and 2010-11), MoRT&H, Government of India.

environmentally damaging and unsustainable because providing adequate infrastructure for the rising numbers of two-wheelers is impossible. Many experts feel that the present motorisation levels are relatively sustainable, but the high motorisation trend is certainly unsustainable and, therefore, the thrust on better balancing demand across the different transport modes is critical (Ahluwalia, 2011).
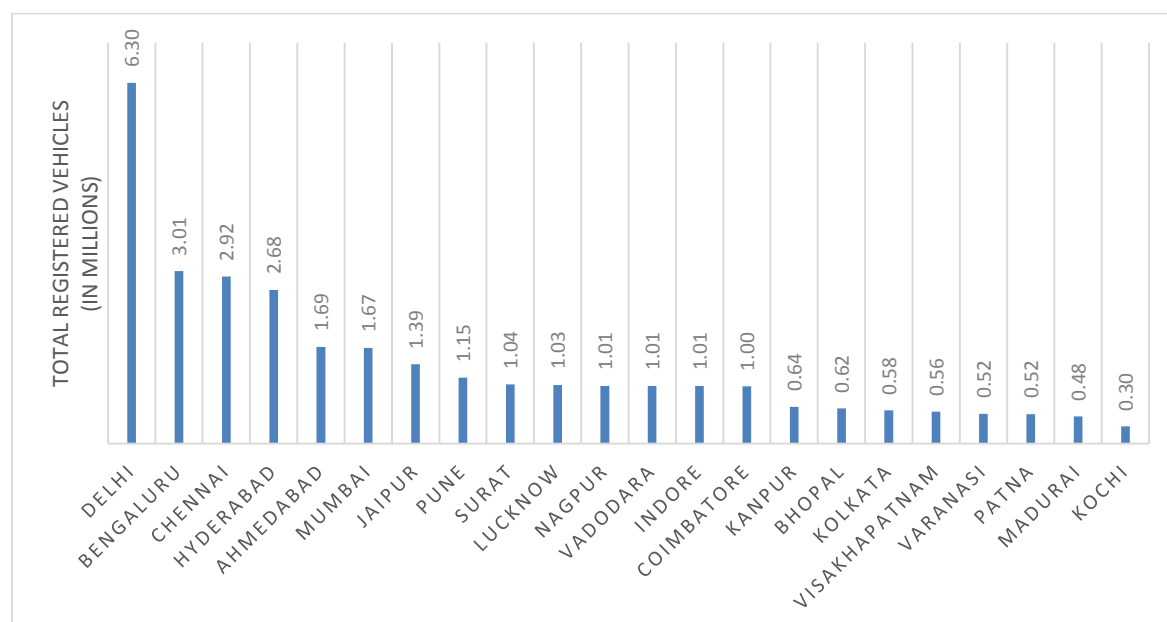


**Figure 2: Total registered motor vehicles in metro cities in '00 (as on 31.3.2009)** (Sarma et al., 2011)

## c) Dwindling share of Non-motorised Transportation

Non-Motorised Transportation (NMT), also known as Active Transportation, includes walking, bicycling, other variants such as small-wheeled transport (push scooters, skates and hand carts), and wheelchair travel. In Indian cities, people who commute by walking outnumber those who use private motorised transport.

As cities sprawl, the share of NMT reduces drastically creating increased reliance on private modes of transport. Urban design that fosters walking and cycling is under threat as sprawl-based urban design is becoming the norm in big cities. The plans for new extensions and townships are still based on low-density, segregated land use with wide roads.

In mega cities with more than 10 million population, average travel distances have increased up to 9-12 km (Roychowdhury, 2013). Cities with 2-5 million population such as Pune, Surat, Kanpur, etc. have an average trip distance of around six kilometres with a high NMT share of 40 to 50 per cent. This share further increases to 60 to 70 per cent in cities with population between one and two million. Smaller cities have a higher threat of losing walking and cycling share to private motorised transport in the coming decades. These cities have neither invested in infrastructure for NMT nor have a formal public transport alternative to prevent shift to personal transport modes. Sidewalks and cycle tracks are the most neglected in infrastructure planning. For instance, the Master Plan for Naya Raipur, the state capital of

Chhattisgarh, is a planning for a 50 per cent share of private vehicles by 2030 and has begun developing 60- to 100-metre wide roads (Roychowdhury, 2013).

NMT modes are perceived to be slow, thereby inhibiting speed of travel in cities. Local policies are curtailing their use on main roads or restricting them to neighbourhood streets. In many cities, cycle rickshaws have been restricted to certain areas within the city. For example, in Kolkata, cycle rickshaws were initially banned on 38 roads and the restrictions were further extended to 174 main roads to increase traffic speeds since 2012. [3] Although bike travel is allowed on some streets after business hours, the ban has adversely affected the livelihoods of families dependent on this service.

**The city's poor are capti**ve users of walking and cycling, but most neighbourhoods have either poorly constructed footpaths or they have been badly maintained, while some have no **footpaths at all. The city's poor are the most affected. In Delhi, transport cost in the** household budget increased significantly for 50 per cent of the poor population when slums were shifted. In the new slums, cycle distances doubled to 7 km and bus distance increased from 4 km to 15 km, thereby NMT trips shrank by 59 per cent amongst the most affected families (Roychowdhury, 2013)(Tiwari, 2007).

Bicycle ownership is relatively high in most megacities but the share of ridership is less than 10 per cent because of the systemic barriers identified in this section. The bicycle market is growing at four per cent every year with the market for high-end bicycles and bicycles for kids growing at much faster rate (50 to 55 per cent) than the standard, low-cost bicycle segment. Bicycle theft, fear of unsafety and lack of infrastructure like bicycle parking spaces and cycle tracks in the city, are factors that affect more widespread bicycle usage across sections of urban society. [4]

## 4. Urban Transport Problems

### a) Road congestion

As populations increase, the average travel distances as well as intensity are expected to increase as there is a direct correlation between the two indicators (See Figure 3). 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.

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[3] http://www.theguardian.com/world/2013/oct/29/kolkata-india-cycling-ban-outcry

[4] TRIPP, Survey report, Bicycle use and barriers to use, Transportation Research and Injury Prevention Program. Almost all states have Municipal laws that lay down the structure and powers of urban local governments. Urban local governments are authorized to regulate traffic within their limits. The states also have town and country planning acts that regulate urban planning (transport planning is supposed to be an integral part of this process). (Bhatt et al., 2013).

 (TRIPP) IIT Delhi, Institute of Democratic Studies (IDS) for LOCOMOTIVES (I-ce) project, 2006.
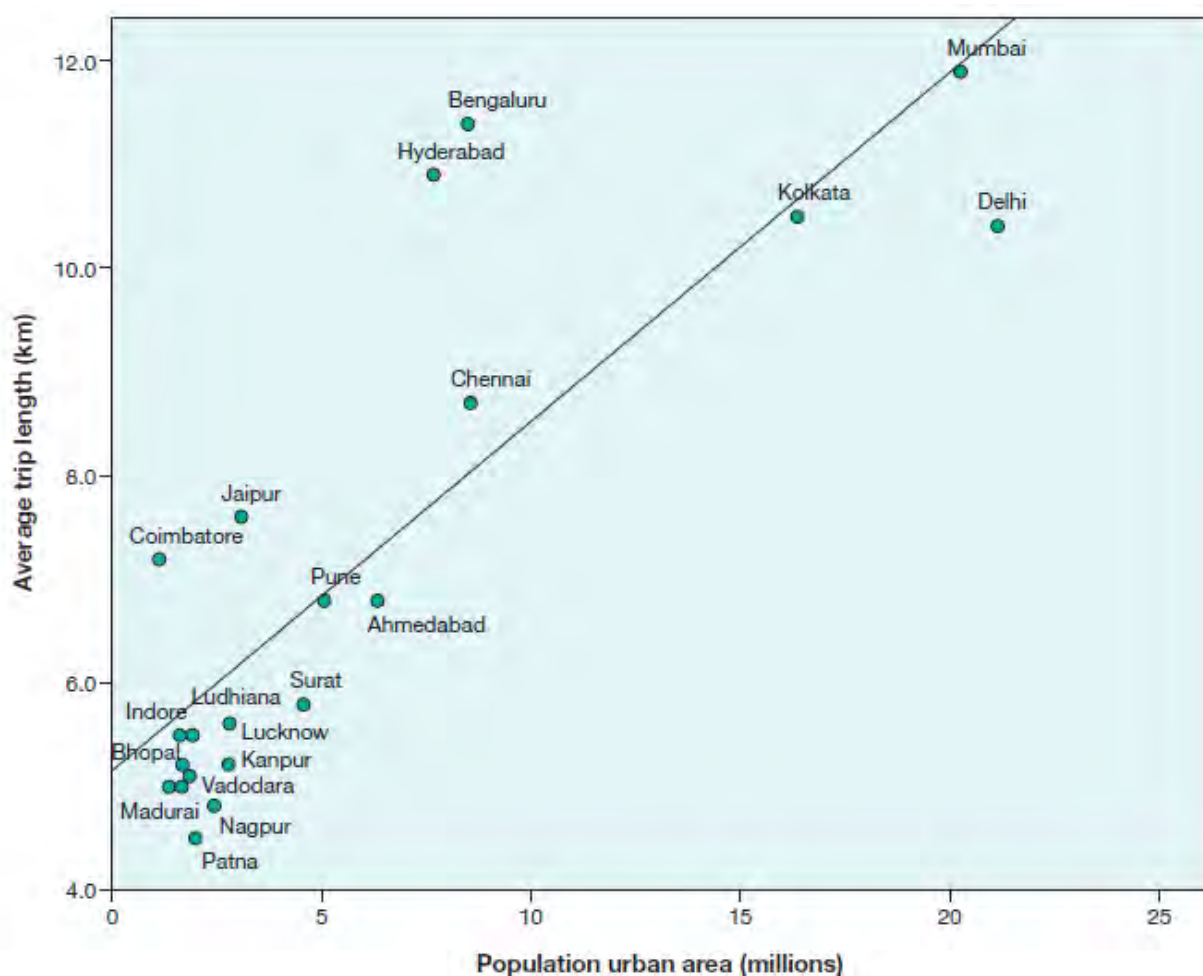
**Figure 3: Average trip lengths as a function of urban population** (Amin et al., 2013)

## b) 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 (Rye, 2010). This problem is especially acute in smaller, compact Indian cities. Delhi has 14 per cent of road lengths used for on-street parking while Surat has almost 60 per cent of its road lengths blocked by on-street parking (See Figure 4). On-street parking is perversely incentivized because it is either free or priced lower than off-street parking. Even if cities invest in multi-level car parks in prime areas, the parking rates are not expected to recover the costs (Rye, 2010). In Delhi, the public parking charges are fixed as low as Rs10 for 8 hours during the daytime (See Figure 5) when it should be at least Rs40 per hour (Roychowdhury, 2013). Kolkata has the highest parking charges in India and these charges are time and place variable, i.e. higher parking charges in specific commercial zones and the rates increase by the hour (See Table 2). In Kolkata, a car pays Rs80 for eight hours of parking during daytime, while in Delhi MCD region, car parking charges are as low as Rs10 for up to 10 hours of parking. Figure 5 shows the eight-hour average parking rates in different cities but does not include special parking rates in parking spaces like malls, airports, etc.

**Table 2: Revised parking rates in Kolkata effective from 1st Aug 2011**

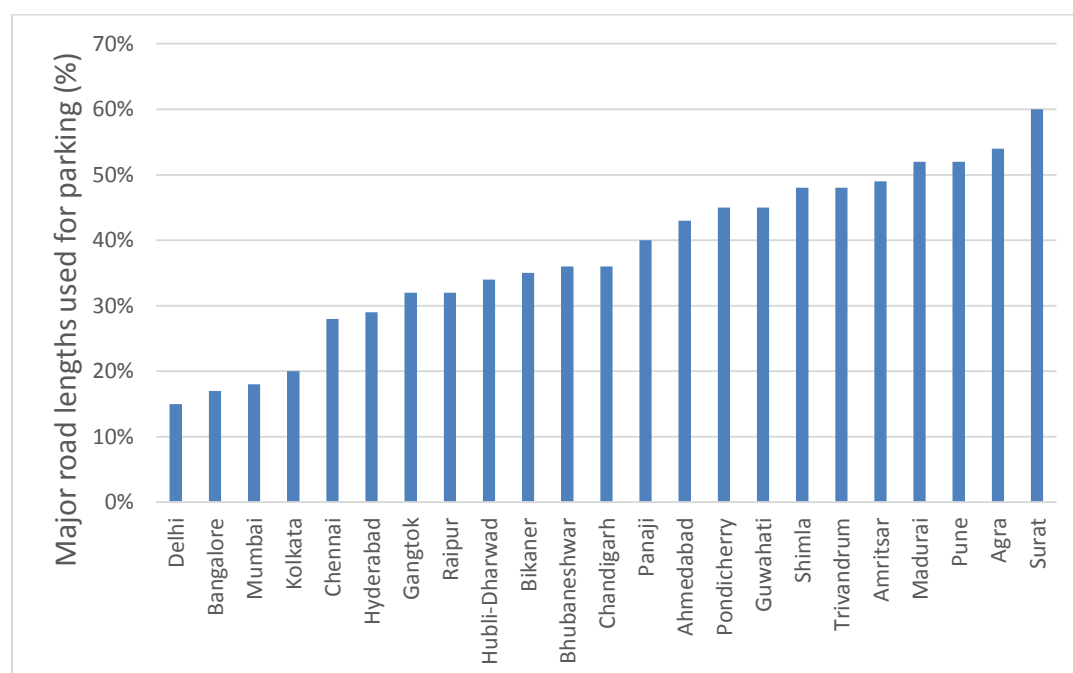| Category of parking space | (Rate per hour, or part thereof, for the first hour (in Rs) | | | |
|---|---|---|---|---|
| | Rate chart for day parking (7 am to 10 pm) | | Rate chart for night parking (10 pm to 7 am) | |
| | Two wheelers (motorised) | Cars / Vans | Two wheelers (motorised) | Cars / Vans |
| A | 5 | 10 | 10 | 30 |
| B | 5 | 10 | 10 | 30 |



**Figure 4: Share of road length used for on-street parking in key Indian cities** (Singh et al., 2008)
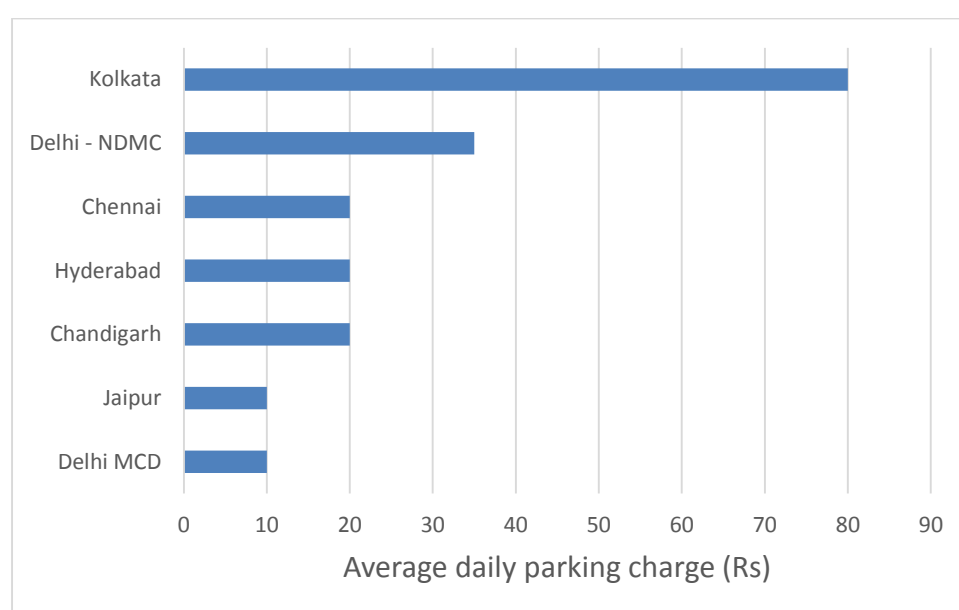


**Figure 5: Comparison of average daily parking charges in 2013** (Roychowdhury 2013)

Even in the densest Indian cities like Mumbai, Kolkata, Chennai and Delhi, cars (typical spot = 280 sq. ft.) occupy more space than a family of four (range from 85-250 sq. ft. depending on income level) (Gauthier, 2012). In several Indian cities, commercial development of vacant plots has taken place without following systematic planning procedures for access and mixed use. This induces heavy traffic leading to localized congestion and parking issues in the neighbourhood. An example is the commercial development of Mantri Mall at Malleswaram, Bengaluru which triggered public protests against traffic gridlock and parking issues in the neighbourhood (Chanchani & Fagun Rajkotia, 2011). Similarly, public parking by the developers in the mill areas of Mumbai has led to traffic snarls on the adjacent arterial roads, forcing a slight rollback of the policy (Roychowdhury, 2013). Another issue with unregulated parking is the skirmishes amongst neighbours over parking space. In many cities, particularly in Delhi, there is animosity amongst several neighbours over parking spaces that have resulted in serious injuries and even murder (Roychowdhury, 2013). Unless parking issues are addressed through a systematic planning process and strict enforcement, such issues will only exacerbate over time in Indian cities.

## c) Air pollution

The severity of air pollution in Indian cities is **judged based on CPCB's** (Central Pollution Control Board) air quality classification. According to available air quality data (Kamyotra et al., 2012), of 180 Indian cities, there is a wide variation in the pollution concentration and severity across cities. Cities are considered critically polluted if the levels of criteria pollutants (namely PM10 and NO2) are more than 1.5 times the standard. Results show that half of the residential areas in cities monitored by CPCB are at critical levels of air pollution (Kamyotra et al., 2012).

According to US-based Health Effects Institute, people residing within 500 metres from roads are exposed to vehicular fumes. The danger is especially pronounced when diesel vehicles are operating, as diesel emissions are known to trigger adverse respiratory health effects. A study of select Indian cities indicates that the share of transport sector's contribution increases when tinier fractions of particulates are considered. In Indore, transport contributes to 30 per cent of PM10 but 46 per cent of PM2.5, while in Chennai, it is 20 per cent of PM10 and 35 per cent of PM2.5.

Air pollution in Indian cities is the fifth leading cause of death in India. Annually, about 620,000 premature deaths occur due to air pollution in Indian cities (Roychowdhury, 2013). Premature deaths due to air pollution occur as a consequence of cardio-vascular ailments. Over a decade, air quality management attempts have met with mixed responses. Metro cities that have initiated pollution control action have witnessed either stabilization or dip in the pollution levels, however, in other cities, the situation has been observed to be getting **worse. Toxic air and its effects on health are seriously compromising the 'livability' of Indian** cities.

In the case of Delhi, vehicular pollution started deteriorating from 1990 as the growth of vehicles outpaced population growth and economic development. While the number of vehicles grew by 87 per cent to 3.6 million between 1990-2001, the city's population increased by merely 14 per cent from 9.5 to 13.8 million in the same period. The Supreme Court of India responded by a ruling in 1998 that all public transport should shift from the use of diesel to CNG by March 31, 2001. After repeated deferments, the court imposed the order that all buses be converted to CNG by December 2002. This was hailed as a success story, however, the results did not indicate an all-round improvement in ambient air quality as the amount of NOx rose along with a marginal decrease in PM10 (Foster & Kumar, 2007).

The Environment Pollution Control Authority (EPCA) report for the decade 2002 to 2012 shows that the number of vehicles increased by 97 per cent, contributing enormously to pollution and direct exposure to vehicular toxic fumes to nearly 55 per cent **of Delhi's 17** million people who live within 500 meters from any road side (CSE, 2014). The drastic reduction in price differential between CNG and diesel to just 7 percent in December 2013 from 46 per cent in 2002-2003 hurt public transport and undermined the clean fuel program (CSE, 2014). In February 2014, the EPCA report was presented to the Supreme Court, which took cognisance and directed the city agencies to respond to the priority measures outlined in the report to accelerate second-generation reforms.

This demonstrates a classic case wherein the Supreme Court has repeatedly intervened in policy making while government agencies are merely implementing these regulations, particularly CNG regulation. This problem can be addressed from three fronts – facilitating a reduction in the emissions per unit of fuel used; fewer vehicle kilometres travelled in total; and less fuel use per vehicle kilometre travelled. So far in Delhi, vehicular pollution has been addressed only from the first front. Unless all the three fronts are tackled simultaneously, not much improvement can be expected.

### d) Deteriorating road safety

The high dependence of migrants on non-motorised transport modes such as walking and cycling causes traffic mix in common roads where fast-moving motorised traffic shares the roads with slow-moving modes leading to an increasing number of fatalities and road accidents (WHO, 2013). 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 motorisation 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.

Pedestrian fatalities constitute a significant share of total fatalities and the magnitude is in fact much higher in cities that lack adequate pedestrian facilities. In New Delhi, Bengaluru and Kolkata, the pedestrian fatality share is greater than 40 per cent. In the case of Bengaluru, three pedestrians are killed on roads every two days and more than 10,000 are hospitalised annually. Elderly people and school children carry a large share of the burden with 23 per cent fatalities and 25 per cent injuries (Bhatt et al., 2013). The percentage of streets with pedestrian pathways is hardly 30 per cent in most Indian cities. The main reason behind this is inequitable distribution of road space and the fact that streets in India are not designed with the intention of accommodating all the functions of a street. Furthermore, only a part of the right of way is developed leading to unorganised and unregulated traffic, which is unsafe for pedestrians and cyclists (Bhatt et al., 2013).

## 5. Challenges

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 from expert interviews, literature review and personal experiences for Indian cities that cause or compound the urban transport problems are as follows:

## a) Gaps in Laws and Regulations

Presently, 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

- Tramways Act, 1886, is for operation of trams on the road surface within the municipal limits
- Metro Railways (Construction of Works) Act, 1978, covers the needs of construction of metro railways in metropolitan cities and for matters connected therewith.
- 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.

The Motor Vehicles (MV) Act, 1988, addresses road vehicle licensing and, in its present form, is inadequately equipped to deal with the problems of urban congestion and pollution leading to rampant abuse of the system. For instance, fines are the most common form of penalty for unsafe driving. Since these are very mild and do not have a deterrent impact, critics claim that the MV Act, although comprehensive in regulating urban road transport, is used as a revenue generating mechanism for the state government while other provisions on road safety and security are not adequately enforced.

The requirements of other modes of mass rapid transport such as the Bus Rapid Transit, Light Rail Transit, Monorails, and several other guided modes, do not have any legislation to support its planning and implementation. There are a few other intersectoral coordination issues such as integrated land use, urban transport planning, multimodal integration, that are not covered in any Act leaving gaps in legislation within the urban transport governance framework and consequently leading to issues of coordination and integration of urban transport systems in Indian cities.

Fragmentation or overlap of legislations poses two challenges that constrain the ability to effectively manage the problems of urban transport. Firstly, it leads to incoherence in the policy framework given the many different goals for which laws are enacted. And, secondly, it reflects in the timing, coordination and treatment of how states and cities approach a particular problem.

The relatively weak enforcement of existing laws combined with minimal penalties contribute to rampant flouting of transport rules and regulations. As per the MV Act, motorised vehicles must be inspected after 10 years of use, but the Regional Transport Office (RTO) seldom enforces the rule. RTO is also responsible for issuing driving licenses, which are cheap and relatively fast to acquire in India. The lack of stringent tests, low fees and entry of middlemen for facilitating the issuance of driving licenses has dropped the standard of driver skill and competence. This is an important factor contributing to issues of traffic

discipline, air pollution, traffic related accidents, security etc. that are increasing in most Indian cities.

## b) 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. While, in some states, the transport department undertakes urban transport planning, in others, it is the urban development or municipal administration at the urban level that does it.
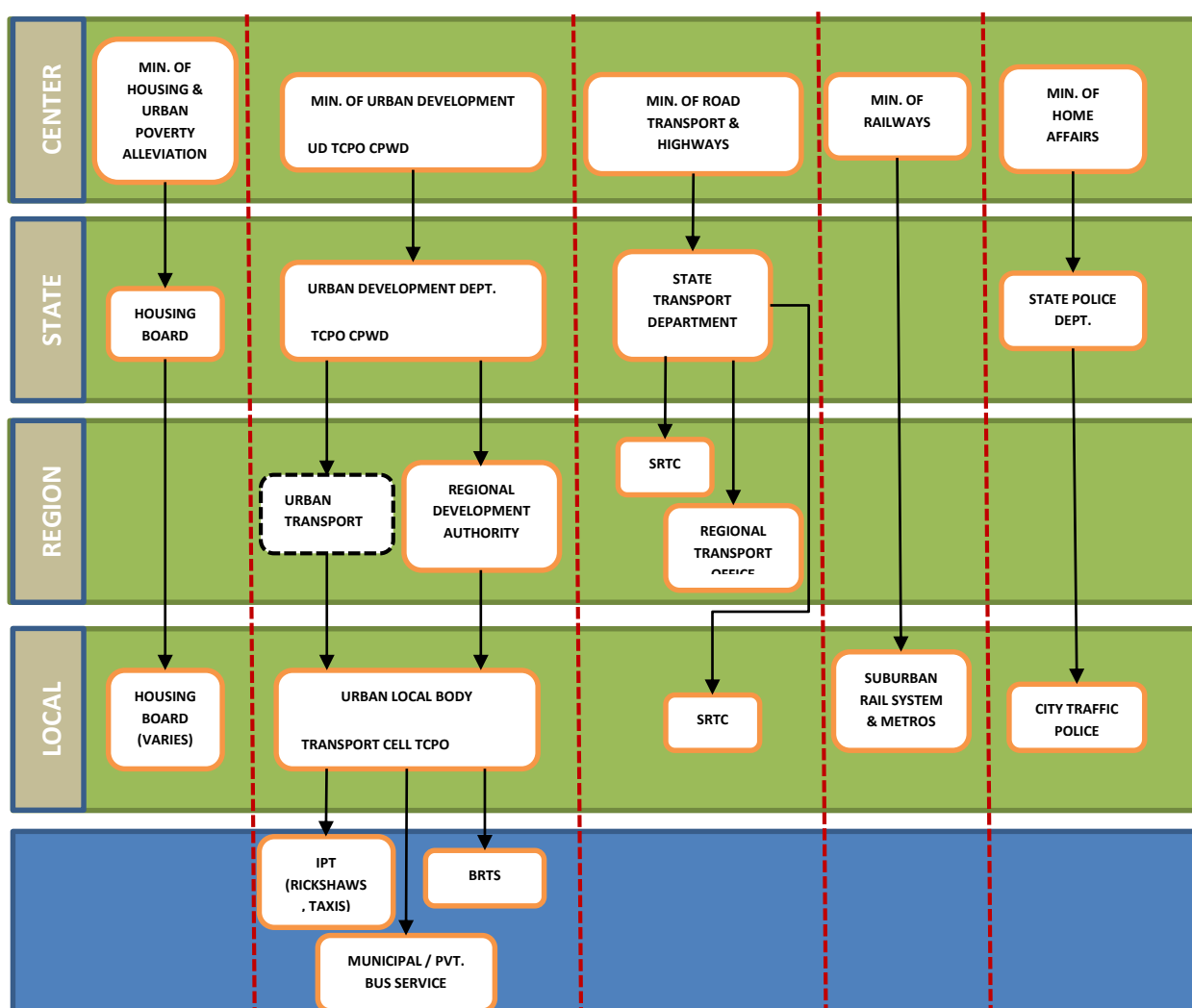


**Figure 6: Representative hierarchy of institutional framework with function of managing land use and transport in Indian cities**

At the central level of the government, the responsibility of urban transport planning is somewhat diffused **which is why it is claimed to be an "institutional orphan"** (Mohan, 2014a). The Government of India (Allocation of Business) Rules, 1961, entrusted the responsibility for planning and coordination of urban transport systems to the Ministry of Urban Development (See Figure 6). At the state level, the State Transport Department and Urban Development Department (UDD) are the two main departments dealing with urban

transport and land use. Unfortunately, there is a severe lack of horizontal and vertical coordination among these agencies at central, state and local levels, making accountability very difficult. Apparently, there is an absence of any effective coordinating agency where urban transport and land use plans can be formulated and integrated keeping an overall goal in mind. Another weakness is the limited authority delegated at the local city level. Generally, city administrations are inadequate to undertake efficient city management either because of the lack of technical capacity in city administrations or because of the weak revenue base and dependence on state and central governments for most of its financial needs. Although the emergent problems in urban transport in India are relatively recent but nevertheless critical, the existing institutional mandates prioritise other sectoral issues over urban transport. For example, the Indian Railways decided not to set up urban rail transport systems in other cities due to financial constraints which resulted in Ministry of Urban Development (MOUD) taking over the responsibility for such systems in spite of their lack of capabilities to manage this area. Similarly, police force consider traffic enforcement and management functions of secondary importance to crime management. Municipalities, too, focus more on water supply and garbage disposal as priority issues than urban transport issues resulting in no single agency accountable or responsible to holistically address urban transport problems and issues.

### c) 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. About 70 per cent of delays in all infrastructure projects in 2008 were due to problems related to land acquisition (Mohanty et al., 2009). One of the factors is the heavily distorted land market, caused by zoning and development control rules in cities that limit the supply of land that can be devoted to commercial, industrial or residential use. Significant amount of public lands keep large portions of well-located land outside markets. Cumbersome and time-consuming rural to urban land conversion rules increase cost of acquisition. Laws such as Urban Land Ceiling and Regulation Act (ULCRA) have put many properties under litigation and thus kept them outside the supply of developable land (Ahluwalia, 2011). The Floor Area Ratio (FAR) and Floor Space Index (FSI) regulations as espoused in the Development Control Regulations (DCR) are too low compared to international benchmarks (FSI in Mumbai is restricted to 1.33). Exceptions to these rules are traded on a highly selective and non-transparent basis, offering little incentive for land owners to surrender their lands for infrastructure development (Narain, 2009).

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. Because of such policies and unplanned growth in the Indian suburbs, they have been characterised by a mix of industrial development, dumps and incompatible land uses. These unplanned extensions of urban settlements have caused conditions in the overtaken villages to deteriorate, both physically and socially. Suburban sprawl have also sprung up along major highways out of Indian cities to the distant countryside. This type of low-density, sprawled decentralisation causes enormous challenges for provision of good public transport services to such areas. In India,

it has consequently led to rapid growth in car and motorcycle ownership and use, leading to increasingly congested roadways that slow down buses, increasing bus operating costs, further discouraging public transport use (Pucher et al., 2005).

## d) Comprehensive design standards for transport infrastructure lacking

Common standards for design, operation and maintenance of transport infrastructure and rolling stock are relatively absent in India. Even if there are existing standards for road construction or metro systems, they are not mandatorily applied during design and construction. Except for road and conventional rail infrastructure systems, the design, operation and maintenance standards for mass transit technologies such as metro, light rail, mono rail or Bus Rapid Transport Systems are non-existent.

The Indian Road Congress (IRC) has been the nodal agency that sets design guidelines and technical standards for construction of roads and bridges, primarily for intercity roads but also for urban roads. These standards are voluntarily followed by all road construction agencies, including Public Works Departments of cities. A critical feature is that IRC codes are not adhered to for urban road development, they are not mandatory for municipalities or public works department and hence they fail to enforce these standards on the contractors. As a result, most urban roads are neither well-designed and nor are the standards well-implemented. The roads cannot fully accommodate all the functions of the street. A part of the right of way is developed while the rest is left undeveloped, leading to unorganised and unregulated traffic - a major cause of the high occurrence of traffic accidents and fatalities. In the absence of urban road design standards, some city-led initiatives have been taken up, notably in Delhi and Bengaluru. In Delhi, Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre (UTTIPEC) developed street design especially suited for cities wherein spaces for vending zones, three-wheeler stops, road infrastructure, pedestrian-oriented lighting integrated with tree shade, water permeability etc. were considered. Delhi is the first city in the country to have formally adopted street design guidelines with requisite detail needed to make a street accessible for various road users. In Bengaluru, too, Janaagraha has taken up the task of developing street design standards and taken up a pilot project to develop 50 roads in Bengaluru to these standards. Such initiatives are limited and therefore there is an urgent need to fill these gaps.

## e) Human Resource challenges

Urban transportation is a complex system as it constitutes several activities, stakeholders and processes. Unfortunately, the capability for undertaking a coordinated approach along with a holistic understanding of transport issues and their causes involved is generally lacking at the state government and city level (Ahluwalia, 2011). This is attributed to a lack of urban transport skills amongst city and state officials, along with no dedicated organisation in city or state to deal with urban transport. The main reason for lack of relevant professional skills is that the urban transport professionals today do not have adequate job opportunities in governmental agencies managing land use and urban transport at the city, state or national level.

Most of the state and city level agencies dealing with urban transport planning and provision have typically suffered from overstaffing of untrained, unskilled manpower on the one hand and shortage of qualified technical staff and managerial supervisors on the other (Bhatt et al., 2013). It is not surprising then that they have not been in a position to deliver the current

demands for urban transport services, let alone plan for the growing needs of cities. The staff and management at these agencies are typically not accustomed to innovation and taking up new tasks, and are more comfortable opting for traditional methods of procurement and working with government grants and loans (Ahluwalia, 2011). A comparative analysis of CMPs (Comprehensive Mobility Plan) of eight cities (Bengaluru, Madurai, Jaipur, Thane, Rajkot, Varanasi, Asansol and Chandigarh) prepared by external consultants indicated that these documents did not fully follow the provisions of National Urban Transport Policy (NUTP), CMP toolkit, advisories and guidelines issued by MOUD (Chotani, 2010). It appeared that the focus of the analysed CMPs was on listing a number of transport projects without a thorough impact assessment using tools such as a cost-benefit analysis or an Alternatives Analysis. It now appears that neither the consultants always have the desired level of skill in the assigned task nor do the cities have the necessary skills to supervise and monitor the work of the consultant (Chotani, 2010). Therefore, there is an urgent need for building capacity at the individual and institutional level.

### f)  Absence of reliable transport data

The absence of a database with scientific management and analysis of urban transport statistics has severely constrained the ability to formulate sound urban transport plans and reliably assess the impact of the different projects carried out in the cities (Bhatt et al., 2013; Agarwal, 2006; Ahluwalia, 2011). The reliability and accuracy of even the available data is suspect at present since much of the data collected is either part of a specific study or collected with a specific project in mind. Secondly, available data is scattered over a multiplicity of different agencies and often difficult to obtain. Thirdly, the data is neither collected regularly nor kept up to date which is a limiting factor for larger policy and planning functions. In any case, the data is not available at regular intervals and does not lend itself to any kind of trend analysis. This seems to be a major problem observed across Indian cities, which is why the urban transport management seems to be a major challenge.

**Recently, MOUD has established a 'Knowledge Management and database Center' (KMC)** with the support of Global Environment Facility (GEF) and United Nations Development Programme (UNDP) under the sustainable urban transport project. The NUTP 2006 identified the Institute of Urban Transport (IUT) India to be developed as a national institute to build up a database repository of all urban transport sector related data and information in India. However, there is an urgent need to ensure that the data collection is standardised, systematised and that the data is regularly collected for it to be meaningfully used in planning, research and training, etc.

### g) Inefficiencies in bus based PT services

For many decades, State Road Transport Undertakings (SRTUs) have been providing city based Public Transport (PT) services in about eight cities in India (Delhi, Mumbai, Chennai, Bengaluru, Kolkata, Pune, Chandigarh and Ahmedabad) for which there is data available for analysis. Most of the SRTUs have common problems. In terms of operational performance, excluding Bengaluru and Chandigarh, the remaining six cities have less than 70 per cent fleet utilisation indicating sub-optimal utilisation of their bus fleet. This affects the passenger-carrying capacity and service frequency in key cities. In fact, the slow turnaround time of operational buses due to road congestion also affects the fleet utilisation and the overall performance of the bus fleet. As congestion causes a difference in the scheduled bus trips operated daily (up to 20 per cent of scheduled trips are cancelled daily in Delhi), passenger volumes typically fall. At present, there is no systematic exercise for network and route

design for bus based PT services. The precise allocation of the responsibility for route design is also unclear. The SRTUs usually decide the routes on which they would operate services on the basis of public pressure, rather than a scientific assessment of the demand. The SRTUs also tend to start routes applied for by individual operators resulting in a sub-optimal allocation of routes, with surplus capacity on some and a deficit in others (Agarwal, 2006).

The financial health of almost all SRTUs is generally in a poor state. The SRTUs in Delhi, Chennai and Mumbai are facing sustained operational losses and inefficiencies over many years without corrective measures.

According to data collected in March 2010, India had 135,506 buses for a population of 1,150,000,000 population, i.e. one bus for every 8,500 passengers which reflects an enormous under-capacity of public transport in Indian cities (Roychowdhury, 2013). Time series data from SRTUs indicate that there has been a steady decline in bus registrations since 1961 (See Figure 7). In cities without SRTUs providing PT services, mass transport demand is met by privately operated bus services or Intermediate Public Transport (IPT) modes. However, there is practically no data available about the performance of such systems in public domain which makes it difficult to assess their performance.
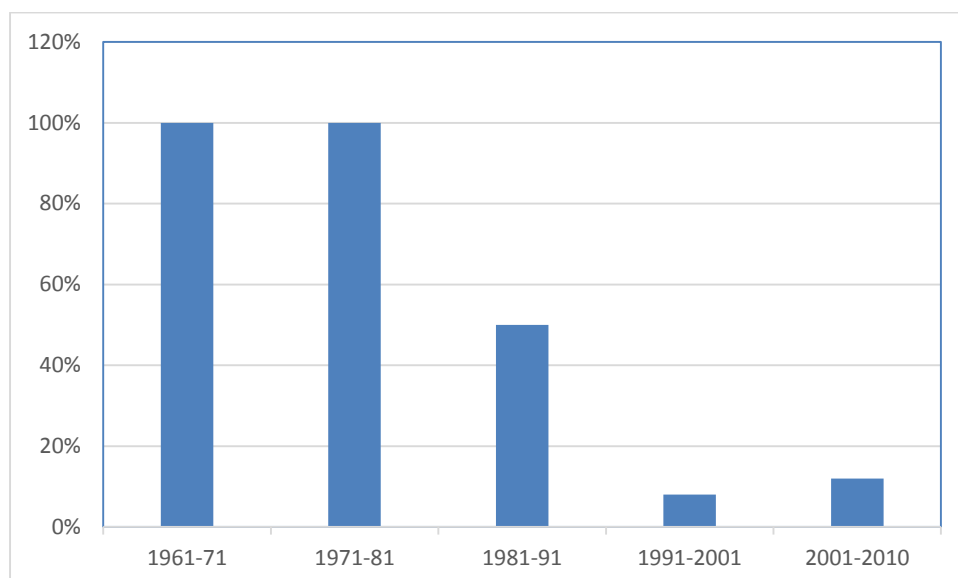


**Figure 7: Decadal growth rate of PT bus fleet in India (%)** (Roychowdhury, 2013)

## h) Energy Security

The production of crude oil in the country has increased at an average annual growth rate of around 1.6 per cent from 2000-2001 to 2010-2011, whereas the consumption of petroleum products over this period has increased at a rate of more than 4 per cent annually (MoPNG, 2012). The reserves to production (R/P) ratio of crude oil in India indicates enough reserves for 30 years, whereas the R/P ratio worldwide indicates enough crude oil to last for 46 years (TERI, 2011). India has become, and will continue to be, increasingly dependent on imported crude oil.

Total petroleum consumption by the transport sector is expected to grow three-fold from 2010 to 2030 (See Figure 8). Crude oil imports now account for almost 80 per cent **of India's** demand (MoPNG, 2012). If petroleum consumption trends continue unchecked, this will rise to 90 per cent by 2032 (TERI, 2011a). The current trend of growing fossil fuel use in the

transport sector and increasing dependence on oil imports poses a significant risk to India's energy security and domestic economy growth as it exposes domestic economy to the vagaries of international crude oil prices. It also sends billions of rupees abroad to purchase fuel, rather than investing the money for development.
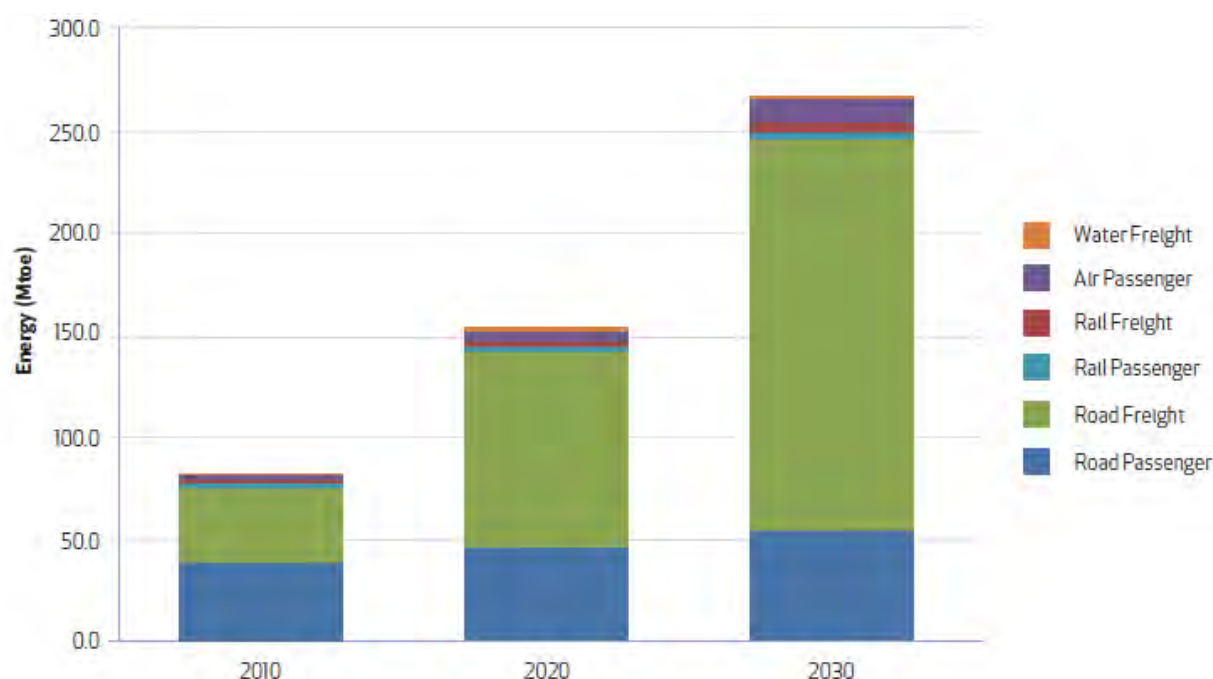


**Figure 8: Growth in Energy Consumption in Transport Sector in a BAU Scenario**

Source: (TERI, 2009)

# 6. 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.

## a) 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 ensuring

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 Ninth Five-Year Plan, it was realised that the need to develop urban transport institutions and active collaboration between central, state and local governments is indispensable to tackle this complex problem. Mass transit systems in metro cities were perceived as the solution to urban transport problems and therefore this plan mandated financing metro projects through dedicated levies on users and non-users. It also proposed the setting up of National Urban Transport Fund to support metro project implementation (Commission et al., n.d.). The Tenth Five-Year Plan went a step ahead to recommend enactment of supportive legislation for mass transit projects, especially the metro systems, along with a financing strategy in cities with three million-plus population. It stressed the need to have clear responsibilities and active collaboration amongst Indian Railways, urban development authorities and state governments concerned with urban transport. To financially support urban transport projects, the Tenth Five-Year Plan proposed setting up of National Urban Transport Development Fund with initial seed money of Rs3,000 crores, with an equal amount raised from tax or cess, although it did not happen in the plan period.

The Eleventh Five-Year Plan proposed improving productivity and efficiency of urban transport systems in an integrated manner by augmenting capacity and by allocating funds for technological upgrade and modernisation. The approved outlay was Rs1,000 crores, of which 37 per cent was spent up to the mid-term appraisal (MTA). The MTA proposed to develop a strategic long-term framework to strengthen public transport in Indian cities. In this direction, it proposed to allocate central funds to support technology for intermodal fare integration and automatic fare collection systems. To address road safety issues, the National Road Safety and Traffic Management Board (NRSTMB) and Inspection & Certification (I&C) centres were set up across the country. The role of NRSTMB is to regulate, promote and optimize modern and effective road safety and traffic management systems and practices on national highways. NRSTMB is also mandated to develop improved safety standards in highway design, construction, operation and regulate high standards in production and maintenance of mechanically propelled vehicles (Tiwari, 2011).

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.

## b) National Urban Transport Policy (NUTP)

The central government, under the Ministry of Urban Development (MOUD), issued the National Urban Transport Policy in 2006 with specific policy objectives of achieving safe,

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.

Without land use transport integration on the ground and specific policies and action plans supporting the same, not much change in the existing urban transport condition can be expected. Even today, appropriate accessibility and mobility objectives are not well-considered and defined in land development and as a result current development practice tends to lengthen trips and leads to increased congestion. Real estate developers have continued to build new developments with segregated land uses and in locations that are inaccessible by PT and NMT (Sriraman, 2012). Violation of zone laws are a common occurrence which often translates to a different land use pattern emerging than what was planned. This adversely impacts transport and traffic patterns, which is nowhere near the one that was expected. Even with specialised institutions to deal with these issues, the haphazard land development continues due to irrelevant considerations. Although the NUTP supports integration of land use and transport, it only touches on the generalities associated with it (Sriraman, 2012). NUTP's silence on ways in which national and state leadership can help city governments integrate land use and transport in urban development is criticised.

International experience has shown that participatory approaches that incorporate community consultation and wider participation by all social groups have been successful in enhancing sustainable urban transport development. Such "bottom-up" approaches are more likely to win public support, especially when difficult policy decisions arise, such as while implementing transport demand management measures. This approach has been visibly absent in the NUTP. It would require a fundamental institutional change in the planning process to incorporate participatory approaches in decision making and seek inter-disciplinary solutions to urban transport problems.

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 travellers. 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.

### c) 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 (Thornton, 2011). Another objective was to address distortions in the urban land markets arising largely out of a plethora of regulations. To achieve these objectives, the JNNURM mandated a set of reforms at state and municipal levels. The urban transport sector was allocated 11 per cent of the total JNNURM investment. Except for Delhi, most urban transport systems and interventions are funded and owned by state governments. National intervention in the sector has been very recent particularly after JNNURM and National Urban Transport Policy were announced in 2006. The JNNURM program attempted to improve the public transport system in larger cities through funding of public transport buses, development of comprehensive city mobility plans and supporting city transport infrastructure projects (Baindur, 2011). 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.

To encourage holistically planned development of cities, the JNNURM program mandated preparation of City Development Plans (CDP). The CDP would highlight the city-level improvements so as to integrate land use and transport planning, and address infrastructure needs in a sustainable manner. All proposed projects by ULBs were required to be in tune with the city development plans. Moreover, JNNURM required that all proposed transport projects are complied with the NUTP guidelines. To give effect to this, the program provided for an outlay of central assistance of more than Rs66,000 crore for the seven-year period, and linked the release of assistance to completion of the reforms. Currently 138 urban transport projects have been approved, with the majority (80 per cent) in Category A cities with populations of at least four million (Hidalgo et al., 2012).

Ex-post analysis observed that the  JNNURM-funded projects in urban transport lacked effective monitoring and verification mechanisms on the impact of JNNURM funding at city scale. Land use transport integration has not happened. Most of the JNNURM funded projects have seen improvement of the urban infrastructure to facilitate smooth traffic flow in the short term. More than 70 per cent of JNNURM program funds were allocated for roads and flyovers demonstrating the inequitable allocation of resources for sustainable transport modes such as NMT and public transport. Chennai, Delhi, Hyderabad and Pune spent less than 20 per cent of the JNNURM funds allocated to these cities on NMT infrastructure.

MOUD, required that all cities prepare Comprehensive Mobility Plans (CMPs) before accessing any funds from the Government of India, but this approach also was ineffective. The CMPs became mostly intricate modelling exercises justifying a wish list of ambitious transport infrastructure projects with no integration or understanding of **the city's needs or expectations** (TERI, 2011b). According to an expert, 70 per cent of the CMPs developed under JNNURM program were criticised for lack of attention to mixed land use, resettlement of slum and informal housing, developing links to the urban periphery and elaboration of legal and administrative issues in implementation (Chotani, 2010). 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.

# 7. Proposed 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:

## a) Re-aligning legal and regulatory instruments

As mentioned earlier, 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.

The proposed interventions in land management, built form, transport planning and engineering, institutional and financing arrangements towards land use transport development need to be built on sound legal foundation. Therefore, an overhaul of existing legal and regulatory framework relating to urban management is recommended. The Town and Country Planning Acts have to be amended from segregation of land uses and rigid zoning towards fostering more mixed-use and compact development. Similarly, building codes and development control regulations need to be critically reviewed and necessary amendments made to cover any unforeseen gaps. Efforts to consolidate and strengthen enforcement capabilities to ensure that the laws and regulations are abided by need to be in place.

## b) 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. Moreover, participatory mechanisms must be in place to ensure that planning and investment decisions are socially inclusive, and engage public in a shared common vision for their city and neighbourhoods. This implies providing a platform for non-state actors and city residents to negotiate when making important urban mobility decisions that directly or indirectly influence their lives. In strengthening institutions, it is

essential that financial resources be channelled into training and capacity-building of the concerned personnel in order to empower them to take on the complex challenges of the urban transportation sector. Intra-municipal and inter-municipal coordination is essential for the development of a fully integrated urban transportation system for the metropolitan region. This fosters accountability and provides a territorial context for planning for infrastructure development and provision of PT services within the region. Metropolitan institutions need to be strengthened with powers for regulatory oversight and funding capacities to finance transportation investments and service management.

Central government through the MOUD has played a crucial role in formulating a NUTP and supporting it with central grants and technical assistance in their achieving urban transport improvements. There is also a need to inject efficiencies, accountability and transparency into the urban transport decision-making process which is presently opaque in Indian cities. This can be achieved by the development and institutionalisation of planning and evaluation approaches that are inclusive in nature. In other words, it should be able to bring representation from all sections of society to voice their views and make decisions based on performance measures and well-articulated goals identified through active public engagement. This promotes both transparency and accountability. Presently, urban transport in India has neither institutional ownership nor skills within cities and state authorities to address related issues. This paper advocates for the decentralisation of urban transport sector to municipalities in India as is mandated by the 74th Constitutional Amendment. This will mean that delegation of functions and investment responsibilities from state to the Metropolitan Planning Committees should be made. Therefore, the following division of responsibilities and institutional framing across the three governance levels is proposed:

### i.    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 pre-determined basis to enable them to plan and implement major urban transport infrastructure projects. Secondly, the central government should house an empanelled 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 OTS should support the central government in laying down a national policy framework for UT, drafting laws and regulations, and setting national level common planning standards (without restricting local operational efforts to achieve set outcomes). 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.

### ii.    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. It should also organise educational and capacity-building programs for staff engaged in urban transport in that particular state. This ministry should also institutionalise the process of actively engaging with practitioners, academia and researchers on urban transport issues on a regular basis. Another important role would be to allocate state funds and funnel central government funds to cities on a predetermined basis.

The division of regulatory and enforcement functions related to urban transport and land use planning should be clearly defined and looked after by the newly created Ministry of Urban Transport. The regulatory functions of licensing, vehicle inspection and enforcement may continue with the transport commissioner. Specifically for traffic safety, a high level safety board should be set up within this ministry to deal with safety issues in a comprehensive manner.

### iii.    At city government level:

The primary responsibility for providing good mobility to the city and its population presently lies with the state government. This responsibility should eventually be devolved to metropolitan and city authorities in those cities with one million-plus population. A three-level organisational setup is proposed for each urban agglomeration in the state as follows:

- The constitution of Metropolitan and District Planning Committee (MPC, DPC), as envisaged in the 74th Constitutional Amendment, for the metropolitan areas, which will be responsible to ensure intersectoral coordination, primarily amongst authorities responsible for urban land use and transport. It should act as the focal point for resolving inter-jurisdictional and macro-regional decisions and coordination issues. It should have the representation from all city agencies and stakeholders, including those from the surrounding region. Presently, MPCs are underdeveloped either because some states with urban areas do not have an enabling legislation or those with enabling legislation have not set up MPCs.
- The Unified Metropolitan Transport Authority (UMTA), as proposed in the NUTP 2006, to be established as a full-time professional body working under the Metropolitan or District Planning Committee. UMTA should be empowered by suitable legislation at the state level for technical decision making and as a coordination body for all work related to urban mobility. This will include strategic and policy functions; regulatory functions; integrated planning; transport demand management; organising services; providing common services; resolution of day-to-day matters and monitoring of the work assigned to implementing agencies both for the city and the surrounding region. The existing implementing agencies should continue to manage day-to-day operations of bus, rail and other guided transit modes, BRT schemes, water transport etc. Also, construction, operation and maintenance of urban transport infrastructure should continue to be with the relevant agencies, although, stage carriage permits for PT bus operations, including para-transit, should be issued by the UMTA. UMTA should be supported by a professional body that will analyse and recommend on various issues for consideration and decision by UMTA. For UMTA to be effective, it should be backed by legislation and the entire funding for urban transport should be routed through UMTA to various implementing agencies in that particular urban agglomeration. This will give it the required authority in coordinating projects across the various specialised agencies.

Very few cities have enacted UMTAs but most of them operate more like committees than planning secretariats. As of the 2011 Census, there are 53 million-plus cities, but there are only eight to ten UMTAs existing in any form. There are reports that discussions for UMTA formation are underway in many cities across India but the implementation time frame is not clear (Mohan, 2014b). The Hyderabad UMTA is reportedly the strongest as it enjoys the power to approve projects and the Chief Secretary plays an active role in convening the various stakeholders.

## c) Resource Mobilization

For the UMTA or DPC to effectively govern and carry out its mandate of urban transport coordination, access to resources is critical. Resources include access to public finance, skilled and technically qualified pool of man power and relevant and up-to-date data for planning and decision making purposes. Following sub-sections elaborate on these critical resources.

### i. Public Financing

The choice of infrastructure investments is central in determining the choices and options for sustainable mobility. It is important that gradual steps are taken to correct the current imbalance in funding and investments between auto-centric road expansion projects or public transport projects. Allocation of more resources for the majority of people should be the rationale in decision making. The current bias towards roads and highways needs to be replaced by more funding for expanding non-motorised and high-capacity public transport infrastructure. It is equally important that the urban transport is treated as an integrated whole through systems financing and pricing. Given the distribution of taxation powers between the centre, the states and local bodies in India, cities have to deal with long gestation period for completion of transport infrastructure projects. The present method of financing large infrastructure projects in Indian cities is through capital grants by the centre or state as Urban Local Body (ULB) budgets are ill-equipped to leverage such huge capital expenditure. Options for funding urban transport projects stems from the following approaches:

1) *Tapping private source of capital through Public Private Partnerships.* The involvement of the private sector is a potent source for financing and managing urban transport services in the city. Due to the scarcity of public funds and expertise, the PPP route has been pursued in the recent past for funding and/or implementing urban transport projects. It needs to be clear that city authority should assume a managerial role in PPP projects instead of engaging in actual operations. However, PPP approach to funding urban transport projects needs to be treated with caution as the bargaining power and technical expertise that private players bring could result in a "regulatory capture" unless a strong regulatory framework is in place. Therefore, it is proposed to have a PPP regulatory body that is supported by a body of experienced advisors with techno-managerial expertise to effectively regulate PPP projects.

2) *Setting up the National Urban Transport Development Fund as proposed in the Ninth Five-Year Plan.* These funds will provide financial assistance to mass urban transport projects, preparation of feasibility studies, project reports, R&D and training. These funds should be enhanced by raising revenues from fuel surcharge, cess on running vehicles and additional tax on purchase of new motor vehicles. In addition, an Urban Transport Fund (UTF) in each city should be encouraged at city level to meet the share of state and urban local body contributions in urban transport projects. City transport fund

resources could be sourced from land monetisation, land value tax, enhanced property tax, grants of development rights, charging cess on turnovers and sales tax, betterment levies, shops and establishment levies, tax on employment, surcharge on octroi, advertisement, congestion pricing, parking charge, and other levies.

The authority and responsibility for allocation and dispensation of UTFs in each urban agglomeration to the various implementation authorities under its jurisdiction should be that of the UMTA. Allocation among the different urban transport modes and programs should be in accordance with well-defined objectives and priorities of the city as outlined in its mobility plans. Pune Municipal Corporation (PMC) proposed creation of UTF for a self-financing metro rail project. The fund resources were to be raised from additional FSI along the metro corridor. Pimpri-Chinchwad Municipal Corporation also set up an UTF to finance through resources from capturing value from beneficiaries in the project influence zone.

3) *Tax exemptions -* Public transport projects and services attract central and state taxes of up to 15 per cent for rail transit projects and up to 19 per cent on bus operations because these services are treated as business ventures. Each PT service provider should undergo financial audits on a yearly basis and central and state tax concessions should extended to only those providers that are not already profitable. These tax remissions should also be extended to projects undertaken by private sector provided they are willing to undergo performance and financial audits by regulatory authorities.

The selection and implementation of projects should be based upon sound principles of economic efficiency since it has major financial implications on municipal budgets. For instance, the high capital investments and operating costs needed to support metro projects must be carefully examined to ensure that local, state and national governments have the financial capacity to maintain its services. Amongst the various other sources of financing urban transport projects, the option of **"value capture"** (taxing the appreciation of land value around the project) is considered a significant source of revenue. By reinvesting these funds in urban mobility improvements locally, the linkage between land use and transport is reinforced.

### ii. Capacity building within government agencies & systems to attract best talent

The other important requirement is in meeting the professional expertise required at institutional and individual levels within government authorities. Capacity building implies reskilling city officials through executive programs and developing university-educated professionals. The focus of training for existing city officials should be to develop awareness, skills and a deeper understanding of the requisite issues in urban transport. For the training and skill building program to be beneficial, states should be mandated to immediately constitute a dedicated agency for urban transport in each city and at the state level, identify officials to be appointed to these agencies, send them for training and, on return, post them to these agencies or departments.

To develop a new cadre of working professionals in this field, the MOUD has established four centres of excellence in urban transport (CoEs) at CEPT Ahmedabad, IIT Madras, NIT Warangal and IIT Delhi to impart certificate and post graduate programs in urban transport management, engineering and planning disciplines. Considering the size of the manpower requirement across India, at least one (CoE) should be created in in each state. Financial aid for setting up such centres should flow from State Ministry of Transport and supplemented with financial outlays from central governments such as Ministry of Human Resources

Development and Ministry of Urban Development. Sufficient funds should also be allocated for creation of new faculty positions and provision of research scholarships in order to ensure a healthy manpower base of highly qualified and trained experts addressing urban issues is developed in each state. The curriculum taught in these centres in universities should be reviewed so that the professionals coming out have skills in tasks needed today such as planning and design of bus rapid transit, facilities for NMT etc. It is equally important that urban transport education provides a multi-disciplinary, holistic perspective of this sector. It is therefore proposed to design courses and offer labs that bring together students with training in humanities, sciences, engineering and arts to address urban transport challenges.

Presently, there is a demand for professionals with urban transport expertise in the private sector, but not so in governmental institutions. Therefore, to create good job opportunities within the government establishment, it is proposed that each state creates a new state cadre of urban transport professionals who are then posted to various cities and managed by the proposed state transport ministry. The professionals of urban transport cadre from the states should have access to the top posts at the centre, state and city authorities engaged in urban transport. Similarly, each agency engaged in urban transport planning and implementation in every city and state should carry out periodic assessments within their departments to identify required expertise to cover skill gaps. A skill management plan should be developed to align the selection process and allocate budget in order to hire the best available talent. The aim is to cover immediate skill requirements, develop and keep expertise in urban transport planning within planning agencies.

### iii.     Knowledge management and research and development

To formulate sound urban transport policies and plans as well as assess its impacts, reliable source of data needs to be made available to all stakeholders including the public. In this **direction, MOUD has set up 'Knowledge Management and database Center'** (KMC) under the Institute of Urban Transport India (IUT) in Delhi. Its mandate is to develop a database for planning, research and training from all Indian cities as well as house a state-of-the-art library infrastructure. Similarly, it is proposed that each state replicate KMC and library in their state capital. The data collection and management process needs to be regularly updated and the process institutionalised to keep it current and relevant for analysis and decision support purposes. CoEs should be given the mandate to regularly update the database and maintain systems for universal access to the database.

Once good data is made available, application-oriented research in urban transport across the country needs to be stepped up and channelized in a coordinated manner, in sync with the needs of the cities, and its dissemination organised so as to reach a wider audience of academicians, decision makers and public at large. For this, it is proposed that either CRRI or Council of Scientific & Industrial Research (CSIR) or Transport Ministry should fund, organise and institutionalise a coordinated research program in urban transport and direct research outputs around themes relevant to Indian cities on the lines of Transport Research Board (TRB) in the United States of America.

## d) 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:

- 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 (See Box 5). 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.
- 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.
- 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.

At the operational level, the UMTA should spearhead the preparation of the Comprehensive Mobility Plan for the city as per the standard guidelines framed by the MOUD. It should also provide technical and financial support to local ward committees in the preparation of LTPs. Stakeholder and citizen involvement needs to be an integral part of the whole planning process in all stages of planning to ensure public support for the shared city vision and proposed interventions. On preparation of the CMP, UMTA should be obliged to submit it to DPC or MPC for approval. On its approval, projects in the plan are to be prioritised and implemented by respective executing agencies under strict oversight from UMTA.

## e) Transferability of best practices

Several state governments and urban local bodies have come up with innovative ideas to plan and implement projects to improve urban mobility in their cities that have resulted in significant benefits to the users. Some of these urban initiatives have been documented and disseminated among cities for knowledge sharing and horizontal learning under the MoUD approved mega project Peer Experience and Reflective Learning (PEARL) Program, under JNNURM and Best Practice awarding schemes. The objective has been to create an effective network of cities for cross learning and knowledge sharing on urban mobility infrastructure

projects so as to make all Indian cities more liveable, economically vibrant and environmentally sustainable. It is equally important that these solutions are analysed for scalability and transferability potential. Wherever feasible, they should be implemented in other cities.

**Mumbai has India's most extensive suburban rail network** which carries over five million passengers daily and accounts for 58 per cent of total public transport passengers in the region or 80 per cent of total passenger-kilometre. Whereas the suburban rail transport in Kolkata and Chennai carries less than a third of public transport passengers. In some Indian cities such as Hyderabad, Pune, Barabanki-Lucknow and Lucknow-Kanpur, suburban rail operates on lines shared with other passenger and freight trains. Efforts to develop a suburban rail system for Ahmedabad, Bengaluru and Thiruvananthapuram have been stalled because of the lack of interest on part of the Indian Railways. The main concern being operational losses suffered on existing suburban rail services in addition to the capacity constraints. Here, a devolution of responsibility of suburban rail operations to a state or city rail operator regulated by the state or city government is needed to develop these systems.

Buses are integrated formally or informally in cities of different sizes. Until a decade ago, only eight Indian cities had city bus services. Organised city bus services operate now in about 65 cities, an increase from only 20 cities in 2006 (Rakesh Mohan, 2013). In several other cities such as Gangtok, Bikaner, Raipur, Amritsar, Patna, Agra and Varanasi, there are no formal public transport bus systems. Here, private bus operators are permitted to provide public transport services (Krishna et al., 2012).

In riverine and coastal cities, inland waterways are being leveraged to meet intra-city commuting needs. Kochi already has an efficient privately-owned water based intermediate public transport service which is fiercely competing with state sponsored bus transport service. It takes Rs5 and 15 minutes of ride to commute from mainland to Fort Kochi compared to a bus ride costing Rs12 and one hour of travel by road (Rakesh Mohan, 2013). The upcoming metro will be one of the few services to integrate water transport system. Kolkata has the oldest ferry system that connects Howrah railway station to the city. Being a legacy service, the piers are located close to other public transport nodes including metro, bus and railway station. The ferry services, with their extensive network, cover a wide area of Kolkata metro region and are now carrying more number of commuters than the tram system.

In Chennai, the municipal corporation has reduced the width of motorised roads to widen footpaths. Bhubaneswar has set an exemplary initiative to build seamless and extensive walking and cycling infrastructure, and space for hawkers that simultaneously protects the infrastructure from encroachments. Vishakhapatnam, Ahmedabad, Dehradun, Puducherry, etc. have introduced no-vehicle zones on targeted streets during weekends to encourage walking (Roychowdhury, 2013). Popular cycle movements are also coming up in cities. In Bengaluru, DULT, CiSTUP and cycling enthusiasts have led a campaign to promote cycling in the city. Every month, **the "Feel Bengaluru Cycle Day" event is** organised at various locations across the city of Bangalore to make cycle riders more visible on the roads so that planners take note and provide dedicated cycle infrastructure for greater adoption of this mode[5].

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[5] http://praja.in/en/projects/2013/09/25/cycle-day-campaign

# 8. Conclusion

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 realisation 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. Comprehensive integration of urban transport and land use planning systems is needed so that synergies are harnessed, interconnections are promoted and functionality optimized through multimodal mobility solutions for Indian cities. Present urban transport issues such as congestion, road accidents, pollution, etc. cannot be wished away by conventional interventions that favour public funding and investments for private transport instead of public modes of transport More public resources need to be allocated to developing NMT and high capacity public transport infrastructure. It is also important that urban transport sector is treated as an integrated whole through systems financing and pricing. Urban transport systems influence the spatial morphology and configuration of built form of its cities. The paper suggests that sustainable mobility systems in Indian cities can only be achieved when robust, integrated and participatory institutions are created and enabled through clear responsibilities, legislative authority, financial independence and professional competence to effectively enhance accessibility of our cities. Most importantly, mechanisms for transparency, oversight and accountability of such institutions towards its people need to be ensured. All this can only be possible by strong political will and sustained public pressure for change.

# Annexure I: List of experts interviewed

| No. | Name | Affiliation | Date | Location |
|---|---|---|---|---|
| 1 | Dr Ashwin Mahesh | MAPUNITY | 18/2/2014 | Bengaluru |
| 2 | Dr Ashish Verma | IISc | 4/2/2014 | Bengaluru |
| 3 | Anjali Mahendra | WRI / EMBARQ | 5/2/2014 | Bengaluru |
| 4 | Sujaya Rathi | CSTEP | 4/2/2014 | Bengaluru |
| 5 | Sudhir Gota | CAI Asia | 28/1/2014 | Bengaluru |
| 6 | Professor Sriraman | Univ. of Mumbai | 7/2/2014 | Mumbai |
| 7 | Champaka Rajgopal | Kala Ghoda | 7/2/2014 | Mumbai |
| 8 | Dr L R Chary | ex-MD Shipping Corporation of India | 9/2/2014 | Mumbai |
| 9 | V Phatak | Town & Country Planning Dept. | 6/2/2014 | Mumbai |
| 10 | Mr Ashok Datar | Citizen Activist | 8/2/2014 | Mumbai |
| 11 | Mr Sudhir Badami | Citizen Activist, Transport Engineer | 6/2/2014 | Mumbai |
| 12 | S Sundar | Faculty, TERI | 14/3/2014 | Delhi |
| 13 | Dr Akshima Ghate | TERI | 14/3/2014 | Delhi |
| 14 | Professor Geetam Tiwari | TRIPP, IIT Delhi | 14/3/2014 | Delhi |
| 15 | Jessica Seddon | IIHS | 28/2/2014 | Chennai |
| 16 | Shubhagato Dasgupta | CPR Delhi | 14/3/2014 | Delhi |
| 17 | Professor Sanjay Gupta | SPA Delhi | 13/3/2014 | Delhi |
| 18 | Mr Ashok Bhattacharjee | UTTIPEC | 13/3/2014 | Delhi |

**Mumbai skywalks case study**

Skywalks were built in Mumbai by MMRDA and MSRDC as the only project for the pedestrians in the city with the first skywalk coming up in 2008 - a 1.3 km connector between Bandra and Kalanagar junctions. Around 50 skywalks have been built to date and have benefitted pedestrians to a certain extent. The purpose of skywalks was to connect suburban rail stations to important roads of the area, but most skywalks constructed are on the road medians and are eating up space on crucial station roads.

MMRDA had projected that 10 lakh pedestrians and suburban commuters will use skywalks every day. However, along with skywalks, illegal parking and illegal hawking have consumed almost all the space on crucial station roads, especially at Vile Parle, Bandra, Goregaon and Kandivli, especially after skywalks were built. Many feel that **Mumbai's skywalks have not served their intended purpose of diverting human traffic** from busy roads. The absence of lifts and escalators on most of them has made skywalks inaccessible, especially to senior citizens who would have otherwise been the biggest beneficiaries. The skywalk project is an example of the lack of coordination between the BMC, MMRDA and other city authorities. While the MMRDA only built the skywalks, it was left to the BMC to clear encroachments around them. Many skywalks are not used and many are poorly maintained (Ninad Siddhaye, 2011)(News, 2013).

**Local Transport Plans – England case study**

In England, guidance on Local Transport Plan (LTP) or neighbourhood plan development acknowledges that each neighbourhood in a city has very specific needs with regard to its mobility requirements. Hence, the state mandates local authorities to build an LTP on a framework informed by the national policy, the relevant metropolitan city objectives and any additional local goals. Local goals should be in the form of desired outcomes, and should look outside the transport agenda to wider social priorities such as access to key services in the neighbourhood. Setting goals for LTP is a critical first step to ensure consistency before prioritising transport measures for implementation. Setting goals will also facilitate in identifying performance indicators and targets which enable progress towards these goals to be monitored and incentivized.

Subsequently, LTPs consider the evidence on specific challenges or problems that relate to these goals. Each local authority faces a unique set of challenges and developing an understanding of current and future transport issues – and how these fit with the wider socio-economic agenda – will be pivotal to the LTP. Authorities are required to identify problems and priorities on the basis of clear evidence and data on environmental, socio-economic, transport service related issues, network connectivity issues, stakeholder views, etc. Authorities are expected to also consider which priorities to address within the timescale of the plan. By carefully analysing local transport problems and challenges, it will be easier to identify opportunities and come up with innovative solutions. ICT tools such as accessibility planning software are often used in identifying an area's accessibility needs.

**Box 1: LTP**

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