

SUSTAINABLE URBAN TRANSPORT IN INDIA :CHALLENGES & STRATEGIES

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Abstract

India's transportation sector is vast and diverse, serving the requirements of 1.1 billion people. The sector contributed around 5.2 percent to the nation's GDP in 2012-2013, with road transportation accounting for the majority of that. Economic growth requires good physical connectivity in both urban and rural locations. India's rising economy has seen an increase in demand for transportation infrastructure and services since the early 1990s. For India to maintain significant economic growth, it needs efficient and reliable urban transportation infrastructure. The importance of urban transportation in India arises from its involvement in poverty alleviation, as it improves access to labour markets and so raises earnings in disadvantaged neighbourhoods (Antonio Estache, 2007). Services and industrial businesses, in particular, are concentrated in and around major cities, necessitating efficient and dependable urban transportation systems to transfer people and connect manufacturing sites to the logistics chain.

Mobility flows have become a significant component in India's rapid urbanisation process, with urban transportation infrastructure serving as the urban form's skeleton (Amin et al., 2013). Despite the fact that urban mobility in Indian cities is expanding, access to locations, activities, and services is becoming increasingly problematic in terms of convenience, cost, and time. In fact, current levels of urban mobility are already causing a crisis defined by high levels of traffic congestion, pollution, road fatalities, and unfairness, eventually leading to an unwelcome accessibility catastrophe (Pucher et al., 2005). With nearly a quarter of India's urban population living in poverty, the poor's mobility issues are of particular importance (C Rangarajan et al., 2014). Due to the high cost of private transportation or a lack of public transportation options, this portion of the metropolitan population is forced to walk or pedal longer distances, resulting in significant pollution. As Indian cities expand outside, residents who cannot afford motorised transportation will be increasingly disadvantaged, and will be cut off from job, recreational, educational, medical, and other activity areas that they require in the city.

INTRODUCTION

Despite the vast differences in the size, shape, and growth trends of India's 468 cities, there are a number of similar characteristics that add to the severity of urban transportation challenges. The following are the primary aims of this research:

- To examine the key developments in urban India that result in negative externalities or transportation issues;
- To identify main obstacles to effective policy creation and implementation in this industry;
- To examine present policies and programmes in India's urban transportation industry;
- Identifying gaps in existing policies and initiatives, as well as making solutions to solve the major issues.

The authors acknowledge that there is no one-size-fits-all answer or approach for the 468 cities' complicated transportation concerns. As a result, the focus has been on improving the

existing governance mechanism so that it can respond decisively and effectively to the issues at hand while also aligning with the broader policy IIHS goals of achieving sustainable, environmentally friendly, and affordable transportation systems at the regional and national levels.

Methodology and Scope of Work

The authors gathered information on the growth of urban transportation systems in India after economic liberalisation in the early 1990s through a thorough literature review. National and international research articles, working papers, book chapters, planning commission reports, vision documents, publicly accessible plans, such as comprehensive mobility plans and comprehensive development plans, national and state policy briefs, relevant laws, regulations, and notifications, publicly accessible consultancy reports published by industry, and non-goals were all used in the review. During the literature review, a wide range of blog postings, news and magazine websites, as well as local, national, and worldwide media, were referred to.

The important findings on common trends, difficulties, and challenges were consolidated following the literature review. Following that, semi-structured interviews with important stakeholders in the urban transportation arena were conducted. To achieve a comprehensive spectrum of opinions on urban transportation in India, efforts were made to gather enough representation from a diverse collection of stakeholders from across India, including policymakers, think tanks, industry representatives, and academia.

Between 28 January and 14 March 2014, the author was able to conduct interviews with 18 specialists from various backgrounds in Mumbai, Bengaluru, and Delhi. The interview questions centred on three areas of urban transportation in Indian cities: the evolution of urban transportation in India over the previous few decades, main difficulties confronting Indian cities, and effective solutions for achieving sustainable transportation in Indian cities. To find common perspectives and recommendations, the interview replies were analysed and compiled. Finally, the IIHS team considered the difficulties and recommended options based on its own experience working in various sectors inside Indian cities during the previous five years. These various

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inputs combined to form a wide perspective on the current situation, as seen in the diagram below.

India's urban population expanded from 286 million to 377 million between 2001 and 2011. Nearly half of them live in tiny cities (with populations of less than 0.5 million). Cities with populations of 100,000 to 1 million, such as Surat, Nashik, and Faridabad, experienced the fastest decadal growth, while metro cities like Mumbai, Delhi, Kolkata, Chennai, Hyderabad, and Bengaluru experienced slower peripheral growth, with villages surrounding the core city merging with the larger metropolitan area. According to 2011 census data, there are three cities with populations over ten million people and another 53 cities with populations exceeding one million people (Revi et al., 2012). The top ten Indian cities, which account for 8% of the total Indian population, are expected to provide 15% of the country's GDP, while the remaining 53 cities with populations of one million or more contribute 31%. (Revi et al., 2012). In India, around 377 million people live in 8,000 cities and towns, accounting for nearly 38% of the population and contributing more than 50% of the country's GDP. By 2031, this rural-to-urban demographic shift is predicted to result in a surge in urban population of about 600 million people, accounting for nearly 40% of the Indian population. Cities and towns are likely to become increasingly important drivers of the country's economic growth in the future decades..

Rapid Motorisation

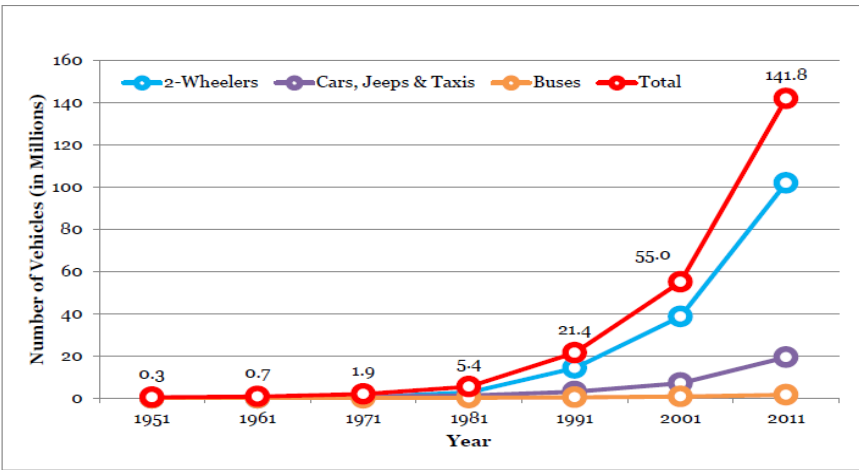


Figure 1.1: Growth of registered vehicles in India in Millions

The number of autos per 1,000 inhabitants in Indian urban centres has increased dramatically since 2001. Between 1991 and 2009, the total number of registered vehicles in the country increased at a CAGR (Compounded Annual Growth Rate) of 9.8%. Personalised private vehicles, such as cars and two-wheelers, grew at a CAGR of 9.6% and 10.3% per year, respectively. The rate of increase of registered vehicles in cities with populations greater than a million people is much higher than in the rest of India. Meanwhile, vehicle registrations in metro cities climbed at nearly double the rate of those in cities with populations of more than a million people. In 2011, 22 cities had a CAGR of 8.7% in total car registrations, accounting for roughly 28% (39.7 million) of all vehicles registered in the country (141.8 million) (Sarma et al., 2011).

As of 2011, five metro cities had vehicle registration rates of more than 500 per 1,000 persons, accounting for 54 percent of all automobiles in the metropolitan area (Sarma et al., 2011). With around 6.3 million automobiles, Delhi had the biggest vehicle population (See Figure 1.2). The four major cities—Delhi, Bengaluru, Chennai, and Hyderabad—accounted for over 17 million automobiles in 2011, accounting for 12.3% of the total number of vehicles in the country. Delhi accounts for approximately 5% of all motor cars in India, although having just 1.4 percent of the population. According to MORTH (Ministry of Road Transport and Highways) figures, the yearly growth rate of the motor vehicle population in India has been roughly 10% during the last decade (Mohan, 2014b). Two-wheelers are the most common mode of private transportation on Indian roadways, accounting for 71.8 percent of the 141.8 million vehicles registered in 2011. (See Figure 1.1). Two-wheelers are dangerous, destructive to the environment, and unsustainable because it is hard to provide appropriate infrastructure for the growing number of two-wheelers. Many experts believe that current levels of motorisation are relatively sustainable, but the current high motorisation trajectory is unsustainable, and hence the focus on properly balancing demand across multiple forms of transportation is crucial. (Ahluwalia, 2011).

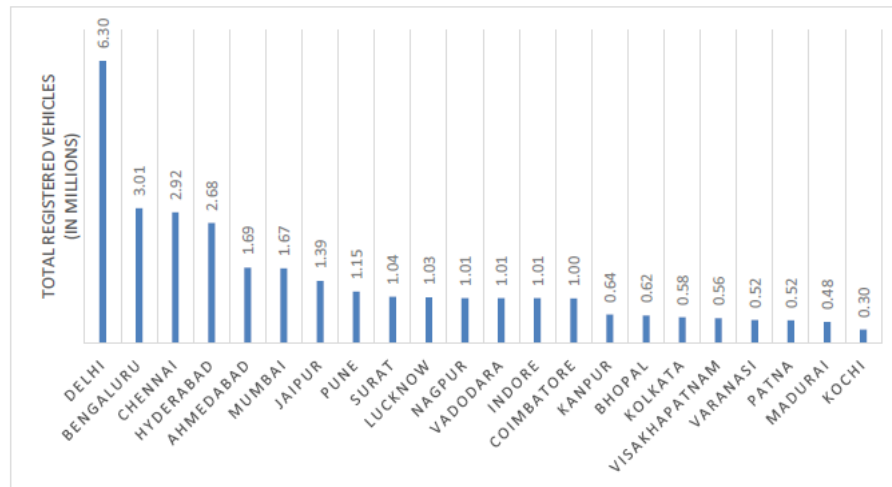


Figure 2: Total registered motor vehicles in metro cities in ‘00 (as on 31.3.2009) (Sarma et al., 2011)

Figure 1.2: 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

Walking, bicycling, and other small-wheeled transport (push scooters, skates, and hand carts) are examples of non-motorized transportation (NMT), often known as Active Transportation. People who walk to work in Indian cities outweigh those who use private motorised transportation.

CHALLENGES OF URBAN TRANSPORT IN INDIA

a) Road congestion

Because there is a direct association between the two measures, average travel distances and intensity are projected to increase as populations grow (See Figure 2.1). The average travel length for metro cities, including Bengaluru, is over 8 kilometres, while the average route length for all other metro cities is 6 kilometres or less. With rising income levels, migration, women's engagement, and a service-oriented economy, this trend in travel duration and frequency is only projected to continue. As more people travel longer distances on a regular basis for work and education, road congestion will eventually result.

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Transportation Research and Injury Prevention Program, Survey report, Bicycle utilisation and barriers to use. Municipal laws govern the organisation and powers of urban local governments in almost every state. Within their jurisdictions, urban local governments have the authority to regulate traffic. Town and country planning statutes regulate urban planning in the states (transport planning is expected 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.

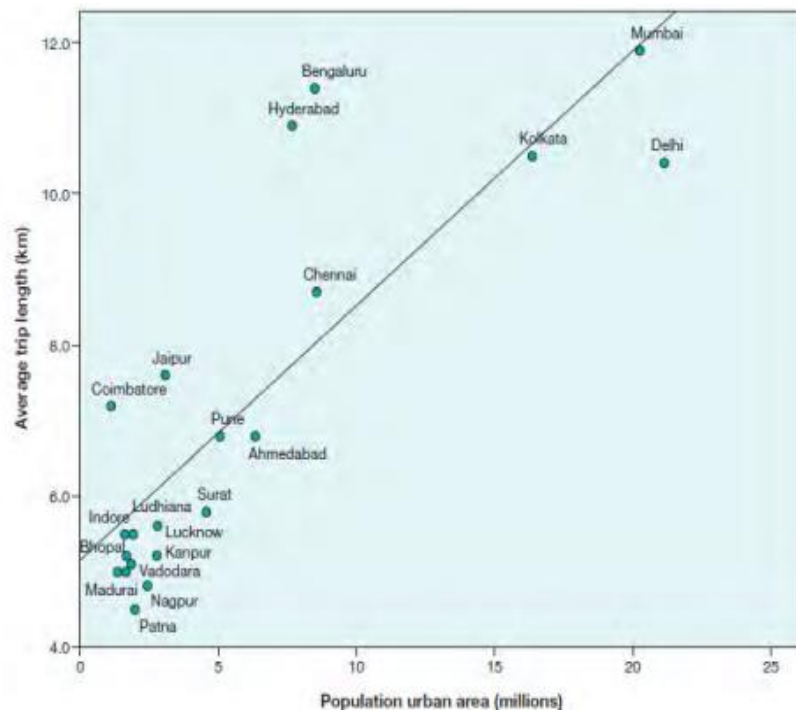


Figure 2.1: Average trip lengths as a function of urban population (Amin et al., 2013)

b) Parking problems

In Indian cities, the extreme shortage of parking places on and off the streets increases the time spent looking for a parking spot and causes traffic congestion. According to available data, on-street parking is a problem on a large percentage of Indian roadways (Rye, 2010). This issue

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is particularly prevalent in India's smaller, more confined cities. On-street parking is used on 14% of road lengths in Delhi, whereas on-street parking is used on over 60% of road lengths in Surat (See Figure 2.2). On-street parking is motivated by the fact that it is either free or less expensive than off-street parking. Even if communities invest in multi-level parking garages in high-traffic locations, parking fees are unlikely to cover the expenditures (Rye, 2010). In Delhi, public parking costs are as low as Rs10 for 8 hours during the day (see Figure 2.3), despite the fact that they should be at least Rs40 (Roychowdhury, 2013). Kolkata has the highest parking fees in India, and these fees vary by time and place, with higher fees in specialised commercial zones with rates increasing by the hour (See Table 2.1). A car in Kolkata pays Rs80 for eight hours of parking throughout the day, while a car in the Delhi MCD district pays Rs10 for up to ten hours of parking. Figure 2.3 depicts the eight-hour average parking rates in several cities, but excludes special parking fees for malls, airports, and other locations.

Table 2.1: 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

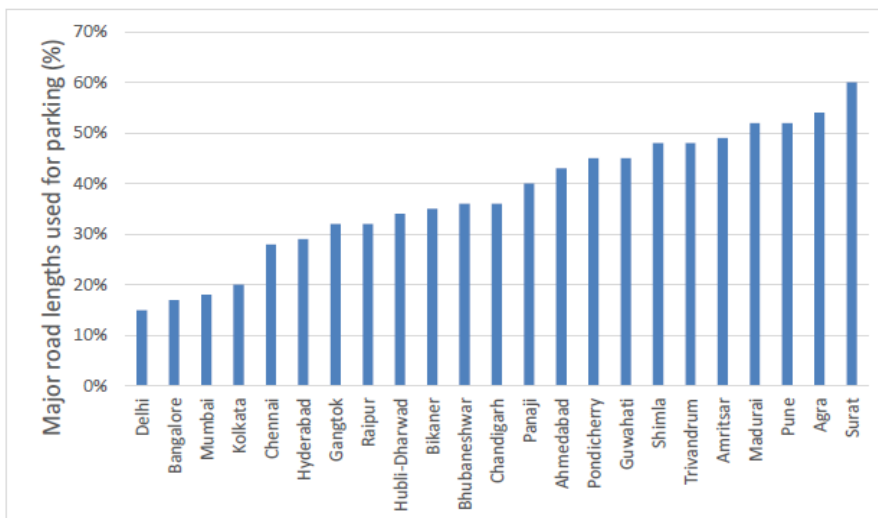


Figure 2.2: Share of road length used for on-street parking in key Indian cities
(Singh et al., 2008)

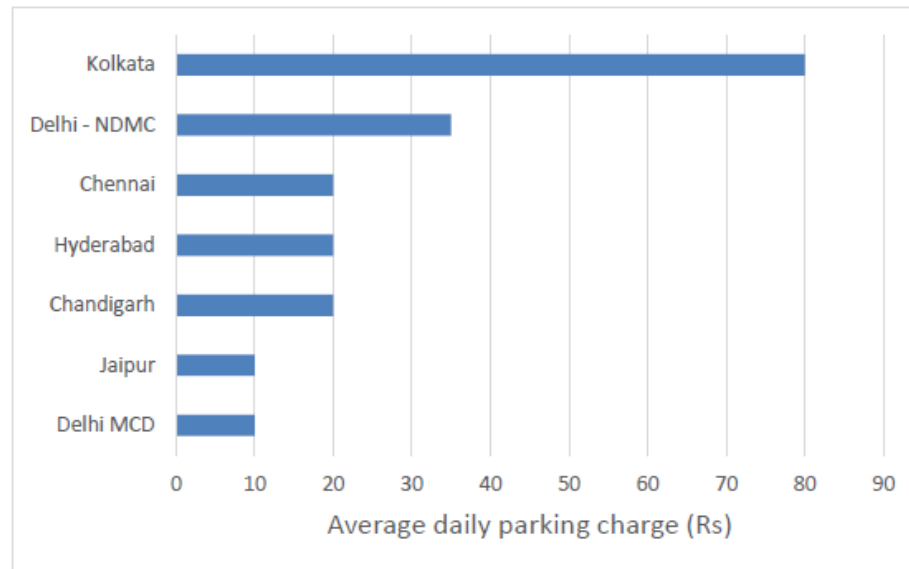


Figure 2.3: Comparison of average daily parking charges in 2013 (Roychowdhury 2013)

Cars (average spot = 280 sq. ft.) occupy more room than a family of four (range from 85-250 sq. ft. depending on income level) even in the densest Indian cities like Mumbai, Kolkata, Chennai, and Delhi (Gauthier, 2012). Commercial development of unoccupied plots has occurred in various Indian cities without following systematic planning procedures for access and mixed use. This results in excessive traffic, which causes localised congestion and parking concerns in the area. The commercial growth of Mantri Mall in Malleswaram, Bengaluru, for example, sparked public outrage about traffic congestion and parking concerns in the area (Chanchani & Fagun Rajkotia, 2011). Similarly, developer-provided public parking in Mumbai's mill districts has caused traffic jams on nearby arterial roads, necessitating a policy reversal (Roychowdhury, 2013). Skirmishes between neighbours over parking space are another issue with unregulated parking. There is enmity among neighbours in many places, particularly in Delhi, over parking spaces, which has resulted in serious violence and even murder (Roychowdhury, 2013). Parking difficulties in Indian cities would only worsen over time unless they are handled through a systematic planning process and stringent enforcement.

d) Pollution of the air

The CPCB (Central Pollution Control Board) air quality rating is used to determine the severity of air pollution in Indian cities. There is a substantial variance in pollution concentration and intensity across 180 Indian cities, according to available air quality data (Kamyotra et al., 2012). If the levels of criterion pollutants (particularly PM₁₀ and NO₂) are more than 1.5 times the standard, cities are termed seriously polluted. According to the findings, half of the residential areas in cities surveyed by the CPCB are polluted to critical levels (Kamyotra et al., 2012).

People living within 500 metres of highways are exposed to automobile fumes, according to the Health Effects Institute in the United States. The threat is magnified when diesel vehicles are in use, as diesel pollutants are known to cause respiratory problems. A study of a few Indian towns found that as smaller fractions of particles are evaluated, the contribution of the transportation sector increases. In Indore, transportation accounts for 30% of PM₁₀ but 46% of PM_{2.5}, while in Chennai, it accounts for 20% of PM₁₀ but 35% of PM_{2.5}.

Air pollution is the sixth greatest cause of death in India's cities. Air pollution causes approximately 620,000 premature deaths in Indian cities each year (Roychowdhury, 2013). Cardio-vascular diseases cause premature deaths as a result of air pollution. Air quality control efforts have received a mixed reception during the last decade. Pollution levels have stabilised or decreased in metro cities that have implemented pollution control measures; nevertheless, in other cities, the situation appears to be worsening. The 'livability' of Indian cities is being significantly jeopardised by toxic air and its health impacts.

Challenges

In general, each city has its own distinct history, traits, and issues, although urban difficulties in India are strikingly similar to those in other developing countries. The following are some of the most important issues and challenges for Indian cities discovered through expert interviews, literature reviews, and personal experiences that generate or aggravate urban transportation problems:

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a) Legal and regulatory voids

At the moment, there is no comprehensive legislation covering Indian cities' urban transportation needs at the federal, state, or local levels. The current systems of urban transportation rules, regulations, and governance are a holdover from a time when Indian cities were lightly populated and had not yet experienced the kinds of transportation issues that they do now. Many of the Acts in effect today are remnants of the British Raj, and a few of them have evolved to address specific difficulties in urban transportation, resulting in jurisdictional fragmentation or overlap. In India, for example, there are three Acts dealing specifically with metro systems that need to be studied and correctly revised so that they are all consistent in their treatment of this method of transportation.

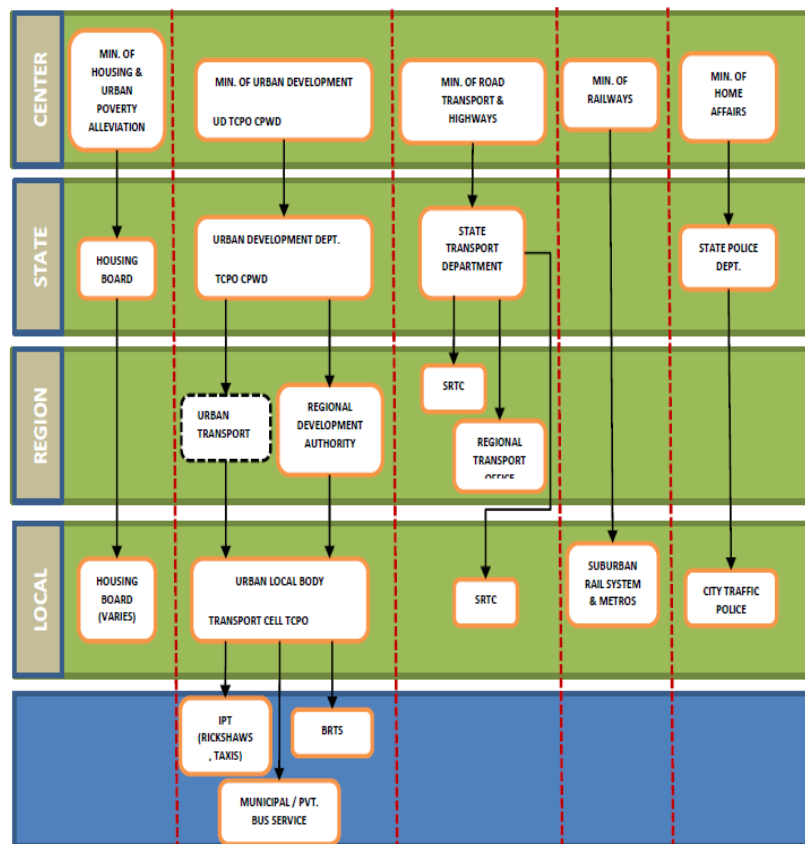


Figure 2.4: Representative hierarchy of institutional framework with function of managing land use and transport in Indian cities

The duty for urban transportation planning is largely spread at the federal level, which is why it is referred to as a "institutional orphan" (Mohan, 2014a). The Ministry of Urban Development was given responsibility for planning and coordination of urban transportation systems by the Government of India (Allocation of Business) Rules, 1961. (See Figure 2.4). The State Transportation Department and the Urban Development Department (UDD) are the two principal departments in charge of urban transportation and land use at the state level. Unfortunately, at the federal, state, and municipal levels, there is a severe lack of horizontal and vertical coordination across these organisations, making accountability extremely difficult. There appears to be a lack of an effective coordinating organisation where urban transportation and land use plans can be established and integrated with a long-term purpose in mind. The minimal authority allocated at the local city level is another flaw.

e) Human Resource challenges

Because it involves multiple activities, parties, and processes, urban transportation is a complicated system. Unfortunately, at the state and city levels, the ability to take a coordinated approach, as well as a holistic grasp of transportation issues and their causes, is typically missing (Ahluwalia, 2011). This is due to a lack of urban transportation skills among local and state authorities, as well as a lack of a dedicated urban transportation organisation in the city or state. The fundamental reason for the scarcity of appropriate professional skills is that today's urban transportation specialists do not have enough work prospects in government organisations that manage land use and transportation on a local, state, or national level.

On the one hand, most state and city-level agencies that deal with urban transportation planning and provision have had an overabundance of untrained, unskilled people, and on the other, a shortage of qualified technical employees and managerial supervisors (Bhatt et al., 2013). It's no surprise that they haven't been able to meet present demand for urban transportation services, let alone plan for the future needs of cities. Staff and management at these organisations are often not used to experimenting with new ideas or taking on new responsibilities, preferring instead to stick to tried-and-true procurement techniques and working with government grants and loans (Ahluwalia, 2011). A comparison of CMPs (Comprehensive Mobility Plans) prepared by external consultants in eight cities (Bengaluru, Madurai, Jaipur,

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Thane, Rajkot, Varanasi, Asansol, and Chandigarh) revealed that these documents did not fully follow the provisions of the National Urban Transport Policy (NUTP), CMP toolkit, advisories, and guidelines issued by MOUD (Chotani, 2010). The focus of the examined CMPs seems to be on identifying a variety of transportation projects without doing a detailed effect evaluation utilising tools like a cost-benefit analysis or an Alternatives Analysis. It appears that neither the consultants nor the cities always have the requisite level of ability in the assigned assignment, nor do they have the essential abilities to supervise and monitor the consultant's work (Chotani, 2010). As a result, there is a pressing need to increase individual and institutional capacity.

f) Inadequate transportation data

The lack of a database that allows for scientific administration and analysis of urban transportation statistics has severely limited the ability to develop solid urban transportation plans and accurately assess the impact of various city projects (Bhatt et al., 2013; Agarwal, 2006; Ahluwalia, 2011). Because much of the data collected is either part of a specific study or acquired with a specific goal in mind, the reliability and quality of even the available data is now doubtful. Second, existing data is dispersed among a variety of agencies and is frequently difficult to obtain. Third, the data is not collected or updated on a regular basis, which is a constraint for bigger policy and planning activities. In any case, the data is not available on a regular basis and does not lend itself to trend analysis. This appears to be a widespread issue in Indian cities, making urban transportation management a significant difficulty.

g) Inefficiencies in bus based PT services

State Road Transport Undertakings (SRTUs) have been providing city-based Public Transportation (PT) services in India for many decades in around eight cities (Delhi, Mumbai, Chennai, Bengaluru, Kolkata, Pune, Chandigarh, and Ahmedabad) for which data is available for research. The majority of SRTUs have similar issues. In terms of operational performance, the remaining six cities, with the exception of Bengaluru and Chandigarh, have less than 70% fleet utilisation, indicating that their bus fleet is underutilised. This has an impact on passenger capacity and service frequency in major cities. In fact, due to traffic congestion, the slow turnaround time of operational buses has an impact on fleet utilisation and overall performance.

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Passenger loads often fall when congestion causes a change in the number of scheduled bus trips operated daily (up to 20% of scheduled journeys are cancelled daily in Delhi). For bus-based PT services, there is currently no systematic exercise for network and route design. It's also unclear how responsibility for route design is distributed. The SRTUs typically determine which routes to conduct services on based on public pressure rather than a scientific assessment of demand. The SRTUs also have a tendency to start routes that have been requested by specific operators, leading in a less-than-optimal route allocation, with surplus capacity on some routes and a shortfall on others (Agarwal, 2006).

Almost all SRTUs are experiencing financial difficulties. Without corrective steps, the SRTUs in Delhi, Chennai, and Mumbai have experienced long-term operational losses and inefficiencies.

According to data obtained in March 2010, India had 135,506 buses for a population of 1,150,000,000 people, or one bus for every 8,500 passengers, indicating that public transportation in Indian cities is severely under-capacity (Roychowdhury, 2013). Since 1961, according to SRTU data, the number of bus registrations has been steadily declining (See Figure 2.5). Privately owned bus services or Intermediate Public Transportation (IPT) modalities meet mass transportation demand in cities where SRTUs do not provide PT services. However, there is virtually no publicly available data on the efficacy of such systems, making it difficult to measure their effectiveness.

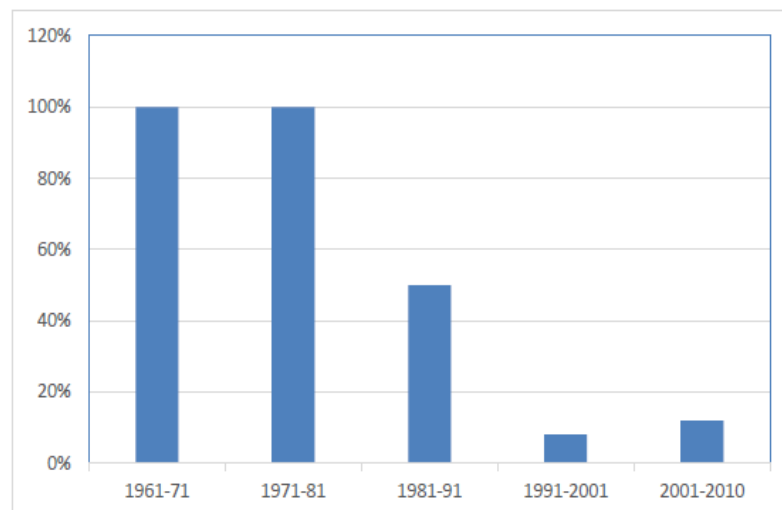


Figure 2.5 : Decadal growth rate of PT bus fleet in India (%) (Roychowdhury, 2013)

h) Energy Security

From 2000-2001 to 2010-2011, the country's crude oil output increased at an annual rate of roughly 1.6 percent, while petroleum product consumption increased at a pace of more than 4% yearly (MoPNG, 2012). The reserves to production (R/P) ratio of crude oil in India suggests sufficient reserves for 30 years, whereas the R/P ratio worldwide indicates sufficient crude oil for 46 years (TERI, 2011). India has grown increasingly reliant on imported crude oil and will continue to do so.

From 2010 to 2030, total petroleum consumption by the transportation industry is predicted to triple (See Figure 2.6). Imports of crude oil now account for about 80% of India's demand (MoPNG, 2012). If current trends in petroleum usage continue, this figure will reach to 90% by 2032. (TERI, 2011a). The current trend of expanding fossil fuel consumption in transportation and increasing reliance on oil imports poses a huge threat to India's energy security and economic growth since it exposes the domestic economy to the whims of international crude oil prices. It also transfers billions of rupees abroad to buy gasoline instead of investing it in growth..

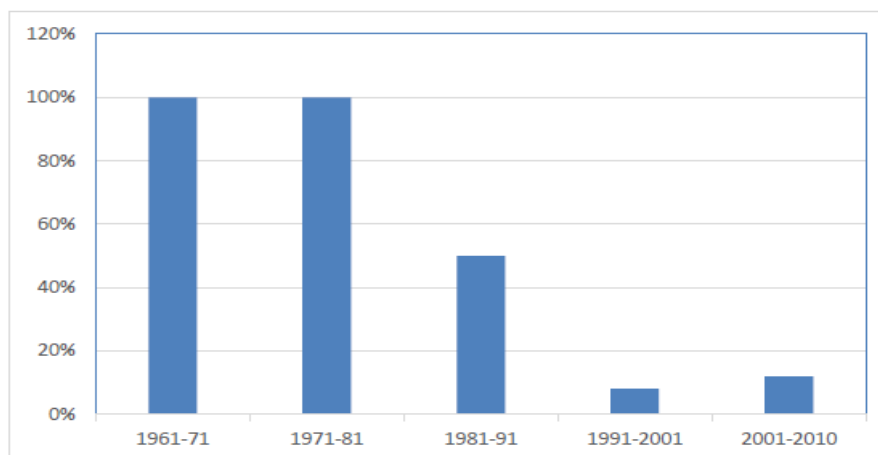


Figure 2.6: Growth in Energy Consumption in Transport Sector in a BAU Scenario

STRATEGIES OF URBAN TRANSPORT IN INDIA

Policy responses to address urban transport issues

The central government's role in urban transportation is still limited in scope. Because the bulk of India's population lived in rural areas until the mid-1990s, connection of rural areas to urban centres was the main focus of investment and transportation policy direction (Tiwari, 2011). Most large cities have the ability to make decisions and put them into action on a local level. However, they lack the necessary incentives to make strategic decisions that benefit cities and their residents in the long run. There are no checks and balances in place to ensure that a sound strategic plan is carried out. At the local level, where planning and policy are implemented, central monitoring and supervision are minimal. The delayed transfer of authority and resources from states to local governments has resulted from this circumstance, creating an institutional gap. Because state and municipal institutions have different political constituencies, the state's continuous dominance results in transportation policies that are not aligned with local interests. The following subsections emphasise the central government's major plans, policies, and programmes to solve urban transportation difficulties in Indian cities.

a) Commission on Planning

Until the NUTP in 2006, urbanisation and urban development were low-priority sectors, and urban transportation was even lower. From the First Five-Year Plan onwards, the plan papers emphasised intercity transportation of all modes and built rail, road, and aviation infrastructure to fulfil demand. The Planning Commission has recognised the importance of transportation in maintaining sustainable economic growth and development of various segments of the economy since the Sixth Five-Year Plan. However, it was not until the Eighth Five-Year Plan that the necessity for a single coordination organisation and a distinct finance institution to solve urban transportation issues was highlighted. Despite the fact that MOUD was given responsibility for urban transport policy in 1986, the Ministry of Railways was given a special function in the Eighth Five-Year Develop to plan and provide metro rail networks.

The necessity to create urban transportation institutions and active collaboration between central, state, and municipal governments was recognised in the Ninth Five-Year Plan as essential to addressing this complicated problem. Because mass transit systems in metro areas were seen as the answer to urban transportation difficulties, this plan dictated that metro projects be funded through special levies on users and non-users. It also advocated the creation of a National Urban Transport Fund to aid in the development of metro projects (Commission et al., n.d.). The Tenth Five-Year Plan went even farther, recommending the passage of supportive legislation for mass transit projects, particularly metro systems, as well as a finance strategy in cities with populations of three million or more. It emphasised the importance of clearly defined roles and active coordination among Indian Railways, urban development bodies, and state governments involved in urban transportation. The Tenth Five-Year Plan envisaged the establishment of a National Urban Transport Development Fund with an initial seed money of Rs3,000 crores and an equal amount raised through tax or cess, however this did not happen within the plan period.

b) National Urban Transport Policy (NUTP)

The National Urban Transport Policy was issued by the central government in 2006, under the Ministry of Urban Development (MOUD), with the specific policy objective of providing safe, affordable, quick, comfortable, reliable, and sustainable access to jobs, education, shopping, recreation, and other such needs to an increasing number of urban residents within our cities. The policy acknowledged the issue of traffic congestion and the resulting air pollution. The NUTP proposed four strategies to address these issues, primarily focusing on increasing road space efficiency by favouring public transportation, using traffic management instruments to improve traffic performance, limiting the growth of private vehicular traffic, and technological improvements in vehicles and fuels to reduce vehicle emissions. The NUTP regarded the states as the primary facilitators in policy implementation, and the central government's role was limited to providing the required financial and technical assistance to the states.

Conclusion

In order to promote sustainable urban economic development in Indian cities, accessibility and urban mobility are essential. In terms of spatial growth and consolidation of the built form, they are likewise inextricably linked to urban stock and flows. However, due to car-centric policies enacted by successive plans and projects at the local level, urban mobility has not contributed to anticipated objectives.

In terms of policy and operational ramifications, urban mobility is multi-faceted. As a result, policy interventions must be consistent and processes must be linked. Accessibility is neither improved by adding more roads, rail, or cars, nor by using ad hoc spatial interventions like traffic management techniques to achieve delocalization and decongestion in isolation.

A systems approach to tackling complicated urban mobility difficulties appears to be well suited for a complete knowledge of the issues and their causal relationships. Significant policy measures to address it can only be created after comprehending the interdependencies between the system components that function behind the symptoms. Mispricing, for example, leads to overuse of roads during peak hours; expanding settlement patterns render public transportation ineffective; and urban design for machines rather than people results in communities built for automobiles rather than people.

It is critical to recognise that mobility is a derived need resulting from people's need to engage in necessary social or economic activities. Private vehicles, public transportation, and NMT are merely means to an end. This vision sees cities and mobility networks as tools for achieving desirable societal results, with transportation serving as a facilitator. Compact city forms and mixed-use communities can help achieve this by drastically reducing travel distances and, in some cases, travel needs. Compact cities not only bring activity centres closer together, but they also provide safe and efficient pedestrian and bicycle corridors, as well as low-cost, high-quality public transportation options.

Finally, in Indian cities, sustainable mobility is a critical enabler of economic growth, poverty reduction, and shared wealth. Multimodal mobility solutions for Indian cities require a

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comprehensive integration of urban transportation and land use planning systems in order to maximise synergies, encourage linkages, and enhance functionality. Congestion, traffic accidents, pollution, and other current urban transportation concerns cannot be solved by traditional solutions that favour public money and investments in private transportation over public forms of transportation. More public funds should be devoted to the development of NMT and high-capacity public transportation infrastructure. It's also critical that the urban transportation sector is viewed as a whole through system financing and pricing. The spatial morphology and layout of built form in cities are influenced by urban transportation networks. According to the paper, sustainable mobility systems in Indian cities can only be achieved if strong, integrated, and participatory institutions are established and enabled through clear responsibilities, legislative authority, financial independence, and professional competence to effectively improve city accessibility. Above all, systems for openness, monitoring, and accountability of such institutions to their constituents must be established. All of this is only achievable if there is strong political will and public demand for change.

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