URBAN TRANSPORT SYSTEMS AND CONGESTION: A CASE STUDY OF INDIAN CITIES

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ABSTRACT

Traffic congestion is a public policy issue and solicits a policy response which can strike a balance between urbanization and urban mobility. In the case of India, several policy initiatives have been undertaken but have not yielded desired outcomes. This is primarily because the focus has only been on public transport improvement measures, while traffic demand management measures have largely been neglected. This paper studies the traffic scenario in select Asian cities and the policy measures undertaken by their respective governments. It revisits relevant policies in India and assesses the gaps that deter the desired impact of such policies on reducing traffic congestion. It also suggests policy measures to overcome these gaps and the way ahead.

INTRODUCTION

Most cities in Asian countries are experiencing multi-faceted problems as a result of rapid urbanization. Urban congestion is one such problem afflicting urban agglomerations in Asia and has multiple effects on urban economies. Urban congestion is broadly defined as excess demand for travel over its supply. In fact, the reason why governments are forced to revisit their policies for urban mobility is because of growing demand for travel with limited supply of services. The presence of urban congestion prevents free movement of traffic. For example, according to the International Association of Public Transport (UITP) in 2001, the average speed of vehicles on Bangkok streets was 15 km/h, while that in Manila, Jakarta and Singapore was 18 km/h, 19 km/h and 20 km/h respectively (BOQUET Yves, 2010).

There are various policies and initiatives underway to improve urban mobility in Asian cities, primarily aiming to enhance and strengthen urban infrastructure. In addition, some Asian countries have also adopted congestion pricing and policies to restrict private car ownership. However, some of the conventional causes of congestion are still rooted in growing cities owing to policy overlaps and distorted policy implementation. These include insufficient and inefficient public transportation, mixed use of dedicated roads, low-price parking policies, lack of connectivity between modes, poor driving behaviour, lack of transport planning, and the absence of intelligent transport systems, among others. In addition, the presence of informal operators in public transport system also has a critical impact on congestion. Therefore, it is certain that the creation of new infrastructure alone will not solve the problems, and that other aspects also deserve consideration.

This paper first describes some of the factors contributing to congestion in Asian cities in general. It then discusses the status of congestion in Indian Cities and various measures which the Government of India and municipal authorities have implemented. It finally discusses the policy gaps which hinder the effectiveness of these measures and advocates a strong institutional mechanism for better policy planning to address such critical concerns.

I. CONGESTION IN ASIAN CITIES

In many respects, rapid urbanization is an indicator of economic growth in Asia, and it is expected to continue. As per an estimate by the Asian Development Bank (ADB), about 44 million people are added to Asia's urban population every year.[1] Asian cities are also characterized by high population density. For instance, Dhaka, Bangladesh, grew rapidly during the last decade and became the most densely populated city in the world, whereas Mumbai stands at number two. Also,

[1] Asian Development Bank, available at http://www.adb.org/sectors/transport/key-priorities/urban-transport

Chinese cities are among the most densely populated cities in the world, with China having the most cities with high density of population.[2]

With such a rapid increase in urban population, there has been an increase in demand for mobility, and with it, an increase in motorised vehicle ownership. As per a report by Wards Auto Research, the overall vehicle population growth in China was 27.5% in 2010 as compared to the preceding year. The estimates show that the total vehicles in operation in China "climbed by more than 16.8 million units, to slightly more than 78 million, accounting for nearly half the year's global increase" (Sausanis, 2011). Similarly, "India's vehicle population underwent the second-largest growth rate, up by 8.9% to 20.8 million units, compared with 19.1 million in 2009" (Sausanis, 2011). The vehicle population in China has been increasing at more than 30%, and at around 10% in India. However, this has recently dropped to negative growth in the first quarter of 2013.

Similarly there were more than 11.3 million motor vehicles in Jakarta in 2011, while the city population is below the population of motor vehicles i.e. 9.6 million (Arditya, 2011). It is said that 70% of city households own motor vehicles. Moreover, it is expected that the number would increase to 12 million as around 1500 new motorcycles and 500 new motor cars will continue to be injected into the city on a daily basis (Arditya, 2011).

In terms of mobility, there are 21.9 million trips taking place daily in Jakarta, of which motorcycles occupy a major chunk (Slamet, 2012). It is also estimated that only 2% of the trip is covered by public transport in the city. As a result, speed flow decreases to 10-20 km/h (Slamet, 2012). The scenario is not much different in Bangkok, Manila and other cities like New Delhi and Mumbai. During peak hours, the speed flow on roads in Delhi and Mumbai also drops to 10-20 km/h.

The causes of traffic congestion are categorised in terms of micro-level factors and macro-level factors (Rao and Rao, 2012). Asian countries have devised several policies to tackle congestion problems which encompass both level of factors. Many countries define congestion in terms of lower speed of vehicle on a particular stretch and accordingly devised policies. However, the benchmark of low-level speed of vehicle varies from country to country. Even within a country, this benchmark varies significantly. For instance, in California, if the speed falls to the level of 35 km continuously for 15 minutes then it is referred to as congestion; whereas in Minnesota, congestion occurs when the average speed falls from the speed limit is 45 km per hour during 6 a.m. to 9 a.m (Rao and Rao, 2012).. In the Republic of Korea, traffic congestion is said to be occurring when traffic flow is below 30 km/h or congestion continues for more than 2 hours a day. This implies that different practices are prevailing to measure congestion across various cities.

Most observers argue that the phenomenal increase in private car ownership and the resulting growth in the number of private vehicles are responsible for the high level of congestion in cities. However, in comparison to developed countries, car ownership remains low in most of the developing economies in Asia. As the number of motor vehicles kept increasing in most Asian cities, policies initially focused on strengthening the relevant infrastructure. Then the policies shifted slightly from building infrastructure to accommodate increasing numbers of motor vehicles towards facilitating alternate infrastructure for urban transport in combination with traditional approaches. For example, Bangkok increased the number of streets to accommodate more vehicles. Similarly, Shanghai reduced urban congestion through a network of elevated freeways. Manila and Jakarta have also undergone such transitions to create more space for urban vehicular movement. Singapore created state-of-the-art urban transport facilities.

These policies were expected to be a way forward to accommodate more vehicles on roads, but led to further congestion in these cities. In order to reduce congestion, policies for managing the demand side were then adopted. Local municipal councils of Asian cities agreed to implement traffic management programmes. Manila, for instance, adopted a Vehicular Volume Reduction Programme, which prevented car mobility on specified days on the streets of Metro Manila. Similarly, through its Green Transportation programme, Beijing adopted a strategy to promote green modes of transport among both residents and visitors and reduce emissions through curtailing travel demand. The municipal government of Beijing has also undertaken decision to reduce number cars in the city by

[2] Demographia World Urban Areas, 2013

adopting rotation of tail number plates of driving vehicles in the regional rush hours on working days (Municipal Government of Beijing, 2013). As part to reduce pollution, the city municipality also plans to reduce number of plates for new cars to be sold in coming years.

Also, Singapore successfully restrained car traffic demand through its Vehicle Quota Management Scheme and congestion pricing within the Central Business District, which consists of the core financial and commercial area in Singapore. Some of these policy measures and their features are presented in table 1.

Table 1: Congestion Related Demand Side Policies in Asia

Year	City	Policy	Features
1975	Singapore	Area Licensing Scheme	System of tolls to enter the restricted zones
1991	Singapore	Weekend Car Scheme	Encouraging public transport use
1994	Singapore	Of Peak Car Scheme	Encouraging public transport use
1995/1998	Singapore	Road Pricing Scheme and Electronic Road Pricing	Congestion pricing
1998	Shanghai	Quota for New Car Registration	Setting yearly or monthly quota for new cars in the city
1996	Seoul	Toll Fee on private cars passing through Namsan Tunnels 1 and 3	Congestion pricing based on occupancy
2004	Seoul	Use of integrated payment system for transport services such as T-Money in Seoul	Discounts on travel in using t-money on public transport system

Source: Author's compilation from various sources

However, traffic congestion does not occur only due to increasing level of motorized vehicles. If that was the case, then cities with low levels of motor vehicles should not be congested. For instance, in the cases of Dhaka in Bangladesh and Varanasi in India, traffic flow is slow and causes heavy congestion. Notably, Varanasi has only 7% of total motorized vehicles in Delhi.[3] It suggests that congestion also occurs due to mismanagement between demand for and supply of transport services. In other words, imbalances in managing factors affecting demand and supply for transport services is also responsible for traffic congestion. These factors may include direct and indirect elements such as increasing levels of vehicles and a constant level of road infrastructure, low cost private transport services, psychological factors, lack of policy interventions, and other factors. In this context, it becomes imperative to decipher traditional policy gaps to understand the sources of congestion. That can lead to congestion policies which address the issue in a comprehensive manner, including policies such as congestion pricing, parking policies, land use planning, and so on.

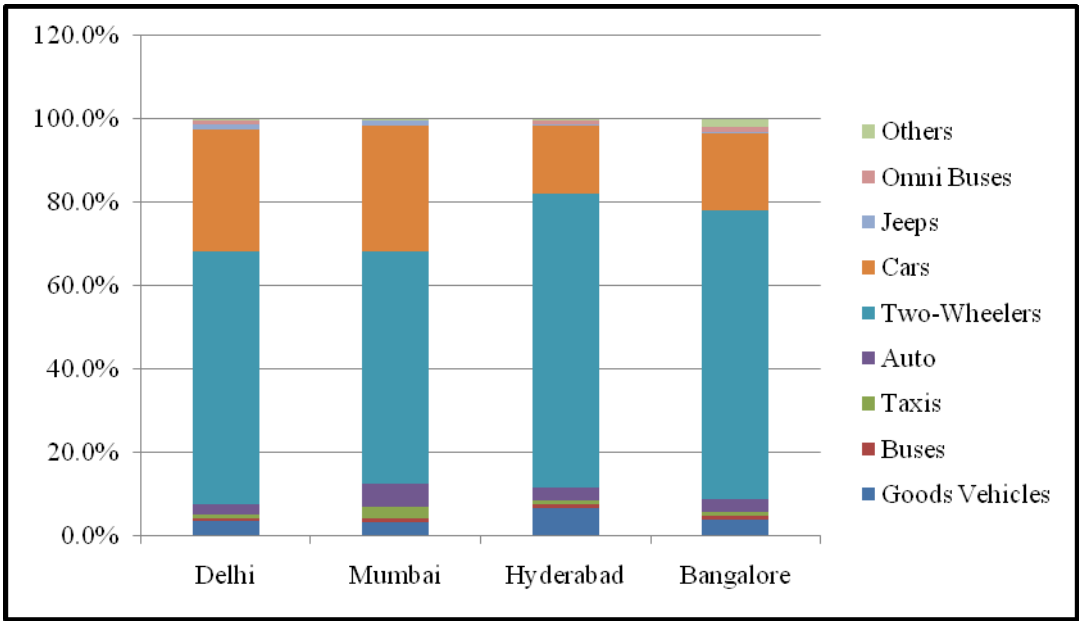
II. CONGESTION IN INDIAN CITIES AND POLICY RESPONSES

As per the 2011 census, India's urban population has grown from 290 million in 2001, to 377 million in 2011, and accounts for over 30% of India's total population. Rapid urbanization has come with several problems, including increased congestion. Policies are now committed to the development of urban infrastructure. In particular, India is passing through the same phase of early urbanization which has already occurred in countries like Japan, Republic of Korea, and Singapore. The growth scenario in Indian cities is not commensurate with the conditions for sustainable transport. The per capita trip rate for all modes of transport is expected to increase from 0.8%-1.55% in 2007 to 1%-2% by 2030 (Planning Commission, 2011). Moreover, the share of public transport is also expected to decrease as there is a likely decrease in the speed flow of public transport from 26-17

[3] Ministry of Road Transport and Highways, Year Book, 2011

km/h to 8-6 km/h during the same period (Planning Commission, 2011). Figure 1 shows the city-wise ownership of motorised vehicles.

Figure 1: Share of Types of Motorised Vehicles in 2011



Source: Ministry of Road Transport, Government of India

The average journey speed in Indian cities is also low, particularly in cities which have high car volumes (Ghate and Sundar, 2013, p. 34). In 2007, a study commissioned for the Ministry of Urban Development, Government of India, found that the average journey speed in Delhi was around 16 km/h and only slightly higher in Mumbai. The study found the average journey speed to be below 20 km/h in Hyderabad, Chennai and Bangalore, as well as low in cities with slow moving vehicles such as Varanasi and Bhubaneswar (Wilbur Smith Associates, 2008).

In New Delhi, Delhi's Master Plan 2021 aims to attract 80% of road travel to public transport by 2020. An estimate indicates that by the year 2021, travel demand in Delhi will increase to 27.9 million passenger trips as compared to 13.9 million passenger trips in 2001.[4] This increase in travel demand is more than double. It implies that in future, public transport will cater to 22.3 million passenger trips. However, according to the statistics of the Ministry of Road Transport and Highways, the number of registered buses in New Delhi have seen little growth, while private vehicles, particularly two-wheelers, are increasing at their highest rate over the last few years.

Similarly in Mumbai, congestion on roads is a regular phenomenon. Despite the fact that in Mumbai, sub-urban rail link meets most suburban travel demand, road congestion is not reduced. During peak hour, traffic in Mumbai flows at a speed of 5 km/h speed (Kumar, 2013). The total vehicles in Bangalore and Hyderabad are around 6.8 million, of which around 70% are two-wheelers. On the other hand, cars and other passenger vehicles such as jeeps, taxis, and auto-rickshaws, account for around 25%, while buses account for only 0.7% of the total motorised vehicles registered in the cities of Hyderabad and Bangalore.[5] This indicates that there is a growing tendency of ownership of two-wheelers, cars, taxis and others in Indian cities.

In response to the above trends, a comprehensive national level policy to manage congestion in urban areas is being solicited through policy debates. Notably, the Working Group on Urban Transport for 12th Plan period (2012-17) has suggested measures to manage urban congestion. The Working Group also highlighted a number of causes leading to urban congestion, including inefficient urban planning and poor implementation of regulations. However, most of the causes that are spelt out in the Working Group document pertain to the lack of adequate urban infrastructure;

[4] Delhi Master Plan, Future Transport Policy
[5] The data is given as of 31 March 2011

consequently, many of their solutions are also related to increasing the capacity of urban transport, such as the creation of new infrastructure, planning and coordination of road works, efficient traffic signals, increasing lanes of roads and creation of one-way streets. Some of the policies which may be expected to ease congestion include the following:

2.1 Better Integrated Urban Planning

Currently, urban transport policies are regulated by city municipalities in the country. At the national level, the Government of India's Jawaharlal Nehru National Urban Renewal Mission (JNNURM) mandated to transform urban areas, particularly urban transport. To get funds under this programme, states and municipalities are required to adopt specific reforms in urban development policies, which relate to the management of funds and adoption of new regulations pertaining to urban land ceiling and public discourse law, etc.

2.2 Promotion of Public Transport

The Working Group on Urban Transport for 12th Plan period recognizes the important of public transport. In India, metro rail transport is already in operation in cities like New Delhi and Bangalore. The same facilities are also underway in other major cities like Mumbai, Chennai, Hyderabad, Jaipur and Kolkata.

2.3 Promotion of Intelligent Transport Systems

The draft document of 12th Five Year Plan clearly spells out that there is a need for intelligent transport systems. Under JNNURM, there is a scheme called the Urban Infrastructure and Governance (UIG), which provides buses enabled with intelligent transport systems. Around 15,260 low-floor buses are already in place. Similarly, under JNNURM, 21 projects including Bus Rapid Transit (BRT) System with an approved cost of 5,211 crores was sanctioned (Planning Commission, 2012-17).

III. POLICY GAPS

The above initiatives, together with policies to disincentivise private car vehicles and promote non-motorised transport, will go some way towards easing congestion in Indian cities. However, the Working Group on Urban Transport for 12th Plan period document is silent on policies to address the mismanagement of demand or supply side of transport services, though scattered references to them may be found. There are also important "gaps" in the policies, both at national level and municipal level. Some of these policy gaps are described in more detail below.

3.1 Fuel Subsidies

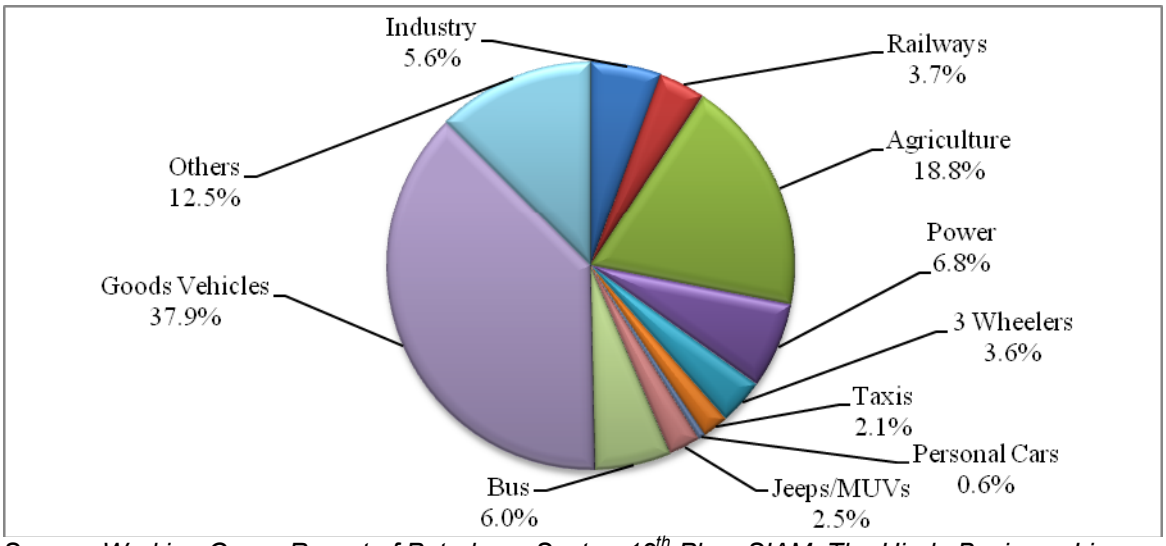
The deregulation of prices of fuel to cut subsidy remains an important issue in public discourse in India. To this effect, the Government of India recently partially deregulated fuel prices. Oil companies have been permitted to raise prices of fuel for retail. However, the use of diesel for both goods and passenger transportation (private cars) are not differentiated under this policy. This implies that both types of users are paying the same price. The impact of partial deregulation of fuel prices on demand side management of travel demand by diesel cars has yet to be studied. The difference between the prices of diesel and petrol remains an important attraction for diesel cars (in addition to efficiency of diesel cars over petrol cars).

Still, diesel has a capped subsidy (reduced by 40%), which is again benefiting private car users. Government subsidy also covers petrol, which is mostly consumed by private vehicles. In 2011-12, diesel accounted for about 45% of total under recovery amount by marketing companies (where private vehicles also have a large share), while the equivalent figure for petrol 4.49% (Singh, 2013). According to a newspaper article published in 2012, out of every 100 litres of diesel, 22 litres goes for private usage.[6] Again, it is difficult to ascertain how much diesel is being used by private cars, which gets subsidy at the same rate as freight traffic. One estimate by the Working Group of

[6] Times of India, August 22, 2012, The statement was made by R. P. N. Singh, Deputy Minister for Petroleum and Gas in the Parliament, on 23 August, 2012

Petroleum Sector, 12th Plan and the Society of Indian Automobiles Manufacturers indicates that total transport sector consumption is around 59% of total diesel consumption, of which goods vehicles consume 37.9% of the total consumption of diesel in the economy. It also implies that rest of the consumption by the transport sector is consumed by other modes of transport. The estimates also indicate that personal cars account for 0.6% of the total diesel consumption. However, the consumption by buses is 6%. The sectoral share of diesel consumption by the group is presented in figure 2.

Figure 2: Sectoral Consumption of Diesel



Source: Working Group Report of Petroleum Sector, 12th Plan; SIAM; The Hindu Business Line

However, previous reports of the Expert Group on "A Viable and Sustainable System of Pricing of Petroleum Products" under the Ministry of Petroleum mention that in 2010, the share of private cars was 10% of the total use of diesel. The contradiction in the data suggests that further research is required, particularly on diesel use in cities. If we take consumption of diesel by the transport sector in major cities, the scenario would be different. The point is that the consumption of diesel shall vary in cities, where private vehicles are in the majority and constitute a major component of passenger transport. A discriminatory measure may need to be used to eliminate the intake of diesel subsidies for private cars.

3.2 Mismatch of Policies on Public Transport and Investment in Public Transport Vehicles

The fleet strength of State Road Transport Undertakings (SRTUs) is not increasing at the expected rate as per the statistics of SRTUs.[7] The total fleet strength during 2000-01 and 2010-11 increased from 115,000 to 130,611. During the decade, the fleet grew at around 1.3% per annum. During the same period, passengers carried by state transport undertakings have also grown by about 1% per annum, from 63.6 million passengers in 2000-01 to 70.5 million passengers in 2010-11. This indicates that the capacity of public transport is still underutilized. Of the total fleet strength, Delhi Transport Corporation (DTC) has around 29.71% over-aged buses, while Andhra Pradesh SRTC city has 5.84% and Bangalore Municipal Transport Corporation has 5.60%.

Fleet utilisation also varies from city to city. For instance, in Delhi, 75.1% of total fleet strength is utilized, while in Bangalore this was 92.3% in 2010-11. In Andhra Pradesh, urban transportation had 99.9% fleet utilisation during the same time period. It is important to rejuvenate the state transport undertakings to strengthen urban transportation. Public transportation, as measured by the performance of SRTUs, needs more attention in urban areas. It is found that average breakdown of SRTUs in urban areas is higher than that in rural areas. In rural areas, the breakdown per 1000 km

[7] Data taken from CIRT, State Transport Undertaking Profile and Performance: 2010-11

was 0.13 while in urban areas, breakdown was 0.78 in 2010-11.[8] This is partly because of the low level of bus transport services in rural areas as compared to urban areas. However, it indicates that the reliability rate in urban areas is a matter of concern for SRTUs.

Meanwhile, while several dedicated transit corridors for urban mass transit are in operation, they are no longer dedicated to urban transit. The mixed use of road is a common phenomenon. This usage rendered Delhi Bus Rapid Transit (BRT) Corridor a failure. The success of metro rail in Delhi indicates that road also needs a dedicated transport corridor, which should be exclusively interlinked. Delhi metro and road transport are not able to congregate themselves to make public transport more comfortable, though the Government of Delhi is taking adequate measures to streamline it. A monorail project is also proposed in Delhi which will be a significant landmark in ensuring state-of-the-art connectivity.

Interestingly, Delhi metro rail also attracts private car users as well for their daily purposes. However, there should be exclusively designed roads for public transport in Indian cities, which must be integrated with other mass transit systems. It should also adopt integrated use of land in these cities. To this effect, policies need to be designed considering the behavioural aspects of commuters. This will also help in ensuring the inclusivity of public transport for all sections of the society.

3.3 Driver Education and Road Safety

Both large and small cities in India have poor safety standards due to poor driving behaviour, inadequate driving education and poor standard of driving tests. As a result, India has around 1% of the total vehicles in the world but accounts for 18% of the world's road deaths.[9] As per a national daily, every sixth accident in the world happens in India.[10] In the year 2010, total death by road accidents in India was estimated to be .23 million out of 1.24 million in the world.[11] According to a Delhi Traffic Police survey, majority of drunk drivers are educated, young and familiar with traffic rules. However, their behaviour while driving is irresponsible. The survey found that more than 85% of drivers were car drivers.[12] This is again a serious concern for urban safety, as these drivers are well aware of driving norms but are negligent when it comes to following such norms. On roads in Indian cities (both major and small cities), drivers of private cars are generally car owners under the age of 40. Regulation of such drivers on roads needs the strict enforcement of laws.

Driving education manuals are presently related to traffic manuals. More comprehensive manuals for drivers' education, which can also encompass social and environmental impacts of road transport, need to be developed. At municipal and institutional levels, training programmes are being carried out. These programmes require manuals for both municipal as well as state levels. The traffic guidelines for car drivers by Delhi Traffic Police make no mention about issues such as congestion, pollution, etc.

3.4 Promotion of Automobile Industry

The Planning Commission has constituted a Working Group on Automotive Sector. This Working Group highlights the automotive sector as the next sunrise sector in the Indian economy, pointing out that the sector's contribution to GDP has increased from 2.77% in 1992-93 to 6% in 2010-11 (Planning Commission, 2012-17). According to the Report of the Working Group on Automotive Sector for the 12th Five Year Plan, the number of passenger vehicles produced is projected to reach 5 million units in 2015 and 9 million units in 2020 (see figure 2). In such a scenario, policies which discourage private passenger vehicles will also have a negative impact on such targets. A combination of measures targeting better management of both the economy as well as environmental problems needs to be encouraged.

3.5 More Effective Parking Policies

Parking policy is featured in the National Urban Transport Policy (NUTP) and JNNURM programme. The NUTP clearly spells out the need for high parking fees, which represents the land value. In addition, the policy also calls for encouraging parking places to catalyse the use of public

[8] *Ibid.*
[9] WHO, Road Traffic Deaths by Country in 2010
[10] Times of India, 8 October, 2012
[11] WHO, Road Traffic Deaths by Country in 2010
[12] Delhi Traffic Police Survey, January-March 2012

transport through connectivity with urban mass transit systems. JNNURM has also linked its financing with availability of adequate parking. The programme advocates provision of parking lots through public private partnerships.[13]

However, parking policy is generally not seen as an important instrument for decongesting cities. In Delhi, the Environmental Policy (Prevention and Control) Authority has submitted a report in 2004 indicating that there is an urgent need for an exclusive parking policy to manage travel demand. Even the Supreme Court of India directed the government of National Capital Territory of Delhi to have an action plan for parking policy in 2005. At that time, recommendations were made by the government, and in 2006 the recommendation on increases in parking charges was accepted by the Supreme Court as well.

Increasing parking charges is not the only remedy for congestion. The evolving nature of parking policy has an impact on reducing travel demand in Delhi, but it is one of the least effective measures which is not able to control the rising demand for private car travel in the city. A report of Centre for Science and Environment on parking in Delhi shows that while the transportation reform agenda under JNNURM has a mandate to fund urban renewal projects including parking projects, the National Urban Transport Policy (NUTP) states that urban agglomerations must have parking areas built on the basis of public-private partnerships. Under NUTP, state governments are directed to award building bye-laws in all cities which have a population of more than 1 million. This is adopted to make available adequate parking space for all residents. The two important aspects of NUTP and JNNURM have different perspectives, in that "the floor area ratio (FAR) laws are made more liberal and multi-level parking is made mandatory in cities" (CSE, 2012).

The main issue with parking policies in cities is the informal and rent-seeking characteristics of parking areas. In Delhi itself, parking is still unorganised and not systematic. A variance in rates on parking lots can also be seen at different places. Another important aspect related to parking is that Indian cities have the lowest parking charges compared to other cities in the developing and developed world. An estimate indicates that Indian cities have around 13 times lower parking charges than Hong Kong, China, and more than 20 times lower parking charges than Singapore.[14] Though the same cannot be replicated in India, yet it solicits a policy space for reconsideration. The dilemma is that parking management is still naïve. Road accessibility is not smooth because it is given for car parking, which increases the level of congestion.

IV. THE WAY AHEAD

Due to increasing levels of urbanization, public transport in Asian cities is characterized as that of high dependency and low availability. It also suffers from huge deficiencies both in terms of infrastructure availability as well as operational efficiency. Considering the policy gaps in Indian cities, the following measures are recommended to reduce congestion in mega cities. These recommendations are in addition to those related to congestion pricing and other charges, which may be levied to reduce personal vehicle travel.

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1. There is a need for integrated transport policies to address problems of urban transport and urban infrastructure development through an integrated institutional mechanism. For example in India, a National Transport Development Policy Committee was set up to formulate such policies. The committee also recommends developing effective institutional frameworks at centre/state and city level.

2. A national policy needs to be designed to address more environmentally sustainable and urban growth. Alienated sectoral policy frameworks do not have the desired impact on urban transportation. For instance, if India wants to reduce personal vehicles in cities like Delhi, Mumbai, Hyderabad and Bangalore, then policies to address issues related to manufacturing of automobiles also need to be formulated. In the case of NTDPC, the Working Group on Urban Transport speaks about urban transport tax, green cess, increase on diesel prices; while on the other hand, the Working Group on Automobiles Sector speaks about emerging as the world's 5th largest car producer and largest

[13] Revised guidelines for JNNURM
[14] Colliers International (2011) - CBD daily parking charges (in US $)

manufacturer of three-wheelers, with the automotive sector expected to increase its share of India's GDP from 5% in 2006 to 10% in 2016.

3. Urban transportation needs strict parking policy and uniform parking charges at national level for mega cities. There is also a need to increase parking charges as it has an impact on parking demand as well. It is also important to link parking rates with the commercial viability of parking structures in mega-cities.

4. There is a need for exclusive lanes for public transport in Indian cities. For instance, in Delhi, land availability for transport infrastructure is less. In this context, integrated approach of land use is important for different transport modes.

5. State transport undertakings need to be strengthened to ensure safe and reliable public transportation.

6. There is a need for driving manuals for drivers at both municipal and state levels.

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