Technological Interventions to Make Urban Transport Reliable and Efficient

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Abstract – India is presently going through phase of rapid urbanization due to enhanced economic growth specially at around urban centers leading to development of Urban agglomerate and multi-fold increase in number of vehicles plying in these cities, that is owing to transport related risk and crisis in these cities. Unplanned road network, deteriorating air quality, reduced areas under green space, no space for hawkers and pedestrian pathway, poor parking system are some of the risk transport sector as a result of rapid unplanned urbanization. It is estimated, that in 2007, the transport sector contributed emissions to the tune of 142.04 Mt CO_2 eq in India alone. It accounted for approximately 13% of total energy related CO_2 emissions (MoEF, 2010), of which majority of emissions were from the road transport. The Conditions in developing countries pose additional challenges on transportation systems – demand far exceeds supply, particularly for the growing number of urban poor getting pushed in urban center for better livelihood opportunity. Thus, to minimize this gap of demand and supply in transport sector an integration between land use and transportation system is mandatory to enhance resilience and ensuring sustainable planned urban development.

Keywords: Urban agglomerate, Integrated Transport, Risk Resilience.

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INTRODUCTION

The urban population in India grew from 25.8 million in 1901 to 377.1 million in 2011. According to the Handbook of Urban Statistics (2016) of Ministry of Urban Development, the urban population is projected to grow to about 600 million (40 percent) by 2031 and 850 million (50 percent) by 2051. Apart from population growth, urbanisation is viewed as socio-economic growth of any region. According to 15th Census of India, 91.4 percent of urban households had access to drinking water. The electricity coverage of urban households in 2012 (97.9 percent) increased over six percent from 2002 (91.6 percent). Literacy rate had also shown increase from 79.9 percent in 2001 to 84.1percent in 2011. Urban households having drainage facility surge to 82 percent in 2011 as compared to 78 percent in 2001. These few indicators offer evidences socio-economic growth of cities.

However, in addition to the opportunities, increasing urbanisation invites several challenges. Escalating urban population demands dedicated key urban infrastructures and services viz. transportation, solid waste management, integrated urban water resources management, low-income housing, education, sanitation and health. These basic needs of communities put further pressure on available natural resources such as land, water and energy. In order to achieve sustainable urbanisation and built resilience of cities a wide spectrum of interventions are required.

RESILIENT CITIES

"A city can be termed as resilient, if it has ability to continue its essential functionality and sustain formidable physical, social and economic challenges". Haphazard urbanization along with adverse changes in climate are challenging capacity of cities to become resilient. The need of the hour is to debate on climate change issue from global and regional platform to local city level. IPCC 2014 report outlines many global risks emanating from climate change, which are concentrated in urban areas.

It's now widely accepted that there is a need to reduce the basic service deficits, improve housing and build resilient infrastructure, which could significantly reduce vulnerability and exposure in urban areas. Government of India had initiated eight national level missions under National Climate Action Plan (2008) to ensure sustainable development in view of changing climate and to promote

understanding of climate change, adaptation and mitigation, energy and natural resource conservation.

22 COP on sustainable Urbanisation at Paris (2016) highlighted disasters as one of the important sector requires adaptation in urban areas. It emphasis upon strengthening disaster risk reduction and reduce population's vulnerability to climate risk and extreme weather events through enhanced awareness, coordination and adaptive capacity of local communities, especially in the disaster risk-prone areas.

UNFCCC, India indicated rapid urbanisation and increasing pressure on urban amenities leading to double challenges for planned urbanisation and ensuring sustainable city development. However, Climate Resilient Urban Centers being developed under various initiatives of GoI through AMRUT, HRIDAY, and SMART Cities mission would enhance the resilience of cities to various risks.

Maintaining the environmental harmony is a new concern for the Government across the globe in view of the urban growth not matched with the supply of quality urban life support. The gap between the demand and supply is huge and widening on account of the countries experiencing such growth having inadequate resources to bridge them. The greatest polluters are said to be energy generator units, transport and solid waste generation taking place by its populace. Besides above, water extraction leading to rise in the contaminated land, exposes built up area leading to heating of the urban space etc. The migration to the city accentuating the slum growth and poverty has the new order of socio economic life of the emerging urban landscape.

Urban Transport – It's bearing on GHG emissions and vulnerability profile

Cities today have become hub of the transportation sector. According to the C40 Cities Climate Leadership group (www.C40Cities.org), cities contribute 75 percent of greenhouse gas emissions. It is estimated, that in 2007, the transport sector contributed emissions to the tune of 142.04 Mt CO2 eq in India alone. It accounted for approximately 13% of total energy related CO2 emissions (MoEF, 2010), of which majority of emissions were from the road transport. It may increase further given that India is witnessing rapid economic growth and owing to dramatic increase in urbanization and thus leading to multi-fold increase in number of vehicles plying in the urban area. Based on the IPCC assessments, "petroleum supplies 95% of the total energy used by world transport. In 2004, transport was responsible for 23% of world energy-related GHG emissions with about three quarters coming from road vehicles" (Kahn Ribeiro et al., 2007,p. 325). The Conditions in developing countries pose additional challenges on transportation systems – demand far exceeds supply, particularly for the

growing number of urban poor with severely undersupplied transportation systems.

While increase in transport system will exacerbate the vulnerability profile of the cities, the Climate change-related extreme events will also affect the urban transportation and telecommunication infrastructure, including a variety of capital stock, such as bridges and tunnels, roads, railways, pipelines, and port facilities, data sensors, and wire and wireless networks (IPCC-2014, Koetse and Rietveld, 2009; Hallegatte et al., 2011a; Jacob et al., 2011; Major et al., 2011). The literature on urban transport and climate change focuses more on mitigation, with less attention to vulnerability, impacts, and adaptation (Hunt and Watkiss, 2011). However, climate change creates several challenges for transport systems. The daily functioning of most transport systems is already sensitive to fluctuations in precipitation, temperature, winds, visibility, and for coastal cities, rising sea levels with the associated risks of flooding and damages.

Impact of extreme weather on city transport

The direct impacts of extreme weather on transport are more easily assessed than the indirect impacts or possible knock-on effects between systems. Studies have often examined the direct impacts of flooding on transport infrastructure, but the indirect costs of delays, detours, and trip cancellation may also be substantial (Koetse and Rietveld, 2009). Mumbai's 2005 floods caused injuries, deaths, and property damage but also serious indirect impacts as most city services were shut down without contact via rail, road, or air (Revi, 2005).

Urban transport Sector can be categorized based on what is being transported, the mode of transportation and by its regulation and other institutional dimensions. Impacts on greenhouse gas emissions as well as mitigation and adaptation measures to reduce those emissions can vary widely depending on how passengers travel, freight and information are transported. Further, transportation is expressed in terms of modes of travel, which are categorized broadly as occurring by land, air, and water.

While studying the impact of climate change on the transport sector, the scientist and researchers have done a great deal of work as to how the transportation impacts the climate change. An estimate of GHG emission per capita per year in transport sector and typical green- house gas emission from different means of transport can be seen from Figure and table below.

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Table 1: Typical green- house gas emission

Activity	Tone capacity
Bus Rail Transport	0.1
Car	1.2
Air travel	1.8
Other direct emission	0.6
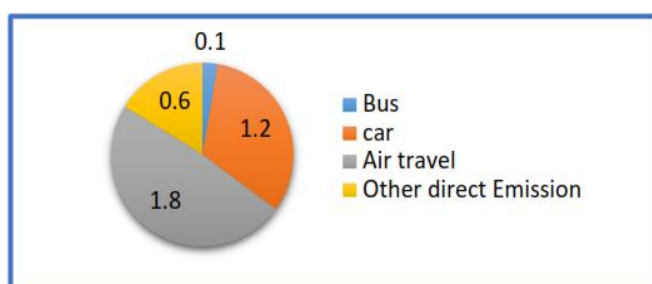
Fig.1 : Global GHG Emission per capita per year in Transport sector

Urban Mobility and its challenges

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).

Traditionally, the focus of urban transportation has been on passengers as cities were viewed as locations of utmost human interactions with intricate traffic patterns linked to commuting, commercial transactions and leisure/cultural activities. However, cities are also locations of production, consumption and distribution, activities linked to movements of freight. Conceptually, the urban transport system is intricately linked with urban form and spatial structure.

Urban transit is an important dimension of mobility, notably in high density areas.

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). In spite of the large diversity in the urban size, form and growth patterns of the cities in India, there are several common factors that contribute to the severity of urban transport problems. Few of the problem identified in Urban transport are:

Road congestion

As more people travel over longer distances on regular basis for employment and education purposes, it will inevitably lead to road congestion as populations increase, the average travel distances as well as intensity are expected to increase.

Parking problem

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.

Air pollution

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. 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

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per cent of PM2.5, while in Chennai, it is 20 per cent of PM10 and 35 per cent of PM2.5.

Detoriating 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.

Shuttl an office bus is a success story of urban transport in Delhi NCR – a step towards transit oriented development

Transit Oriented Development is the exciting fast growing trend in creating vibrant, liveable, sustainable communities. Also known as TOD, it's the creation of compact, walkable, pedestrian-oriented, mixed-use communities centred around high quality train systems. This makes it possible to live a lower-stress life without complete dependence on a car for mobility and survival.

Transit oriented development is regional planning, city revitalization, suburban renewal, and walkable neighborhoods combined. TOD is rapidly sweeping the nation with the creation of exciting people places in city after city. The public has embraced the concept across the nation as the most desirable places to live, work, and play. Real estate developers have quickly followed to meet the high demand for quality urban places served by rail systems.

Transit oriented development is also a major solution to the serious and growing problems of climate change and global energy security by creating dense, walkable communities that greatly reduce the need for driving and energy consumption. This type of living arrangement can reduce driving by up to 85% (www.tod.org).

It has been noticed that there is congestion on the roads due to heavy traffic and reaching office on time has become a humongous/big problem in Delhi NCR. The existing public transportation is either not existent or in a very poor state. The buses are overcrowded, uncomfortable, are often late, most of the buses are not air-conditioned. Metro has provided with a comfortable and economical alternative but after travelling in AC coaches of Metro, travelling in shared autos is extremely uncomfortable for the last mile connectivity. Moreover getting a seat in DTC buses and Delhi metro is not less than a winning a lottery.

An innovative technology of urban commute by providing efficient last mile connectivity, operating a Safe, Reliable, Punctual, Comfortable & Economical air-conditioned fleet on key routes with 500+ vehicles. Popularly known as Shuttl, a pioneer of tech-enabled, seat-based ecologically sustainable urban transit service which has taken 16 lacs cars off the road and saved 8,500 tons of CO_2 emissions since inception. Shared mobility via Shuttl helps remove 11,000 cars and save 26 tons of CO_2 each day (https://ride.shuttl.com/). This popularly known as office bus. Because it operates to drop offices and bring back home from offices.

How to avail this service

To use this services user are required to registered with the Shuttl on their mobile based application so credentials of travelers can be verified. After booking a seat through mobile app you will get a confirmed seat and charges wpuld be deducted from your Shuttl wallet or Paytm depending on what type of wallet you want to use. After booking application will guide you to the nearest pickup point and you will be able to track your Shuttl. If seats are not available in the bus coming at the preferred time of the user. A seat is booked for him in the next bus and the user is informed about it through SMS and app notification. Once booking is complete, the user gets an app notification with a booking id. A map to the location of bus stoppage and photograph of the location to help the user identify the right place. The user gets a notification, on the app and SMS, five minutes before his preferred pickup time with details of the bus that is coming next.

Each driver has a phone device with a GPS tracker. With booking allocation to passenger, the driver receives the booking ID on his device so at any point of time, the driver has a list of passengers who will be boarding the vehicle during the journey. He cannot pick / hail any passenger other than the person who has booked a ride through a mobile.

Once the bus is allocated, the customer's mobile app screen turns 'Green' with Booking Id and Vehicle No written in White for the Bus Driver to verify the passenger boarding the bus. While boarding bus the bus passenger required to press to board button on the mobile app and chirp noise create which validate the credential of passenger. This process makes sure that the passenger who booked the bus has boarded the bus.

There is predefined process for grievance Redressal of passengers. If any customer faces an

issue/problem while using services, he/she can call to customer care and mention the grievance.

There is a "call us" option available inside the app that directly connects the user with the customer care on phone

Recently Shuttl has launched an array of security features for its passengers. Secure Anxiety Free Experience(SAFE)that provides several safety checks to every commuter by leveraging embedded technology. One of them is face recognition technology for drivers and boarders to validate the authenticity of people who check-in to the bus. Commuters will have to upload their picture on the Shuttl app which will allow the app to verify the face of the passenger. That will also eliminate the need to show tickets as people check-in.

There is a SOS and a Panic button on the Shuttl App as well as in the buses so that passengers can trigger an emergency response. Also, live CCTV recording of the commute will be available to all passengers from a URL link which will enable them to watch the footage and also share it with their family and friends. The CCTV comes with an auto alert feature which sends the Emergency Response Team (ERT) an alarm if anyone inside the bus is in danger. To ensure there is no case of drunk driving, the driver seat has an alcohol sensor. In case of alcohol detection, the sensor will automatically lock the ignition of the bus.

CONCLUSION

Urban transport Sector can be categorized based on what is being transported, the mode of transportation and by its regulation and other institutional dimensions. Impacts on greenhouse gas emissions as well as mitigation and adaptation measures to reduce those emissions can vary widely depending on how passengers travel, freight and information are transported. TOD has come up as smart solutions for increasing hazards in urban transport sector. Thus, an integrated transport planning would certainly support in minimising the hazards and challenges of urban transport and ensuring resilience of community.

REFERENCES:

1. Estache A. (2007). Public Private Partnerships in Transport, European Center for Advanced Research in Economics and Statistics , World bank Policy Research Working Paper No. 4436.

2. Handbook on Urban Statistics, Ministry of Urban Development, Government of India, 2016.

3. Intergovernmental Panel on Climate change, fifth assessment report on impact, adaptation and vulnerability to climate change, 2014.

4. https://unhabitat.org/wpcontent/uploads/2013/06/GRHS.2013.Regional.Southern.Asia_.pdf

5. http://www.tod.org/

6. Hunt, A. and Watkiss, P. (2011). Climate change impacts and adaptation in cities: a review of the literature. *Climatic Change*, 104 (1), pp. 13-49.

7. Kamete Amin Y, Tostensen Arne, Tvedten Inge (2001), "From global village to urban globe: urbanization and poverty in Africa: implications for Norwegian aid policy", Chr. Michelsen Institute, Bergen, quoted in Njoh Ambe J (2003), "Urbanization and development in sub-Saharan Africa", Cities Vol 20, No 3, pages 167–174.

8. Kahn-Ribeiro , S. , S. Kobayashi , M. Beuthe , et. al. (2007). Mitigation. In B. Metz, O. R. Davidson, P. R . Bosch, R. Dave, and L. A. Meyer (Eds.), Climate Change 2007. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge, UK and New York, USA : Cambridge University Press.

9. Koetse, M. J., Rietveld, P. (2009). 'The impact of climate change and weather on transport: An overview of empirical findings', (2009) Department of Spatial Economics, VU University, De Boelelaan 1105, 1081 HV, Amsterdam, The Netherlands.

10. Ministry of Environment forest and climate change, Government of India.

11. National Action plan on Climate Change, Prime Minister Council on Climate Change, Government of India, 2008.

12. National Urban Transport Policy, Government of India, 2008.

13. Revi, A (2008). "Climate Change: An Adaptation and Mitigation Agenda for Indian Cities", Environment and Urbanisation, Vol 20, Issue 1 (London: Sage).

Veer Singh[1]* Dr. Mukta Girdhar[2]

14.   Urban Transport in India- Challenges and recommendations, IIHS R F Paper on Urban Transport, 16 July, 2015.

15.   UNFCCC, report on 22COP, Sustainable Urbanisation in Paris, 2016.

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