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Critical Appraisal of Urban Transport Funding Pattern in an Emerging Economy: Case Study- India

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Abstract

Essential urban transport infrastructure and efficient public transport system in cities are critical for growth in service sector economy. Major cities in India face challenges to cope up with ever increasing private vehicle volume, limited funding options in urban transport infrastructure development and absence of policy initiatives for restrictive car usage in the cities. Per capita investment in urban transport in Indian cities varies from \$18 to \$39, which is comparatively lower than per capita investment in China \$116 and UK \$ 319 (McKinsey 2010). Central government have been releasing funds since last two decades for development of urban transport in cities through Jawaharlal Nehru Urban Renewal Mission (JNNURM) program (2007-2014), Smart City schemes (2015-2019) etc, however, 57% of JNNURM funds were used in developing roads and flyovers and 33% used for urban transport development. This paper attempts to various issues associated with urban transport funding in India. In addition, various types of funds are identified which are suitable for financing urban transport projects at local, state and national government level including national government grants, subsidies, parking charges, congestion charges, land value capture, betterment levy are assessed and development of toolkit for financing urban transport projects. The paper also reviews practices of urban transport funding in some of best global cities and identifies way forward to develop a coordinated project appraisal process and decision making for funding of urban transport projects.

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Keywords: Type your keywords here, separated by semicolons ;

1. Introduction

Urban population shows upward growth trend in emerging economies in recent years mainly due to rural to urban migration for better economic opportunity in cities coupled with natural growth. Urban population of India

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grew from 286.1 million to 377.1 million in 2011, which is 31.14% of total population of India in 2011. Indian urbanization is comparatively lower than urbanization in China (54.4%) and Brazil (85.4%) in 2014 (Handbook of Urban Statistics 2016). Rural to urban migration component of urban population in India has grown from 19.9% in 1980 to 21.1% in 2001 (Ramesh R et al 2009). India transformed its economic base from agriculture in 1950s to service sector based economy in present days. Cities support most of the economic activities for a favourable condition for service economy, which contribute 57.6% of Indian GDP in 2011. Service sector is growing in 9% growth rate since 2001 and Indian GDP is expected to grow more than 8% in coming years (12th Five Year plan).

Urban transport facilitate people in the cities to move from their home to work, business and other purposes to contribute to the service economy. Government of India recognized urban transport as an important sector and created a separate head in 8th Five Year Plan period (1992-1997). India's urban transport spending jumped during 10th Five year plan (2002-2007) and onward. Jawaharlal Nehru National Urban Renewal Mission (JNNURM), the central government funding program for development of urban transport infrastructure was initiated in 2005 and Rs 58,100 crore was spent through JNNURM program from 2007 to 2014 to improve urban transport systems in cities. Even within the allocated resource, 57% of JNNURM fund from central government were spent in development of road, flyover etc. and 33% in urban transport (Budget Brief 2013-14). Government of India funded Rs 56,182 crore to develop Metro Rail system in 10 cities, which is around 25% of the total project costs. As per High Power Expert Committee (HPEC) report, India required more than one lakh crore investments annually for urban transport development in Indian cities for the next 20 years. Funds are limited and demands for investment are huge in India, clearly there is a gap in funding demand in urban transport. To meet the requirement of urban transport development, a sustainable funding policy based on sustainable urban transport option need to be evolved.

In spite of the central government funds spent in cost intensive public transport projects in India, major issues in urban transport system including traffic congestion, delay in travel time, loss of fuel cost, emission related pollution are increasing day by day. This paper attempts to find out gaps in urban transport funding process, project appraisal system, decision making process in India and identify best practices and policy interventions required to achieve sustainable transport goals. An attempt is made to critically review the urban transport funding practice in India and suggest sustainable funding options.

2. Trend and pattern of urban transport funding in India

2.1. Genesis of Urban Transport funding in Five Year Plans

Planning commission of India had been established in 1951 to formulate Five Year Plan or annual plan for most effective and balanced utilization of country's resources. Allocation of funds in each of the sectors e.g. agriculture, industry, education, health care, transport, environment etc. were earmarked in the five year plans. The serious issue of urban transport was first recognized in 6th Five Year plan (1980 – 1985) and a tentative policy direction was attached to it. However, it was 8th Five Year plan (1992 – 1997) which emphasized urban transport to create a unified coordination body, a separate financial institution to tackle urban transport issues. It emphasized role of Ministry of Railways in planning and providing Metro Rail system in cities, although responsibility of urban transport policy and planning was entrusted to Ministry of Urban Development in 1986. Funds allocated for urban transport was meager up to 8th Five Year Plan period. 9th Five Year Plan (1997-2002) accepted that heavy investment in urban rail system was necessary and private sector investment was not the solution. Dedicated levies from users and non-users were introduced for financing metro rail projects and “National Urban Transport Fund” was introduced. 10th Five Year plan (2002-2007) enunciated need of legislation and financing strategy for development of metro rail system in cities with population more than 3 million. The plan mentioned institutional responsibilities of ministry of urban development, ministry of railways, state government departments etc. It proposed a corpus of 3000 crores to set up National Urban Transport Development Fund (NUTDF), however, it was not implemented.

11th Five Year Plan (2007-2012) emphasized on developing infrastructure including transport to support rapid pace growth of country's economy. It highlighted importance of developing various transport modes in an integrated manner. Mid Term appraisal of 11th Five Year Plan showed only 37% of the allocated fund were utilized for central road transport improvement, a more effective monitoring program was suggested. Use of latest technologies in

public transport system such as GPS based vehicle tracking system, fare collection system etc. were mentioned and an integrated view of transport development and a long term framework to strengthen it. Setting up National road safety and traffic management board and Inspection and certification centres are mentioned in the plan. Total funding requirement for 11th Five Year Plan was Rs 132,590 crore as presented in Table 1 and source of funding are proposed in the plan.

Table 1. Funding Requirement and Sources in 11th Five Year Plan (2007-2012)

Source	Funding in Crore
JNNURM	15500
Non JNNURM	4400
VGF	6000
Resource from States/ULB	19500
Loan from Financial Institution	61190
Participation by private promoters	26000
TOTAL	132590

Source: 11th Five Year Plan

It is also mentioned that actual amount available for urban transport in JNNURM is 10,000 crores out of 50,000 crores in 2005 to 2012 period. Non-JNNURM support is 3,055 crores and the shortfall is need to be met by other source of finance.

12th Five Year Plan (2012-2017) aimed to achieve faster, inclusive and sustainable goal for urban transport development in India in parallel with 8% to 9% of GDP growth in India. Major thrust was on improvement of implementation, accountability and service delivery of public transport system. The need of most vulnerable section of the society was to be included in the process. Bus transport was to be improved in smaller cities and metro rail system to be introduced in cities through Public Private Partnership (PPP) mode wherever possible. Requirement of funding for urban transport improvement are presented in Table 2 and in terms of funding sources, it is mentioned that it will include Government of India, State Government/ULB, property development, multi-lateral loans, domestic loan and private funds.

Table 2 Funding Requirement and Sources in 12th Five Year Plan (2012-2017)

Expenditure Head	Funding Required in crore Rs
Urban Roads	213498
Mass Transit	55497
Traffic Management System	12100
Street Lighting	2294
Capacity Building (urban transport)	5000
TOTAL	288389

Source: 12th Five Year Plan

In terms of expenditure in various sectors in Indian economy are presented in Figure 1, it shows transport sector constitute 18% to 22% of total expenditure of the Government of India in the year 2000-01 and 2012-13.

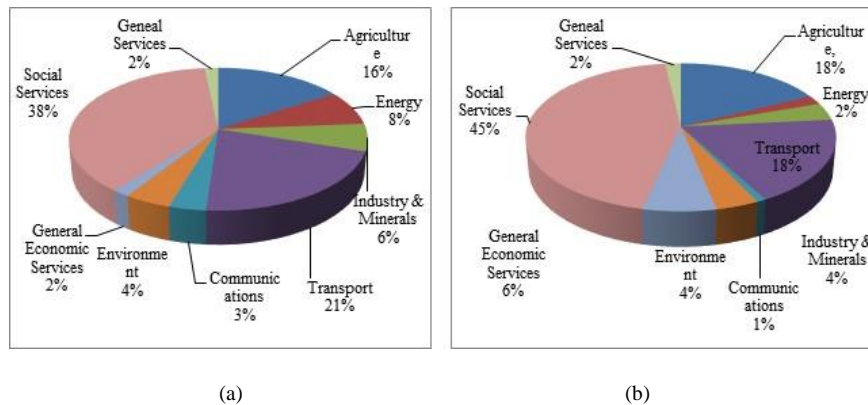


Figure 1. (a) Percentage Composition of Sectoral Expenditure in India 2000-2001 (b) (a) Percentage Composition of Sectoral Expenditure in India 2012-20013

2.2. National Transport Development Policy Committee (NTDPC)

NTDPC was constituted to develop long term transport policy for India and developing transport strategies starting from 12th Five year plan 2012 for a period of 20 years. As per NDTPC, investment in urban transport is proposed to be increased by 3.7% in proposed 13th, 14th and 15th Five year plan period (NTDPC 2014). Investment in infrastructure was raised from 4% of Indian GDP in 12th Five year plan period to 4.3% and 4.5% in proposed 14th and 15th Five year plan period. It is mentioned that efforts are to be made to commercialize the public sector entities and that invest and manage public transport infrastructure at both central and state level.

Three scenarios are developed to address investment required for urban transport improvement in India. Scenario I is Business As Usual scenario where it is estimated that if the same growth continues Rs 22.78 trillion will be required in 20 years. Scenario II is the Intermediate scenario between BAU and desired sustainable scenario and estimated Rs 17 trillion will be required for urban transport development. Rs 15 trillion will be required under desired scenario which is the most sustainable scenario as estimated by the Working Group Urban Transport (WGUT). Key funding sources includes support from government, user charges, tax concession and dedicated levies, land monetization, recovery from non-user beneficiary, debt and PPP (NTDPC 2014).

National Urban Transport Policy (NUTP) 2006 envisaged creation of National Urban Transport Fund (NUTF) and was included in the 12th Five year plan. Urban Transport Fund (UTF) is proposed to be developed in central, state and city level (NTDPC 2014). Based on “polluters pay” principle, three major sources for UTF were identified eg, Green Surcharge on each litre of petrol sold, Green Cess on existing personalized vehicle, Urban Transport tax on purchase of new cars and two wheelers. NUTF is expected to generate Rs 400 billion in first year, Rs 1,860 billion in first four years and Rs 22 trillion within 20 years period. Responsibility of development of urban transport is kept at city and state government level (NTDPC 2014).

2.3. Jawaharlal Nehru National Urban Renewal Mission (JnNURM)

The most significant central funding program undertaken by central government of India was Jawaharlal Nehru National Urban Renewal Mission (JNNURM). It was initiated in 2005 and a total of Rs 51,800 crore was allocated by government of India from 2007-08 up to 2013-14 for development of urban transport in cities. JNNURM included four sub-programs eg, (i) Urban Infrastructure and Governance (UIG) for large cities that included roads, mass transit, parking, other transport, urban infrastructure etc, (ii) Urban Infrastructural Development Scheme for Small and Medium Town (UIDSSM) included roads, drainage, parking and other infrastructure, (iii) Integrated Housing and Slum Development Program (IHSDP) and (iv) Basic Services for Urban Poor (BSUP). UIG and UIDSSM constituted 42% and 37% of total fund of JNNURM. Only 23.65% of the UIG fund and 9.27% of UIDSSM fund was allocated for urban transport. Overall 33% of JNNURM funds were allocated for urban transport

improvement. Figure 2 presents composition of UIG funds and Figure 3 presents year wise JNNURM fund allocation and Figure 3 presents year wise JNNURM fund allocation.

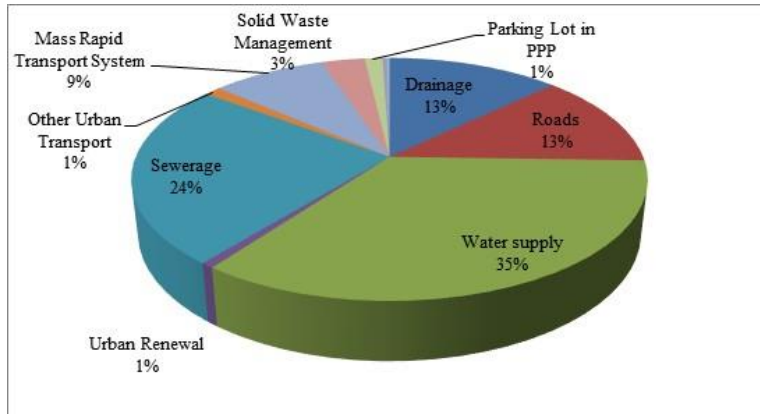
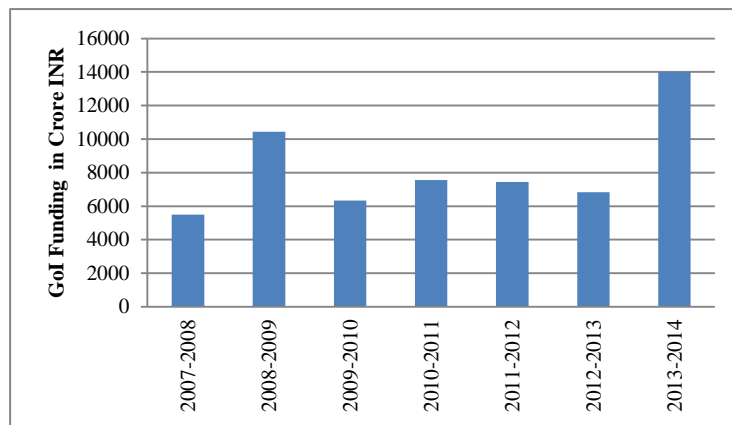


Figure 2. Percentage Composition of Approved Funding in UIG from 2007 to 2014



Source: JNNURM 2013-14

Figure 3. Government of India Allocation in Urban Transport in crore INR

2.4. NITI Aayog Three Year Action Plan

National Institution for Transforming India (NITI Aayog) was formed by Government of India in 2015 to replace Planning Commission and its agenda was to prepare fifteen-year vision, seven-year strategy and three-year action plan. Three-year action agenda 2017 of NITI Aayog included development of funding programs viz (i) Atal Mission for Rejuvenation and Urban Transformation (AMRUT) for development of urban infrastructure, (ii) Swachh Bharat Mission for improvement of solid waste management and (iii) Smart City Mission for identified 100 cities. Development of Non-Motorized Transport (NMT) facilities, smart parking facilities in Area Based Development (ABD) areas, energy efficient street lighting facilities in ABD areas, pan city Intelligent Traffic Management System (ITMS) and development of Central Command and Control Centre are included in Smart City Mission projects. Total funds released for 36 states of the country in Smart city mission from 2015-16 to 2017-18 is Rs 10,459.2 crore.

A total of Rs 2,03,979 crore investment was allocated from Government of India for 99 Smart City Mission cities from 2015-16 to 2019-20. Sector wise share of investments includes 16.6% for urban transport, 15% for Area based development, 12.7% for economic development, 10.1% energy, 9.5% for IT/ICT solutions etc. Urban transport constitutes Rs 33,000 crore, which is 16.6% of total allocated investment in Smart cities. A total of 948 projects are under implementation stage in 2018, which costs Rs 30,675 crore. The list of projects included urban infrastructure development such as drainage, transport, solid waste management, energy, environment etc.

3. Mode wise urban transport investments in India

3.1 Investment patterns

Central government, state government and other funding sources for Metro railway construction at 10 major cities shows varied funding sources in cities in India. Except Kolkata Metro which was majorly funded by central government sources (88%) in 1980s, central funding for majority of cities viz Delhi, Jaipur, Bangalore, Nagpur, Mumbai, Ahmedabad, Chennai, Kochi was reduced to 18%-20%. Central funding for Hyderabad metro is lowest 10%, as Hyderabad metro was primarily designed in PPP model. Table 3 presents funding sources for metro rail construction projects in 10 major cities in India.

Table 3. Funding Sources for Metro Rail projects in India

	Central Government Funding in crore INR	State Government Funding in crore INR	Funding from other sources in crore INR	Total in crore INR
Delhi Metro	14,392	-	60,151	74,543
Jaipur Metro	630	-	2,519	3,149
Kolkata Metro	18,487	2,619	-	21,106
Hyderabad Metro	1,458	-	12,674	14,132
Bangalore Metro	8,318	8,318	23,614	40,250
Nagpur Metro	1,555	1,555	5,570	8,680
Mumbai Metro	5,430	5,430	22,292	33,152
Ahmedabad Metro	1,990	1,990	6,793	10,773
Chennai Metro	2,920	-	11,680	14,600
Kochi Metro	1,002	-	4,180	5,182

Source: MoHUA

Each of the city developed separate agency/corporation to develop metro rail system, viz Delhi Metro Rail Corporation (DMRC) was formed with equal share of Government of India and State Government of Delhi in 1995. The corporations developed financial planning and suitable sources of funding and started construction of metro rail system in cities. Figure 4 graphically presents the central funding and total project cost for the metro rail system development.

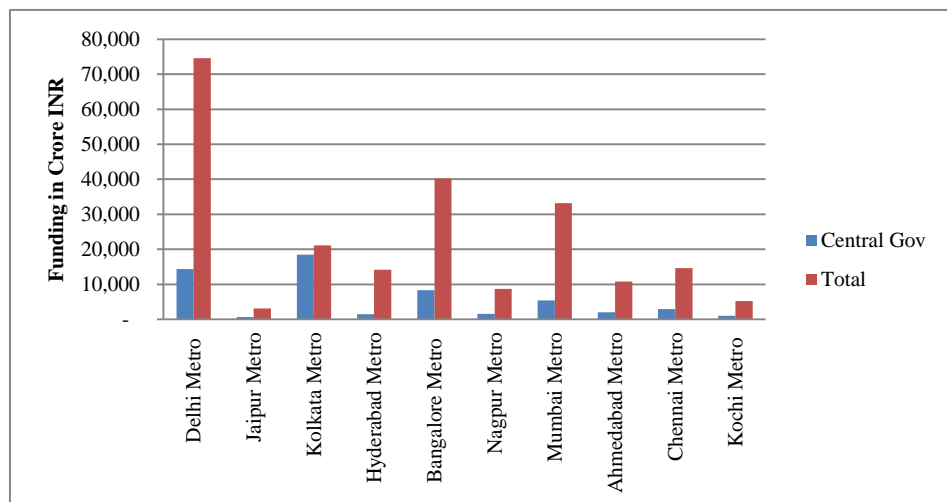


Figure 4. Share of Central Government and Total Cost of development of Metro Railways in Indian Cities

Central funding for urban transport infrastructure improvement included three major heads, which included funding for metro railways; procurement of buses and related infrastructure; and construction of roads and flyovers in cities under JNNURM scheme. Central government funding for metro rail, bus and roads and flyovers in major cities and the corresponding city population as per 2011 census data is presented in Table 4.

Table 4. Central Government Funding for Urban Transport Infrastructure Improvement in Major cities with Populations in India
Central Government Funding in crore Rs

	Metro	Bus	Road/Flyovers	Total in crore Rs	Population in 2011 census
Delhi	14,392	768	1,085	16,245	16,349,831
Jaipur	630	70	75	775	6,626,178
Kolkata	18,487	384	56	18,927	14,035,959
Hyderabad	1,458	84	61	1,603	7,674,689
Bangalore	8,318	181	636	9,135	8,520,435
Nagpur	1,555		27	1,582	2,497,870
Mumbai	5,430	62	23	5,515	18,394,912
Ahmedabad	1,990	252	711	2,953	6,361,084
Chennai	2,920	75	38	3,033	8,653,521
Kochi	1,002	71		1,073	2,119,724

Source: MoHUA

Development of Metro railway system in cities constituted major share of central government funding compared to roads/flyover development and bus procurement and related infrastructure development in cities. Figure 5 shows a comparative analysis of central funding for Metro railway, bus procurement and roads & flyover development across major cities in India.

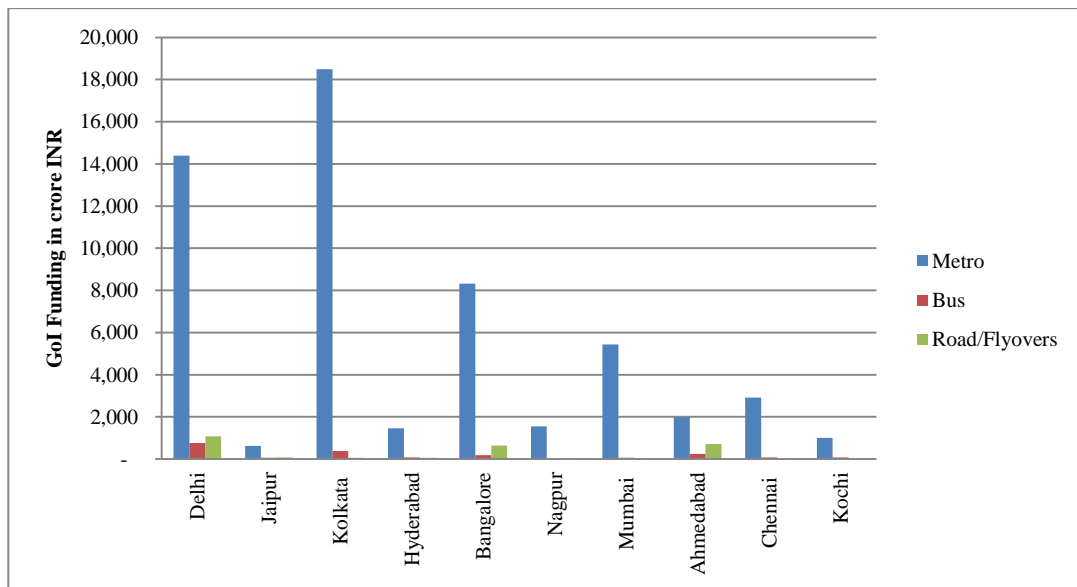


Figure 5. Central Government Funding for Metro Rail system, Bus procurement and Roads/Flyovers in Indian Cities

Per capita investments for urban transport development in cities are derived from total funding from central government for each of the city and population data from 2011 census. Indian rupees are converted to USD. Per capita investments for urban transport development are presented in Table 5 for a period from 2008 to 2014.

Table 5 Per Capita Investment from Central Government for Urban Transport Infrastructure Improvement in Major cities in India (in USD)

	2008	2009	2010	2011	2012	2013	2014
Delhi	15	28	17	20	19	17	35
Jaipur	2	3	2	2	2	2	4
Kolkata	20	38	23	27	26	24	48
Hyderabad	3	6	4	4	4	4	7
Bangalore	18	32	19	21	20	18	35
Nagpur	10	18	11	13	12	11	22
Mumbai	5	8	5	6	6	5	11
Ahmedabad	7	14	8	9	9	8	16
Chennai	6	10	6	7	7	6	12
Kochi	8	15	9	10	10	8	16

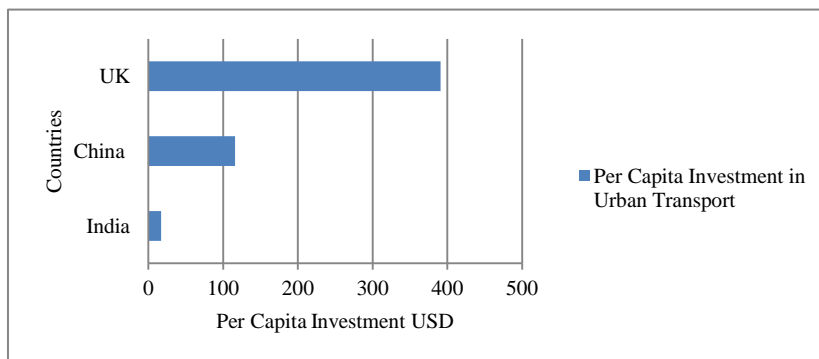
Per capita investments in urban transport in major cities are increasing over the years with growing population in Indian cities. Urban transport investment data shows per capita investments in mega cities like Delhi, Kolkata and Bangalore increased from Rs 1,153 (\$18) in 2008 to Rs 2,560 (\$39) in 2014, however, per capita investment in Mumbai, Nagpur, Jaipur, Ahmedabad, Hyderabad, Chennai, Kochi increased from Rs 379 (\$6) to Rs 815 (\$13) during the same period. Major cities in India absorbing funds, but tier II and tier III cities with less population less pressure on land value, where favourable infrastructure can be built for sustainable transport system, are not getting enough funding. Per capita per year investment in urban transport in China is \$116 with 51% population live in cities and per capita investment in UK is \$391, which is 83% urbanized country.

A comparative analysis of India, China and UK in terms of per capita investment in urban transport shows huge gap in funding in India. Table 6 and Figure 6 show comparison of per capita investment in urban transport in India which is very low in comparison to China and U.K.

Table 6. Per Capita Investment in India and other Countries

	India	China	UK
Per Capita Investment in Urban Transport (\$)	17	116	755
% of Urban Population	31%	51%	83%

Source: McKinsey Report 2010



Source: McKinsey Report 2010

Figure 6. Per Capita Investment in Urban Transport

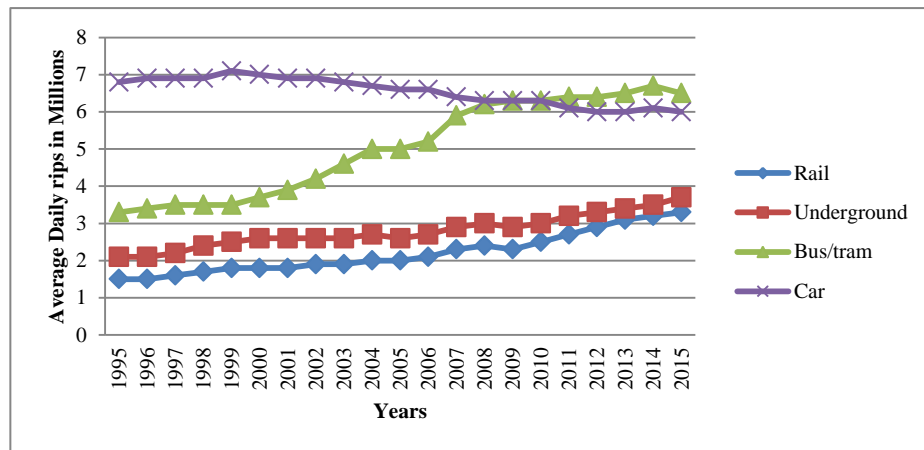
One of the visible impact of urban transport investment is its impact on the modal shares in cities of India. Based on available data, it is found that mode share in major cities in India remained unchanged during the same period. Table 7 presents modal share in major cities in India.

Table 7 Mode share in Major cities in India

	Walk	Cycle	Three Wheeler	Public Transport	Car	Two Wheeler
Delhi	21.0%	12.0%	6.0%	43.0%	14.0%	5.0%
Kolkata	19.0%	11.0%	4.0%	54.0%	8.0%	4.0%
Hyderabad	22.0%	6.0%	7.0%	49.0%	8.0%	8.0%
Bangalore	26.0%	7.0%	7.0%	35.0%	8.0%	17.0%
Mumbai	27.0%	6.0%	7.0%	45.0%	8.0%	7.0%
Ahmedabad	22.0%	14.0%	6.0%	16.0%	17.0%	25.0%
Chennai	22.0%	8.0%	8.0%	31.0%	10.0%	20.0%

Source: NTDP Report 2013

In London the daily average number of trips in Rail, underground, bus/tram and car are estimated from 1995 to 2015 and presented in Figure 7. It shows steady increase in Bus/tram, Rail and underground Metro trips per day and a decline in car trips during the same period of time.



Source: Mark Wingham 2017

Figure 7. Estimated Average Daily Trips in London (in Millions) from 1995 to 2015

India started investing in cost intensive high capacity Public transport/Metro system in major cities since 2004, however, no significant changes are observed in mode share for public transport and private car mode usage are not arrested or declined in cities. Major issues in urban transport development in India not meeting the expected results include lack of facilities for first mile and last mile connectivity to the high capacity mass transport systems, lack of inter-governmental coordination to develop feeder services, NMT and pedestrian facilities, lack of restrictive car usage policies, lack of legal backing, weak enforcement and most notably lack of investment in urban transport sector in India.

4. Urban Transport Investment Practices in other Emerging Economies

Developing countries in Asia exhibits high density mono centric development in its major cities for agglomeration economy. Seoul in South Korea, Singapore and Beijing, Shanghai in China show high density

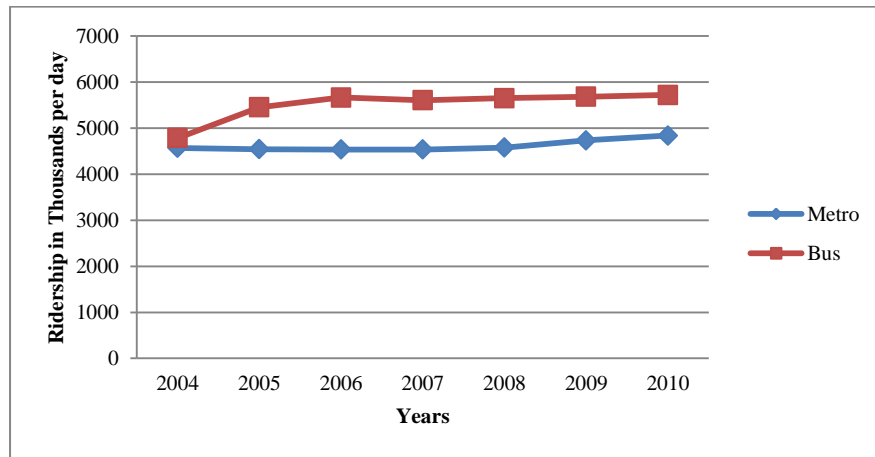
development. With the economic prosperity in these emerging economies, per capita incomes of people have rose significantly and personal vehicle volumes were also grown up. Number of motorized vehicle is projected to reach 2.6 billion by 2050 and most of them will be found in developing countries viz China, India and other Asian countries (United Nations Habitat 2011). If integration of urban growth with metro investments is not envisaged in the city centric agglomeration economy, its benefits erode over a period of time (Robert Cervero 2013). All these countries invested heavily in improvement of urban transport systems in their cities that included development of high capacity public transport systems and feeder service, last mile connectivity, unified fare collection system, NMT and pedestrian infrastructure etc.

4.1. Seoul (South Korea)

Population density of Seoul was 17,275 people per square km in 2010 and population density of Delhi was 11,297 people per sq km in 2011 census. The first Metro railway/subway system was developed in Seoul in 1974. Bus Rapid Transit (BRT) and Light Rail transit (LRT) were developed in Seoul in 2004 and 2009 to connect Seoul with adjacent city of Busan. Bus services had been the major mode of public transport in 1960s even before Metro/Subway system installed in Seoul (KOTI Report 2012). Transport policy of 1980 included policies to promote public transport usage, however, bus ridership started reducing since 1990 due to the increased car ownership in the city. Metro/subways and bus system were not connected smoothly and there were weak incentive for transfers. Supply centric public transport policy was revised by the government to Travel Demand Management (TDM) policies in 2004. Congestion fees, garage certification, parking management etc were part of the TDM. South Korean government legalized and implemented integrated fare system for all public transport modes as part of public transport reform in 2004. It included role of public sector to control bus routes and provide financial support to the private players for operations of bus services. Requirement of funds by the public agencies increased, but the bus and metro services revived with increase in ridership due to ease of intermodal transfer and transfer discount.

Quasi-public bus reform in Seoul included redesign of bus routes to hub-and-spoke model, integrated fare structure with transfer discount, improvements of bus management systems and infrastructure such as bus median lane. Bus ridership started increasing from the time when the bus system reform implemented in 2004. Bus companies were offered a revenue guarantee for maintaining a certain level of services. The competition among the bus companies to attract more passengers reduced, bus related accidents reduced and customer services for bus passengers improved.

Metro/Subway system of Seoul the life line of the city was built in 1974 then expanded in 1978. It was a cost intensive investment and mostly funded by government of Korea. Subway construction bond, municipal budget, central government financing, national subsidy etc were used for financing the metro/subway. Subway ridership was below the expected numbers and the operating deficit exacerbated the financial condition of the local government. It was re-examined that development of LRT and BRT which were much low in investment that could have been more reasonable. LRT implemented in Seoul and nearby Busan area and BRT bus system implemented and fully operational by 2009 in Seoul. Figure 8 presents the bus and metro ridership data for Seoul from 2004 to 2010.



Source: KOTI Report 2012

Figure 8. Metro and Bus Ridership in Seoul

In 2009, BRT system in Seoul had 7,548 buses, 367 routes operated by 150 companies, around 5 million trips per day and constituted 27.8% of all motorized trips in Seoul. Subway/metro construction financing were presented in Table 8 shows debt and equity part of the for the Metro Line 1, 2, 3 and 4.

Table 8. Funding Sources for Seoul Subway/Metro System Development (in USD)

Types of Financing		Amount in Million USD
Equity	Municipal Budget	656
	National Budget	77
	others	36
Debt	Government Fund	373
	Financing fund	440
	Loans	472
	Foreign debts	19
	Public bonds	805
Total Investment		2878

Source: KOTI Report 2012

Continuous investments in Metro/Subway, LRT, BRT and other modes in Seoul for a long period of time help to maintain high share of public transport in Seoul. Table 9 presents modal share percentages of Seoul from 2003 to 2009.

Table 9 Changes in Modal Share in Seoul

	Subway	Bus	Taxi	Car	Others
2003	35.6%	25.6%	7.1%	26.4%	5.3%
2004	35.8%	26.2%	6.6%	26.4%	5.0%
2005	35.9%	26.8%	6.2%	26.3%	4.8%
2006	34.7%	27.6%	6.3%	26.3%	5.1%
2007	34.9%	27.6%	6.2%	26.3%	5.0%
2008	35.0%	27.8%	6.2%	26.0%	5.0%
2009	35.2%	27.8%	6.2%	25.9%	4.9%

Source: KOTI Report 2012

Per capita income of South Korea increased from \$2,044 in 1980 to \$12,531 in 2002. Car volume increased from 2.2 million in 1996 to 3 million in 2009. Even with the increase in per capita income of people and increase in

registered car volume, Seoul achieved to maintain public transport share with 63% in 2009 and private car share reduced from 26.4% from 2003 to 25.9% in 2009. Public transport investments were done through scientific rationale, legal support, TDM policy, effective implementation process.

4.2. Singapore

Singapore is an island country with 719 sq km of land area with population density of 7,908 people per sq km. Land Transport Authority (LTA), the statutory body for development of urban transport in Singapore, initiated land use and transport planning, road improvement, public transport expansion. Mass Rapid Transit (MRT) Metro line started in Singapore during 1987. In 1990 LTA focused on intermodal coordination, building a balanced and efficient transport network. LRT system in Singapore was developed in 1999.

Singapore Bus Service (SBS) was formed in 1973 and Trans Island Bus Services in 1980. LTA acquired all assets of the existing bus companies in 2013 and shifted from privatized model of bus operation to bus contract model, where bus companies bid for routes.

To improve first and last mile connectivity, Singapore government allocated 1 billion USD in 2016. Public transport mode constitutes 65% and car trips 29% of all trips in Singapore in 2011. Car volume per thousand population in Singapore increased from 91 in 2002 to 101 in 2015. Car control policy of Singapore in 2000 actually controlled the road usage of cars. Electronic Road Pricing was introduced and steady declined in Vehicle-Km travelled was observed, although car population increased at a rate of 4% per annum from 1991 to 2010 (Sreyus P. et al 2017).

4.3. China

Proportion of expenditure of public transport in China increased from 10.2% in 2003 to 16.2% in 2009. China invested 1 billion USD per annum from 2001 to 2010 for development of rail based transit system in Beijing and 1.7 billion USD per annum for Shanghai during the same period. Central government of China approved construction of Metro rail in 28 cities in 2010. Total investment of 140 billion USD was envisaged by the Chinese government to be spent by 2020 to develop Metro rail system in 10 major cities in China viz Beijing, Shanghai, Tianjin, Guangzhou, Shenzhen, Nanjing, Wuhan, Zhengzhou, Hefei and Guiyang (Zhong Ren Peng et al 2012).

BRT line in Beijing initiated in 2005, followed by Guangzhou, Hangzhou and Jinan. The Guangzhou BRT system is having 42 lines and 130,000 passengers per day. It was built in one tenth of cost of Metro rail system in Guangzhou.

Investment in transport in China is unbalanced due to the fact that most of the investment goes to high capacity mass transit system, viz intercity high speed rail, metro rail and bus rapid transit system etc. essential bus service system in cities were not improved in the same pace. Major issues included lack of coordination between land use and transport development, coordination between inter-governmental agencies viz ministry of railways, local government. Bus feeder system to metro rail system is not well connected, because metro and bus are managed by two or three different agencies.

5. Sustainable Urban Transport Funding Options

Key funding sources for urban transport development includes support from government, user charges, tax concession and dedicated levies, land monetization, recovery from non-user beneficiary, debt and PPP (NTDPC 2012). NUTP 2006 envisaged creation of National Urban Transport Fund (NUTF), which is included in the 12th Five Year Plan. Green surcharge on petrol, cess on personalized vehicle, tax on purchase of new cars and two wheelers are the three major sources mentioned in the plan. Urban Transport Fund (UTF) is expected to generate Rs 22 million in 20 years' duration (NTDPC 2014). However, the onus rests on the state government and municipal corporations to form UTF fund through necessary legislation, ensure the taxes and cess to be channelized to UTF, form institutional setup viz Unified Metropolitan Transport Authority (UMTA) to manage the fund to develop urban transport systems. Many state governments formed UMTA in major cities viz, Madhya Pradesh, Maharashtra, Karnataka, Andhra Pradesh, Kerala etc. For implementation of UMTA and UTF and their proper functioning,

essential bills need to be passed through both houses of state government to be enacted as state law. State governments have their own list of priority sectors, state government's vision is generally compromised to have short term vision, imposing taxes entail high risks in electoral politics, and it seldom gets any political support to move forward. States generally depend on central funding for implementation of urban transport systems in its cities. Central government through various schemes/programs viz JNNURM, AMRUT, Swachh Bharat, Smart City etc. funds infrastructure development in cities, however, domestic funding will not be sufficient to satisfy the future demand.

Funding requirements for urban transport project at different level of government are different. Various types of domestic, international funds are available in the market, however, the knowledge and experience to tap the most suitable finance rests on the capacities of local/state/national government agencies. Financing instruments are broadly categorized in (i) general benefit instruments, (ii) direct benefit instruments and (iii) indirect benefit instruments.

5.1 General benefit instruments

General public are the beneficiaries for general benefit instrument funds. It includes public transport subsidies, national government grants and loans, climate related funds from Multi-Lateral Funding agencies viz Global Environmental Facilities (GEF), Clean Technology Fund (CTF), Clean Development Mechanism (CDM) and PPP for public transport.

Public transport subsidies, national government grants are stable funds with high acceptability among the public. However, subsidies are dependent on the financial health of the national government, as it is derived from the common tax base and transferred from national to state and local government. Subsidy and grants have low stability as it changes with change in priority of the government and its efficiency and administrative ease is medium. Central government grants are the main source of financing urban transport in India viz JNNURM, Smart City Mission etc. State run transport corporations provide subsidies in bus fare. Major issue in central government grants lies in evaluation of projects suitable for funding. State governments identify projects, prepare Detailed Project Report (DPR) and forward them to central government committee for further evaluation. Isolated projects are evaluated mostly based on economic and financial return at central level. Comprehensive Mobility Plans (CMP) prepared to identify urban transport projects for a city are weak and loosely connected with the funding process. Scientific project appraisal system is to be developed in India based on travel demand model of the city, stakeholders participation, vision of the city, key performance indicator, construction methodology, risk assessment for implementation, balanced financial model etc. Central government grants to develop urban transport can be utilized properly when it is linked with scientific project appraisal system to achieve sustainability goal.

National, state and local government can apply Multi-lateral funding agencies for urban transport projects and national government can leverage the funding gap and establish link between international and national funding mechanism. Climate finance can be used to develop urban transport infrastructure, which has not been utilized to its full potential. Only 28 projects for urban transport development were applied out of 6,660 projects submitted to avail CDM fund up to 2013 (Anjali Mahendra et al 2013). CTF funds of 70 million USD were used to co-finance Bangkok BRT system and similar model of CTF financing were replicated for low carbon BRT projects in other cities in Thailand (World Bank 2011). The city government developed urban transport plan with a peer-reviewed greenhouse gas emission baseline, and procured CTF funds for public transport projects. Japan International Cooperation Agency (JICA) Climate Finance Impact Tool (JICA Climate- FIT) fund is available for the urban transport projects where reduction in GHG emission, reducing vulnerability of climate change are established (JICA 2011).

Public Private Partnership (PPP) can be utilized in development of urban transport project. Social, environmental, macro-economic and political risks can be assumed by the public sector, and private sector can utilize their skills in assuming financing risk, construction and commercial risks. Strong legal, institutional and procurement framework, regulations, incentives and accountability are to be developed at each level of government to capture private sector

investments (Embarq India 2013). Private investment in India and Thailand are considerably high, Indian private sector investments in port is 80%, airport 64%, road 16% and rail 4% (MGI 2013). Private investment in urban transport projects can be increased with positive effort from government side to create favourable environment for private investors to invest at national, state and local level.

5.2 Direct Benefit Instruments

Direct benefit instruments comprised of parking charges, road pricing, congestion charges, fuel tax and surcharges, vehicle taxation, fare box revenue and PPP for urban roads. Parking charges, congestion charges are in the purview of a local government, fuel taxation and vehicle taxation is state government's subject. City and state can develop supporting policy framework, enact laws to implement some of the taxation and generate funds for urban transport development. Stability of car parking charge fund and road pricing fund are medium, however, acceptability to public is very low, medium risks are involved in such financing instruments. Stability and efficiency of fuel charge funds are very high, but public acceptability is very low (Arturo Ardila Gomez et al 2016).

12th Five Year plan already set aside fuel tax, cess and taxes on personalized vehicle for UTF and its financial health will be depend on the government's effort to implement and channelize it to urban transport project development. Parking is a serious issue in mega cities in India, inadequate on-street parking are available in cities and local government collect parking charges from the users and due to mishandling and low quality service from the on-street parking space maintenance, people's willingness to pay is low. Multilevel car parking spaces can be developed in PPP model in high demand areas. Private sector management of parking spaces will be determined by key performance indicators and local government will get its revenue generated from the user charges. The space can be commercially exploited to achieve financial viability and users' willingness to pay user fees will be improved. However, local government need to ensure enforcement to stop illegal parking on the road and maintain parking demand at the multilevel car parking to maintain it as a financially viable option. Implementation of congestion pricing and other direct benefit instruments are to be studied based on data analysis and these can be achieved with policy support and public acceptance

5.3 Indirect benefit instruments

Indirect benefit instruments consisting advertising, land value capture, betterment levy, tax increment financing, developer's exaction, development impact fees, transport utility fees etc. Additional benefits to the property owner, developer and firms due to public transport improvement in the area are included indirect benefit instruments. Stability and public acceptance of betterment levy are low; however, its efficiency can be improved if managed properly. City and state governments can utilize indirect benefit instruments to finance lower cost urban transport projects viz last mile connectivity, NMT and pedestrian infrastructure etc.

Land value capture method of financing public transit projects can be developed where a Bus system, BRT, LRT or Metro services are proposed in a fixed route with a fixed schedule. It is found that uplift in property value is more in East Asian Cities and European cities than North American and Australian cities. Property value was increased by 13 to 15% in 2004 due to Trans-Milenio BRT system in Bogota Columbia (Rodriguez et al 2004). Seoul BRT improved property value by 5 to 10% (Cervero et al 2010). Assessment of relevant alternative funding legislation and regulations in each level of government, accessibility beneficiary analysis, land and property market analysis for willingness to pay for transit accessibility, analysis of public transit project value capture mechanism and procurement/implementation strategy through hypothecated transit fund (James McIntosh et al 2017). Land value capture mechanism can be developed to finance much needed public transit lines in Indian cities. List of beneficiaries to be developed for urban transport projects that will include land owners, property developers, transport system users, business owners and local/state government authorities. Local or state government can develop a strategic fund and the revenue stream from the project will be directed to the fund. Tax Increment Financing (TIF) can be clubbed together with the strategic fund, where future increase in property tax will be accounted and debt-financing facilities can be developed. Institutional capacity of government to be built up through creating separate agency viz UMTA, detailed analysis of existing property value data and willingness to pay for beneficiaries will enable policy makers to judge social acceptance and new financing method will be evolved to

fund urban transport projects.

Options of Public Private Partnership in road development and public transport infrastructure are already in use in many states in India. In order to achieve more effective utilization of private funds, state government need to address issues of private sector involvement through legalizing roles of institutions and their functions to transfer of funds from central to local level, capacity building at national, state and local level.

Funding toolkit is to be developed for local, state and national government level to assess available funding option and their appropriateness for particular urban transport projects. Options for sustainable funding sources can be identified to meet the demand for urban transport development in cities and to achieve desired result of sustainable urban transport development.

Project appraisal system in India needs improvement to enhance capacity of state agencies to analyse complex data. Comprehensive Mobility Plan developed for the cities need to have adequate information and connect with the city's vision. State agency viz UMTA need to hire professionals, provide sufficient time to develop and maintain travel demand model for each of the city. Urban transport projects need to be evaluated in an integrated way to achieve desired outcome. DPRs for high capacity public transport system need to be complemented with feeder service and last mile connectivity system.

6. Summing Up

Improvement of urban transport infrastructure coupled with improved public transport system in Indian cities is most critical to support its emerging economy to grow in coming decades. It is estimated that as investment of Rs 22 billion in next 20 years would be needed to improve from its present condition. India is at a stage to invest in urban transport to its full potential with expected GDP growth rate of 8 to 9% in coming decades. The existing urban transport financing practices in India reveal that the funding priorities in India on urban transport are skewed in favour of major cities while the tier II and tier III cities with less population and less pressure on land are devoid of requisite funding to develop , sustainable transport system infrastructure. Further the study of Seoul, Singapore and China taken up case cities in this paper show that urban transport investment and implementation of high capacity public transit system are required to achieve desired modal share for public transport trips.

It is also established in context of Indian cities that conventional sources of funds are not enough to develop urban transport systems in cities and there is an urgent need to develop an informed policy to tap alternative sources of finance to fund urban transport development. Financing toolkit for local, state and national level needs to be developed to assist evaluating appropriate funding sources for particular urban transport projects. Policy framework and legal support are to be provided for ease of management of various types of funds. Unified Metropolitan Transport Authority and UTF are to be developed with full legal support and manage allocation of funds for urban transport development in cities. Role of agencies are to be defined, service level benchmarking is to be determined and private sector needs to be incentivized to take part in urban transport development. Policy intervention is necessary to develop a coordinated project appraisal system across local, state and national government level and develop a holistic urban transport investment decision making process which include city level development options, development indicators, assess funding requirement, identify financing sources, develop project appraisal system and derive list of projects essential and suitable for funding. Lastly institutional capacity of the local, state and national government also needs to be improved coupled with better Intergovernmental (local, state national) and intra-governmental (between ministries and departments) coordination to achieve balanced and equitable development.

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