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Exploring Non-Motorized Transportation for Indian Cities: A Sustainable System

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Abstract

The existing modal share in Indian cities is in favor of non-motorized transport but there is a minimal infrastructure available to support non-motorized transportation. In most of the Indian cities, even in the megacities of India (population more than 8 million), 30% of the trips are made by non-motorized transportation, but the adverse climatic conditions, inappropriate infrastructure and facilities for non-motorized transportation and increasing accident risk to non-motorized users, the use of personal motorized vehicle is increasing. This trend is accompanied with the rise in traffic crashes and deteriorating air quality in cities. This paper discusses the various problems and issues related to Non-Motorized Transport in Indian cities and highlight the need to adopt non-motorized transportation. It further explores the existing provisions related to non-motorized transportation provided in India.

Keywords: non-motorized transport, urbanization, walking

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INTRODUCTION

Mobility, the ability to move or the movement of individuals or groups from one place to another, job to job, or one social or economic level to another is essential for smooth functioning of a city. Every Indian city has to face a lot of challenges to achieve the appropriate level of mobility by providing sufficient infrastructural services and facilities so that the movements of people become convenient, comfortable and safe.[1] But, due to lack of appropriate infrastructural services and facilities, people are facing a lot of difficulties and problems related to mobility. The issues and challenges related to mobility are further going to be further aggravated as the urban population is growing at an average rate of around 3%per year and facilities are not upgrading at the same rate. India's urban population is expected to increase from 377 million in 2011 to 500 million in 2021. To accommodate the ever-increasing urban population, the cities are also expanding outwards and consuming the valuable agricultural land. Challenges related to urban mobility are envisaged and discussed/raised at national, regional and local level through different researches and vision and/or action reports. Presently Indian cities are facing different challenges/issues related to mobility that can be broadly classified as challenges related to mobility at the individual site level, challenges related to mobility at campus or township or neighborhood level, challenges related to mobility at Zonal level, and challenges related to mobility at the city level.

Urban transport provides mobility of people and goods and access to employment, education, shopping, health,

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entertainment opportunities. Though, under Jawaharlal Nehru National Urban Renewal Mission (JNNURM), many initiatives have been taken to provide public transportation facilities at zonal and/or city level, but still more interventions are required to improve the condition. In spite of that, many cities are unable to meet the increasing demands for travel due to the prevailing imbalance in the modal split; inadequate transport infrastructure and its sub-optimal use; lack of integration between land-use and transport planning; and no improvement or little improvement in city bus services. These factors collectively encourage a shift to more personalized modes of travel. People have turned towards personalized modes such as scooters, motorcycles, and cars; as a result there is a tremendous increase in the number of motor vehicles, which are further growing at a very high rate. As a result cities are facing tremendous issues and challenges like, pollution, congestion, traffic jams and accidents, inappropriate road space distribution, inadequate parking space in cities, inadequacy of road infrastructure to cater the increasing travel demand, increasing pressure on roads, increased consumption of energy, etc. The depressing scenario of Indian cities further advocates that a lot more interventions are required to achieve satisfactory level of public transportation.[1]

However, challenges of mobility at the site level and neighborhood or campus level are still prevalent and continue to be increased at a high rate. The challenges at the site and neighborhood level coupled with inappropriate and informal feeder/ intermediate facilities, that generally can act an intermediate mode from individual site/neighborhoods to nearest public transport station, forces people to choose private mode like cars and two wheelers, this is further evident from the modal share of daily trips of Indian cities, as shown in Table 1.

Table 1. *Existing Modal Split in Indian Cities (as Percentage of Total Trips).*

City population (in millions)	Walk	Mass transport	Intermediate public transport		Car	Two-wheeler	Bicycle
			Fast	Slow			
0.10–0.25	37.1	16.4	10.4	20.1	3.3	24.1	25.7
0.25–0.50	37.8	20.6	8.9	17.2	2.6	29.8	20.9
0.50–1.0	30.7	25.4	8.2	12	9.5	29.1	15.9
1.0–2.0	29.6	30.6	6.4	8.1	3.3	39.6	12.1
2.0–5.0	28.7	42.3	4.9	3	5	28.9	15.9
5.0+	28.4	62.8	3.3	3.7	6.1	14.8	9.4

Source: *Ministry of Urban Development.*

Table 2. *Desirable Modal Split for Indian Cities (as Percentage of Total Trips).*

City population (in millions)	Mass transport	Bicycle	Other modes
0.10–0.5	30–40	30–40	25–35
0.50–1.0	40–50	25–35	20–30
1.0–2.0	50–60	20–30	15–25
2.0–5.0	60–70	15–25	10–20
5.0+	70–85	15–20	10–15

Source: *Ministry of Urban Development*.

The desired modal split for various Indian cities based on the population size is shown in Table 2.

There is a huge difference between the existing modal split (Table 1) in different Indian cities and desired modal split. The variation in split can be due to the economic condition of the users and the type, adequacy, efficiency and appropriateness of Transportation infrastructure and facilities available in

particular type of city. In existing modal split in all types of cities, a large number of trips are made either by walking or by bicycle and the provisions and facilities for these two modes are mostly not available/ present in Indian cities. Moreover, mega cities with a population of over 8 million, the modal share of NMT ranges from 40 to 50% (walking and bicycling); attributed to the dense mixed land use patterns in Indian cities, resulting in shorter trip lengths and availability of NMT as the only accessible mode of transport for low-income households. NMT is also a major mode of transportation to access the public transport system, especially by walking and cycle rickshaw. Typically, a public transport user is a pedestrian for at least one part of the trip – either during the access or egress part of the trip.[2]

Sustainable modes of transport, which mainly consists public transport and non-motorized transport have a vital role in resolving these problems of transportation in Indian cities. Sustainable transport meets the mobility and accessibility needs of people by providing safe and environmentally friendly modes of transportation. This mode is affordable, operates efficiently and offers choice of transport mode.[3] For trips of shorter length i.e. trip to schools in locality, neighborhood shopping and to cater the need of a feeder system to public transport, Non-motorized Transportation is the most vital solution as the provision present in this are non-polluting, economical and cheap. In many cities, it is the primary mode of transport for the poor and in some a significant source of income for them. Where NMT is the primary transport mode for the work journeys of the poor, it is also critical to the economic functioning of the city. Despite these obvious merits, NMT have tended to be ignored by policymakers in the formulation of infrastructure policy and positively discouraged as a service provider. Some governments appear to have an ideological preference for motorized over NMT because they regard it as technologically more advanced.

NON-MOTORIZED TRANSPORT IN INDIAN CITIES

Non-motorized transport (NMT) modes (also known as Active Transportation and Human Powered Transportation) consist Walking, bicycling, and variants such as cycle rickshaws, push scooters, e-rickshaws, wheelchairs, etc. it is also defined as any form of transportation that provides personal or goods mobility by methods other than the combustion motor engine.[4] Non-motorized transport (NMT) modes are resource efficient, environmentally friendly, non-polluting and economical modes of transportation. They are most suited to carry out short trips and as access and dispersal trips in case of longer line haul trips. Due to poor pedestrian and cycling infrastructure in Indian cities, non-motorized transportation has become a mode for economically weaker riders only. These users are generally dependent on walking and bicycling, even for commuting longer distances.[5] These modes are not dependent on fossil fuels and have minimal emissions. Thereby, they are truly low carbon modes. Use of non-motorized transport (NMT) has health benefits, however, with the rise in incomes and inadequate infrastructure, use of NMT has been declining.

Despite the obvious merits, NMT have tended to be ignored by policymakers in the formulation of infrastructure policy and positively discouraged as a service provider. Most of the urban development policies and initiatives in India appear to have an ideological preference for motorized transportation over NMT because they regard it as technologically more advanced. The needs of pedestrians

and slow moving vehicles like bicycles and rickshaws have been ignored in the conventional planning strategies. These have been assigned lower importance compared to other vehicles present on the road. Moreover, city authorities and state governments have not invested significantly in upgrading NMT infrastructure, resulting in a degrading level of service and increasing risk to pedestrians and bicyclists. This has led to a declining use of NMT, with the increasing income levels throughout the years.[6]

Presently non-motorized transportation facilities available in different cities have severe issues and problems related to lack of infrastructural facilities, the inappropriate safety of commuters, encroachment on existing NMT provisions, availability of services at night/odd hours, lack of comfort conditions, proneness to noise and air pollution, conflict with other modes of transportation (Figures 1, 2).

Fig. 1. *Cars Parked and Moving on Footpath and Bicycle Track Pushing Cyclists Out.*

Fig. 2. *A Pit on the Cycle Track in Chandigarh.*

INITIATIVES FOR NON-MOTORIZED TRANSPORTATION PLANNING IN INDIA

There are initiatives taken place at different platforms in Indian in the form of Norms and regulations, policy initiatives, guidelines for preparation of master plan, etc. to promote and provide non-motorized transportation facilities. There are also few examples of adopting NMT as main means for transportations in urban areas. For example the main means to access the

famous Mall road of Shimla is through walking and appropriate facilities to facilities walking are also provided along the Mall road.[7] The Pune Municipal Corporation (PMC) constructed footpaths and bicycle tracks along the pilot BRT corridor. Similarly, NMT facilities are provided in Delhi along the BRTS corridor.[8]

Different provisions like formulating norm and regulations for designing Non-motorized transport, National Urban Transport Policy, and infrastructure and facilities for NMT under JNNURM are initiated at the national level to promote non-motorized transport. Indian Road Congress and Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre (UTTIPEC)have provided recommendations/ provisions for non-motorized modes of transportation most these provisions lack implementation part in of the Indian cities.[8]

National Urban Transport Policy (NUTP)

NMT measures proposed by an Indian city should conform to existing policy at national, state and city level. The National Urban Transport Policy for India (published by the Ministry of Urban Development, Government of India, 2006) refers to priority for non-motorized transport. The various provisions related to NMT are:

1. The safety concerns of cyclists and pedestrians must be addressed by encouraging the construction of segregated lanes for bicycles and pedestrians. Segregation of vehicles moving at different speeds would improve traffic flow.
2. Segregated NMV paths are required not only along arterials but also access roads to public transport terminals. This will result in the increase in use of the public transport system, particularly when combined with the construction of NMV parking.
3. It is essential that NMT facilities be designed and constructed by consulting experts and community (i.e., potential users).
4. Activities on footpaths such as street vendors must be adequately controlled to secure pedestrian safety.

Guidelines for Pedestrian Facilities

The pedestrian facilities need to be planned in an integrated manner with transportation to ensure a continuous pedestrian flow. Another important recommendation by the guidelines was that the convenience of the pedestrian should be a prime consideration; otherwise, the facilities provided will not be fully used. The guidelines recommended widths of footpaths as per their carrying capacity regarding number of persons per hour. The minimum width of a footpath is suggested to be 1.5 m, at places where the number of people going in both directions per hour is less than 800. A footpath of width 4 meters is suggested to carry 6000 persons per hour per in one direction or 4,000 persons in both the directions (IRC:103-1988)[9,10] (Table 3).

Table 3. *Capacity of Sidewalks.*

Width of sidewalk (m)	Capacity in number of persons per hour	
	All in one direction	In both directions
1.50	1200	800
2.00	2400	1600
2.50	3600	2400
3.00	4800	3200
4.00	6000	4000

Source: *IRC: 103-1988.*

Street Design Guidelines

Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre (UTTIPEC) (2010) has recently prepared street design guidelines for equitable distribution of road space, as per the recommendations of the NUTP. These

guidelines are entirely focused on the safety of pedestrians and bicyclists and given more importance to the road edges than the road center. These guidelines recommend varied lane sizes of Non-Motorized Transport (NMT) facilities like bicyclists, cycle rickshaws, etc. for different landuse. The minimum width of footpath for residential, mixed use and commercial nodes are recommended as 1.8, 2.5, and 4.0 m, respectively. The minimum width of a footpath was recommended to be 1.8 meters which allow minimum two people to cross each other comfortably (Table 4).[11]

Table 4. *Footpath Widths as Per the Landuse.*

S. no.	Landuse	Minimum width of footpath (m)
1	Residential	1.8
2	Commercial/mixed use	2.5
3	Commercial nodes	4.0

Source: *UTTIPEC, 2010.*

CONCLUSION

Public transport vehicles and non-motorized modes are the major modes of transportation for the majority of the city residents. The existing socio-economic patterns and land use distribution ensures NMVs presence in the whole city, and on the complete road network. The densities and modal shares of NMVs in total traffic may differ from one part of the city to the other depending upon the landuse and availability of services. However, non-motorized transportation facilities available in different cities have acute issues and problems related to lack of infrastructural facilities, the inappropriate safety of commuters, encroachment on existing NMT provisions, availability of facilities at night hours, lack of comfort conditions, proneness to noise and air pollution, conflict with other modes of transportation. Although, some attempts are made at various levels to facilitate NMT in Indian cities, but there is a need to the adopt holistic approach to integrate the NMT with transportation planning.

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