



Economic impact of non-motorized transportation in Indian cities

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ABSTRACT

Lack of a clear understanding regarding the economic impacts of non-motorized modes is a major reason why they are excluded from the transportation development agenda of cities in India. Keeping this aspect in mind the present study has been divided in to two parts. The first part tries to understand the non-motorized traffic evolution in India. It focuses on the declination of non-motorized modes, necessity to revamp it, the favorable conditions to promote them in India and the relative problems associated with it. It is found here that there is a necessity for defining the role of non-motorized modes in India for the viable implementation of infrastructure and policies related with it.

The second part consists of two case studies of Bangalore city where the economic benefits are worked out. The first case study provides a framework for monetizing the economic benefits of non-motorized modes. Here the economic benefits of congestion and air pollution reduction, accident and vehicle cost reduction are considered and total savings are worked out. A savings of Indian Rupees (Rs.) 250,000 was found for an assumed 1% shift of travelers to non-motorized mode in a single day. The second one enlists the expected economic benefits associated with pedestrianization of a major arterial called M.G road in Bangalore and estimates a savings of 1611.4 Rs./day due to air pollution and accident reduction. The economic benefits thus found could be used to convince the policy makers and also to form a framework within which decisions can be made regarding non-motorized modes.

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1. Declination of non-motorized mode culture and necessity to revamp it

Walking and bicycling had culturally been an integral mode of trip making in India. According to Riplogle (1991), non-motorized modes in India accounted for 10 to 30 percent of all person trips and 30 to 50 percent of traffic on primary urban roads. The reasons for this dependence were attributed to the less developed economy and inexpensive lifestyle which the people had at that time. But later there was a massive economic boom in India which led to the development of urban conglomerates where majority of the economic activities were concentrated. The purchasing power of people increased and so the gap between have and have not's. The rich became richer and poor became poorer. Even in transportation field this disparity was quite visible with vehicles like cycle rickshaws and bicycles which were visible identities in Indian cities

during earlier 2000's paving way to motorized modes (Fig. 1). With the policies also being motor vehicle oriented there was a rapid decline in the use of non-motorized modes. Table 1 shows the rapid increase in vehicular population over the years till 2006 as per Ministry of Shipping, Road Transport & Highways Government of India (2009).

Majority of this vehicular growth was oriented in the urban centers and were preceded by lot of problems. Buis (2009) took the case of Netherlands and stated the main problems due to motor vehicular growth as increased pollution and congestion, economic losses in cities and high fatality rates due to accidents. A similar scenario can be found in India also. The expected decrease in the projected speed on major city corridors in India given in Table 2 in case of a do nothing scenario gives an indication of the congestion problem.

The estimated carbon emission increase of 61% between 1990 and 2001 for India (Ng, 2007) points to the pollution problem. Even though the pollution could be expected to show a downward trend by setting up vehicle emission standards, an enormous increase in number of motor vehicles will make this attempt futile. Road fatalities have also been showing upward trend as shown in Table 3. Ng (2007) found accidents to be highly relative to the distances

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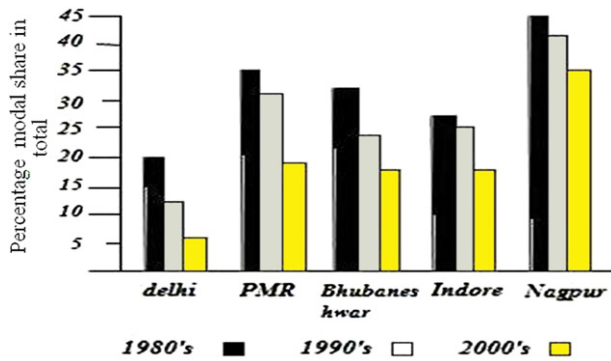


Fig. 1. Cycle share reduction over years in Indian cities. Source: Tiwari and Jain (2008).

actually traveled by motor vehicles. Supporting this argument, Litman (2010) mentioned that in countries like Germany and the Netherlands where walking and cycling travel rates are high the per capita traffic death rates are much lower than in automobile dependent countries. Similarly in India also we can argue that the increase in trip rate of motorized vehicle (Table 4) and also the increase in trip length (Table 5) mainly for cities with a population above 4 million are a major contributor to the accidents in these cities. Here the 2007 survey was done by Wilbur Smith Associates (WSA) and 1994 survey was done by Rail India Technical and Economic Services (RITES).

All these facts points to the necessity of reducing the dependence on motorized vehicles and promoting an alternate mode in the urban centers. An alternative mode which can reduce the unwanted impacts of motorization but at the same time is user friendly. The answer for this question of alternative mode could be found in the work of Riplogle (1991) who proposed that Asian cities need to adopt a non-motorized mode inclusive development to confront diminishing environmental and economic benefits in these cities due to their rapid and uncontrolled motorization. Riplogle also added that non-motorized vehicles are potentially important in solving these problems even though they cannot be considered as a complete solution.

2. Factors favorable for non-motorized development in India

The above mentioned discussion gives an idea of the declination of non-motorized vehicles due to motorization and points to the necessity of developing a non-motorized culture in urban environment in India. Now we will explore some factors which are favorable for such a development. The two major factors which can be attributed in favor of non-motorized development are the high

Table 1
Vehicular population in India.

Year end march	2 Wheelers	Car jeeps etc.	Buses	Others	Total (million)
	(as % age of total vehicle population)				
1951	12.02	71.04	15.16	1.78	0.22692
1961	17.67	62.38	11.51	8.43	0.49302
1971	37.87	44.85	6.13	11.15	1.51776
1981	54.18	23.97	3.34	18.51	4.83483
1991	70.86	14.73	1.60	12.70	20.02369
2001	74.10	13.53	1.27	11.10	52.02054
2002	74.32	13.58	1.16	10.95	55.974
2003	74.79	13.50	1.16	10.55	63.52548
2004	75.32	13.71	1.16	9.92	68.93856
2005	75.81	13.35	1.16	9.57	77.5065
2006	71.04	12.02	1.78	15.16	85.21911

Note: Others include Tractors, Trailers, 3 Wheelers & etc. (P): Provisional. Source: Ministry of Shipping, Road Transport & Highways Government of India, 2009.

Table 2
Anticipated average journey speed (kmph) on major corridors by city Category.

Sl. No	City	Population	2007	2011	2021	2031
1	Category	<5 lakhs	26	22	15	8
2	Category-1	5–10 lakhs	22	18	13	9
3	Category-2	10–20 lakhs	18	13	10	7
4	Category-3	20–40 lakhs	22	18	12	9
5	Category-4	40–80 lakhs	19	15	10	7
6	Category-5	>80 lakhs	17	12	9	6

Source: Ministry of Urban Development, 2008.

percentage of low income and middle income groups, and the high percentage of short trips existing in Indian cities. The World Bank Official Website had classified India a lower middle income economy which points to the presence of high percentage of middle income groups. Tiwari (2003) estimated that in Delhi the percentage of low income group which earns a salary less than Indian Rupees (Rs.) 2000 forms 60% of total population of 13 million and that majority of trips performed by them use walking or cycling as the main mode (Table 6). Tiwari (1999) explained that even a subsidized transportation system remains in-accessible for a large portion of this low income group who works in informal sectors and that cycling and walking was their only logical mode option. The study also suggested the necessity of including these captive riders for a sustainable transportation development. According to the Comprehensive Traffic and Transportation Plan for Bangalore (2007) (CTTP report, 2007) for Bangalore city the percentage of population earning less than Rs. 5000 a month is around 3%, but the number of trips made by non-motorized mode contribute to 10.55% in total trips made. Two of the reasons for this high NMT trips may be due to the acceptance of walking and cycling even in the population of other income groups mainly the middle income groups and also due to the comparatively better foot paths provided in the city of Bangalore. This fact suggest that even urban poor and middle class people need to be included in the transportation development and that non-motorized mode has a role in achieving it.

Another factor favorable for non-motorized traffic development is the number of short distant trips made in urban cities. As indicated by Rastogi (2009) in his work, European cases show that bicycle is far more superior below 5 km. This has been verified even for the case of Bangalore in the CTTP report (2007) which found the average trip length of cycle as 3.88 km and of walking as 1.01 km. Even studies done by Arasan, Rengaraju, and Rao (1994) in Indian scenario for Tiruchirappalli indicates a pedestrian acceptability of 1700 m for walking and 5200 m for cycling. Rastogi and Rao (2003) found the same as 910 m and 2724 m in Mumbai. Tiwari and Jain (2008) in her work mentioned the average trip length for bicycle in Delhi as 5.1 km and 35% of the total vehicular trips as short trips. For Bangalore, the CTTP report (2007) mentioned the average trip length for entire class of vehicles as 10.57 km and 27% of the trips as below 5 km. Table 5 shows the trip length variation with population in urban cities of India.

From the table it may be inferred that the average trip distance is below 5 km for cities with population less than 40 lakhs and that there is an immense potential for promoting non-motorized modes especially the bicycle in Indian cities.

3. Problems hindering non-motorized traffic development in India and factors effecting non-motorized ridership

Even though there is a huge scope for non-motorized modes in India there are certain basic factors which prevent people from using it. The first and foremost one is the lack of infrastructural provisions. There is a lack of proper foot paths and cycle tracks which often compels the commuter to use the road along with the

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