8 The Structures of Mobility and Challenges of Low Carbon Transitions in India

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Introduction

Sustainable mobility describes all forms of transport which minimise fuel consumption and carbon emissions by minimising the need to travel (Knoflacher, 2007; Banister, 2008), and includes modes such as shared or public transport, walking and cycling (Agarwal & Zimmerman, 2008). Knoflacher (2007) argues that the hypothesis of traditional urban transport planning 'growth of mobility' and 'travel time saving by increasing speed' end up creating more transport, environmental and socio-economic problems all over the world. The traditional Indian city was oriented towards the use of low carbon and low-energy transport modes like walking and cycling. High rates of economic growth and rising household incomes in the last decade and a half contributed to the emergence of a new, carbon-intensive mobility pattern centred on the automobile. The growth in transport-related emissions presents a large challenge for India, particularly in achieving a low carbon society (Schipper *et al*., 2009; Woodcock *et al*., 2009). In this chapter, the growth and domination of high-carbon, motorised transport in Indian cities is presented as a major challenge, and opportunities and challenges by way of efforts to respond to growing car-dependence in India are examined.

Non-motorised transport (NMT) modes, including cycles, pedal rickshaws, and animal-driven carts, were once the dominant way of moving around in Indian and other Asian cities (Pucher *et al*., 2007). Replogle (1991) estimated in the 1990s that

NMT accounted for 25-80% of trips in Asian cities, significantly higher than other parts of the world. A Government of India-sponsored study (WSA & MoUD, 2008), based on a sample of 87 Indian cities estimated that the share of cycling declined from an average of 30 percent in 1994 to 11 percent by 2008. The same study also reported a 12 percent rise in the share of personal modes of transport and declining public transport trips in the same time period. These are not encouraging signs from the point of view of reducing emissions or encouraging sustainable transportation, as noted by National Transport Policy Development Committee (NTPDC) working group on Urban Transport (NTDPC, 2012). Consequently, rising numbers of fatalities, overall congestion, and poor air quality have affected the quality of life in Indian cities (Badami, 2009; Mohan, 2013). Lack of integration between land use and transportation, the absence of an enabling environment for NMT modes and poor transportation demand management (TDM) have raised questions over Indian cities' preparedness to transition to a low carbon future.

The Government has made attempts to address the many negative externalities of rising motorisation in the last decade. An example of this is the framing of the National Urban Transport Policy that puts people, rather than vehicles at the centre stage of cities (MoUD, 2006). This landmark change in policy was followed by other interventions including the adoption of bus-based and rail-based mass rapid transit systems in several Indian cities like Delhi, Mumbai, Chennai, Bengaluru, Hyderabad and Kochi, among others. However, these interventions have been criticised for their fragmented response to the problem (Mahadevia *et al*., 2013). This chapter argues that the translation of progressive policies into action has been marred by confusion and ad-hocism which has harmed the cause of low carbon transitions even further. It traces how an early post-independence obsession with modernity drove cities away from a low carbon sustainable model to a more energy-intensive model. A narrow re-imagining of roads as mere thoroughfares combined with borrowed motifs of modernity led to a culture of automobility that prioritises personal mobility over other low carbon alternatives. The chapter argues that despite the many challenges facing the prospect of low carbon transitions, recent government interventions in the form of policies and programmes present some hope.

Urban planning in India prioritises motorised traffic

Ancient Indian cities were only large enough to be easily traversed on foot or other modes like animal carts. Together with the lack of modern modes of intra-city travel seen today, this led to a limitation of the size of ancient Indian cities (Schlingloff, 2014). Colonial settlements such as those of Fort St. George (Madras) and Fort William (Calcutta) were compact on account of the limitations of transport modes in the seventeenth and eighteenth century, respectively (Ghose, 1960).

The planning of New Delhi by Edwin Lutyens in the 1920s was considered by some to be a landmark event in the history of modern urban planning in India (Gordon, 2006). However, notwithstanding the symbolism in the adoption of local building materials, the plan had little in common with the traditional Indian city (Volwahsen, 2002). Unlike the typical chaotic intersection of roads, New Delhi was designed with wide roads accompanied by ceremonial pathways and monuments. This was accompanied by strict zoning and adoption of a low-density approach to residential settlements. This new urban form not only contradicted traditional Indian use of road space but also disadvantaged NMT whilst prioritising motorised transport.

The problem with the idea of wide motorised streets as an integral part of the modern Indian city is that it delegitimises other traditional low carbon uses of the street as not being modern enough (Joshi & Joseph, 2015; Anjaria, 2014). For example, pedal rickshaws and cyclists are often victimised in Indian cities and barred from using many streets on account of their low speed 'causing congestion' (Roychowdhury *et al*., 2013; Bandyopadhyay & Chakraborty, 2013). Meanwhile, automobiles are encouraged to consume road space. This duplicity in allowing 'higher' modes like cars to ply while discouraging the use of low carbon modes (e.g. cycles and pedal rickshaws) is symptomatic of a system that prioritises motorisation.

Existing conditions of urban transport

Indian cities have seen massive growth and spatial expansion over the last few decades (MGI, 2010). With expanding city boundaries, trip lengths and trip times increased, creating the desire for 'faster' options of mobility. As a result, private modes of transport became more desirable over modes that were low carbon and low energy.

Mode share

Figure 8.1 presents the mode share among cities with varying population sizes. This data is a compilation of various studies, using different methodologies, and hence, a large variation is observed between cities of similar category and across categories (WSA & MoUD, 2008). Broad patterns reveal that in cities with larger populations, the share of NMT decreases, PT increases, and personal motorised modes decreases. The share of NMT modes reduces by as much as half. While the share of personal motorised modes decreases in cities with large populations, that of cars alone increases to levels greater than that of two-wheelers.

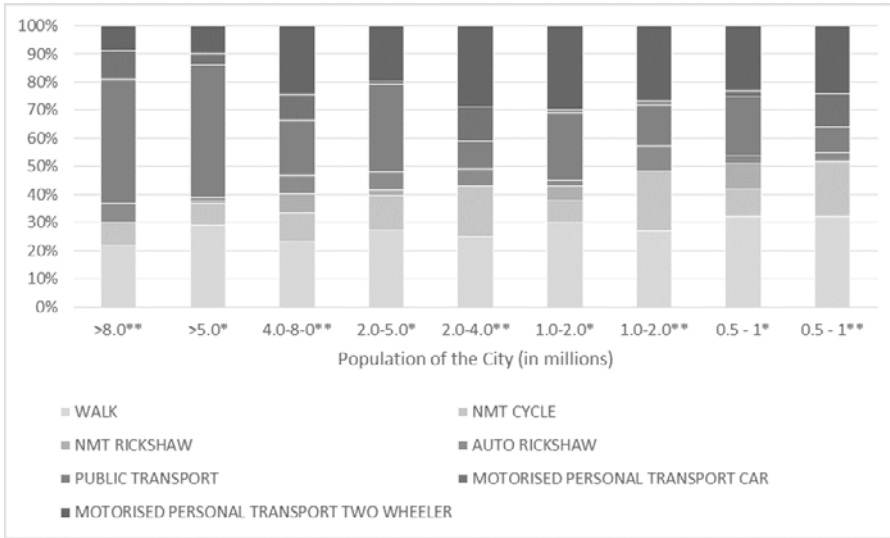

Figure 8.1: Mode share in Indian cities by city population. Source: *Tiwari (2011) and ** WSA (2008).

Increase in urban transport demand

The two pan-India studies (WSA & MoUD, 2008; RITES, 1994), indicate that except for the largest cities, mean trip length has not risen within the same population categories. However, the challenge in the provision of sustainable transport alternatives has been the sheer growth in the number of cities with large populations and added population growth in large cities. During the last decade, India's urban population grew by 91 million to reach 377 million. While half this growth was in cities with less than 0.5 million population (adding 174 new cities with populations between 0.1 and 0.5 million), the other half of the growth was in 97 cities with populations above 0.5 million (Census of India, 2011b). Increased transport demand in Indian cities is not just a result of rising incomes, but also due to expanding city sizes. This translates into longer trip lengths for a greater proportion of the population.

City Category	Population (million)	Cities in 2001	Cities in 2011	Urban Population 2001	Urban Population 2011	Trip Length (in km)	
						WSA, 2007	RITES, 1994
1	< 0.5	220*	372*	49%	49%	2.1- 3.0	3.70 - 4.38
2	0.5 - 1.0	39	44	9%	8%	2.6 - 4.5	4.38 - 4.86
3	1.0 - 2.0	22	34	9%	12%	4.1 - 5.5	4.86 - 5.51
4	2.0 - 4.0	6	11	5%	8%	5.0- 6.0	5.51- 6.40
5	4.0 - 8.0	4	3	7%	5%	6.1- 8.6	6.40 - 7.62
6	> 8.0	3	5	21%	18%	9.6- 11.9	7.62 - 8.32
Totals		294	468	286 million	377 million		

Table 8.1: Trip Length of cities with varying populations. Source: Census of India (2011); WSA (2007); RITES (1994). Note: * Cities with population between 0.1 million and 5 million.