

HOW SHOULD
CITIES PLAN FOR
SUSTAINABLE
MOBILITY?
A FRAMEWORK
BASED ON
EVALUATION OF
CITY MOBILITY
PLANS

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How should cities plan for sustainable mobility? A framework based on evaluation of city mobility plans

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Abstract

Indian cities face the huge challenge of meeting the rapidly growing urban mobility demand in a low carbon and sustainable manner. To guide the cities to move towards the sustainable mobility path, the Government of India is implementing its National Urban Transport Policy that advocates planning for the ‘movement of people, not vehicles’. The successful implementation of the Policy requires cities to develop robust sustainable mobility plans, which call for capacity and expertise that most cities lack. Given the lack of capacity in Indian cities to prepare ‘sustainable’ mobility plans, it becomes necessary to provide them with a framework for preparing the ‘right’ plans and eventually provide them with a template that they can use.

At present, about 50 cities in the country have developed their mobility plans or are in the process of doing so. This paper aims to critically evaluate some of the mobility plans from the perspective of sustainable mobility principles. The purpose of this evaluation is to identify and highlight the gaps in these mobility plans so that these gaps can be addressed by cities that are in the process of developing their mobility plans or are yet to begin.

Keywords: Sustainable mobility, Comprehensive Mobility Plans

1. Introduction

The current pattern of urban transport growth in most developing countries is marked by an explosive growth of personal vehicles and declining share of public and non-motorized transport leading to traffic congestion, road accidents, air and noise pollution, growing dependence on fossil fuels and increasing CO₂ emissions. Indian cities are no exceptions. Rapid urbanisation, rising per capita incomes, growing aspirations and sprawling cities have resulted in transport demand increasing at a rate much faster than the rate of growth of transport infrastructure. Cities are witnessing an

exponential increase in the use of personal transport and a steady decline in the modal share of public transport and non-motorized transport.

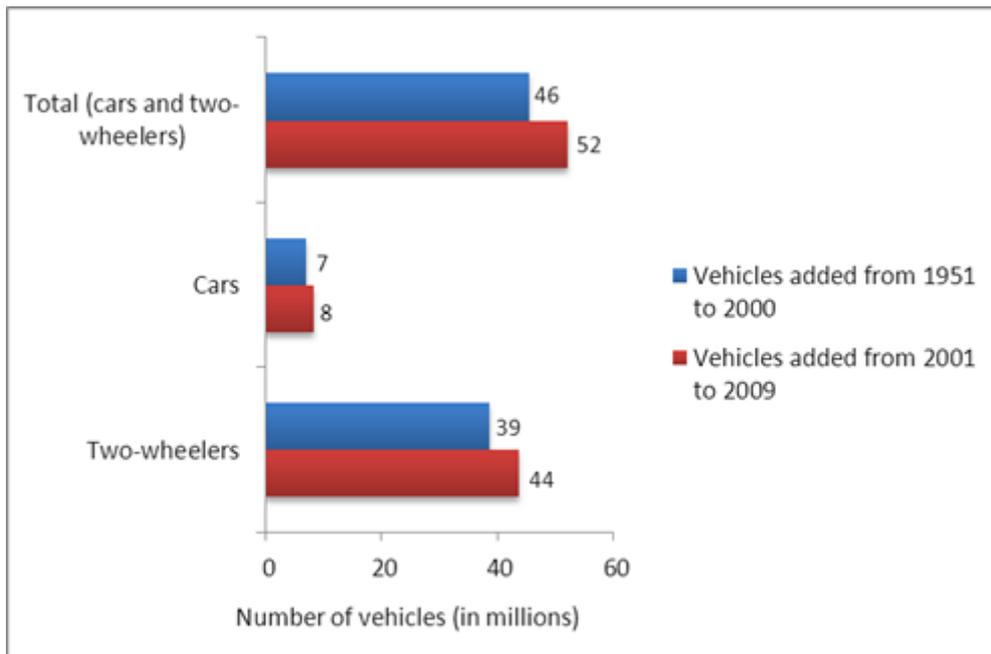
There has been a growing realization, both internationally and nationally, that the current unsustainable trends in urban transport should be arrested and urban transport placed on a low carbon and sustainable path. Several international fora like the SLOCAT , the recently concluded United Nations Conference on Sustainable Development, 2012 (Rio+20), etc. have highlighted the challenges associated with meeting urban mobility demand in a sustainable manner. In India, the National Urban Transport Policy, 2006 aims to move transport in Indian cities to a sustainable and low carbon path. While the Policy promotes all sustainable mobility principles and advocates planning for the ‘movement of people, not vehicles’, the successful implementation of the Policy requires cities to develop robust sustainable mobility plans, which call for capacity and expertise that most cities lack. Given the lack of capacity in Indian cities to prepare ‘sustainable’ mobility plans, it becomes necessary to provide them with a framework for preparing the ‘right’ plans and eventually provide them with a template that they can use.

The implementation of the National Urban Transport Policy in India is supported by financial assistance from the National Urban Renewal Mission. The Mission covers only 65 cities, including the 35 cities with a population of more than 1 million as listed in 2001 census. The rest are capitals of Provinces and cities of religious or tourist interest. At present, about 50 cities, some covered by the Renewal Mission, have developed their mobility plans or are in the process of doing so. This paper aims to critically evaluate some of the mobility plans from the perspective of sustainable mobility principles. The purpose of this evaluation is to identify and highlight the gaps in these mobility plans so that these gaps can be addressed by cities that are in the process of developing their mobility plans or are yet to begin.

2. The urban transport scenario in India

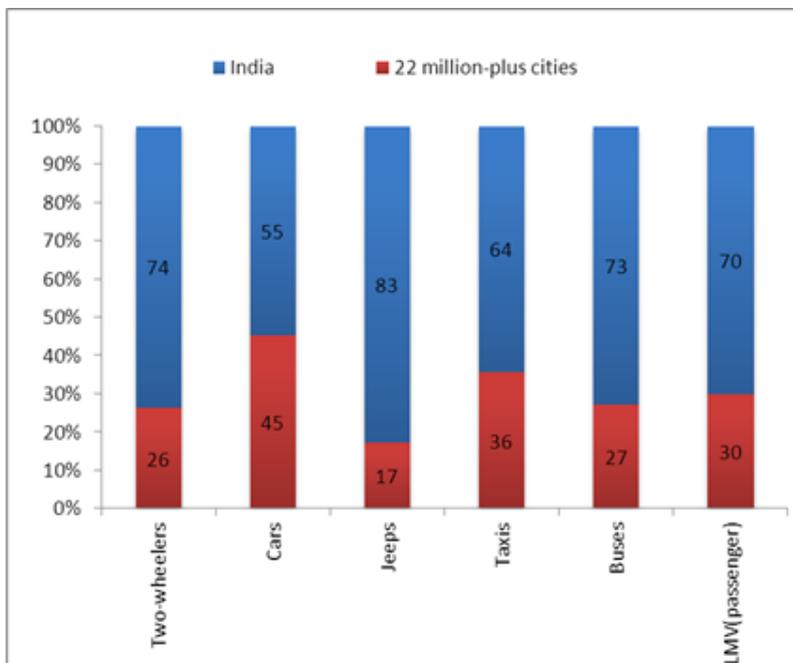
The Indian road transport sector has been marked by an unprecedented growth in the number of personal vehicles. As shown in figure 1, the number of personal vehicles i.e. cars and two-wheelers added to Indian roads in the last decade (2001-2009) has been higher (52.1 million) as compared to the total number of cars and two-wheelers added in the first five decades (1951-2000) after independence (45.6 million). During the same period, the share of public transport has declined steadily. A significant share of the cars and two-wheelers in the country is concentrated in just 22 cities having a population of over 1 million (figure 2). These and other such large cities in India, which are growing at a very rapid pace, are witnessing a growing demand for mobility. In the absence of organized public transport services and infrastructure for non-motorized transport in these cities, the demand for mobility is being met either by personal modes (for those who can afford) or by informal modes (for those who cannot afford personal vehicles).

Figure 1 Unprecedented growth in the number of personal vehicles in India in the last decade



Source for vehicle registration numbers in India: MoRTH (Various years)

Figure 2 Share of passenger vehicles in 22 cities with population above 1 million (Year- 2009)



Source for vehicle registration numbers in India: MoRTH (Various years)

The public and non-motorized transport shares in most big cities in the country have been declining

gradually. It is estimated that the public transport share in cities having a population of more than 0.8 million was in the range of 59.7% to 78.7% in 1994; this however had declined to 35.2% to 54.0% in 2007 (MoUD and WSA, 2008). The public modes in most Indian cities constitute barely 2-3% of the entire vehicular fleet; the four largest cities in the country i.e. Mumbai, Delhi, Kolkata, and Chennai, showed a negative growth rate in bus fleet size from 2000 to 2007 (Ghate and Sundar, 2010). The lack of infrastructure for non-motorized transport and the increasing trip lengths due to the horizontal expansion of cities have also affected pedestrians, cyclists and other non-motorized transport users in cities. Indian cities are also witnessing massive congestion problems as a result of the increasing number of on-road vehicles; the average journey speed on major corridors in large cities is about 17 kmph (MoUD and WSA, 2008). This congestion leads to economic loss, affects the local environment and public health and creates a hostile environment for pedestrians and cyclists.

Clearly, the current state of affairs in Indian cities calls for urgent action to make the transport sector sustainable. Recognising this, the Government of India launched the National Urban Transport Policy (NUTP) in 2006 (Box 1). As stated earlier, this policy, which is being implemented with financial support from the National Urban Renewal Mission, makes it conditional upon the cities to prepare Comprehensive Mobility Plans (CMPs) that are consistent with the NUTP, and identify projects that would make their transport systems sustainable. CMPs are critical from the perspective of deciding the future pattern of growth of transport in the cities as they delineate the path that cities will take to provide 'mobility for all' .

Box 1: National Urban Transport Policy, India

The National Urban Transport Policy (NUTP) was announced by the Ministry of Urban Development (MoUD) in 2006. Its key features include:

Ensure coordinated planning for urban transport

Ensure integrated land use & transport planning

People focused & equitable allocation of road space

Investments in public transport & non motorized modes

Strategies for parking space and freight traffic movements

Establish regulatory mechanisms for a level playing field

Innovative financing methods to raise resources

Promote intelligent transport systems (ITS), cleaner fuel & vehicle technologies for cities

Projects to demonstrate best practices in sustainable transport

Build capacity to plan for sustainable urban transport

3. Review of Comprehensive Mobility Plans (CMPs) for Indian cities

As stated earlier, the Government of India has mandated the formulation of CMPs by the 65 Indian cities covered by the National Urban Renewal Mission. These plans need to promote sustainable mobility principles as advocated in the National Urban Transport Policy (NUTP). As of June 2012, about 50 cities in the country had prepared/were in the process of preparing their CMPs.

The Government of India had issued guidelines and a CMP preparation toolkit to guide the development of the CMPs. While the guidelines and the toolkit outline the technical process to be employed in the preparation of the Plans, they do not ensure inclusion of sustainable mobility parameters in the Plans. As a result, while cities may adopt a technically sound approach in preparing the CMPs, they may not necessarily promote sustainable mobility holistically through Plan strategies, project identification and fund allocation. In order to evaluate this hypothesis, CMPs of five cities were selected for detailed review. The two main criteria used for the selection of cities were:

- Selected cities should represent different population sizes
- Selected cities should have different public transit characteristics

These cities are Kolkata, Pune, Surat, Jaipur and Kochi. The key population and public transit characteristics of these cities are given in table 1.

Table 1 Key population and public transit characteristics of the selected cities

Urban area	Population* (in 2001)	Public transit characteristics
Kolkata	13.2 million	Road, rail and water based mass transit systems; PT share- Buses- 45%, Rail and ferries- 16%
Pune	3.8 million	Bus-based public transit system; PT share- 18%
Surat	2.8 million	No city public transit service till 2007; city bus services introduced in 2007
Jaipur	2.3 million	Bus-based transit system operated by public and private operators; PT share- 26%
Kochi	1.4 million	Buses and ferries operated by private operators; PT share- Buses- 72%, Ferries- 10%

* Population of Urban Agglomeration

Source: TERI (2011)

A detailed review of the CMPs of the selected cities was carried out with reference to the following:

- Do CMPs promote all sustainable mobility parameters?
- Are right kinds of projects identified in the plans to ensure implementation of sustainable mobility strategies, if any?
- Does the fund allocation for projects prioritize/ensure adequate fund allocation for sustainable mobility projects?

In order to objectively assess the plans, a framework was developed to assess whether plans promote all sustainability parameters. The framework is discussed in the next section.

4. Framework to evaluate CMPs

The CMP evaluation framework focuses on evaluating the process of preparation of CMPs and the strategies and projects identified in the CMP.

4.1 Evaluating the process of preparation of CMP

For a city transport plan to be successful in terms of reflecting and addressing the needs and challenges of all key stakeholders- commuters, operators and planners, it is important that the process for preparing the plan is both technically sound and participatory. It should adopt sound technical approach (data, methods and tools) and be based on the use of some basic modelling tools; the preparation of the plan should also include consultation with all the key stakeholders in order to address their needs and challenges.

Data availability on mobility issues and trends is a key challenge in Indian cities, which limits the quality of analysis and modelling required for plan preparation. Any plan preparation exercise should, therefore, be based on adequate data and use/apply appropriate modelling techniques to predict future trends, identify appropriate strategies and evaluate alternatives.

Stakeholder participation is typically ignored while preparing plans; sustainable mobility plans should ensure an inclusive approach involving all stakeholders during plan preparation. The selected CMPs were evaluated to analyze if such a comprehensive approach was adopted in the preparation of the Plans.

4.2 Evaluating the contents of the CMP

The CMP as a future guiding document for transport sector development in the city should be able to encompass all sustainable mobility elements and translate the same into sound strategies and actions/projects that help to achieve, in particular, the following:

Access and equity

Safety and security

Environment friendliness and low energy use

4.2.1 Access and equity

To evaluate whether the CMP promotes access and equity, the strategies and projects proposed in the CMP were analysed to see if the CMP gives recommendations such as promoting equitable allocation of road space; promoting connectivity of slum/urban poor residential areas; special recommendations for mobility of the physically challenged, women, children and elderly; and integrated land use and transport development.

4.2.2 Safety and security

To evaluate whether the CMP promotes safety and security, the strategies and projects proposed in the CMP were analysed to see if the CMP contains recommendations such as providing segregated rights of way for cyclists and pedestrians; providing safe environment for mobility of all traveller categories; reduce encroachment of footpaths; and specific recommendations for security of women, children, elderly and vehicles.

4.2.3 Environmental friendliness and low energy use

To evaluate whether the CMP aims to promote environmental friendliness and low energy use, the strategies and projects proposed in the CMP were evaluated to see if the CMP gives recommendations such as:

- Promoting mass transport

Plans were reviewed to evaluate whether they propose public transport systems serving the entire population and recommend measures to improve access to the public transport nodes. The Plan recommendations were also evaluated to identify whether they suggest integration of IPT as a feeder to public transport systems; suggest measures to ensure quality of public transport services; promote a multi-modal public transport system; and recommend use of ICT to improve delivery of public transport services.

- Promoting NMT

The recommendations in the CMPs were reviewed to evaluate whether they recommend development of NMT networks in the city; creation of safe bicycle parking spaces; provision of facilities like shade giving landscaping, provision of drinking water and resting stations along bicycle corridors and pedestrian pathways and innovative schemes like 'rent and use a bicycle' for promoting cycling.

- Using effective traffic demand management principles and systems

The Plans were reviewed to understand if there were adequate recommendations in the Plans for promoting smooth movement on roads; schemes for incentivising shift to collective transport modes; disincentives for using personal motorized transport; and encouragement of virtual commuting to reduce congestion on roads.

- Promoting use of clean alternative

Plans were also evaluated to identify if they envision and encourage use of clean fuels by ensuring provision of supporting infrastructure at city level to promote use of these fuels.

4.3 Evaluating the implementation mechanism proposed in the CMP

The implementation strategy of a transport plan should prioritize the sustainable projects/actions and develop sound indicators to measure performance of plan implementation. CMPs were evaluated to see if they spelt out a clear implementation strategy and had prioritized projects. Plans were also reviewed to evaluate whether they set targets to be achieved (for e.g. 60% rider ship by public transport modes in 2015) through implementation of plan strategies and whether they formulate indicators to measure implementation. Strategies to finance the projects identified in the Plans and the institutional arrangements proposed to implement the Plans were also evaluated. Additionally the capacity building measures proposed (institutional and individual capacity building) in the Plans were evaluated to assess whether they were adequate.

5. Key findings from the review of CMPs

The CMPs of the five selected cities- Kolkata, Jaipur, Kochi, Surat and Pune were reviewed using the CMP evaluation framework described above and typical gaps identified. These gaps are discussed below:

5.1 Planning process/Plan

As stated earlier, stakeholder engagement in the preparation of the plan is important. It was observed that there was inadequate stakeholder engagement in the plan preparation process. In the preparation of the CMPs of Kolkata, Jaipur and Kochi the key stakeholders were hardly involved. While Pune and Surat established a mechanism to involve stakeholders, it was not clear whether the concerns of stakeholders were adequately addressed in the Plans.

While most of the Plans were weak in terms of adopting a participatory approach, the technical process of plan preparation was quite robust in all the cities except Kochi. In the four cities, comprehensive data collection was carried out and robust transport planning models used to predict future demands, identify strategies and evaluate alternatives.

With regard to the overall plan approach, it was observed that most of the plans did not adequately translate plan recommendations into the 'right' kind of projects that could help achieve the proposed strategy objectives. There was also a lack of clarity on formal linkages of CMPs with other city plans like the Master Plan, the City Development Plan, etc.

5.2 Non-motorized transport (NMT)

While most of the plans except Kochi, identified the need to promote non-motorized transport (NMT) modes and address the infrastructure bottlenecks, the focus was only on providing the Right of Way (ROW) for these modes. There were few recommendations on provision of supporting facilities for NMT users, an aspect typically ignored but critical for promoting the use of NMT.

Several studies have established that NMT use increases when the users feel secure on roads; the presence of hawkers on streets leads to a sense of security among road users. The strategies to promote NMT in CMPs did not recognize the role of hawkers/informal sector in ensuring secure street environments for NMT users and made no recommendations on integration of hawkers/informal sector in the proposals to promote NMT.

5.3 Security

None of the plans suggested any measures to improve the security of transport users, especially of the vulnerable traveller categories like women, elderly and children.

5.4 Access

All Plans except Kolkata ignored the promotion of universal accessibility to the transport infrastructure. Universal accessibility is critical to ensure an inclusive transport system that caters to the needs of all traveller categories including categories like the physically challenged, elderly, etc.

5.5 Public transport

All the CMPs identified a detailed strategy to expand/improve public transit services in cities. However, the plans lacked proposals to improve the quality of public transit services in terms of their reliability, comfort, etc. Also, proposals/projects were not identified to improve accessibility to public transit terminals and promote their integration with intermediate para transit modes like taxis, auto rickshaws, etc.

While some plans contained comprehensive transport and land-use integration strategies, they did not provide a clear strategy to implement proposed transit oriented designs that can help increase public transit ridership.

5.6 Use of information and communication technology (ICT) for traffic management and schemes for transport demand management

Plans lacked measures to promote use of ICT in mobility solutions related to traffic management, accident analysis, road maintenance and monitoring, efficient delivery of public transit services, etc.

Only a few plans like those of Pune and Kolkata suggested some innovative measures to reduce transport demand by means of parking policy/management plan. Other plans lacked proposals to restrain the use of private vehicles.

5.7 Environment

Most of the Plans lacked recommendations specific to improving the quality of the environment like promotion of clean fuels by creating supporting infrastructure, reducing air, noise and water pollution occurring on account of transport operations, construction, etc.

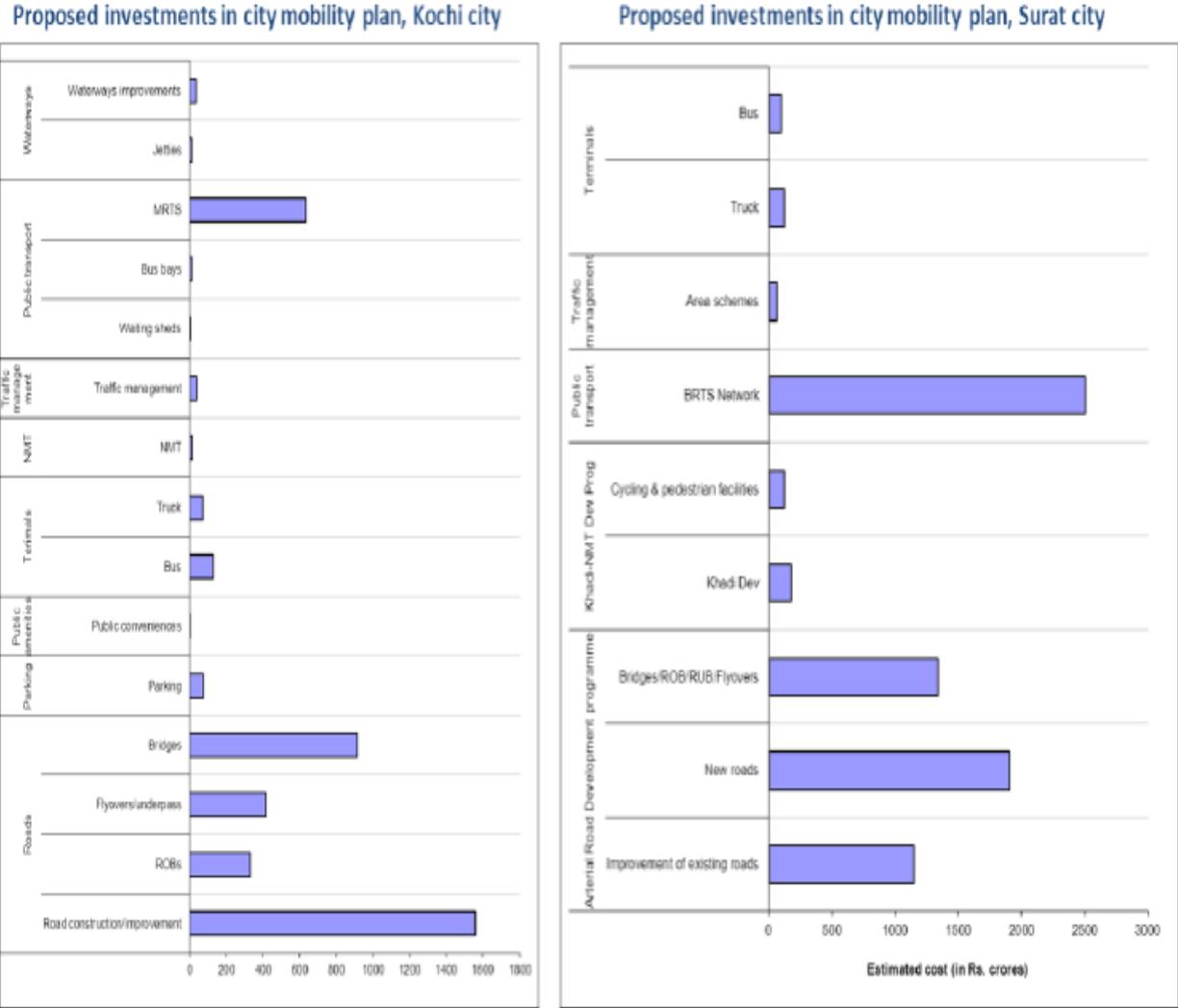
5.8 Implementation strategy

As for strategies to implement the plans, the CMPs reviewed lacked a clear implementation strategy; a well-defined framework of targets and performance indicators; identification of capacity building requirements; recommendations to establish a mechanism for periodic revision and updating ; and a proper communication strategy to build public support for projects to be implemented

In addition to the above listed gaps in the implementation strategies, the plans also failed to translate

all plan strategies into specific projects and allocate funds appropriately. On the contrary, the fund allocation in many of the plans was in favour of extensive road construction intended to create more space for personal vehicles. Figure 3 indicates the budget allocation for projects identified in the plans of two cities. As would be seen from the figure, significant investments were proposed for improvement and expansion of roads in both the cities and not for the implementation of projects that would make their transport systems sustainable.

Figure 3 Proposed investments in CMPs of Kochi and Surat



Source: Authors

6. Addressing the gaps in CMPs- Recommendations

The review of CMPs highlights several gaps that need to be addressed in order to ensure that the plans promote sustainable, low carbon and inclusive mobility systems. Table 2 gives the broad recommendations to address the gaps identified in the CMPs.

Table 2 Broad recommendations to address the gaps in CMPs

	Recommendations
Plan preparation process	Future revision of the Plans and the development of new Plans should ensure comprehensive stakeholder engagement including that of citizens' groups from all sections of the society. Comprehensive data bases should be created and updated regularly in order to ensure robust transport analysis and modelling. Basic transport planning modelling techniques should be used for forecasting future trends and identifying and analyzing alternatives.
Accessibility	Plans should provide measures/design guidelines to improve accessibility of vulnerable traveller categories for e.g. ensuring compliance of transport project designs with standards on universal access, physical connectivity of slums by public transit routes, providing differential public transit services, etc.
Land use and transport integration	Plans should develop strategies to promote integrated land use and transport development in the city. Plans should also recommend studies/projects to pilot the concept of transit oriented growth in the city and suggest mechanism for translating these concepts to city land use plans.
Security	Plans should recommend measures like establishing passenger information systems, separate coaches in public transit modes for specific traveller groups, integration of hawkers/informal sector in road proposals, etc.
Safety	Plans should recommend a city-wide strategy to promote safe movement of motorized and non motorized transport users; promote segregation of motorized and non-motorized users, recommend adequate measures to address safety concerns of NMT users at their interface with motorized traffic; ensure provision of safe road environment, etc.

Public transit	<p>Plans should develop a comprehensive strategy for public transport system for the city; the strategy should cover aspects related to availability, adequacy, affordability, quality, accessibility and integration of public transit modes and other transport modes. Proposals in the Plan that go against the sustainable mobility principles and promote vehicle-oriented rather than people-centric mobility need to be reviewed and revised.</p> <p>ICT needs to be used extensively to improve quality of public transit services; for e.g. using ICT to provide real time information on public transit to users, etc.</p> <p>Plans should identify relevant projects related to public transit development and give priority to them. Projects should be identified to integrate public transport nodes with NMT and Intermediate Para Transit (IPT) systems; for e.g. using IPT as a feeder to public transit terminals, bicycle renting facilities at public transit nodes, etc.</p>
NMT	<p>A comprehensive strategy to promote NMT needs to be developed; segregated lanes for NMT, adequate measures to ensure safety of NMT users at their interface with motorized traffic, parking spaces, facilities like shade giving landscaping, provision of drinking water and resting stations for NMT users, integration of NMT with public transit, bicycle renting facilities, etc need to be promoted. Relevant projects need to be identified to implement NMT measures suggested in the Plan.</p>
Demand restraint measures	<p>A package of demand restraint measures needs to be identified in the Plans to reduce use of private vehicles; for e.g. congestion charging in some identified congested areas, limited availability of parking spaces, etc.</p>
Plan implementation	<p>A clear implementation strategy for the Plan needs to be developed along with clear phasing of projects and activities. Targets and indicators need to be defined in order to measure the implementation of the Plan and achievement of the stated objectives. A mechanism needs to be put in place to ensure revision of the Plan periodically. Also, potential funding sources for the projects need to be identified.</p>
Institutional arrangements and capacity building	<p>Plans should propose an appropriate institutional set-up to implement the Plan and manage the transport sector; the proposed institutional structure should be on the lines of the Unified Transport Authority recommended in the National Urban Transport Policy. Detailed capacity building programs to build capacities at all levels should also be proposed in the Plans.</p>

7. Conclusions

The review of CMPs indicates significant gaps in the plan preparation process, plan recommendations (proposed strategies, projects and fund allocation), and in the implementation strategies. There is a need to address these gaps while revising these plans or drawing up new CMPs. The CMPs should be prepared in a manner that they address all transport related issues (existing and expected) and promote a sustainable and low-carbon transport system for the cities. The plan preparation process should be participatory and technically sound. The projects proposed should help to achieve the objectives listed and address sustainability concerns. The linkages of CMP strategies/projects with the other key city plans should be clearly spelt out. The implementation strategy should be clearly laid out along with prioritization of projects, identification of sources of funding, establishing institutional set-ups and building capacity of officials responsible for transport planning and implementation.

A framework should be given to the cities to guide the preparation of sustainable CMPs. This framework should include all sustainable mobility parameters and guidance on how the cities could incorporate these parameters as specific strategies and actions. Besides this, the framework should also describe the ideal Plan preparation process that should be followed by the cities. This framework could also be used by the approving agencies to evaluate whether a robust planning process has been adopted and whether all sustainable mobility parameters have been addressed in the Plan.

As stated earlier, presently only a few cities are preparing their city mobility plans. According to the Census of 2011, there are 53 cities in India with a population of more than 1 million as against 35 listed in the census of 2001. Of these, many cities have not yet initiated preparation of their CMPs. It is important to encourage and incentivise these cities also to draw up sound mobility plans. In fact, it is necessary to go beyond and encourage cities with more than a population of 500,000 to start planning for sustainable mobility in their cities. It is important to sensitize them about sustainable mobility issues, encourage them to recognise that their cities cannot be liveable unless their transport systems are sustainable, that people should occupy centre stage in their cities and that all plans should promote their common benefit and well-being. Ultimately, a goal can be achieved only if there is a path leading to that goal. It is that path to sustainable transport that Comprehensive Mobility Plans should be delineating.

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