

In this issue

Sustainable transportation system for cities of developing countries: challenges and issues

In the recent past, the word 'sustainability' has attained a prominent place in transportation planning, policy and other documents. It can be broadly defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their needs'. In the context of transportation, sustainability would mean developing better transportation systems, options, and expectations consistent with the objective of securing future social and economic development within a sustainable environment that ensures community well-being. The analysis of data and information available on developing countries clearly suggests that the current systems and trends of urban transportation, with respect to both mobility and safety, are not sustainable. Moreover, sustainable transport is also important for developing countries from the perspective of climate change, i.e. to improve the carbon footprint/ecological footprint of transportation systems. These considerations therefore thrust the need for achieving sustainability in urban transport, particularly for developing countries, not just from the mobility and safety perspective but also from the perspective of local and global environmental issues.

These transportation issues elicit several interesting questions for cities of developing countries:

- What methodologies/approaches have been developed to evolve effective and sustainable solutions for cities of the developing countries?
- What are the new technologies or approaches, that need to be developed?
- What are the technological barriers and research frontiers that merit immediate investigation?

The purpose of this special section is to address questions like the above and present articles that address the challenges and issues with respect to achieving sustainable transportation

system for cities of the developing countries. The objective is to produce an archival snapshot of the state of knowledge in this field and formulate strategies for future research directions. These articles cover aspects related to cities of the developing countries like research issues in sustainable transport, non-motorized transport (NMT), public transport (PT), road safety in developing countries and the role of intelligent transport system (ITS) in achieving sustainability.

Verma *et al.* (page 1328) aim at identifying the research issues and challenges that need to be addressed to achieve a sustainable transportation system for Indian cities. The same is achieved by first understanding the current system and trends of urbanization, motorization and modal share in India, and their impact on mobility and safety (the two basic goals of transportation) as well as environment. The paper concludes by summarizing the research issues with respect to transportation planning/modelling, NMT, PT, driver behaviour and road safety, and traffic management. Rastogi (page 1340) presents key issues and guiding principles of sustainable transportation system, and discusses the sustainability of non-motorized modes across the travel modes and within the modes. Policies related to non-motorized modes especially walking and bicycles are also discussed. At the end, it is emphasized that due consideration should be given to the various aspects mentioned in the paper, which would help in the provision of non-motorized facilities in an area, thus making it sustainable.

Sarkar and Thakur (page 1349) make an attempt to explore the possibility of finding an approach to the development of a sustainable system. They discuss various cities with respect to their traffic problems and methods adopted to mitigate these problems. A case study of Kolkata was taken to appreciate the problems and issues of the existing transport system which is increasingly becoming unsustainable. On the basis of literature studies, an approach to make the transport system sustainable for Kolkata has

been suggested. Madhu *et al.* (page 1362) present a part of the work of Road User Cost Study (RUCS), that evaluates the changing speed characteristics on major highways, which is an important input in the estimation of RUC. An attempt is made to explicitly study the speed characteristics on high-speed multi-lane corridors in plain terrain considering both straight and curved sections spread across the country. From the collected data, free speed profiles of different vehicle types on high speed corridors of India and subsequently free speed equations have been developed considering the effect of roadway roughness.

Verma *et al.* (page 1373) argue that improved driver behaviour can be an effective counter measure to reduce the vulnerability of road users and inhibit crash risks. They highlight improved driver behaviour through better driver education, driver training, and licensing procedures along with good on-road enforcement as an effective counter measure to ensure road safety in India. On the basis of review and analysis, they also recommend certain measures pertaining to driver licensing and traffic law enforcement in India aimed at improving the road safety. Chakroborty (page 1386) highlights the relationship between sustainability (or maintainability) and efficiency of transport systems. He also outlines some of the problems and issues that exist in providing mobility to urban Indians. Finally, he enumerates some of the ways in which application of (modern) Intelligent Transport System technologies can help improve the efficiency of the transportation system and ultimately help achieve a sustainable urban transportation system.

It is my hope that these articles provide insight into the challenges in achieving sustainable transportation system for cities of the developing countries and offer scientific review and methods that can be used to address the unique problems and issues faced by them.

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—Guest Editor