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**Travel Behavior in Rapidly Developing Countries**

***Sanjay Gupta***

*School of Planning and Architecture, New Delhi, INDIA*

***Sivaramakrishnan Srinivasan***

*University of Florida, Gainesville, USA*

***Nazneen Ferdous***

*Resource Systems Group, Inc., White River Junction, USA*

1. **Introduction**

This report is based on a workshop titled “Travel Behavior in Rapidly-Developing Countries”. The purpose of this session was to discuss and characterize travel behaviour in the context of rapidly-developing countries, and to identify areas of research to address the changing/growing travel needs of the population in such countries.

The participants in this workshop represented different interests and came from a range of distinct academic disciplines, research areas, businesses, and private sectors. First, one of the Workshop Chairs provided an overview of issues related to travel behavior in developing countries. The presentation focused on an appreciation of travel patterns in the Indian context and highlighted various factors which characterise the mobility patterns of a typical developing country like India. The presentation concluded with identification of certain research issues which formed the discussion agenda for the workshop. The participants were then randomly divided into three groups (about seven persons per group) to discuss, in more detail, specific issues and possible solutions. These group-discussions lasted for about an hour. After a short break, a resource-paper titled “Modeling Travel Behavior: The Developing Country Context” was presented by the resource paper authors. This was followed by short presentations from one member of each of the three groups on the salient aspects of their discussions. All the workshop participants further deliberated, as a single group, on issues raised in the presentations. The workshop chairs wrapped up the workshop proceedings by summarizing the thoughts and issues discussed throughout the session and by identifying areas for future research.

The rest of this report is structured in three sections. Section 2 presents an overview of travel-behavior related issues in rapidly developing countries while Section 3 summarizes the findings from sub-groups and group discussion. The last Section 4 concludes the report by highlighting the important findings.

1. **Overview of Issues**

Rapidly-developing countries were identified to have the following characteristics:

* high population growth and urbanization trends
* immigration of workers, largely in informal sector
* unplanned, haphazard development, and rampant sprawl
* rising purchasing power of households
* rising motorization levels owing to rising income and poor public transport supply levels
* transportation supply not keeping up pace with the rapidly-increasing demand
* distorted transportation policies
* limited public sector finance

Although several countries including India, China, Brazil, and other nations from South-East Asia and South America can all be classified as being rapidly-developing, India was taken as the primary example. Some of the common factors driving the travel and mobility characteristics of India include:

* Reduction in cost of vehicle purchase has led to an increase in household vehicle ownership levels.
* Despite rapid motorization trends, cars and two wheelers account for only 10-20% modal share while the majority of trips on average are still undertaken by non- motorized modes (NMT) and public transport.
* Motor-vehicle owning households make, on average, more trips than non- motorized households. Further, “search field” of households increases with income and vehicle ownership levels leading to increased travel distances.
* Significant changes in household structure have been observed such as decrease in joint families and increase in nuclear families (overall reduction in household sizes). Increases are also seen in dual-worker households with increasing women in work force.
* Women are less likely to travel longer distances for employment due to their domestic responsibilities.
* An increasing trend in the number of licensed drivers (especially females) in the households is observed.
* Urban sprawl has resulted in longer trip lengths and different modal choices. Increase in city sizes encourage shift from flexible public transport services to fixed route bus /transit services.
* Work trips are largely radial, focusing on central area of mono-centric cities.
* Increases in service employment / hi-tech jobs could shift commute patterns to possibly the traditional “off peak” periods.
* Inequity in mobility and accessibility still exits and the inequalities are perhaps becoming larger given the rapid economic progress of certain segments of the population. Mobility problems of urban poor are of special concern.

Despite the above-discussed factors, it appears that the nature of travel is not yet completely (qualitatively/empirically) documented. In particular, what is known is mostly aggregate trends and little is known about travel behavior of individuals (what influences individuals’ travel decisions, how travelers respond to changes, etc*.*). Although various infrastructure expansion schemes, demand-management schemes, and transit-system improvements (“metro” rail / bus-rapid transit) are being considered, there is minimal understanding of the effects of these strategies on travel-demand.

In this context, the workshop participants were asked to discuss several issues including:

1. What factors should be taken into account while studying travel behavior in rapidly developing countries?
2. What types of modeling frameworks are relevant and feasible?
3. What data and survey techniques are necessary?
4. What are the major future research directions?
5. How can IATBR help with furthering research on travel behavior in developing countries?
6. **Summary of Discussions**

The outcomes of discussion during the workshop are summarized below.

1. Heterogeneity in travel patterns based on the following factors should be considered:
* Demographic and socio-economic differences, in particular, the effects of income, employment, and household structure.
* Cultural, religious, and ethnic factors that could be very different across the rapidly-developing countries
* Recognition of “transportation-disadvantaged” segments (mostly, the poor, disabled, elderly, and women).
* Residential location choices in relation to city structures and land-use patterns
1. In identifying a suitable modeling framework, the following factors should be taken into account:
* “Appropriate” methods rather than “advanced” methods should be adopted. It would not be appropriate to force-fit the models from the developed nations on to the behavior of the developing countries. Rather, one needs to develop methods that are descriptive of the local behavioral patterns.
* Micro-simulation as a modeling tool should be explored. While this is a powerful method to model complex systems, one needs to be careful about the aspects of behavior that are accommodated in the simulation framework. For instance, aspects such as indiscipline and non-compliance with laws which relate to human behavior are perhaps better corrected than modeled.
* Dynamics in behavior should be suitably captured. Periodic updating/re-calibration of model parameters will be necessary, especially if models are built using cross-sectional data. These updates may be more frequent than what is currently adopted in developed nations today. A related issue is the time-horizon for the forecasts. Disaggregate travel-demand models developed may simply not be appropriate for long-range (25 year) forecasts which may be needed to support strategic visioning.
* Most immediately, models for vehicle (car and two-wheelers) ownership and mode-choice model are particularly needed. These models should include policy-sensitive explanatory variables to enable systematic evaluation of alternate strategies to deal with growing auto ownership and declining transit-shares. The mode choice model(s) should include walking and cycling trips.
* In addition to modeling intra-city travel patterns, long-distance travel, and in particular, air-travel behavior should also be modeled.
* Mobility aspect needs to be addressed at micro level (spatially) to make sure that short-distance trips do not get under represented.
1. When deciding on data needs, the following factors should be kept in mind:
* There is a need to collect both quantitative and qualitative data (preferences, attitudes, comfort, access to amenities, constraints, etc*.*). The latter is particularly needed to better understand the behavioral decision-making mechanisms.
* Given the significant heterogeneity (including literacy, disability, and access to telephones and other communication technologies) in the population, a combination of instruments and survey techniques will be needed to collect data. While in-person interviews may be appropriate for certain segments, web-based surveys, computer aided personal interview techniques, and GPS-based surveys should also be explored to cover the younger, technologically-savvy groups.
* Surveys for travel patterns on both weekdays and weekend days should be included. Data should also be collected more frequently (for example, every 2-5 years). Ability to obtain panel data should be explored.
1. Major research areas
* Fundamental research on understanding how transportation/land-use investments improve the livelihood/well-being of people is an important area of future research. A related aspect is studying the travel-behavior patterns of the transportation-disadvantaged population.
* Interdependencies between land-use and transportation patterns including the effects of sprawled developments on travel patterns should be explored.
* Pilot studies on analyzing the effectiveness of alternate survey techniques and development of methods for combining these data would be very useful for further large-scale data collection efforts.
* Targeted empirical studies on how specific policies will affect travel patterns need to be encouraged.
* Development of a travel-modeling framework for rapidly-developing countries and the development of guidelines for modeling would enable research findings to be used in practice.
1. IATBR’s role in furthering research on travel behavior in developing countries:
* Organize regional- and local- conferences at more frequent intervals, possibly with the support and involvement of local organizations and agencies.
* Provide a platform for knowledge sharing – possibly the web site can serve as a repository for references to research documents on travel-behavior patterns in developing countries.
* Facilitate in creating an environment for data archiving and sharing to help prevent duplication of data collection efforts.
1. **Conclusion**

The workshop served as an excellent opportunity to discuss and characterize travel behavior in the context of rapidly-developing counties, and to identify areas of research to address the changing/growing travel needs of the population in such countries. The participants represented different interests and came from a range of distinct academic disciplines, research areas, businesses, and private sectors. The workshop format (discussions in smaller groups of about seven persons) provided opportunities for all persons to speak and share views.

The discussions identified several factors driving the rapid changes in travel patterns seen in developing countries. At the same time, it was also recognized that the nature of travel is not yet completely (qualitatively/empirically) documented. The need for data, issues with survey methods, and other related promising avenues were discussed. The participants expressed the need to develop methods appropriate for developing-country context rather than simply adopting methods used by developed nations. Avenues for further research were also identified. These ranged from fundamental research on understanding how transportation/land-use investments improve the livelihood/well-being of people to applied research on developing modeling guidelines to facilitate systematic planning and policy-analysis practices in rapidly developing countries.

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