Segmentation and Design of Bus Services in Urban India: Kolkata as a Pilot Study

Broad Area

- Planning and Policy
- Design and Development
- Governance

Need for the Study in the Context of Future of Cities

Urban India is experiencing significant increase in vehicular travel primarily due to rapid urbanization, increase in income, and growth of private vehicle ownership. However, most of the Indian cities are not as such planned cities and hence, the capacity augmentation of roads is generally restricted due to physical constraints. As a result, there has been a growing imbalance between vehicular demand and available supply or capacity of roads in urban India. This imbalance has started affecting the quality of urban life due to the presence of negative externalities such as traffic congestion, delay, vehicular emissions, economic loss, etc. Increase in the use of public transport is considered as an effective instrument for reducing vehicular volume and thereby alleviating traffic congestion, vehicular emission, etc. As bus is the predominant public transport mode in majority of Indian cities, it is necessary to improve the bus service and make it an attractive alternative to choice riders (i.e. who have cars). In the recent years, several initiatives have been taken-up by the Government of India and various State Governments to increase the supply of buses in urban areas. However, the overall scenario has not changed as per the expectation and the bus fare continues to remain as the major socio-economic concern with little attention on the overall quality of service. The buses in urban India are generally inferior to those prevailing in developed countries, real-time traffic information (both at bus stop and on-board) is absent and discomfort (related to seat and space availability or crowding inside bus) is high.

A recent study carried out by IIT Kharagpur indicates that captive (i.e. who do not have cars) and choice riders (i.e. who have cars) are distinctly different groups in terms of their Willingness-to-Pay (WTP) for bus service attributes. The study also indicates that the present bus service even with more number of buses (which will improve the frequency) is unlikely to be instrumental in arresting the shift of choice riders to private vehicles. It is rather necessary to (i) improve the in-vehicle travel time by providing suitable bus priority measures, (ii) improve the quality of buses, and (iii) make real time traffic information available on-board and at bus stops for making the bus service an

attractive alternative to choice riders. A distinct segmentation of bus service in urban India is proposed as a solution for making the bus service an attractive alternative to choice riders without imposing additional financial burden to the economically weaker section (in terms of increase in fare) and the Government (in terms of increase in the subsidy). The present project will investigate various issues related to segmentation of bus service and suggest suitable action plan for its effective implementation. It is proposed to demonstrate the work with reference to bus system in the Kolkata city.

A distinct segmentation already exists in the context of rail service in India. For example, users can travel in sleeper class, 3 Tier A/C, 2 Tier A/C, etc. Also, users can travel by express, super-fast, Shatabdi, Rajdhani, local, etc. For various alternatives, quality of service and fare are distinctly different. However, such distinct segmentation of service is largely absent in urban bus system. Say, in Kolkata city, several types of bus service are available: ordinary private bus, minibus, and various types of route/service offered by State Transport Organizations. However, in terms of quality of service they are often not distinctly different. The A/C Volvo service which is distinctly different from other services is available only on a limited number of routes. In general, except for A/C Volvo service, higher fare does not necessarily ensure higher quality bus and service characteristics. It is necessary to have only a few types of service (say, 2 or 3) instead of many or none which are distinctly different in terms of service quality (say, type of bus, comfort, availability of real time traffic information, etc.) and fare. However, there are unique challenges associated with improvement of bus service with segmentation in the Kolkata city. This is primarily due to involvement of a large number of service providers – both individual (private) and Government Organizations (say, CSTC, CTC, WBSTC, etc.). Also, for various Government organizations, available bus fleets include wide variation in bus models and condition of buses. Therefore, it is necessary to look at various issues related to service providers, bus fleets, etc. and prepare a road map or action plan for effective segmentation of bus service over years. It is also necessary to understand the likely impact of bus segmentation on service providers and address the concerns.

The design of segmented services is another key challenge as the design should consider route and demand characteristics, user costs, operator costs, effective utilization of available subsidies, operational viability, etc. It is required to assess the likely impact of segmentation on increase in bus ridership and reduction in negative externalities such as traffic congestion, delay and vehicular emissions. It is also necessary to carry out a detailed socioeconomic impact assessment of bus segmentation.

Objective and Scope of work

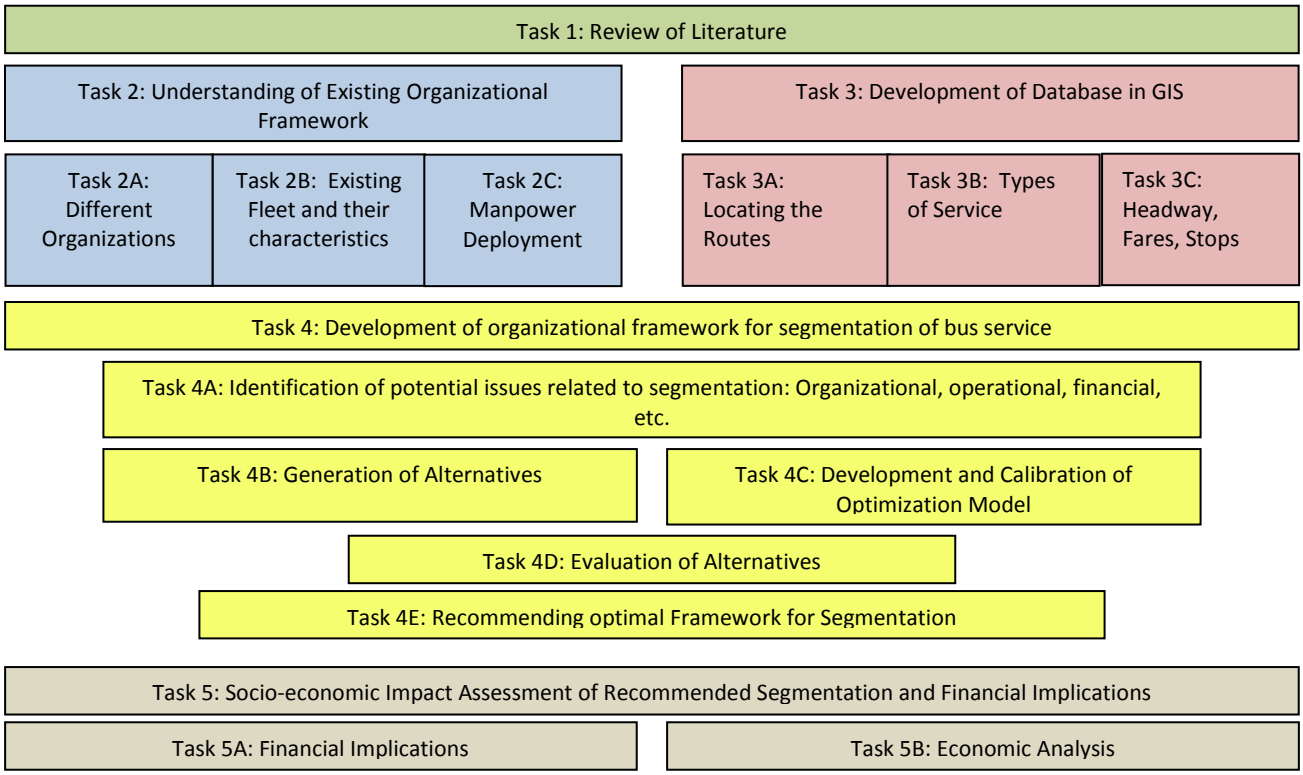
The broad objective of the work is to develop an action plan for effective implementation of 'segmentation of bus service' in the Kolkata city giving due considerations to various issues pertaining to service providers, users, and the Government. Two major components of the work include:

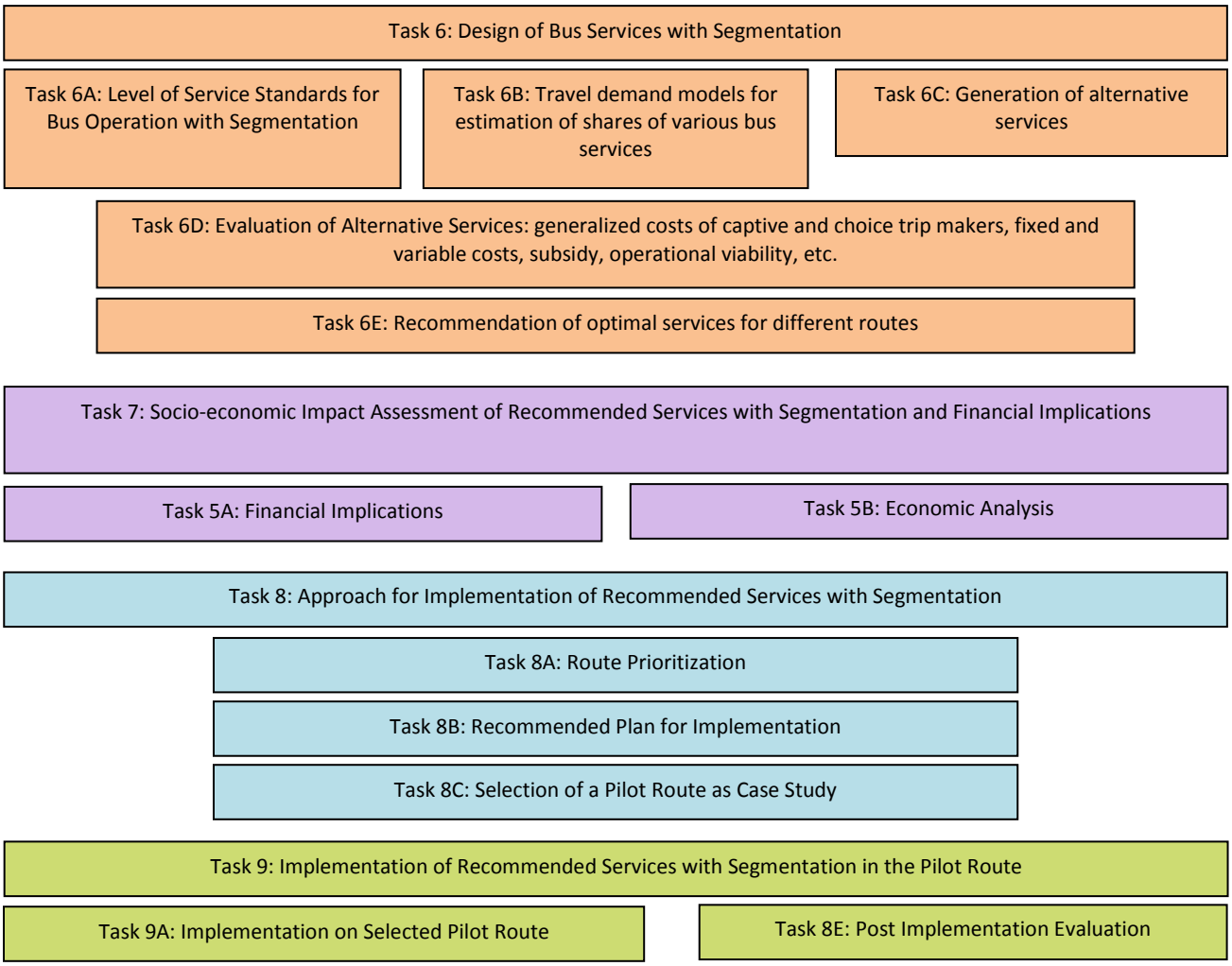
a) Strategies and action plan for carrying out segmentation of bus service from organizational or service providers' perspective where there are multiple service providers (both Government and Private) and there are substantial variations in the quality of buses (e.g. vehicle characteristics, age, etc.) operating in the city
b) Design of bus services with segmentation considering the requirements of various user groups, route and demand characteristics, user costs, operator costs, effective utilization of available subsidies, operational viability, etc.

It is also proposed to select a pilot route for implementation of recommended bus services with segmentation and carry out a post-implementation evaluation.

Methodology

The methodology for the project is summarized below with the help of various Tasks.





Outcome/Deliverables

The expected major outcomes from the proposed research work are as follows:

a) Road map or action plan for effective segmentation of bus service in the Kolkata city where several service providers (both Government and Private) are involved and the quality of buses vary widely in the city
b) Design of bus services with segmentation for various routes/catchments in the Kolkata city and the likely impact of segmentation on bus ridership
c) The socioeconomic impacts of bus segmentation in the Kolkata city
d) Recommendations on financial and regulatory issues related to bus segmentation in the Kolkata city
e) Implementation of segmented bus services for a pilot route with the help of the State Government and evaluation of impacts

Team Composition

The requirements of expertise are different for the two major components of the work. Accordingly two teams are proposed. **Team-A** will primarily focus on "Strategies and action plan for carrying out segmentation of bus service from organizational or service providers' perspective", whereas **Team-B** will primarily focus on "Design of bus services with segmentation ".

Team-A: "Strategies and action plan for carrying out segmentation of bus service from organizational or service providers' perspective"

Principal Investigator	
Prof. Biswajit Mahanty	Industrial & Systems Engineering Department, IIT Kharagpur
Co Investigators	
Dr. Bhargab Maitra	Civil Engineering Department, IIT Kharagpur
Dr. Arindam Basu	Rajiv Gandhi School of Intellectual Property Law, IIT Kharagpur
Dr. Pulak Mishra	Humanities & Social Sciences Department, IIT Kharagpur
Dr. Rudra Prakash Pradhan	Vinod Gupta School of Management, IIT Kharagpur

Team-B: "Design of bus services with segmentation "

Principal Investigator	
Dr. Bhargab Maitra	Civil Engineering Department, IIT Kharagpur
Co Investigators	
Dr. Pulak Mishra	Humanities & Social Sciences Department, IIT Kharagpur
Dr. Phani Kumar Chintakayala	Institute of Transport Studied, University of LEEDS, UK
Dr. Pabitra Mitra	Computer Science & Engineering Department, IIT Kharagpur