

A framework for improving bicyclists' accessibility to rail stations

Broad area

Planning and policy

Need for the Study in the Context of Future of Cities

Properly planned, safe and barrier free access for bicyclists to rail stations improve rail transit usage. The modes of access to and from rail transit stations are both motorized (two-wheeler, auto-rickshaw, taxi, private car and bus) and non-motorized (bicycle and walking). The non-motorized modes are slower over larger distances than the other, but they are highly effective in accessing the rail transit stations within a certain catchment area of it. Recent research on sustainable transportation focuses on non motorized modes due to their environmental implication congestion reduction and low cost). Within non motorized modes, while shorter distance could be catered through walking/pedestrians relatively longer trips upto 3.5 km could be catered through bicycles, if proper bicycle friendly infrastructure or measures are taken. Improving bicyclist accessibility to transit stations may also result in new people using transit, who would otherwise be using two-wheelers and other personal motorized modes thus reducing congestion, vehicular energy use and pollution and provide a safer faster and convenient mode of travel for existing bicycle users. This will immensely benefit the poorer sections of society who would save on fare.

In Indian cities people using bicycle for access trips are of two broad categories i.e. captive and choice riders. While improving bicyclists' accessibility to rail stations will prove to be of immense benefit to both these groups of existing users, at present, there is a marginal increase of captive bicycle users consisting of people who cannot even afford the increasing fare of public transit and para-transit services. Additionally, there is a rising demand from another group urban choice riders for better bicycle infrastructure and facilities. Users belonging to this group are well aware about the advantages of using bicycle for railway station access trips or have experienced the benefits of bicycling for access trips in other developed nations of the world. Thus, the needs and choices by these different groups of existing and potential bicycle users differ even in the same geographic area depending on their socio-economic condition, their purpose of travel, their preferred quality of service for bicycle infrastructure etc. However, the non-existence of bicycling infrastructure and facilities, high population density, heterogeneous vehicle mix of different speed, size, etc. in Indian cities make the scenario quite different from those of developed countries. Hence there is a need to investigate the utility of bicycling infrastructure to access metro and suburban railway stations of major Indian cities based on users'

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perception about existing service level and their expected quality of service. This would help in designing appropriate bicycling infrastructure and facilities within the catchment area of a railway station.

Objective and Scope of work

The aim of the study is to establish a framework for improving bicyclists' accessibility to rail transit stations.

The broad objectives are

- To analyse transit catchment area for determining user characteristics, travel behaviour and trip characteristics related to access trips and egress trips of existing rail transit users.
- To identify a set of relevant indicators (facilities & infrastructure) which influence bicyclists' perception of transit access trips and determine how they influence quality of service.
- To determining the quality of services and facilities that bicyclists desire for each of the identified attributes.
- To develop a model for determining bicycle lane network in the transit catchment area.

Methodology

The present study will be based on selected **metro stations** and **rail stations** and **their catchment areas** in **Kolkata**.

The first part of the study investigates **travel behaviour of transit users** (both frequent and occasional users) and bicycle modal choice model for rail transit access trips, distance decay relationship of different modes used for transit access and egress and finally transit catchment area analysis based on network ratio method using GIS analysis.

The **second part of the study** will consider the factors responsible for choosing or not choosing a bicycle over other modes while accessing or during egress from a transit station. Extensive review of national as well as international literature would be done to identify set of attributes which would be sieved through an expert opinion survey for identifying the relevant ones in determining bicyclists' perception of transit access.

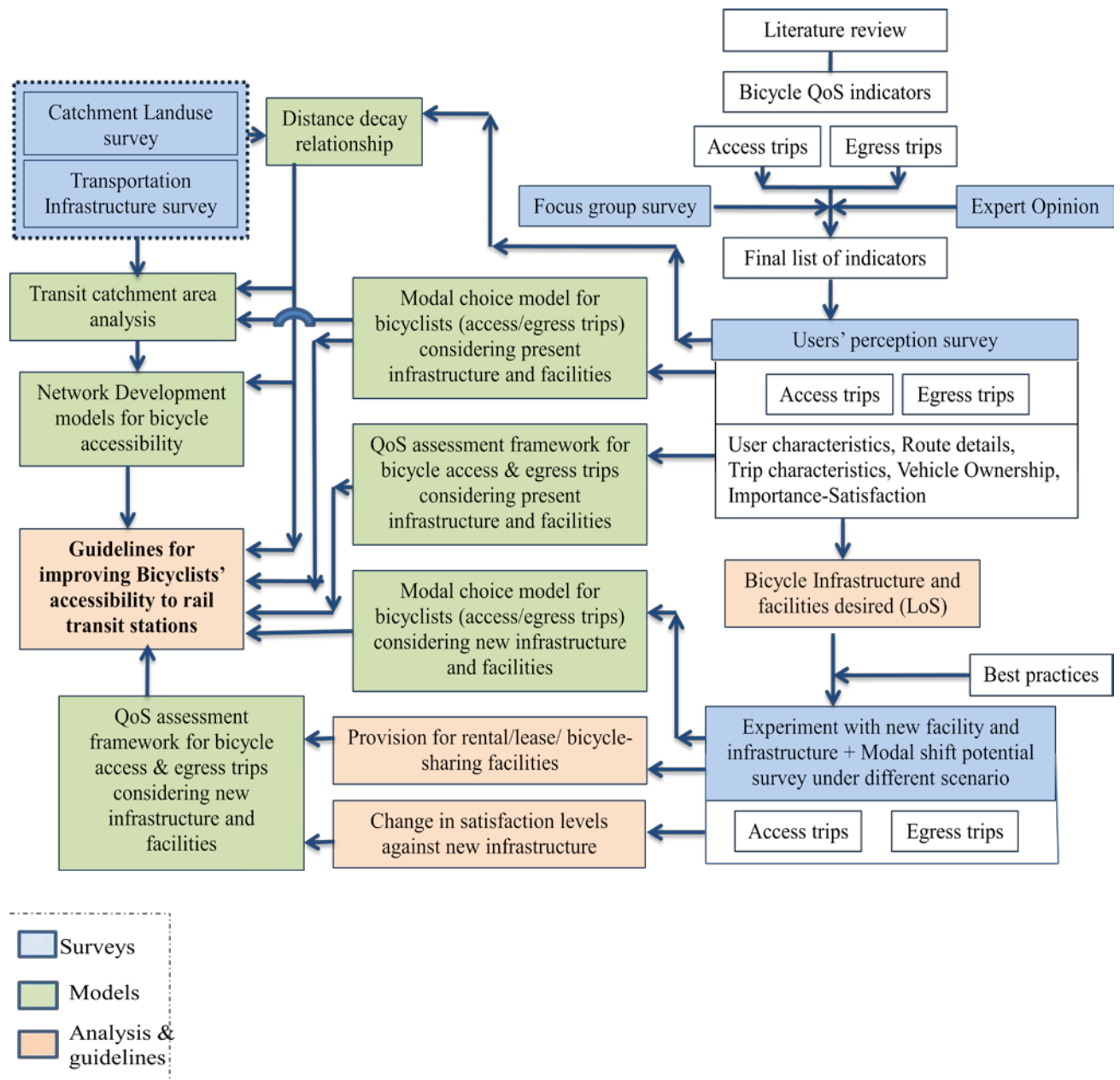
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The **third part of the study** will investigate the role of these attributes on existing transit users who may or may not use bicycle for access trips. Experiments will be conducted during different seasons (summer, monsoon and winter) using existing transit users (including existing bicycle users and potential bicycle users) by providing bicycles and other temporary bicycling infrastructure and facilities on roads for bicyclists and through recording of their pre and post experiment experience and satisfaction level. Bicycle clubs, NGOs, government and private offices etc. would be involved during the experiments. Different indicators for access/egress trip infrastructure like bicycle tracks, weather protection, signage, lighting etc. and interchange facilities like bicycle parking, locker facilities, public bicycle sharing policies, park and ride provision, bicycle renting etc. will be evaluated to determine their relative importance and user's expected quality of service. Meetings at different corporate office would be conducted to identify the users' shift potential to bicycle while reaching office as well as make them aware of different lease, rental and bicycle sharing practices.

The last part of the study will investigate the feasibility of providing relevant facilities and infrastructure using network analysis for identifying the optimised paths to access the rail transit stations from different trip origins with the catchment area. Existing road network, traffic characteristics, and route inventory etc. would be considered along with safety measures and traffic calming techniques to propose a methodology for determining bicycle lane network in the catchment area.

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Methodological flowchart:



Outcomes/Deliverables

The present study will enhance the overall understanding and add to the knowledge base on sustainable transport infrastructure and facilities in the Indian context. The study will investigate the different mode and route choices and the corresponding distances, time and barriers experienced by bicyclists while accessing and egress from rail transit stations. Finally, a framework for integrating the research findings from the above studies along with international and national best practises and also considering peoples' choices and preferences, guidelines in form of quantitative and

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qualitative standards will be framed for improving bicyclist accessibility to rail transit stations.

Deliverables:

- a) Guidelines on standards for improving bicyclist accessibility to rail transit stations. It can be readily adopted for different neighbourhoods or transit catchment areas for improving transit usage and for providing barrier free access for bicyclists.
- b) Manual for provision of infrastructure in railway stations exclusively for bicycles and facilities along identified network in the catchment of railway stations.
- c) Implementation of appropriate bicycling infrastructure and facilities in one zone of catchment area of a rail transit station.
- d) Outreach programs and workshop

Work plan

Time period (Quarter)	Major tasks	Work details
Q1	Landuse& Infrastructure survey of Catchment area (10 stations)	Catchment inventory survey, mapping of the catchment area, traffic volume count
Q2	Expert Opinion Survey + Focus group survey at 6 access stations @ 20 sample per station	Expert opinion survey + Focus Group/Pilot Survey + Analysis of the catchment inventory data
Q3	User perception survey (6 access stations x 200 sample per station)	Analysis of expert opinion and focus group + Survey of transit users, User characteristics, route characteristics (distance, time, mode, cost, route detail), trip characteristics (willingness to shift, factors for bicycle mode choice, problems for not choosing bicycle)
	Pilot/Focus group survey at 4 egress stations @ 20 sample per station	Focus Group Survey
Q4	Analysis of data for access and egress stations	Analysis of data from 6 access stations + analysis of pilot/focus group survey for egress stations

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	Experiment design and setup for access trips to stations	Design of experimental setup(providing bicycle to identified users, temporary bicycle tracks, marking on roads and intersection, parking facilities for bicycle near stns, involving municipal authorities, volunteers, police personnel traffic management and to monitor the cycle movement) + collection of data by contractual manpower in winter
Q5	User perception survey (4 egress stations x 200 sample per station) + Experimental data analysis for access station	Survey of transit users, User characteristics, route characteristics (distance, time, mode, cost, route detail), trip characteristics (willingness to shift, factors for bicycle mode choice, problems for not choosing bicycle) at the egress station + analysis of experimental data collected at access station
Q6	Experiment and data collection for access station during summer + Analysis of egress station user perception data	Experiment & survey in Summer for access trips , data entry of experiment results + analysis of data for egress station user perception
Q7	Experiment and data collection for access station during monsoon	Analysis of experiment data from summer + Experiment in Monsoon
	Meetings for bicycle sharing, rental facilities at egress stations	Conducting meetings with stake holders for participation during experiment
	Experimental design at egress trips and survey during monsoon	Experiment & survey in Monsoon, data entry of experiment results
Q8	Analysis of data for access and egress stations	Analysis of experiment data from monsoon for access trips, compilation of findings , bicycle lane network development model
	Experiment on egress trips and survey at winter	Experiment & survey in winter, data entry of experiment results
Q9	Experiment on egress trips and survey during summer	Experiment & survey in winter, data entry of experiment results
	Network Development model	Selection of final sets of Indicators

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	for bicycle accessibility + Analysis of egress trip experiment data	responsible for bicycle QoS+ identify possible network in catchment areas of rail transit by contract manpower, for bicycle facilities and infrastructure
Q10	Analysis of egress trip experiment data + Compilation of report + Meeting with stakeholders+ Organization of workshop	Analysis of experiment data + Compilation of initial findings and report preparation by CA + Meeting with stakeholders+ Organization of workshop by CA
Q11	Compilation of report + Meeting with stakeholders+ Outreach program (Workshop)	Workshop with relevant offices, agencies, ministry, urban planners, police personnel, + awareness program done by contract manpower
Q12	Implementing of proposals + Compilation of report + Long term review survey	Implementing the recommendations at one site for long term review + survey at the end of one month to evaluate the effectiveness of proposed infrastructure both at access and egress end+ Compilation of report
Q13	Formulation of guidelines and manuals	Analysis of long term review data + Incorporation of stakeholder views from workshop and long term review + Formulation of guidelines and manuals + Book publication
Q14	Compilation and submission of report and manuals to different ministries	Finalization of report, toolkits and manuals + Review of project findings by expert panel

Team Composition

Principal Investigator

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