



Public utility transport system in Bengaluru: An empirical study of BMTC and BMRC services

¹ Uma TG, ² Dr. K Ramachandra

¹ Assistant Professor, Department of Commerce and Management at Maharani's Arts, Science, Commerce and Management College, Seshadri Road, Bangalore, Karnataka, India

² Associate Professor and HOD, Department of Commerce and Management, Maharani's Arts, Science, Commerce and Management College, Seshadri Road, Bangalore, Karnataka, India

Abstract

The Public utility services in the city of Bengaluru are the most sought after commutation means by the residents in the city. The city is at unrest and comes to a standstill if there are no Public utility services on any given day. The number of people using the services is alarming in comparison with the infrastructure available in the city. It plays a decisive role in the setting of the life on the role in the city. The connection of Peri-Urban and Central Business District is bringing the momentum in the socio-economic life has made life more comfortable. The present study is empirical in surveying the commuters in the city.

Keywords: Accessibility, Balance, Commutation

Introduction

Public Transport System-An Overview

Public transport faces severe problems in almost all countries of the developing world, although the situation varies from one country to another, and even from one city to another (Vasconcellos 2001). Perhaps most important, the lack of financial resources prevents necessary investments in maintaining and upgrading existing bus and rail systems and building new ones. Likewise, many advanced technologies long available in Western Europe are simply not affordable in most developing countries. Public transport systems in the Third World are plagued by chronic corruption and inefficiency, overcrowded and undependable service, congested roadways that slow down buses, and an operating environment that is often chaotic and completely

uncoordinated.

Those problems of public transport occur within the broader context of daunting urban transport problems in general. Air pollution, noise, congestion, and traffic fatality levels are often much more severe than those of developed countries. One might expect the much lower incomes in developing countries to assure a huge potential market of public transport riders. In fact, many city residents are so poor that they cannot afford even low fares, and routes are not designed to serve the poor at any rate. Thus, the poor in developing countries suffer even more than those in the Western World from low levels of mobility and accessibility, especially to jobs.

Previous researches on the topic

Table 1

Sl. No.	Authors	Title of the Paper	Year of Publication	Variables	International / Indian	Focus
1	Nick Benbow	Transport for South Hampshire Evidence Base Public Transport Model Calibration and Validation Summary Report	2011	Time, Budget	South Hampshire	Development, Calibration and Validation of Model
2	Department of Transport State Government Victoria	Job density, productivity and the role of transport An overview of agglomeration benefits from transport investments and implications for the transport portfolio	2012	Economic Benefits Agglomeration benefits and Costs	Victoria	Agglomeration of Employment Location
3	Evangelia Pygra Frank Schulz and Dorothea Wanger Christos Zaroliagis	Efficient Models for Timetable Information in Public Transportation Systems- ACM Journal of Experimental Algorithmics Vol. 12 Article No. 2	2008	Information Systems	International	Shortest Path Problems in weighted graphs optimization Problems
4	Department of Transport Melbourne	Melbourne Metro One Business Case Draft public transport patronage forecasts	2010	Workforce statistics, Traffic Congestion	International	Patronage Forecasts, Population

	Metro					Projections
5	Joseph Goodman, Melissa Laube and Judith Schwenk	Curitiba's Bus System is Model for Rapid Transit By Joseph Goodman, Melissa Laube and Judith Schwenk- Race, poverty and the environment winter 2005/2006	2005/06	Frequency cost Fare Collection	Curitiba	BRT on Curitiba
6	Dinesh Mohan, Geetam Tiwari	Sustainable Transport Systems- Linkages between Environmental Issues, Public Transport, Non-Motorized Transport and Safety	1999	Safety and Environment redesigning roads	Indian	Needs of non-motorised modes of traffic
7	Neli Paulley, Richard Balcombe, Roger Mackett, Helena Titheridge, John Preston, Mark Wardman, Jeremy Shires, Peter White	The demand for public transport: the effects of fares, quality of service, income and car ownership		Influence of Fares, quality of services, Income	International	Up-to-date guidance manual on factors affecting demand for Public Transport
8	Azeem Uddin	Traffic congestion in Indian cities: Challenges of a rising power	2009	Congestion, Unexpected delays Investments, Advancements	Indian	Need for transportation systems management and operations Traffic Engineering
9	Sudhir & Sameera Kumar	<i>Azeem Uddin Draft, 23 March 2009</i>		Walking, Incentive to pedestrians	Indian Bengaluru	Design Safety Economic and Policy Issues
10	Sudhir & Sameera Kumar Secon Pvt. Ltd.	Pedestrians at Crossroads: A Case Study of Bangalore		Connectivity to Economic Dynamism	Indian	Sustainable Mobility Challenge
11	Wbcsdpublications.org	Mobility for Development	2008	Urban Development Options Rapid changes Infrastructure Development Projects	Bengaluru	Urban Development Alternative
12	S. Majid Mofidi, Khashayar Kashani Jou	Workshop on Alternative Urban Futures for Bangalore- Urban Research and Policy Programme	2008	Regulation & Competition, Investment, Financing Design	Iranian Cities	Improving service quality, efficiency & sustainability of mass Public Transit System
13	Ashwin Mahesh and R.K. Mishra	Improving the service quality, sustainability, and Efficiency of mass public transportation systems (with Particular reference to transit oriented development in Iranian cities)	2011	Financial Resources Planning Continuous Demand-Supply assessment	International	Data-led, Dynamic and Flexible governance
14	Amit Bhatt	Plan Bengaluru 2020 Bringing back Bengaluru of Kempe Gowda's dreams- Road, Traffic Management and Transportation Draft Ver. 1.0 Net 16.01.2009 abide	2010	Stakeholders reform oriented	Indian	Role of Auto Rickshaws in Sustainable Urban Transport
15	Mamatha. P Raj, Madhu chand K.R	Restructuring Auto-rickshaws within a Sustainable Urban Transport System in Indian Cities - Urban Mobility India 2010 December 4 th , 2010 EMBARQ Centre for Sustainable Transport - Assessing the Role of Auto-rickshaws in Sustainable Urban Transport	2007	Congestion, Vehicular trips, Volume Capacity Ratio	Indian Bengaluru	Traffic and Transport Streamlining
16	P.S. Kharola, Geetam Tineari and Dinesh Mohan	Spaces of mobility in the city centre, explore the role and impact of transportation infrastructure (ITPI Journal 2007)	2010	Crashes involving Public buses micro analyses, Bus Design Infrastructure	Indian Bengaluru	Fatal Crashes
17	Bangalore Metro Bus Feasibility	Traffic safety and city public transport system : case study of Bangalore, India	1999	Service Level, Performance and	Indian Bengaluru	Feasibility Study

	study	(P.S.Kharola, Geetam tineari and dinesh mohan Indian Institute of Technology, Delhi) [journal of public transportation Vol B, No.4.2010]		Capacity		
18	The Energy and Resources Institute (TERI) World Business Council for Sustainable Development	Bangalore Metro Bus Feasibility study Executive Summary funded by Swedish Sida	2007	Stakeholder Dialogue Urban-Rural Connectivity Interfaces	India Bengaluru	Sustainable Mobility Challenge
19	Nikki Laffel	Mobility for development- Bangalore:- The Energy and Resources Institute (TERI) World Business Council for Sustainable Development	2006	Vehicle Emission and Environmental Problem		
20	Smitha K C, Sangita S	TERI initiated the study Mobility for development (M4D) – A case study of Bangalore.		PPP Institutional Constraints	India Bengaluru	Service Delivery, Equity Concerns
21	Dr. Santosh A., Jalihal, Kayitha Ravinder, Dr. T.S. Reddy			Traffic Characteristics, Traffic Problems	India Bengaluru	Traffic Composition trends, Sped Characteristics, Travel Pattern
22	The Ministry of Urban Development	Urban Mobility India	2010	Multi-modes Toll Parking	Indian	Interoperable Automatic Fare Collection (AFC)
23	National Urban Transport Policy	National Urban Transport Policy		Mobility Needs, Urban Infrastructure	Indian	Sustainable Investments
24	Kaushik Deb and Sanjivini Sundray	Restructuring Urban public transport in India Kaushik Deb and Sanjivini Sundray The Energy and Resources Institute New Delhi, India		Mobility requirements	India New Delhi	Productive efficiency, Restructuring and Reformation
25	Rajeev Chandrashekhar and Ashwin Mahesh	Bangalore and its challenges in managing urban growth - Study by Agenda for Bengaluru Infrastructure and Development Task Force (ABIDE)	2009-11	Quality Availability, understandability of Public Transport System	India	Integrated Vision Plan
26	P.K. Sarkar and Pratiti Tagore	An approach to the development of sustainable urban transport system in Kolkata- Current Science Volume 100, No. 9 May 2011	2011	Traffic and Environmental Problems, Traffic congestion, Road accidents	India Kolkata	Sustainable Transport System for Kolkata
27	Jeffery Kenworthy, Christina Inbakaran	Differences in transport and land use in thirteen comparable Australian, American, Canadian and European cities between 1995/6 to 2005/6 and their implications for more sustainable transport	2011	Policies	International	land Use related indicators Sustainable Transport
28	Meghna Shrivastava, Prof. Dr. Sanjay Gupta	Planning for Multi-level car parking facilities in Metropolitan city of Delhi		Financial Economic Social indicators regulatory framework	Indian	Parking projects on PPP
29	Sustainable Transportation Indicators Subcommittee of the Transportation Research Board	A recommended Research Program for Developing sustainable Transportation Indicators and Data	2009	Sustainable Transportation Indicators		R& D factors in Sustainable Transport Indicators
30	Todd Litman and David Bruwell	Issues in sustainable transportation-Global Environmental Issues Vol. 6, No.4, 2006	2006	Automobile dependency Equity Land Use Community Liveability, Economic Efficiency		Sustainable Transportation
31	David	Assessing Public transport supply for	2012	Performance	Netherlands	Public Transport

	Niyonsenga Enschede	Kigali, Rwanda		Assessment Demand and Supply		Network routing and service Capacity
32	Touba Amirazodi	Sustainable Urban Transport Management and its Strategies- Touba Amirazodi		Economic Efficiency Environmental Issues Resource Constraints, Land Use, Social Justice	International	Transport System efficiency, Improvement
33	Sudhir& Sameera	Bangalore: Silicon City or Black City?		Motorisation Index	Indian Bengaluru	Existing Traffic Accident Scenario
34	Workshop on Alternative Urban Futures for Bangalore Urban Research	Workshop on Alternative Urban Futures for Bangalore Urban Research	2008	Land Acquisition Displacement Tree felling Urban Space	Indian Bengaluru	Urban Development Alternatives
35	James MacKenzie, Roger Dower, and Donald	and Policy Programme - National Institute of Advanced Studies, Bangalore -October 11, 2008	1992	External Costs	International US	Motor Vehicle Costs
36	CEC (1994)	California Transportation Energy Analysis Report, California Energy Commission (www.energy.ca.gov).	1994	Congestion Accidents Infrastructure Maintenance Service Air Pollution		Environmental costs of Transportation Fuels and Environmental Externalities
37	Christopher Zegras with Todd Litman	An Analysis of the Full Costs and Impacts of Transportation in Santiago de Chile, International Institute for Energy Conservation (www.iiec.org).	1997	Vehicle Roadway, Parking Congestion Crash Environmental Costs	International Chile	Transport Cost Studies
38	John Pucher, Nisha Korattyswaroopam, Neenu Ittyerah	The Crisis of Public Transport in India: Overwhelming Needs but Limited Resources		Travel Demand and Supply	Indian	Improvement and Expansion of Public Transport Service
39	Naveen Eluru, Chandra R.Bhat, Ram M.Pendyala, Karthik C. Konduri		2010	Environment and Travel Behaviour	India	Modelling Joint Models of Multi-Dimensional land-use and travel choice process
40	Bilge Atasoy, Aurelie Glerum, Ricardo Hurtubia, Michel Bierlaire	Demand for public transport services: Integrating qualitative and quantitative methods- September 2010	2010	Psychometric Indicators for attitudes Perceptions, Lifestyle Preferences		
41	Zhenhua Chen and Kingsley E.Haynes	Spatial impact of transportation infrastructure: A spatial econometric CGE approach	2013	Spatial Econometrics	International	Transportation Infrastructure
42	Diem-Trinh Le-Klähn, C. Michael Hall, Regine Gerike	Analysis of Visitor Satisfaction with Public Transport in Munich		Traveling Comfort Service quality accessibility and Additional Features	Germany	Level of Satisfaction by visitors
43	Zegeye Kebede Gurmu, Teague Nall & Perkins	Artificial Neural Network Travel Time Prediction Model for Buses Using Only GPS Data		Real-time travel information Input-Output Combination	International	Production Accuracy
44	Ralf Risser, Susanne Iwarsson, Kerstin Wendel and Agneta Ståhl	The Challenge of Using Public Transport: Descriptions by People with Cognitive Functional Limitations		Quantitative Content Analysis	International	Cognitive Functional Limitations

Source: Compilation by the Author

Research Design and Methodology
Sampling Design and Data Collection

The present study is an empirical study which is based on the primary data collected from 600 respondents representing the commuters availing BMTC services in the city. The data was collected by using judgemental and convenient sampling technique through a well structured questionnaire with 5-point Likert scale for measuring the level of response of the respondents.

For analyzing the data Mean and Standard Deviation, Ranking analysis and Percentage analysis were used.

Results and discussion

Classification of respondents availing BMTC and metro services in Bengaluru

The respondents have been surveyed based on the availing of the BMTC and Metro services for commutation. The results are arrayed in the Table 1 respectively.

Table 1: Classification of respondents availing BMTC and metro services in Bengaluru

Public Utility Service Availed	Category	Responses (N=600)	
		Number	Percent
BMTC	Yes	511	85.2
	No	89	14.8
Total		600	100.0
METRO	Yes	304	50.7
	No	296	49.3
Total		600	100.0

Source: Primary Data

Analysis

There are a fair proportion of the respondents availing the services of BMTC and Metro in the city of Bengaluru. 85.2% of the respondents have availed the services of BMTC. One-half of the respondents have availed the Metro services.

Classification of respondents by total family members and earning members

The respondents were asked information about the total family members and the earning members in the family. Responses for the said question is presented in the Table 2.

Table 2: Classification of respondents by total family members and earning members (N=600)

Characteristics	Category	Responses (N=600)	
		Number	Percent
Total family members	Three	147	24.5
	Four	239	39.8
	Five	106	17.7
	Six	108	18.0
Total earning members	One	261	43.5
	Two	203	33.8
	Three	87	14.5
	Four	49	8.2
Total		600	100.0

Source: Primary Data

Analysis

39.8 percent of the respondents are from four member family. 24.5 percent of the respondents have three members in the family. 17.7 percent of the respondents have five members in the family. Further data on earning members in the family reveals that 43 percent and 33.8 percent of the respondents have one and two earning member respectively. 14.5 percent of the respondents have three earning members and only 8.2

percent of the respondents have four earning members.

Classification of respondents by education

An attempt has been made to find out the proportion of the respondents based on their qualification. This would throw light on the academic background of the respondents. The responses are tabulated and shown in Table 3.

Table 3: Classification of respondents by education

Educational level	Respondents (N=600)	
	Number	Percent
Below SSLC	107	17.8
PUC	60	10.0
Graduation	157	26.2
Post graduation	276	46.0
Total	600	100.0

Source: Primary Data

Analysis

Considering the qualification of the respondents, 46% possess PG degree. 10% of the respondents have PUC qualification. Overall, 11/20th of the respondents have qualification of Degree and Post-Graduation.

Classification of respondents on the service reception level of public utility services

The respondents' service reception level of Public Utility Services is measured based on the responses. The responses are arrayed as in the Table 4 and Figure 1 respectively.

Table 4: Classification of respondents on the service reception level of public utility services

Service Reception Level	Category	Responses (N=600)	
		Number	Percentage
Low	< 69.69 Score	170	28.3
Moderate	69.69-78.35 Score	292	48.7
High	> 78.35 Score	138	23.0
Total		600	100.0

Source: Primary Data

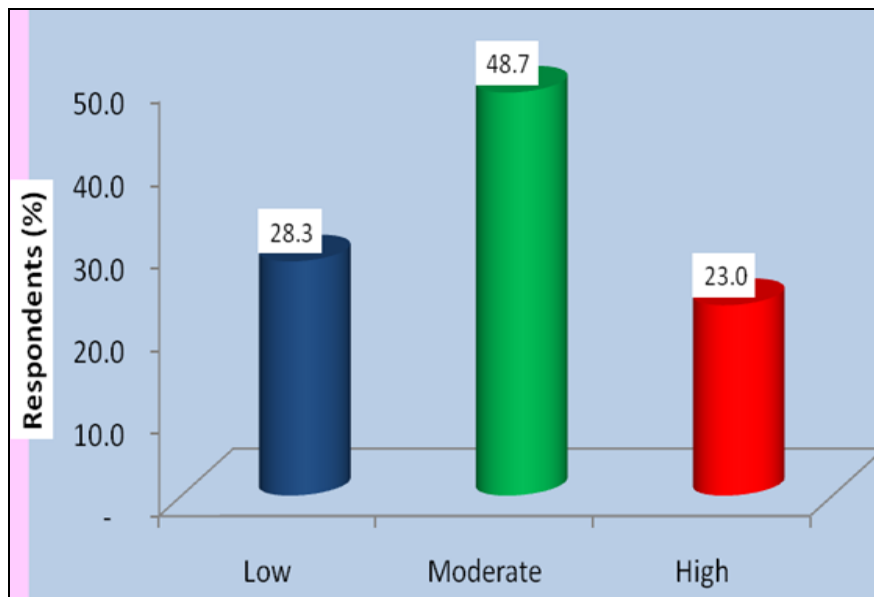


Fig 1: Classification of respondents on service reception level

Analysis and Interpretation

The data reveals that the classification of service reception level based on mean and standard deviation obtained on the sample respondents. It is evident from the results that 48.7 percent of the residents showed moderate service reception level followed by low level with 28.3 percent and 23.0 percent found with high level of service reception level.

Aspect-wise behavior towards the services of BMTC and BMRC- scores of respondents

The classification of respondents based on behavior aspects viz convenience, Economy and Affordability is tabulated and shown in the Table 5

Table 5: Classification of aspect wise behavior scores of commuters (N=600)

Buying behavior Aspects	Statements	Max. Score	Responses (N=600)			
			Mean	SD	Mean (%)	SD (%)
Convenience	12	60	45.91	5.60	76.5	9.3
Economy	15	75	52.89	8.39	70.5	11.2
Affordability	10	50	38.15	4.51	76.3	9.0
Combined	37	185	136.95	16.02	74.0	8.7

Source: Primary Data

Analysis

The data reveals that the mean response of respondents on **Convenience** found to be 76.5 percent compared to mean response of **Affordability** 76.3 percent and **Economy** 70.5 percent on services of BMTC and BMRC. The overall response on the services by the respondents observed to be

74.0 percent.

The mean value of the convenience and Economy has crossed good and are above the moderate level but the Affordability is found to be at a slightly below moderate level. The variation among the Convenience is comparatively higher than that of Economy and Affordability.

Conclusion

The Indian city has to cope with an increasing urban travel demand by introducing public transport system and cannot be compensated by just increasing infrastructure space.

Suggestions

- Co-operation among the actors responsible for defining and implementing an urban and Peri-Urban Transport strategy in order to meet the needs of the users
- A fare policy that is understandable and providing incentive,
- Simple and complete information to travellers making use of new communication technologies,
- Political responsibility that is unified in the urban and peri-urban transport area, which is backed by concentration and co-operation among all collectivities at the local, regional and national level, which can also lead to economies of scale at the financing level.

References

1. Volvo Research and Educational Foundations, Task No. 048010
2. www.intechopen.com
3. Journal of Transport and Land Use, Available at <http://jtlu.org>, 2009; 2(1):65-80.
4. Darbari M/SJM. 2008; 3(2):145-156.
5. Australasian Transport Research Forum Proceedings, Adelaide, Australia Publication website, 2011, 28-30.
6. <http://www.patrec.org/atrf>. ATRF 2011 Proceedings.
7. <http://www.tandfonline.com/loi/tran20>.
8. Journal of Public Transportation, 2014; 17(3).
9. Journal of Transport and Land Use. 2009; 2(1):65-80.
10. Journal of Public Transportation, 2014; 17(2).
11. Proceedings of the 7th International Conference on Innovation & Management
12. Critical Appraisal of Web-Based Passenger Information Systems
13. <http://www.tandfonline.com/loi/tran20>
14. Proceedings of the Eastern Asia Society for Transportation Studies, 2007, 6.
15. Journal of Public Transportation, 2012; 15(1).
16. A1E02: Committee on Public Transportation Planning and Development Chairman: David Miller, Parsons Brinckerhoff
17. The Institute of Cost and Works Accountants of India, 2012.
18. MPRA Paper No. 38584, posted 5. May 2012 14:43 UTC
19. Proceeding in START-Conference held at IIT Kharagpur, India
20. From the book Divorce Your Car! by Katie Alvord and Stephanie Mills, 2005.