SUSTAINABILITY IN PUBLIC TRANSPORT SYSTEM- AN EMPIRICAL STUDY WITH REFERENCE TO BANGALORE

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ABSTRACT

Transportation has significant economic, social and environmental impacts, and so is an important factor in sustainability. Sustainability supports a paradigm shift occurring in transport planning. The CAI- Asia defines sustainable transportation as, "……..a set of transport activities together with relevant infrastructure that collectively does not leave problems or costs for future generation to solve or bear present builders and users of the system should pay such costs today. These costs are not limited to environmental externalities, but also include social and other economic impacts caused by transportation". Sustainable transportation provides access to all groups of people in the city in a manner that is within the environmental carrying capacity of the city and is affordable to both the providers and users of the system. The system adopts environmental friendly transportation practices and modes addressing the social equity coupled with accelerated economic development.

Key words: Sustainability, Economic Development, Standard of Living, Equity.

1.1 Introduction

Sustainability is a new paradigm of decision making for all sectors of society based on a better appreciation of the complex interconnections between economic, social and environmental

issues, and the impact of today's decisions on future generations. Sustainability favours decision making processes that are participatory, transparent, equitable, and accountable. Sustainable transport refers to any means of transport with low impact on the environment, and includes walking and cycling, transit-oriented development, green vehicles, car sharing and building or protecting urban transport systems that are fuel-efficient, space-saving and promote healthy lifestyles.

1.2 Review of Literature

MOST (1999), has propounded that, "The goal of sustainable transportation is to ensure that environment, social and economic considerations are factored into decisions affecting transportation activity." **Nikki Laffel (2006)** addresses the issue of public transportation as a means for sustainable development. Transportation is an issue that needs to be addressed because it has two deleterious effects on the environment. One is the effect of vehicle carbon dioxide, CO2, emissions on climate change and the second stems from other vehicle emissions that cause air pollution leading to negative health effects. These two issues warrant the conclusion that transportation needs to be monitored. Policies can be instituted to mitigate these negative consequences. This report focuses its policy recommendations on promoting public transportation as a means for environmental sustainability. The idea is that increased use of public transportation will lessen the demand for private transportation thereby lowering the number of vehicles on the road and thus lessening global vehicle emissions. **Touba Amirazodi (2012**) propogate that Rapid process of urbanism development has increased the demands for some infrastructures such as supplying potable water, electricity of the existing system with parallel managements of urban traffic management has increased the gap between supply and demand of traffic facilities. Sustainable transport management considers the effects of transportation development on economic efficiency, environmental issues, resources consumption, land use and social justice and helps reduction of environmental effects, increase of transportation system efficiency as well as improvement of social life and aims to enhance efficiency, goods transportation, provides services with minimum access problems that cannot be realized without reorganization of strategies, policies and plans.

1.3 STATEMENT OF THE PROBLEM

Transportation, A core component supporting the interactions and the development of socioeconomic systems has reached the stage where it needs to revisit the modus operandi in a sustainable mode. Sustainability in public transport is very important & reliable tool to mobilize the economic development efficiently. It intends to promote the linkages between environmental protection, economic efficiency and social progress. The transport being a catalyst has to reengineer itself towards the sustainable perspective.

1.4 Objectives of the Study

1. To understand the pitfalls in the present Public Transport System in Bangalore.
2. To suggest how sustainability can be implemented in the Bangalore Public Transport System.
3. To validate the data and offer constructive suggestions on the topic.

1.5 Methodology

The proposed research programme will adopt descriptive, analytical and survey method of research to collect, analyze and interpret the research objectives and hypothesis.

1.6 Sampling

Universe: All commuters of BMTC and BMRC.

Sample size: 50 comprising 25 commuters and 25 BMTC and BMRC

1.7 Scope of the Study

I.Geographic Scope

The study is restricted to Bangalore

Ii. Subject scope

The study encompasses public transport with reference to sustainability.

1.8 Period Covered

January 2011 to July 2014.

1.9 Tools Used

A well structured questionnaire is used for the purpose of the collection of primary data on the topic.

1.10 Framework of analysis

The data collected is analysed with the help of statistical tools and techniques. The analysis is done using the tables, charts, diagrams and graphs wherever necessary.

1.11 Results and Discussion

Analysis-I

Profile of Sample Respondents

1.1 Gender-Wise Classification of Respondents

GENDER WISE CLASSIFICATION

Gender	***Responses (n=50)***	
	Number	***Percent (%)***
Male	31	62
Female	19	38
Total	**50**	**100**

(Source: Primary Data)

Analysis

Under the study 62 percent of the respondents are male and remaining are female. This elicits the representation of both male and female.

1.2 Classification of Commuter Respondents Based on Purpose of Travel

TABLE 1.2

CLASSIFICATION BASED ON PURPOSE OF TRAVEL

Purpose of Travel	*Responses (n=50)*	
	Number	*Percent (%)*
Business	12	24
Employment	15	30
Shopping	10	20
Education	10	20
Leisure and Pleasure	3	6
Total	**50**	**100**

(Source: Primary Data)

Analysis

More than half of the respondents travel for the purposes of Business and Employment. Only 6% of the commuters travel for leisure and pleasure.

1.3 Age-Wise Distribution of Commuter Respondents

TABLE 1.3

AGE-WISE DISTRIBUTION OF RESPONDENTS

Age in Years	*Responses (n=50)*	
	Number	*Percent (%)*
Below 25 years	11	22
25-50 years	14	28
50-75 years	19	38
Above 75 years	06	12
Total	**50**	**100**

(Source: Primary Data)

Analysis

Half of the respondents are in the age group of below 25 years and 25-50 years.

1.4 Monthly Income-Wise Distribution of Commuter Respondents

TABLE 1.4

INCOME-WISE DISTRIBUTION OF COMMUTER RESPONDENTS

Monthly Income in Rupees	***Responses (n=50)***	
	Number	***Percent (%)***
Below 5,000	11	22
5,000-10,000	7	14
10,000-15,000	18	36
Above 15,000	14	28
Total	**50**	**100**

(Source: Primary Data)

Analysis

Around 1/3rd of the respondents have monthly income in the range of Rs. 10,000-Rs. 15,000. 22% of the respondents have income below Rs.5, 000.

1.5 Number of Trips Made on an Average Every Week

TABLE 1.5

NUMBER OF TRIPS IN A WEEK BY COMMUTER RESPONDENTS

Sl. No.	**Trips**	***Responses (n=50)***	
		Number	***Percent (%)***
1	More than four times	6	12
2	Four to Six times	9	18
3	Six times to Nine times	9	18

4	More than Nine Times	26	52
	Total	**50**	**100**

(Source: Primary Data)

Analysis

Around one-half of the commuters travel more than nine times in the BMTC buses and metro train.

ANALYSIS-II

PUBLIC TRANSPORTATION IMPACTS ON SUSTAINABILITY

2.1 The impact of the Public Utility Transport System in Bangalore on social aspects

Sl. No.	Statement	Scale				
		LE	FE	M	SE	NTL
1	Equity	15(30)	12(24)	15(30)	10(20)	8(16)
2	Health of human	10(20)	6(12)	13(26)	11(22)	10(20)
3	Community livability	14(28)	17(34)	10(20)	5(10)	4(8)
4	Cultural and historic values	21(42)	12(24)	4(8)	7(14)	7(14)
5	Public involovement	12(24)	13(26)	1(2)	8(16)	16(32)

Key: a) Large Extent b) Full Extent c) Moderately d) Some Extent e) Not at all

Analysis

A sustainable Public transportation system must cater to the diverse, integrated and balanced public transportation services. Bangalore is a city where one can find people belonging to wide and varied sections and economic class. Societal concerns are to aligned alongwith other aspects in a public transport system.

2.2 The impact of the Public Utility Transport System in Bangalore on Environmental aspects

Sl. No.	Statement	Scale				
		LE	FE	M	SE	NTL
1	Ecological stability	21(42)	15(30)	10(20)	2(4)	4(8)

2	Environmental effects	32(64)	10(20)	2(4)	3(6)	3(6)
3	Demand for fossil fuels	17(34)	14(28)	11(22)	4(8)	4(8)
4	Air pollution	19(38)	15(30)	11(22)	11(22)	4(8)
5	Global warming and climatic changes	20(40)	11(22)	12(24)	2(4)	5(10)
6	Destruction of natural and green areas	19(38)	11(22)	10(20)	8(16)	2(4)

Key: a) Large Extent b) Full Extent c) Moderately d) Some Extent e) Not at all

Analysis

A well structured public transport system has to be integrated for the environmental concerns. Continuous monitoring, functioning and planning the activities to conserve and promote environmental concerns is in fact to be taken up as a institutional responsibility.

2.3 The impact of the Public Transport on the economic aspects

Sl. No.		Very High	High	Moderate	Low	Insignificant
1	Traffic Congestion	15(30)	11(22)	11(22)	12(24)	14(28)
2	Mobility barriers	26(52)	18(36)	6(12)	-	-
3	Accident damages	13(26)	17(34)	10(20)	5(10)	5(10)
4	Facility costs	19(38)	20(40)	10(20)	1(2)	-
5	Consumer costs	30(60)	5(10)	8(16)	7(14)	-
6	DNRR	39(78)	10(20)	1(2)	-	-

DNRR: Depletion of non-renewable resources.

Analysis

Transport is a very significant and a basic infrastructure to address a host of economic issues. It is necessary to ensure mobility to step up the production, consumption, marketability and a host of other economic, commercial and trade related activities. It can be reiterated that the transport stands at helm of the economic system.

2.4 The Performance measures in Public Transport sustainability

Sl. No.	Statement	Scale				
		SA	A	N	DA	SDA

1	Transit Accessibility	20	21	9	-	-
2	Carbon intensity	18	20	12	-	-
3	Mixed Land Uses	25	10	10	5	-
4	Transportation Affordability	31	10	5	2	2
5	Benefits by Income Group	39	10	1	-	-
6	Average Vehicle Occupancy	20	19	11	-	-
7	Transit Productivity	25	10	2	10	3
	TOTAL SCORE	178	200	150	58	10
	MEAN SCORE	29.86	33.56	25.16	9.73	1.69

Analysis

The performance measures in public transport sustainability is identified and the results show that the parameters are strongly agreed upon by the respondents.

HYPOTHESIS TESTING

H_o - There is no relationship between Sustainable urban transportation on one hand and the poverty reduction on the other

H_a – There is a relationship between Sustainable urban transportation on one hand and the poverty reduction on the other

Statement	Responses	Number	Alpha=0.05
Sustainable urban transportation can result in the poverty reduction	SA	17	Degree of freedom= 5-1=4
	A	15	Chi square=15.8
	N	08	Table value of F (0.05) at 95% level of significance = 9.94
	DA	06	
	SDA	02	
	TOTAL	**50**	

Conclusion

Hypothesis is rejected but the alternate hypothesis is accepted.

1.12 FINDINGS

The study has to offer the following findings from the data collected.

1. The unprecedented growth in the economy coupled with urbanization pose a challenge to sustainability. Public transportation system, no doubt, is a very significant catalyst in the Indian economy which has to fall in line with the sustainability.
2. The culture in India is such that the majority of the population in urban areas incessantly depends upon Public Transport System for travel, education, business, employment, etc. This acceptance is strength to work out even stronger market penetration.
3. There are a lot of challenges that Public Transport has in India. Be it the para-transit solutions, other modes of private transport etc. There is a need for a strong sense of support from the public at large.
4. Intelligent Transport System has to be implemented in stages and gradually.
5. The policy of the Government as regards the Public Transport system is concerned has to be effective to bring the sustainability.
6. Consumer education and consumer awareness can reduce the possible harm to the various subsystems in the society.

1.13 Conclusion

The scope of the challenges ahead of the public transport system calls for a profound transformation in the transport system in the coming decades. Yet the resources available to meet these challenges are limited by the economic crisis. To meet the present day demand of the burgeoning population, the sustainable transportation system is not just an option but a necessity for the Bangalore context where the demand has to be fulfilled keeping in mind the quality of life to be maintained for the residents, both present and future.

1.14 Suggestions

1. The soft infrastructures like Intelligent Transport Systems and Traffic Management Systems for both bus and metro services can give a giant leap to strengthen the existing situation.

2. The policy framework has to be stringent for the Public Transport to make it mandatory to meet the emission standards, adopting greener policies, etc.
3. The urban population belonging to middle and lower classes incessantly depend on the Public Transport system. This market segment has to be reached to through a social dialogue.
4. The best public transit systems available in the other parts of the world have to be opted to Bangalore standards in a way that would suit the native conditions in here.
5. A sense of responsibility has to be felt and the public on their own have to adopt the eco-friendly modes of transport systems.

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