INTELLIGENT TRANSPORT SYSTEM AND ITS PLANNING ISSUES
A CASE STUDY OF PUBLIC TRANSPORTATION OF MYSORE CITY

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ABSTRACT

Cities are like human bodies. Their prosperity and liveability depends on their lifeblood of residents, workers, goods and materials being able to move about. So it is an obviously good idea for the process of developing and re-developing our towns and cities to start from insight into their transport infrastructure – a kind of 'x-ray' view that can see where their arterial structure is strong enough to support the increased travel demand of new development.

Mysore is one of first city to adopt intelligent transport system. The study focus on key aspect such as level of people response to the new application and how much it help in day to day movement. The study conducted to know the efficiency of first phase implementation of GPS on 500 buses and passenger information system (PIS) display boards in Karnataka State Road Transport Corporation KSRTC, socio-economic background of passengers using public transport and bench marking of existing transport system.

The objective of study is to study existing scenario of public transport system and to study and analyse the new Intelligent transport system. The findings highlight three core areas that require particular attention at the institutional and policy level they are. The study concludes with some strategic recommendations aimed at overcoming these institutional challenges.

KEYWORDS: Global Positioning System (GPS), Passenger Information System (PIS), Roadside Camera Recognition, Probe Vehicles or Devices. Transport Forecasting, Transport Modelling

INTRODUCTION

An *Intelligent Transport System (ITS)* is the integration of information and communications technology with transport infrastructure, vehicles and users. It enables information to be collected and shared in order to help people to make more informed travel choices, improve journeys and helps to reduce the impact of transport on the environment.

Transportation is the backbone to the development of urban areas. It enables functioning of urban areas efficiently by providing access and mobility. Passenger transport has an overriding influence on the functioning of the city. With growth, the mobility needs increases. People's personal choices and freedom get expressed in increased ownership and use of personalized vehicles. The public agencies operating public transport systems often fail to restructure service types to meet with the changing demand pattern. As a result public transport becomes financially less viable, speeds reduce and congestion levels increase and the transportation becomes a source of environmental problem. One of the current issues pertaining to urban traffic is the role of Intelligent ITS in public transport.

Public transport should always be the hallmark of a good transportation system for a city, especially for a city like Mysore, which is earmarked as the "Heritage City", as it provides good impetus to the tourist population. The role of public transport is vital, particularly to reduce the use of personalized transport. The Karnataka State Road Transport

Corporation (KSRTC) is the major inter-city and intra-city service provider in Mysore. KSRTC provides services to about 179,000 commuters per day by city services.

Intelligent Transportation System (ITS) is the application of computer, electronics, and communication technologies and management strategies in an integrated manner to provide traveller information to increase the safety and efficiency of the surface transportation systems. These systems involve vehicles, drivers, passengers, road operators, and managers all interacting with each other and the environment, and linking with the complex infrastructure systems to improve the safety and capacity of road systems. As reported by Commission for Global Road Safety (June 2006), the global road deaths were between 750,000 to 880,000 in the year 1999 and estimated about 1.25 million deaths per year and the toll is increasing further. Without significant changes to the road transport systems these dreadful figures are likely to increase significantly. ITS refers to efforts to add information and communications technology to transport infrastructure and vehicles in an effort to manage factors that typically are at odds with each other, such as vehicles, loads, and routes to improve safety and reduce vehicle wear, transportation times and fuel consumption. The indicators to calculate the usage of ITS facilities in the city Intelligent Transport Systems are the best solution to the problem. Safety is one of the principal driving forces behind the evolution, development, standardization, and implementation of ITS systems. ITS improves transportation safety and mobility and enhances global connectivity by means of productivity improvements achieved through the integration of advanced communications technologies into the transportation infrastructure and in vehicles.

BACKGROUND OF STUDY AREA

The Mysore is the 3rd largest city in Karnataka next to Bangalore situated in the southern most part of the state. The city of Mysore is spread geographically over an area of about 128 sq.km with the growing population is of 8,87,446 in 2011 census (Cities having population 1 lakh and above, Census 2011). The Mysore city is known for tourism, education, medical facilities etc. in India at faster rate due to industries such as soft ware, information technology activities etc., and the automobiles has been on the rise in the urban area of Mysore. The economic activities and increase in the income by the public generate large income posing a problem of traffic flow in Mysore city. While the improper planning and maintenance of transport has leaf to spreading of congestion, accidents, flow of traffic etc., At the same time the total number of vehicles has increased in an accelerated rate, According to statistics available from the Regional Transport Office (RTO), the total number of vehicles registered in Mysore was 4,95,513 as on December 31, 2010. There are more than three lakh two-wheelers registered in Mysore city. They comprise the single largest category of vehicles on the city roads. There are nearly 51,000 cars registered in the city and their number is increasing faster than ever before.

Mysore being the cultural capital of India is also a hub of industrial activities and is also called the 2nd capital of Karnataka. This city is one of the most preferred destinations for industries including IT hubs other than Bangalore due to salubrious climate and availability of natural resources (water, etc.). It is a main trading centre of silk and sandalwood. Mysore district is bounded by Mandya to the northeast, Chamrajnagar to the southeast, Kerala state to the south, Kodagu to the west, and Hassan to the north. The district lies in the southern Deccan plateau, within the watershed region of Kaveri River, which flows through the northern and eastern parts of the district.

Mysore possesses vast potential in Industrial and Tourism sectors. The existing state of its road network is getting choked day by day. Hence to tap the potential of economic progress, the need of the day for the Mysore City is to provide effective efficient public transport system on which people of Mysore can trust.

Figure 1: Mysore City Bus Route and Bus Stops

Over the past few years there has been a rapid increase in the traffic of Mysore. This stems the increased use of city roads for the heavy transport vehicle's etc leading to traffic congestions. KSRTC is hopping get solution through implementation of intelligent transport system. In the long run, the completed intelligent transport system provides solution to resolving traffic congestion, air pollution, concerns and economic development. Also the proposed developments of the intelligent transport system are essential to gain full benefits out of the investment made in the partial completion of the intelligent transport system.

EXISTING ITS SYSTEM

Currently, the electronic ticket issuing machines represent the only ITS system utilized at MCTD. KSRTC operates the on-line and counter AWATAR reservation system for transport services, but this is not utilized for the urban services at Mysore. About 180 buses at MCTD are currently fitted with digital exterior and interior displays, provided by Hannover Signs. The standard configuration is 3 external 2-line displays (front, side, rear) and one internal 1-line display. The route reference data is uploaded periodically to the control unit by technical staff at the depot using a memory card. The driver initiates the signage using a control panel. About 40 buses are currently fitted with GPS units. These are used to support the vehicle displays and do not have any AVL or Operations Management function.

The ITS system currently under procurement and installation at MCTD will provide the following applications:

- GPS-based Automatic Vehicle Location

- GSM-based data and voice communication

- Central Control Station applications.

- Real-time passenger information in-vehicles, at bus stops and bus stations

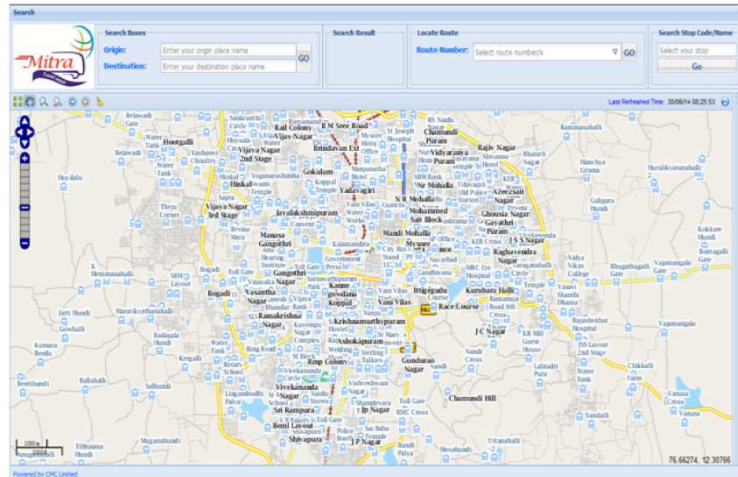- Real-time passenger information on the internet and SMS

Figure 2

METHODOLOGY

The first part focus on socioeconomic and public response to ITS so, primary survey is conducted to know the public opinion and acceptance and changes due to implementation of new Intelligent Transport system. The second part focus on the benchmarking the existing system. The user satisfaction survey and problem survey carried out on random sampling comprising of 51 commuters and 10 places in Mysore city.

The parameters analyzed in this survey are: Socio-economic background of passenger, Information availability, and Travel time and user satisfaction.

USER SATISFACTION SURVEY

Gender of Respondents

We took sample based on the ratio of male and female persons present at the bus stop at the time of interview, for example if there are 10 male 5 female we took sample as 2:1 respectively, so it gives clear view about the majority of passengers using the public transport.

From the sample we took for study there are 37 male and 14 female respondent, 72% of the respondents are male it shows that there are more male persons using the public transport than female.

Age Group of the Respondents

To know about the age group of people who are utilizing the public transport so we divided the ages as below 25 in which trip purpose is majorly for education. 25-50 age group in which the majority of trip purpose is work based and the age group of above 50 are having mixed nature that is both work and recreational and home based trips.
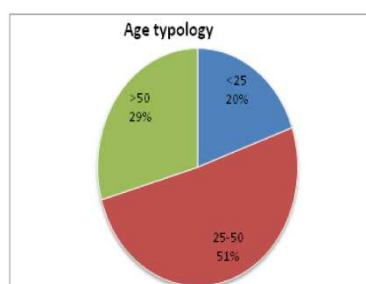

Figure 3: Respondent Details Based Age

Based on the survey it is evident that 51% people are making daily trip are of age group between 25-50 and it is surprise to know that more number of people of age above 50 are using the public transport and it is more than that of the age group below 25 i.e. 20% of age group more than 25 are using the public transport.

Income Pattern of the Respondents

Family income shows the efficiency of attracting to public transport of the different level (economic status) groups. The income groups are classified as 10 k, 10-30k and above 30 k. Based on the primary survey majority of people using the public transport are low and middle income group people.
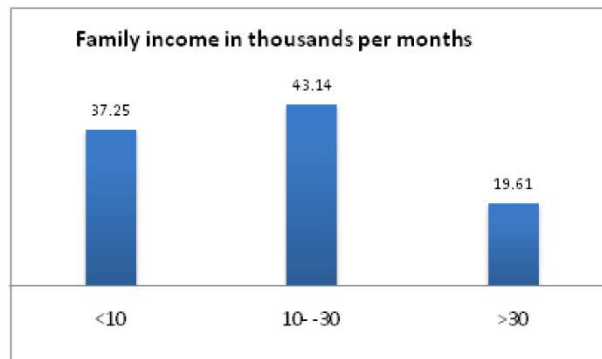

Figure 4: Classification of Respondent Based on Income

The graph shows the majority (80%) of people travel through public transport are middle and low income groups and 20 % are high income group, the income pattern important to know the service utilizing sector of people. From graph it is clear that public transport is majorly used by middle and lower middle class and other factor is higher middle class people are not interested with existing public transport.

Public Transport Efficiency and Satisfaction
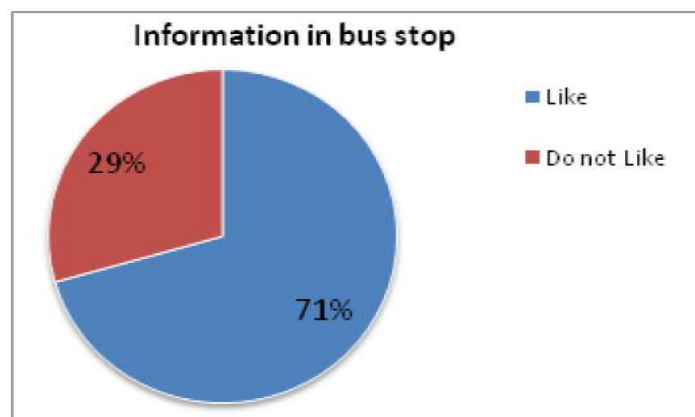**Willingness to Get Information on Bus Timings**

Figure 5: Percentage of People Willing to Get Information on Bus Timing in Bus Stop

It is good to know that the 70 % of people are willing to get information but at the same time it is strange that about 29 % of people are not in need of the new intervention. Our survey found majorly two reasons that is 1st Mysore is traditional city and the people are willing to keep it in that way 2nd investment on the assets is more so they don't want invest money on equipment's rather use for city beautification and greenery.

But if see the number of respondents who want the information is 36 where as people who are not willing to get information on bus are only 15 that is half of them. So majority of them are willing for the new system and they think this will give the identity for city so there is scope for the development of ITS in the city unless it does not interface the cities heritage.
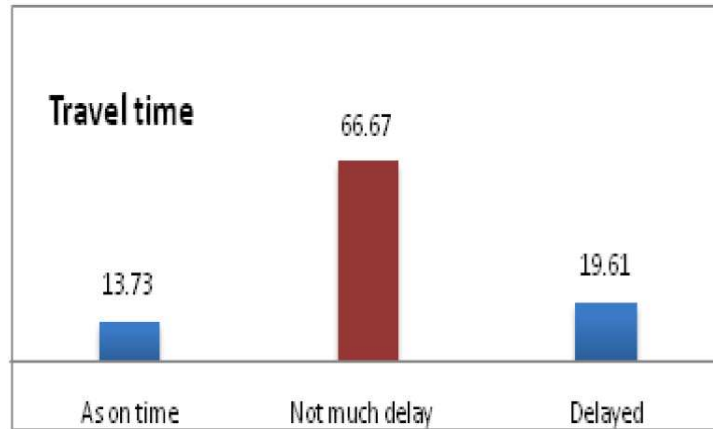

Figure 6: Percentage of People Opinion about Trialling Time

Travel Time

66.67% says that travel time of the bus was good without much delay in reaching the destination. Commuters using KSRTC buses whole week and 50% of people say that the buses are delayed before implementation of ITS. We can see that implementation of ITS has changed the bus timings in the city and buses are arriving at right time.

Time Spent in Bus Stop

The more time the people have to wait in bus stop makes them to take alternative mode for transport so it is important to know about the time they spent in bus stop average time a person can wait in bus stop is 10-15 min but people feel the transport facility is excellent if bus are available at interval of 2 min, 2-5min is good, 5-15min is tolerable and >15 min is more than tolerance.
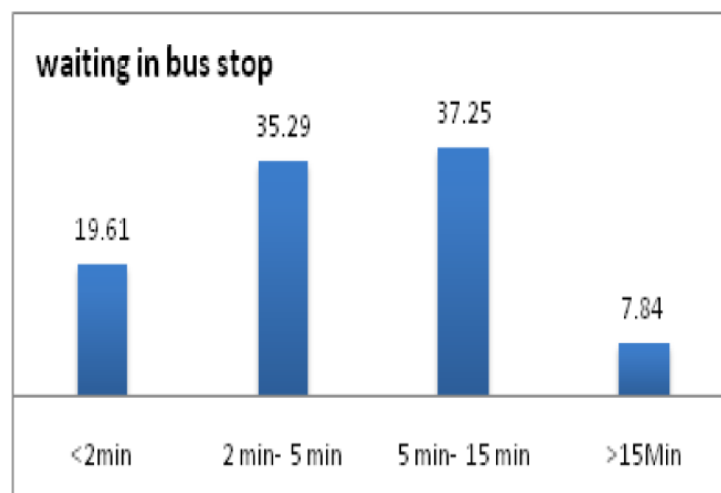

Figure 7: Percentage of People Wait in Bus Stop

As per the survey,80 % of commuters wait for more than 2 minutes at the bus stop out of which 32.29 % wait for 2-5 minutes 37.25 % wait for 5-15 minutes, and 7.84 % wait more than 15 minutes. Output shows that the buses are at tolerance interval that is about 92 % say that they have wait for below 15 min after implementation of ITS.
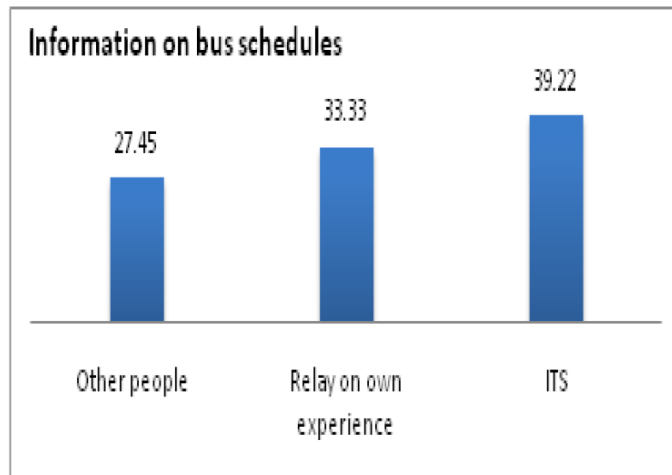
Information on Bus Schedules

Figure 8: Percentage of People Getting Information on Bus Schedules with Different Sources

The basic objective of Mysore ITS is to give information on bus timings. it is important to know about from where the people are getting the information on bus schedules.

Survey reveals that the information on bus timings are majorly through ITS, that is 39 % by ITS 27.45 % of commuters get information on bus schedules from other people and 33.33 % of commuters rely on their own experiences. Implementation of ITS in public transport has increased the information of bus timings.

User Satisfaction

The overall quality and availability of city public transport (KSRTC) is having a good opinion, the below graph indicates good performance of the city bus transport except the people are afraid of increase in bus fare and accuracy in announcement of names of bus stop. People feel safe and secured with the existing bus system and they also feel that travelling in public transport reduces environmental pollution and also stress on road network. The new ITS system have increased identification of bus route for the public but it is difficult as the people need to understand the system of road network and their labelling, so there is a need for public awareness and interacting workshops to know about their intelligent transport system.
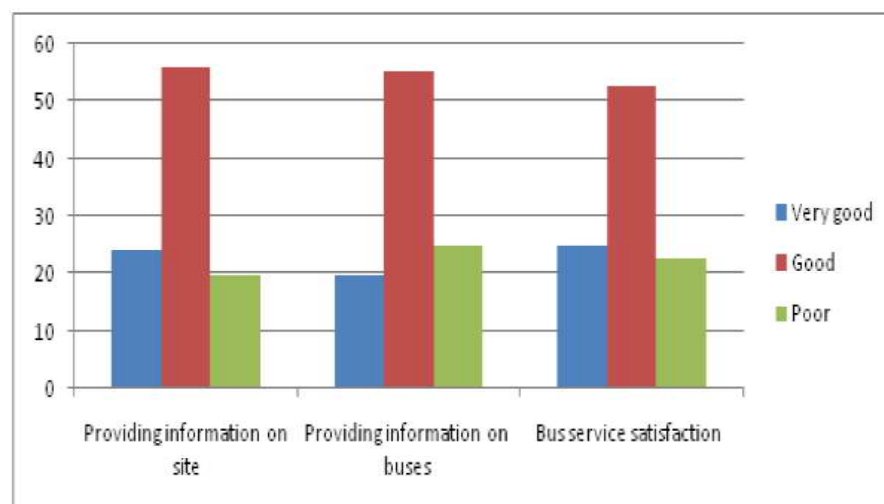

Figure 9: Satisfaction of People in Different Aspect in Public Transport

SERVICE LEVEL BENCHMARKING FOR MYSORE CITY

The challenges of the urban sector in India are growing rapidly, and government agencies at various levels are taking steps to address the gaps in service delivery. One of the important steps towards this is introduction of appropriate systems for information management, performance monitoring, and benchmarking.

Benchmarking is now well recognized as an important mechanism for introducing accountability in service delivery. It can help Urban Local Bodies (ULBs) and other agencies in identifying performance gaps and effecting improvements through the sharing of information and best practices, ultimately resulting in better services to the people. It provides

- Common minimum framework for monitoring and reporting on service level benchmarks.

- Guidelines on how to operationalize this framework in a phased manner.

Ministry of Urban Development (MoUD) wants to address institutional and operational aspects for ensuring long term sustainability of the benchmarking activity. Indicators to calculate city-wide Level of service(LOS) of Intelligent Transport System(ITS) facilities Data Requirement to Caluculate the Level of Service of Intelligent Transport system facilities.

The outcome of ITS implementation could be translated into measurable parameters such as: Service Outcomes- Socio economic benefits, reduction in travel time, patronage of Public Transport System, reduction in Congestion, reduction in accidents, Increase in tourist satisfaction.
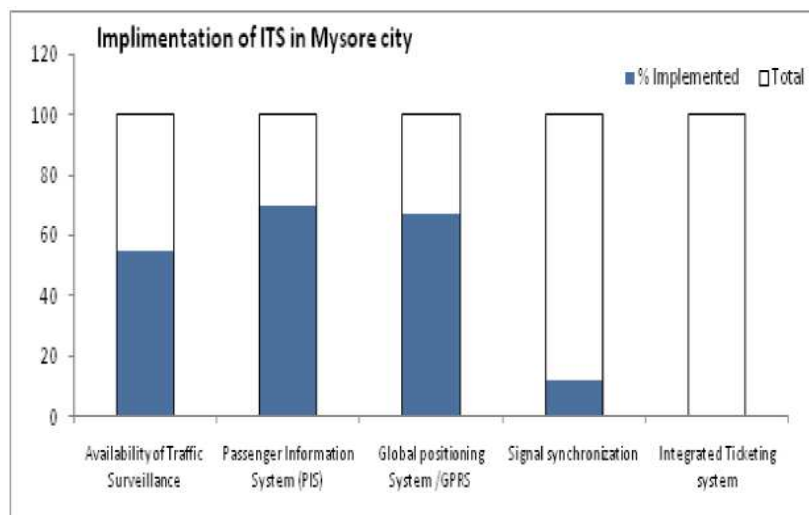

Figure 10: Level of Implementation

Table 1: Service Level Bench Marking

	ITS Applied for no of Units	Total Potential Options Implementation of its	Calculate [A/B]*100. Compute Los	1,2,3,4,	>=75, 50-75, 25-50, <25
Availability of Traffic Surveillance	36	66	54.55	2	50-75
Passenger Information System (PIS)	193	278	69.42	2	50-75
Global positioning System /GPRS	500	745	67.11	2	50-75
Signal synchronization	5	44	11.36	4	<25

Table 1: Contd.,					
Integrated Ticketing system	0	3	0.00	4	<25
The calculated level of service (los) of Intelligent Transport system =(los1+los2+los3+los4+los5)				14	11-15,
The city has ITS facilities which may need considerable improvements in terms of integrated ticketing system, signal synchronization, GPS/GPRS, PIS etc as many parts of the city are nor served by it. Reliability of measurement: Intermediate level (B) Only surveys are undertaken					

POSSIBLE MEASURE

Unified Traffic Monitoring Centre: Traffic infrastructure for tourism and environmental city, vehicle restriction entry Pre-trip information (tourism spots, facilities, available route/transport mode from Bangalore and Mysore), Unified authorities for to work under single window system and Initiatives for safety, environment and mobility The possible unified transport authorities which is formed by heads of different authorities and headed by chair person formally appointed by Government of Karnataka and the person should be a Mysore citizen. The committee can appoint the specialized persons in the field of traffic and transportation.

This committee will interact and co-ordinate with the different departments and formulate the requirement of the different department and make five or required interval plans for the different departments based on their requirements and it control all the signals and surveillance cameras and other intelligent services under one umbrella and is supported by other departments

CONCLUSIONS

The city of Mysore young metropolis the problem of public transport and traffic congestion is new to city, the city have wider road and they are well aligned and converge toward the core of the city. The city has newly introduced the Intelligent Transport System and the city has the second largest public city transport service in the state of Karnataka.

Based on the study conducted the people who Majorly utilize the public transport is Male and age group of 25-50 that is working and whose wage per month is below 25,000 rupee and which is major sector of our society, so it is very much necessary to provide good and sound reliable public transport in this regard the initiative of ITS is step for achieving the reliable public transport. The next part in the paper is about the efficiency of public transport, the public transport has improved after implementation of ITS the overall opinion on public transport and acceptance about ITS is good, but the service level bench making shows that how much improvement is required.

Any system will die if is not in use like human lose the tail as part of evolution as it was not put use it is same with ITS but as government is investing so much of amount in adopting new system and public have accepted it has become necessary to encourage the new technology into reliable public transport.

ACKNOWLEDGEMENTS

REFERENCES

1. L R Kadiyali: Traffic Engineering And Transport Planning, (2008).

2. Service level benchmarking for Urban transport at a glance; Ministry of Urban Development, Government of India, 27 to 29.

3. Comprehensive Traffic and Transportation Plan for Mysore: Volume 1 and 2; (2012).

4. Detailed project Report of Intelligent Transport System for Mysore City, CIRT, (2008).

5. Detailed Project Report - Intelligent Transport System & Ethanol Diesel - KSRTC, Mysore, Central Institute of Road Transport &eGestalt; *http://www.ksrtc.in/site/sites/all/themes/ksrtc/pdf/DPR-ITS.pdf* (Accessed on 01 May, 2013).

6. Stephen Ezell.: Intelligent Transportation Systems; (Jan 2010).

7. The World Bank: Toolkit on Intelligent Transport Systems for Urban Transport; Case Study: Mysore, India

8. *http://www.ssatp.org/sites/ssatp/files/publications/Toolkits/ITS%20Toolkit%20content/case-studies/mysore-india.html*(Accessed on 10 May, 2013.)

9. KSRTC ITS | About-ITS: http://mitra.ksrtc.in/MysoreMBus/abti.jsp (Accessed on 10 May, 2013).

10. Intelligent Transport System-KSRTC, Mysore: CMC Ltd *http://ewf.eletsonline.com/2012/05/intelligent-transport-system-ksrtc-mysore-cmc-ltd/* (Accessed on 11 May, 2013).

11. Sustainable urban transport Project:*http://thenih0n.in/sutpp/?sutpevent1*(Accessed on 26 Jun, 2014).

12. Real time Bus tracking system (Mitra):*http://mitra.ksrtc.in/Mysore_commuter_3/*(Accessed on 26 Jun, 2013).

13. The Times of India, Mysore: Intelligent transport system for Mysore *http://timesofindia.indiatimes.com/city/mysore/Intelligent-transport-system-for-ysore/articleshow/16330384.cms;* Sep-10-2012; (Accessed on 26 Jun, 2014).