

Performance Impacts through Intelligent Transport System

¹ D.Ashok & ²M. Harish Kumar

1. ASSISTANT PROFESSOR Bomma Institute of Technology and Science, Allipuram, Khammam, Telengana, INDIA - 507318

2. M.Tech, Bomma Institute of Technology and Science, Allipuram, Khammam, Telengana, INDIA – 507318

ABSTRACT :

Intelligent Transportation Systems (ITS) are not an individual system, which must integrate with Bridge Management System, Communication System and so on. Cooperative management is trend of ITS, the thought of distributed management and agent technology combines with development course of tradition ITS, not only can improve the efficiency of management but also reflected the essence of transportation system. ITS are equipped with mobile phone technology and global positioning satellites (GPS) to send data to the car on the pedestrian's location, which developed enormously worldwide. With its broad market prospect, ITS will continue to show high-speed growth tendency in a longer period of time. But our country's ITS far more perfect and needs to be developed in future. This article analyses the current developmental situation and deficiencies of the ITS, and introduces some effective measures which promote the development of the technology of the ITS from different points of view.

Index Terms—development thinking; information Technology; integration; intelligent transportation systems

I.INTRODUCTION:

TO effectively meet the travel needs of urban residents, a balanced approach is required, in which efforts to manage travel demand are complemented with strategic road network improvements to address capacity deficiencies. The key objective is to minimize infrastructure costs and promote sustainability while maintaining an acceptable level of mobility. One way of accomplishing this objective is to increase the efficiency of the existing transportation network through the use of intelligent transportation systems. Such efficiency improvements can also achieve important socio economic and environmental objectives, including a reduction in Greenhouse Gas (GHG) emissions. Improvements in traffic flow tend to reduce energy use and associated

GHG emissions by reducing the amount of fuel that is wasted under congested “stop and go” conditions. However, once the optimal speed is exceeded, fuel consumption and GHG emissions begin to rise. Moreover, if travel conditions become so favorable that induced demand materializes, emissions will increase simply due to the greater number of vehicles on the road network. Although the environmental impacts of ITS could be significant, few efforts have been made to quantify such impacts in any meaningful way. Given the complex interactions which characterize the urban transport system, a comprehensive modeling framework is needed to fully understand the potential implications of ITS technologies from a climate change perspective

II. INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent Transportation Systems have been defined in many different ways. While some definitions focus on technology, others capture the functional aspects of ITS and the relationships that exist between advanced technology and the various components of the transportation system as [6]. This definition highlights the technologies intrinsic to ITS, and the various transportation system components that interact with these technologies. Other definitions focus on how the technology is applied, and the system operators and users impacted by it. Indeed, ITS are often defined in terms of the user services it provides, which range from traffic control and incident management to the application of advanced technology in the transit and freight sectors. Clearly, technology and technology integration are key aspects of ITS. However, from [5], ITS are more than just technology, it is an institutional arrangement for applying technology to solve transportation problems, for example, through the formation of joint public private ventures. ITS can also be defined in terms of objectives; ITS facilitates many activities related to the operation, management, and use of the transportation system, enhancing safety and efficiency, and reducing environmental impacts. Taken together, the above definitions imply the following:

- ITS are concerned with the mobility of people and goods, and more specifically the delivery and management of multimodal transportation services.
- ITS exists as a system, with a web of interactions that both complicate service delivery and lead to important synergistic benefits.

- ITS involves the use of “smart” technology which is capable of dynamic, real-time interaction between various

Sustainable Transportation Numerous researchers, institutes, and government organizations are working on reducing traffic congestion and building sustainable transportation system all around the world. The common conclusion for this problem is that it is not feasible to continue to consume resources at current rates and the time is limited to take action. These conclusions lead to the idea of sustainable development implementations on transportation systems. 1 “Sustainable development” was defined by United Nations’ Report in 1987 as; “generating a development which meets the needs of the present without compromising the ability of future generations to meet their own needs.” This definition can be paraphrased for transportation systems as ensuring that future generations need for mobility and transport will not be compromised. Researchers, governors, decision makers etc. are still working on building a sustainable world, and sustainable transportation systems, however, the results of these efforts do not indicate significant improvements (Black, 2010). The concept of sustainable development is not straightforward, since it has various indicators. For instance, transportation affects fossil fuel (petroleum) reserves, global atmosphere, local air quality, noise pollution, level of mobility, congestion rate, and mortality rates (fatalities and crashes). The world has used approximately 1 trillion barrels of petroleum (Black, 2010). This fact could highlight the severity of this problem by itself. Due to the increasing rate of population growth and number of vehicles on the roads, the question arises as to whether or not the

petroleum reserves will be able to meet the needs of future generations. Congestion and level of mobility are directly affected by the increase of VMT and number of vehicles. Today in most urban areas, traffic congestion is one of the main concerns of residents. Even the local government agencies invest enormous amounts of money to expand roads and reduce congestion; however, the results of these investments do not indicate significant benefits since the existing roads cannot be expanded to the 2 infinity. In addition, congestion is the main reason for low air quality in urban areas, due to vehicle emissions. Transportation is one of the main factors that affects air quality and greatly impacts the global atmosphere. Urban area air quality data is an example of the severity of transportation's impact on the environment. According to the U.S. Bureau of Transportation Statistics, transportation modes caused 3.7% of sulfur dioxide, 57% of nitrogen oxide, 68.4% of carbon monoxide, 2.9% of PM10 particulates and 11.8% of PM2.5 particulates, and 33.9% of volatile organic compounds emissions to the air in 2009 (U.S. Bureau of Transportation Statistics, 2009). Poor air quality does not only threaten human life, it also afflicts the life of all species on the planet. In addition, emissions and the global average temperature are increasing because vehicles are burning fossil fuels. Finally, traffic crashes is another issue that should be included as a part of sustainable development. According to World Health Organization (WHO), crashes are responsible for almost 1 million fatalities each year and nearly 70 million of injuries (2001) (World Health Organization, 2004). Fortunately, per 100 million VMT mileage death rates are decreased from 2 to 1.25 in the last 10 years in the U.S. This decrease in crash rates can be explained by an increase in

enforcement of traffic laws and new traffic regulations by the U.S. Government in last decade. Also, every crash costs a significant amount of money to society. For instance, moderate injury crash costs \$392,000 and where fatality crash costs \$4.2M in 2009 dollars [(Blincoe et al., 2002) (costs converted from year 2000 to year 2009 by consumer price index)]. 3 As a result of these unsustainable aspects of transportation, there is a crucial need to develop new strategies to decelerate the current trend. Using the word "deceleration" is more accurate for current issue, because stopping or become sustainable cannot go beyond the point of utopia. The studies in this era include widespread point of view changes such as technological improvements, commuter behavior, alternative fuels etc. These changes may make interesting impacts on society in addition to the common concerns: economic and environmental. For instance, Frank et al.'s study (2004) states that the chance of becoming obese increases by 6% with every extra hour wasted in traffic (Frank, Andresen, & Schmid, 2004).

CONCLUSION:

Congested roadways are negatively affecting the quality of life for society on a daily basis. Intelligent Transportation Systems (ITS) are one of the approaches that aim to reduce traffic congestion and provide socio-economic, environmental, and safety benefits. In order to encourage decision makers to proceed with new ITS investments on transportation infrastructures, it is crucial to present their impacts in a holistic point of view. This thesis summarized detailed sustainability impacts and performance of ITS investments with TBL-LCA and fuzzy-DEA methodologies in the United States. First, the results of the impacts of ITS on seven



metropolitans in Florida were analyzed; this was performed by using TTI's UMR (2011) congestion relief results for those metropolitans. The thesis then expanded to an U.S. level study which summarized sustainability impacts of the U.S. on a state level. Finally, the reference ITS investments were compared in terms of their sustainability performance. Therefore, this thesis fills a gap by presenting nine sustainability indicators results of ITS implementations from city to state level, or sustainability performances of these implementations. An input-output based TBL approach was implemented for seven urbanized areas in Florida. As a result, additionally to the cost savings related to delay reduction and fuel savings, their nationwide economic (profit, employment, tax revenue, import), and environmental

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