Donthula Venkatesh[1], Akula. Priyanka[2]

Turkish Online Journal of Qualitative Inquiry (TOJQI)
Volume 12, Issue 4, Month 2021: 72-76

Development Of Smart Transit System

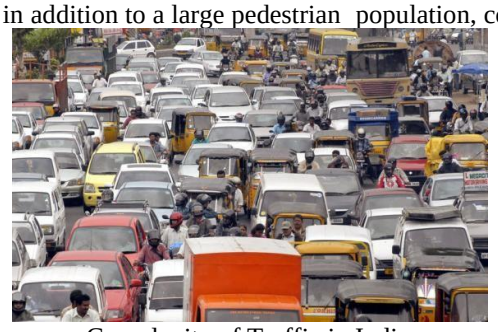
Donthula Venkatesh[1], Akula. Priyanka[2]

[1]M-Tech Scholar, [2]Asst Professor
[1,2] Department of Civil Engineering
Qis College Of Engineering And Technology (Autonomous)
Approved By Aicte | Permanent Affiliation: Jntu-Kakinada | Ugc-Recognized
Accredited By Nba | Accredited By Naac | Iso 9001:2015 Certified
Vengamukkapalem (V), Ongole, Prakasam Dist., Andhra Pradesh-523272

Abstract
For decades, transportation has been considered as a link to all aspects of life worldwide. In this case, the world's natural environment, social well-being and economic development all usually depend on transportation systems. In most cases, safe, clean, sustainable and equitable transport systems help countries, especially in cities and urban centers, to thrive. However, a wide range of research shows that transportation systems in most of the cities and urban areas are unsustainable. In fact, some of these transportation systems are considered to be a threat to the environmental, social and economical aspects of future generations. In this perspective, therefore, changing such trends in transportation requires the collaboration of various stakeholders at regional, national and international levels.
In this study, therefore, a wide range of definitions of sustainable transport are discussed. More so, some of the aspects of smart transport for modern cities such as cycling and the role of women in sustainable transport were explored. With the aim of getting to the core of the subject, cases of women in bicycle transport, especially in the India is equally elucidated. Although not fully outlined, the idea of smart cities and sustainable transport have heterogeneous characteristics globally as discussed herein.

1. Introduction

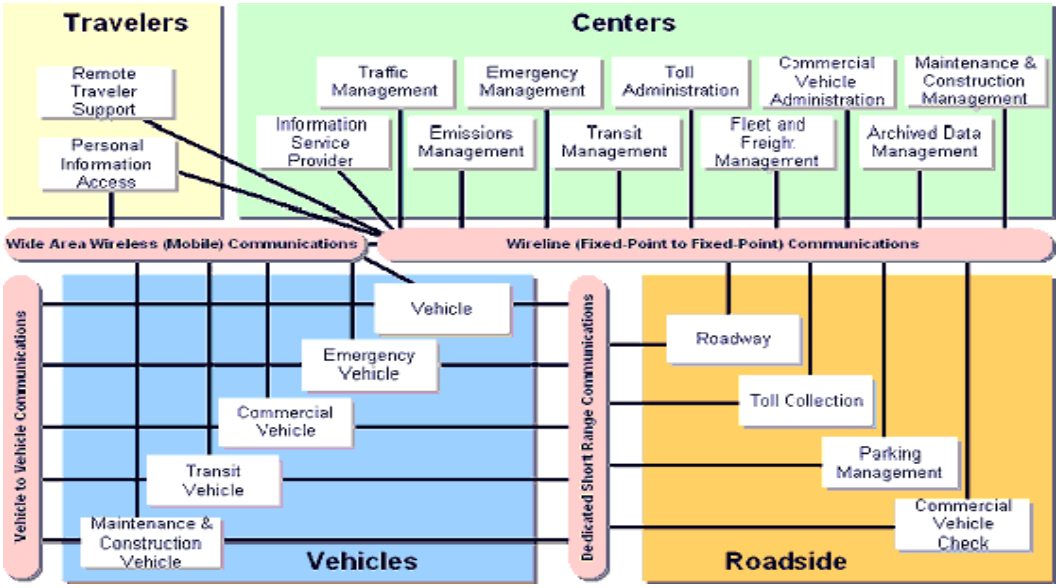
An important metric for economic growth of any country is its burgeoning vehicle ownership. However, the indirect effect of vehicle ownership is acute traffic congestion. India has, in the past decade, seen an astronomical increase in vehicle ownership and associated road blocks and traffic snarls in its metropolitan cities. The variety of vehicles in India two, three and four wheelers, in addition to a large pedestrian population, complicates the situation.



Complexity of Traffic in India

Smart Transit Systems (STS) is a tested route to mitigate traffic congestion problems. STS can be broadly defined as the use of technology for improving transportation systems. The major objective of STS is to evaluate, develop, analyse and integrate new technologies and concepts to achieve traffic efficiency, improve environmental quality, save energy, conserve time, and enhance safety and comfort for drivers, pedestrians, and other traffic groups. State-of-art data acquisition and evaluation technology, communication networks, digital mapping, video monitoring, sensors and variable message signs are creating new trends in traffic management throughout the world. The synergy of data acquisition, analysis, evaluation, and information dissemination helps

in developing an all-encompassing system of traffic organization that enables information sharing among the managers and users of traffic.



2. Sts taxonomy

The most commonly used classification of STS is based on the positioning of the system as given below.

Vehicle level

Technologies deployed within vehicles, including sensors, information processors and displays that provides information to the driver.

Infrastructure Level

Sensors on and by the side of roads collect important traffic data. Tools of communication provide drivers with pertinent information to manage traffic better. These tools include roadside messages, GPS alerts and signals to direct traffic flow.

Cooperative Level

Communication between vehicles, and between infrastructure and vehicles involving a synergic combination of vehicle level and infrastructure level technologies.

The commonly adopted functional taxonomy of the ITS is as follows

Advanced Traffic Management Systems (ATMS)

Integrates various sub-systems (such as CCTV, vehicle detection, communications, variable message systems, etc.) into a coherent single interface that provides real time data on traffic status and predicts traffic conditions for more efficient planning and operations. Dynamic traffic control systems, freeway operations management systems, incident response systems etc. respond in real time to changing conditions.

Advanced Traveler Information Systems (ATIS)

provide to users of transportation systems, travel-related information to assist decision making on route choices, estimate travel times, and avoid congestion.

Advanced Vehicle Control Systems (AVCS)

AVCS are tools and concepts that enhance the driver's control of the vehicle to make travel safer and more efficient. For example, in vehicle collision warning systems alert the driver to a possible imminent collision. In more advanced AVCS applications, the vehicle could automatically break or steer away from a collision, based on input from sensors on the vehicle. Both systems are autonomous to the vehicle and can provide substantial benefits by improving safety and reducing accident induced congestion. The installation of high tech gadgets and processors in vehicles allow incorporation of software applications and artificial intelligence systems that control

internal operations, ubiquitous computing, and other programs designed to be integrated into a greater transportation system.

Commercial Vehicle Operations (CVO)

CVO comprises an ensemble of satellite navigation system, a small computer and a digital radio, which can be used in commercial vehicles such as trucks, vans, and taxis. This system affords constant monitoring of truck operations by the central office and provides traceability and safety.

Advanced Public Transportation Systems (APTS)

APTS applies state-of-art transportation management and information technologies to public transit systems to enhance efficiency of operation and improve safety. It includes real-time passenger information systems, automatic vehicle location systems, bus arrival notification systems, and systems providing priority of passage to buses at signalized intersections (transit signal priority).

Advanced Rural Transportation Systems (ARTS)

ARTS provide information about remote road and other transportation systems. Examples include automated road and weather conditions reporting and directional information. This type of information is valuable to motorists travelling to remote or rural areas. This has been widely implemented in the United States and will be a valuable asset to countries like India, where ruralareas are widely distributed.

Development of smart transit system in India

The STS program in India is aimed at ensuring safe, affordable, quick, comfortable, reliable and sustainable access for the growing urban and rural population to jobs, education, recreation and such other needs. A few STS applications have been introduced in India in metropolitan cities like New Delhi, Pune, Bangalore, Chennai etc. focusing on stand-alone deployments of area- wide signal control, parking information, advanced public transportation, toll collection etc. However, all of these are small scale pilot studies limited to major cities and are in the beginning stage of deployment. Thus, at present, there are no exhaustive fully developed STS applications with traffic management centers in India.

A brief description of some of the existing applications of STS is given below

Trial of advanced Traffic Management System

This involved a trial run of the fully automated Traffic Regulatory Management System (TRMS), involving usage of surveillance cameras in the city of Chennai. This project involved installing sophisticated cameras, wireless towers and poles, under the Rs. 3-crore-State government-funded project.

Automated Traffic Control (ATC)

The Area Traffic Control Project of the Mumbai Traffic Control Branch focused on synchronizing major junction and was implemented through the Mumbai Metropolitan Region Development Authority (MMRDA) and Municipal Corporation of Greater Mumbai (MCGM) with financial aid from World Bank. Modern gadgets such as Speed Check Guns and Multi Radar C comprising Smart Cameras, Radar sensor, Screen, Manual control unit, Flash generator, Flash light, Power Box and Tripod were used in this project.

ATIS

The objective is to inform road-users of latest traffic updates and better management of traffic. SMS, internet and radio have been employed for updates. The update protocols in a few Indian cities are as follows.

Advanced Public Transportation System APTS

One application implemented in APTS area is GPS vehicle tracking system in public transport buses (Bangalore, Chennai, Indore) to monitor vehicle routing and frequency so that passengers do not have to wait long hours for a bus. The objective is to provide Global Positioning System based passenger information system to help passengers utilize their waiting time at bus stops more efficiently as well as to reduce the uncertainty and associated frustrations. Display boards with high quality light emitting diode in wide-view angle are provided at bus stops so that passengers can read the information. It displays the number and destination of the approaching bus, expected time of arrival, and messages of public interest.

Bus Rapid Transport (BRT)

Bus Rapid Transit (BRT) systems are viable alternatives to traditional light rail public transport. Instead of a train or metro rail, BRT systems use buses to ply a dedicated lane that runs lengthwise along the centre of the road. At specific locations, passengers can embark or disembark at conveniently located stations, which often feature ticket booths, turnstiles, and automatic doors. Studies have shown that a BRT is not only cheaper to build, but is also

profitable for bus owners to operate and relatively inexpensive for commuters to use. The cities selected for implementing BRT include Ahmedabad, Pune, Rajkot, Bhopal, Indore, Visakhapatnam, Vijaywada and Jaipur.

Electronic Toll Collection (ETC)

The Electronic Toll Collection (ETC) is designed to determine if a car is registered in a toll payment program, alert enforcers of toll payment violations, and debit the participating account. With ETC, these transactions can be performed while vehicles travel at near highway cruising speed. ETC is fast becoming a globally accepted method of toll collection, a trend greatly aided by the growth of interoperable ETC technologies. Technologies used in ETC are Automatic Vehicle Identification (AVI), Automatic Vehicle Classification (AVC), Video Enforcement Systems (VES) and Vehicle Positioning System (VPS).ETC systems are deployed in the following cities in India:

Advanced Parking Management

State-of-art parking management system is set up by the New Delhi Municipal Council at Palika Parking in Connaught Place. This system allow vehicle users to be guided by a wide range of sensors, lights, signboards and directional displays to the closest vacant car space existing in the parking lot and similarly for identifying their car location at the time of exit. Apart from automatic online guidance at junctions, zone-wise sub-division of areas will assist easy identification. The guidance system operate throughout the three levels of parking at Palika, which has a capacity for 1,050 cars and 500 scooters.

Conclusions

1. Technology: The development and implementation of advanced technologies is important to the successful management and operation of STS in India. These technologies include electronic equipments such as sensors, detectors and communication devices and application of global navigation satellite system (GNSS). This in turn hinges on cooperative work between the Government, academic research institutions, and industry.
2. Modeling of Indian traffic: A proper understanding of the traffic system is important in the successful implementation of any reliable STS systems. The existing models, developed for the western traffic conditions may not be suitable for the Indian traffic and hence there is a need to modify or develop models that can characterize the Indian traffic in a better way.
3. Supply Chain: Seamless interconnectivity of the various branches of the transportation sector is essential to provide effective, efficient and secure movement of goods and services while improving the conservation of natural resources and reducing environmental impacts such as the effects of carbon emissions.
4. Energy and Sustainability: The STS in India should closely work with the energy sector in the promotion of fuel efficient transport policies and practices, including the use of alternative transport fuels. Fuel efficient policies and practices will assist the country in achieving sustainable economic and environmental benefits through the application of intelligent transportation services.
5. Human Capital Development: Human skills are important to ensure the development of seamless transportation systems. Given the population density of India and the varied skill sets available in the country, the ability of the work force to develop, manage and safely implement existing and emerging technologies is essential for STS design andimplementation.

REFERENCES

[1]. Rassafi, A.A.; Vaziri, M. Sustainable transport indicators: Definition and integration. Int. J. Environ. Sci. Technol. 2005, 2, 83–96.

[2]. Hall, R.P. Introducing the Concept of Sustainable Transportation to the U.S. DOT through the Reauthorization of TEA-21. Master's Thesis, Massachusetts Institute of Technology, Cambridge, MA, USA, June 2002.

[3]. Hall, R.P. Understanding and Applying the Concept of Sustainable Development to Transportation Planning and Decision-Making in the US. Ph.D. Thesis, Massachusetts Institute of Technology, Cambridge, MA, USA, 2006.

[4]. Kronsell, A.; Smidfelt Rosqvist, L.; Winslott Hiselius, L. Achieving climate objectives in transport policy by including women and challenging gender norms: The Swedish case. Int. J. Sustain. Transp. 2015, 10, 703–711.

[5]. Litman, T.; Burwell, D. Issues in sustainable transportation. Int. J. Glob. Environ. Issues 2006, 6, 331–347. [CrossRef] 8. Malasek, J. A Set of Tools for Making Urban Transport More Sustainable. Transp. Res. Procedia 2016, 14, 876–885.

[6]. Zhou, J. Sustainable transportation in the US: A review of proposals, policies, and programs since 2000. Front. Archit. Res. 2012, 1, 150–165.

[7]. Black, W.R. Sustainable Transport: Definitions and Responses. Integrating Sustainability into the Transportation Planning Process; National Academics Press: Washington, DC, USA, 2004; pp. 35–43
[8]. Scholl, L.; Schipper, L.; Kiang, N. CO2 emissions from passenger transport. A comparison of international trends from 1973 to 1992. Energy Policy 1996, 24, 17–30.
[9]. Friedl, B.; Steinninger, K. Environmentally Sustainable Transport: Definition and Long-Term Economic Impacts for Austria. Empirica 2002, 29, 163–180.
[10]. Legacy, C.; Curtis, C.; Scheurer, J. Planning transport infrastructure: Examining the politics of transport planning in Melbourne, Sydney and Perth. Urban Policy Res. 2017, 35, 44–60.