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Traffic congestion in Tier-I and Tier-II cities by executing Intelligent Traffic System

Saqlain Haider Mir [1], Deepak Kumar[2]

[1]*M.Tech Scholar, Department of Civil Engineering, Desh Bhagat University, Mandi Gobindgarh Punjab, India.*

[2]*Assistant Professor, Department of Civil Engineering, Kurukshetra University, Kurukshetra, India*

Abstract: - Various ITS application and policy measures have also been discussed to provide a full support to the traffic management. Different issues and challenges of ITS application have been considered intricately for a suitable alternative to the conventional systems that were adopted since decades. Specifically tier I and tier II cities are worst affected due to the stranded vehicles who pile up for hours and simply they crawl in the peak hours either to reach their work places or to return back to their residences. This not only a misuse of bio-fuel but also add pollution to the atmosphere emitting colossal CO_2 to the environment.

Key Words— ***Traffic system, Transportation, Tier I and II Cities, Intelligent Transportation.***

I. INTRODUCTION

There are two types of cities in India namely Tier I and Tier II. According to 7th pay commission in 2017 this was introduced according to which there are three categories. a) Category X (population of 5 million and above) b) Category Y (population between 0.5 and 5 million) and category Z (population below 0.5 million). In common dialect, these are respectively called Tier 1, Tier 2 and Tier 3 cities. According to the last census of 2011, however, there is a different classification in terms of million-plus agglomerations, which are 53 in number, including mega cities (population greater than 10 million) like Mumbai and Delhi. Then there are statutory towns which is any town having a municipal corporation and at the third level are census towns having a population over 5000 people with most people engaged in non-agricultural work (https://www.dnaindia.com/analysis/column). Hence, the classification of cities in India is itself not standardized. However, considering with unanimity most of the infrastructure budget is spent on metros, BRT corridors and expressways in these cities of Mumbai, Delhi NCR, Chennai, Kolkata, Ahmedabad, Bangalore and Hyderabad. Meanwhile, Tier II cities, such as Surat, Bhopal, Kochi, Lucknow, and Vadodara, continue to have poor public transport facilities and stagger under alarming air pollution levels. Several of these cities are billed to be among the fastest growing cities of the world. It is worth examining if mere fast growth is anything to be proud of when the quality of life for its residents remains one of the most horrible. Intra town bus services are typically non-existent except perhaps for state capitals. The result is chaos and traffic congestion, a scenario shared with all smaller Indian cities. Public transport accounts for a mere 1% of all trips in Surat.

Skeletal bus services run in most Tier II cities where inter-city buses start from a main bus terminal. These are run by the state road transport undertaking and private operators. Passengers hop onto these intercity buses and get off on the way if their destination lies on route, which naturally means there is limited connectivity. A good bus service in a smaller Indian city is rare to find, with the South faring better on this aspect whereas public utilities are poor. A few cities, though, like Pune and Surat have been innovative on the energy front, developing energy efficient programmes through renewable sources. The most damning indictment of India's Tier II cities is that nine of them fall in the 'category of the world's top 15 most tainted cities'. A number of Tier II cities attribute in the 100 cities listed for the Smart Cities assignment whose objective is "to provide primary infrastructure and give an appeasing quality of life to its inhabitants, a clean and liveable environment and application of 'Smart' elucidation". The mission for Smart Cities is good for Tier II cities in comparison to Tier I because it reflects the glare of publicity towards India's smaller cities which are often neglected of the transformation on development and renewal of urbanization. This will enhance voluminous resources that the government assigns for infrastructure and urban service relief under this project. The challenge now is to empower local governing bodies and encourage them to innovate, relook at old models of service delivery and enable them to raise funds required for improvements. Given that the baseline of development is rather low, this would be a huge challenge for the city but one that is well worth undertaking to pull itself out of years of neglect.

Fig.1. Stranded Vehicles on Beijing

Fig.2. Traffic congestion in Mumbai

Fig.3. Vehicular traffic in Delhi NCR

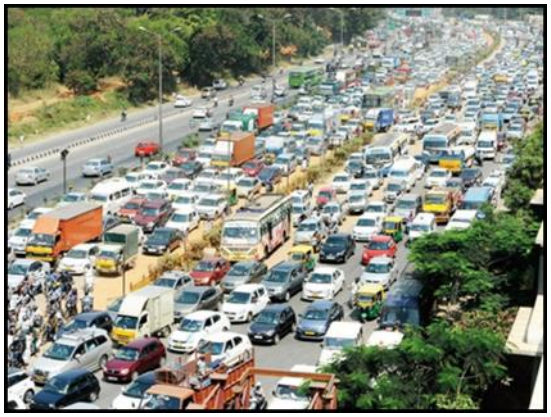

Fig.4. Traffic bottleneck in Bengaluru

Fig.1. shows the massive vehicular traffic along the highway in the city of Beijing. This rush was noticed in the Chinese New Year eve. Figure 2, 3 and 4 reflects the movement of vehicles in the tier I cities like Mumbai, Delhi and Bengaluru respectively. Figure 5 and 6 are the pictures clicked in the cities of Kolkata and Chennai respectively in the peak hours cited almost every day.

Fig.5. Traffic chaos in Kolkata

Fig.6. Dense traffic jam in Chennai

II. LITERATURE SURVEY

Sumit Mallik (2014) has undertaken a research to understand the problems due to traffic congestion and task of information technology in creating collaborative effect in communication systems. Due to congestion in traffic, transportation competence gets diminished and travel time enhances including increasing in pollution level. Development in the road infrastructure results into more number of accidents. In this paper attempt is made to discuss the impact on different application field. Studying earlier work problems identified as grouped into three clusters. First, Lack of Traffic Management System due to heavy increase in the number of the vehicles resulted into traffic congestion. Secondly, Homeland Security system and Vehicle Operations are not developed resulted into non tracking of the vehicles.

Lastly, third cluster is inter-vehicle co-ordination and application of new technologies. To overcome these problems some solutions are suggested by the researcher such as use of GPS, GIS, remote sensing etc resulted into efficient mobility of traffic. By keeping surveillance on the road traffic identification of the vehicles became easy for tracking. Use of Bluetooth, WIFI, sensors will provide a better synchronization between one vehicle to the other. Due to ITS there is encouragement for use of public transportation and results into reduction in personal vehicles.

Rijurekha Sen and Bhaskaran Raman (2011) studied the clogging in the road traffic particularly focusing on developing countries or fastest growing economy like India. Their research addresses predominantly to the issue of sluggish growth in infrastructural in terms of roads and highways and its relation with drastic increase in the number of the vehicles. The reason is that of cost and space limitations for hindering the infrastructure progress. The other problem identified in the perspective is that the Indian traffic does not have proper lanes, which creates difficulties in implementation in Intelligent Transportation Systems (ITS). As a result, ITS used in Developed Countries cannot straightway being implemented in India. In this research paper different ITS applications for managing traffic are dealt with Revenue collection, Incident detection, Vehicle classification, Monitoring, Intersection control etc issues. The information from road can be collected through sensing with different modes like static sensing, mobile sensing and hybrid sensing. The ITS architecture considering choice of application, choice of sensing and choice of communication mode is discussed in this study.

Partha Chakroborty (2013) threw some lights on the relationship of sustainability and efficiency of transport system. Sustainable transportation focuses on safety, economy, efficient and controlling emissions as well as waste. Addressing urban transport mobility issues such as Integration of Bicycles in system, Use of Public Transportation and cost of it, Road infrastructure and parking facilities, large number of vehicles has human-vehicle conflict and integration of suburbs with multimodal transportation system. In achieving sustainability road and public transportation is required to be balanced. Improved travel times, safety and better terminals (parking) can leads to efficient road transportation.

M. Absar Alam and Faisal Ahmed (2013) studied in this paper issues related to non-utilization of traffic demand management measures vis a vis public transport improvement measures. Higher urban population growth resulted into Traffic congestion which is major problem in Asia and particularly in India. Increase in vehicles is not only problem of this traffic congestion, other areas like road infrastructure, private transport cost, psychological factor, policy implementations etc are also required to be addressed more carefully. With respect to average travel speed in Indian cities is very low due to traffic congestion. Some policy measures like integration in urban town planning, encouragement to public transpiration and emphasis on ITS will probably yield into effective transport management. In this study some research gaps were identified like withdrawal of fuel subsidies impacted upon the public transportation as its cost increased which affected majority of stake holders. The investment in the public transport and its required rate is mismatched which leads to shortage of public transport resulting into search for alternatives. There is very requirement of making awareness in the driver community about the safety aspect of the transportation. Another gap identified related to inadequate parking facilities. To overcome gaps following recommendations are suggested: more precise integration of transport policies and urban transport development, sustainable environment and urban growth in consultation with vehicle manufactures, more focus on parking facilities, adoption of separate lane system for public transport, empowering of state transport, and proper driving manual for drivers.

Chinta Sudhakar Rao, M. Parida, and S.S. Jain (2011) considered in their paper about the persuasion of ITS devices in the exchange of information to drivers and retort of the drivers towards traffic management. A survey conducted on the understanding of information produced using ITS modules like APMS, VMS, ATIS with special allusion to Delhi. In their study it was observed that the age and

education plays a vital role in understanding through ITS modules. Frequency of the trips has major impact upon the drivers understanding about the system. The parking sign boards are well recognized by the drivers during their travelling. There is expectation of the drivers for Parking guidance system and also Parking Site Map so as to make their parking of vehicles at appropriate place. The information displayed on VMS board has been observed by the most of the drivers and they reacted upon the information as per their requirement. In the survey it was primarily observed that due to heavy traffic congestion in Delhi, respondents are expected that there should be more display of traffic congestion information on the VMS board.

Prof. U.J Phatak, Mr. Lintu Abraham, Miss Nivedita Kaushik, Mr. Sudeep Mitra, Mr. Sagar Dalal (2014) undertook a study on the traffic congestion in India with case study approach selecting Pune with targeted locality of SH60 from Kharadi Bypass to Bakoriphata. The nearby area of metro cities while commuting to city face a major problem of traffic. The researcher focused upon the major problems causing traffic congestion by studying the targeted region. The traffic congestion reasons are poor infrastructure planning which can create major problem in future. The survey for traffic intensity was performed by manually counting of the vehicles which gives information about traffic volume on the SH60 for a day. Road Profiling survey also carried out and it was observed that due to uneven road surface and elevation the heavy vehicles cannot able to keep steady pace which results into one of the reasons for traffic congestion. This paper suggests to the town planning authorities to give more emphasis on the development road infrastructure in the forms of highways of outskirts of the metro cities so as transpiration problems can be addressed.

III. METHODOLOGY

Research methodologies have been compiled using different websites, digital libraries and local area data collections and later on pledged to know about operational and legal necessities for traffic control schemes. Research has been accompanied by different academicians and people engaged in the research field of transportation are to be studied to comprehend in depth about the problems faced by commuter's visa vis trying to overcome from the situation of traffic congestion along with prospective solutions to impart with. Loss of valuable time and burning fossil fuels the two congestion metrics have been investigated along with other ways for congestion measurement. To define and analyse traffic flows and congestion causes, mathematical methods are used. Human response and time of processing are considered to be essential in understanding rates of lined up creation and dispersed time. The response and processing time for automatic vehicles and automated driver assistance is likely to be much faster than for human beings however it is still in a tune of restriction. This triggers resulting in delay by which reaction times play a vital role for predicting the suitability of future Intelligent Transportation Systems.

Deep learning on research parameters, access to Government establishments as well as local authorities, research establishments through university platforms and various NGOs have to be added up for a detailed analysis. Those working groups will through light on further research on ITS enabled services in the field of minimizing traffic congestion in the tier I and tier II cities.

A. Project Methodology

Project methodology is too vast and needs to be intricately studied. This will generate a boundary of the research and the expected outcomes. The viability and beneficial parts need to be looked seriously to elaborate the problems generated and how to curb from the situations coming in the near future. Continuous improvement of the technology must have been endured for an improved outcome. Comparative measures of improvement should be noted down for every instance periodically. Formal mathematical modelling in association with its procedures and simulation were investigated. This may enhance the outcome of the benefits and limitations as well as the ability of the proposed outcome Enabling the simulation to be used as a workable method of acquiring results a hypothetical layout and traffic flow and test scenario was created. It has to be justified by the use of simulator, scenario and other assumptions if any resulting in with an assurance of the control system to be defined and understood. Fixed timing, vehicle actuated and the novel approach are the three control systems well defined for available forward road capacity. Simulations were done for each control system and the results were collated. An iterative development process was drawn by proper examination with its accuracy for the simulation as well as for the control system. Practical implementation and opportunities for further development are done in lieu of the success of the research work. The impending, mid-term and enduring benefits of the system are identified. Connected and autonomous vehicles are also considered for potential transportation developments.

IV. RESEARCH OBJECTIVES

This project is mainly an apprehension with traffic management and congestion in city roads. The assignment rapidly congregates towards the traffic light for various reasons, namely that it is the most common outline of active

urban traffic control, providing a sequence of congestion incidentally or by plan. The research observes the causes of congestion in city environments and attempts to address the negative aspects while recognizing the inevitability of congestion in urbanized areas. It proposes an innovative control method to deal with the clearance of already existing congestion in addition to reducing congestion upsurge. Existing triggered directs to the retort of approaching vehicles. Green time response may be unswervingly share to the arrival delay in current traffic rate. A loop detector implanted in the road surface though other detection methods Detection is commonly are available including optical recognition like RADAR and LIDAR are used to detect and the traffic saturation level at a junction and the lined up vehicles are recorded but it has got some limitations. Hence diversification of traffic volume at this green time duration has to be taken care of or else vehicles will pile up in a few minutes resulting to an unbearable traffic volume that cannot be dispersed instantly but they may take hours to get themselves diffused. The volume of directional control needs to be justified at this stage and the controller will effectively be operating as a fixed time system. Congestion detection and an algorithm to dynamically resolve the problem whereas the controller is built on pre-existing control technology using the benefits of well-known systems. The main motivation for this project is the need to reduce the disadvantageous environmental bang on shipping. To accomplish, it is necessary to comprehend the ground of occurrence of traffic congestion and whether can it be administered more efficiently than existing solutions permit. This is not an inconsequential task; congestion has been a rendering problem which has proven indescribable to resolve. The location of the residential complexes and official areas ensures that traffic is highly exhaustive in the area and results in striking congestion during the evening rush-hour and in morning at the office going hours, although by a slightly different route. Stranded vehicles are nominal other than at the peak hours. Congestion is seldom resolved as per the observations including identifying that traffic lights and pedestrian crossings. The traffic signal light control system hardly releases the long queue of vehicles waiting at the junction points. At all some are released but still they stand for some minutes in the next junction and this problem exists in continuity. Unless and until vehicles are diverted manually or by some automated process the problem will not have any end as the traffic flows are complex, temporal and tidal. This is further exaggerated in the places which as tourist spots and historic areas where thousands of vehicles and millions of pedestrian assemble together making it a melancholy. City planners at this stage fail to plan the streets accordingly. A part of problem is created by erratic vehicular movement and the other is the over crowd in the areas where people even do not know how and when to follow the basic traffic rules resulting into a series of crawling vehicles lined up in the streets. A proper well thought-out and realistic planning to diffuse the crowd needs an outstanding consideration for a smooth functioning of traffic flow.

V. CONCLUSION

Mushrooming increase in population, public transport in Tier-I and tier-II cities exemplify higher demand and low accessibility. Enduring huge deficit of required infrastructure and operational competence add up more crisis to the planning. Faulty policies for tier I and tier II cities prepared by the planners have added more woes. Detailed survey and proper planning may boost perfect execution of the projects. The gaps created in policy may be rectified to reduce congestion in those cities. In addition to the previous charges this may be an additional way of pricing.

1. Metropolitan transport and infrastructural development using integrated institutional mechanism must be integrated for a variety of transport policies. NTDPC the national policy committee of India is given the responsibility to recommend any efficient institutional framework at either central or state or city level.
2. Policy on national level is formulated by the said organization which must have sustainable environment friendly giving rise to urban growth. Embittered policies on regional level do not have any impact on urban transport rather the policies become biased. Restriction policies on manufacturing and purchase as seen in Singapore must be adopted in tier I and tier II cities to control the traffic volume of vehicles. NTDPC suggests urban transport tax, green cess, and raise on diesel prices. On the other hand, India is the 5th largest car manufacturer and largest 3 wheeler auto rickshaws in the world. If production ceases, it will have a grave situation on the economy of the country. This issue needs to be amicably resolved.
3. Strict parking policy and uniform parking charges at national level must be adhered to for a homogenous policy in consultation of center with the state governments specifically for tier I and tier II cities. For this mega parking structures must be constructed for disciplined parking.
4. Public transport system must be provided some preference so that the lanes will move faster attracting the self-drive car drivers for opting public transport. For different transport mode integrated approach of land use should be provided.

5. Strong policy for comfortable, safe and sound policies must be made public to ensure a better reliable public transport facilities provided by state transport departments
6. State transport undertakings need to be strengthened to ensure safe and reliable public transportation.
7. Driver manuals for tier I and tier II cities must be available at all levels for a better understanding and transparencies for the commuters in those tier I and tier II cities.

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