EVALUATING THE FEASIBILITY OF DIFFERENT APPROACHES TO DECREASE ROAD TRAFFIC CONGESTION IN INDIA

M. Durga
Research Scholar, Civil Engineering Department, Noida International University, India

Dr. A. Shanmuganathan
Associate Professor, Director of School of Engineering & Technology, Noida International University, India

Dr. Paritosh Srivastava
Associate Professor, Head of Civil Engineering Department, Noida International University, India

ABSTRACT
India can be considered as one of the fastest Growing nations of the world. Hence, its road network can be reflected as the lifeline of its citizens. Quality traffic management would result in lesser road condition; this is expected to be associated with certain other impacts that have been mentioned in detail within the study. The information provided in the study has been provided in context to Bangalore. This can be considered as one of the fastest growing metro-city in India. People from all over India has been observed to be migrating to Bangalore for employment as it is the Silicon Valley for India. In this context, it can be stated that Bangalore is home to some of the Top notch IT companies in India. These conditions have resulted in increasing population within the city. Hence demands for good quality Roads have been uprising. Apart from this, better traffic management can be considered as the main demand of the city. Hence, 3 different managers from BBMP (Bruhat Bengaluru Mahanagara Palike) had been interviewed in order to identify the best feasible traffic management conditions. After the solutions have been identified, analysis for feasibility has also been presented within the study accordingly. These conditions are expected to pave ways for better management of Traffic within entire India.

Keywords: Road Traffic Congestion, Traffic rules, effective measures
1. INTRODUCTIONS
The concerns associated with rising traffic conditions have been observed to be an inescapable condition in metropolitan cities across the world. In this context, it can be stated that, these conditions can be classified as inherent in the way modern cities operate accordingly. Despite specific remedies being applied in order to eliminate road traffic congestions, yet, conditions are worsening. Daily commuters have been observed to be frustrated about the inability of policy makers for not being able to address the problem accordingly. The conditions associated with traffic congestions can be considered to have compounded rationale. However, the primary problems are mainly due to the fact that too many people have been observed to be moving through a certain point at the same time. Poor traffic management can also be considered as one of the reasons for pertinent traffic congestions. Hence, it is axiomatic that holistic approaches are expected to be implemented in order to reduce road congestion related problems.

1.2. Rationale
The conditions of traffic congestions have been observed to be characterized by slower traffic conditions and increased queuing of vehicles accordingly. Therefore, it can be stated that the problems associated with Road traffic congestions can be considered to be problematic for citizens accordingly. In this context, it can be stated that populations across the world has been observed to be growing exponentially. However, on the contrary, effective road infrastructure development has not taken place [7]. Hence, exit traffic through a particular area would have to face certain difficulties. As commented by experts, road traffic congestions have been observed to be common during school as well as office timings accordingly. However, these conditions can be solved by effective Traffic management [3]. Therefore, it can be stated that it is the Role of Metropolitan Development Authorities to plan and implement Strategies that can be used to reduce road traffic conditions. For instance a Flyover can be constructed in order to divert increased traffic. This would further help in reducing traffic congestion and ensure free flow of traffic accordingly.

1.3. Background
Massive delays have been observed to be dominant condition that has resulted from increased traffic congestion. Apart from this, fuel and financial wastages can be considered as one of the main problems that have been generated due to increased traffic congestion. In India, most of the most of the metropolitan cities have been observed to be developed in an unplanned manner. Hence, construction of Quality roadway infrastructure has not been possible accordingly. Despite this fact, certain measures can be implemented that can help in reducing traffic congestion in India.

1.4. Aim
The main aim of this study is to “Evaluating the Feasibility of Different Approaches To Decrease Road Traffic Congestion In India”
1.5. Objectives
Based on the aim of the study, the objectives of the study can be entailed accordingly;
- To understand the basic concepts of Road Traffic Congestions
- To highlight the processes that Results in Road Traffic conditions in India
- To highlight as well as evaluate the processes that can be used to Reduce road traffic congestion in India

1.6. Research Questions
Based on the objectives of the study, the Research Questions of the study can be entailed accordingly;
- What is the concept associated with Road Traffic Congestion?
- What are the processes that Result in Road Traffic conditions in India?
- Explain as well as evaluate the processes that can be used to reduce road traffic congestion in India?

2. LITERATURE REVIEW
2.1. Overview of the Indian Traffic conditions
The road traffic congestion in India can be considered to be affecting the daily life of people. This has resulted in more time to be consumed while covering a certain distance accordingly. In this context, it can be stated that traffic congestion in India has been observed to be characterized by decreased flow of traffic and slower traffic conditions accordingly. India can be considered as a country that has the second largest road Networks [1]. Further, it can also be stated that the Indian government has been evidenced to spend more than 20000 to 30000 cores per Year in order to maintain road conditions [2]. Despite this fact, it can be stated that maintenance of Roads is of problem. Due to unplanned expansion of Metro cities, the construction of wide roads often becomes difficult for Indian authorities accordingly.

As per the views of experts, it can be suggested that an average Indian depends mainly on two wheelers for their daily commute. However, with increased amount of traffic congestion, mobility conditions with two wheeler vehicles have been evidenced to be a daily struggle accordingly [18]. In compliance with this, it can be suggested that an average Indian would have to drive for more than 2 Hours on their way back home [4]. This condition has been evidenced to put psychological stress on the minds of individual accordingly.

2.2. Importance of Rules and Regulations Associated with Traffic
Traffic rules and regulations have been observed to be framed in order to regulate the mobility of vehicles along with pedestrian movements effectively. However, it has been evidenced that traffic rules have been deliberately violated in most of the cases [23]. Further, it can be stated that, these conditions would further increase chances of road accidents in India accordingly. As per statistical data, India witnesses at least 8 accidents per hour and most of this have been resulted due to violation of road traffic conditions accordingly [5]. Therefore, it can be inferred that the main aim of Traffic rules is to ensure the safety of commuters along with maintaining smooth flow of traffic accordingly.

Based on the discussions in the aforesaid topics, it can be stated that commuting on Indian Roads is not safe. Lack of Knowledge regarding Traffic rules and Regulations can also be considered as one of the major reasons for fatal accidents [9]. In this context, it can also be stated that accidents often leads to road closure. Hence, traffic movement is expected to be
diverted. This condition has been observed to create pressure on the existing commuters of the diverted routes.

2.3. Pedestrian Safety Considerations

Road traffic rules and regulations have been observed to be implemented on both pedestrians as well as vehicle based commutes accordingly. In this context, accidents that have resulted due to pedestrian crashes can also be reflected as the major reason for Road congestion [6]. Further, it can be mentioned that the aforesaid conditions have been observed to be representing 35% of the total Road congestion problems [5]. Apart from this, the aforesaid conditions have been observed to be axiomatic in developing nations across the world [24]. Lack of Awareness about traffic rules and regulations can be considered as one of the major reasons supporting this problem accordingly.

However, detailed information regarding this context, cannot be provided due to lack of Research in this area accordingly. In order to ensure pedestrian safety, the concerns associated with construction of wide roads can be suggested to the metropolitan development authorities accordingly [8]. However, development in major metro cities in India like Mumbai, Bangalore and Kolkata has been observed to take place in an unplanned manner accordingly [10]. Therefore, it can be stated that unplanned settlements have hindered the construction of Wide roads with provision of Footpaths accordingly. However, construction of sky walks and subways can also be considered as some of the platforms for increasing pedestrian safety accordingly.

2.4. Impacts of Road Traffic Congestions

Conditions associated with traffic congestions and Road accidents can be considered as two external costs of Transport regulatory department. Hence, this can also be considered as one of the primary concerns for policy makers [11]. However, in this context, it can be stated that the concepts associated with road accidents and road congestion can be considered to be interlinked. Traffic pressure on existing roads can be considered to be extreme. Hence, in this case, it can be stated that in case of road accidents, roads are often blocked [13]. In most of the cases, it has been observed that traffic is being diverted to a different route. In this context, it has also been observed that road accidents often slows down the movement of traffic. Hence, the time taken to reach a particular destination would be longer comparatively.

As per the views of, it can be stated that the conditions associated with Traffic jam have been observed to have drastic impacts on Human Psychology. In most of the cases, emotional stress and Frustration would often be generated if stuck in a traffic jam accordingly [14]. This problem is more pertinent in case of office going people in India. In this context, it can be stated that minimum working hours in India is more than 8 Hours [15]. Combined with time taken for commuting, this can be extended to 10 to 12 hours [13]. In hinders the process of creating effective work life and Personal life balance.

2.5. Role of the Government in Controlling Road Traffic Conditions in India

Studies about road traffic conditions in India suggest that roadways can be considered as one of the primary means of commute in India [12]. Hence, it can be stated that, it should be the primary role of the government in ensuring proper road conditions are being maintained accordingly. Considering the fact that Road accidents are one of the primary causes of traffic congestion, the government has been observed to implement certain policies more making road traffic conditions safer for commute. The government has been observed to approve “The road safety policy” [16]. The main aim of this policy is to outline the process of commuting effectively in Roadways. This also helps in implementing effective infrastructure
for roadway development. The government of India has been promoting the utilization of public transport for daily commute. Hence, the government has introduced many AC buses for the same [17]. However, these considerations have been observed to be implemented with the help of State governments accordingly. In areas like Varanasi, Prayagraj and Kolkata, the government of India has also encouraged ravine transports accordingly.

2.6. Gap in Literature
So far, the proceedings of the study had highlighted the considerations that lead to road traffic congestion in India. Apart from this, the impacts Psychological as well as Emotional wellbeing of people has also been identified accordingly. However, the study fails in highlighting the processes that can be used in order to improve road traffic congestion in India. This can be considered as one of the major gaps in literature. However, the study would analyze the feasibility of solutions that could help in reducing road traffic congestions. However, the process of implementation would not be specified. This can be considered as one of the major gaps in study accordingly.

3. METHODOLOGY
The study had been accomplished implementing the concepts associated with positivism philosophy. Hence, the proceedings of the study would be presented without influencing the subject accordingly. Hence, valid reasons had been provided for evaluating the feasibility of approaches to reduce traffic congestions accordingly. In order to collect data regarding the study, the concepts associated with Primary data collection had been used. Hence Data collected would be more authentic accordingly. To be specific data would be collected implementing the concepts associated with Qualitative means. Hence, Interviews of 3 managers of BBMP (Bruhat Bengaluru Mahanagara palike) would be interviewed for the same (Refer to Appendix-1). Data analysis would be done through themes and would be based completely on deductive analysis accordingly. The aforesaid process would ease out the process associated with analyzing the feasibility of various approaches to manage traffic congestion.

4. FINDINGS AND ANALYSIS
4.1. Construction of Wider Roads and Footpaths
Road traffic conditions can be considered as one of the major ways that can be used for reducing traffic conditions. Apart from this, footpaths can also be constructed in order to separate pedestrians and vehicle based commute accordingly [21]. Hence, it can be stated that traffic flow through a given point would also be increased significantly [22]. This, conditions would reduce congestion within road traffic accordingly. However, construction of widened roads can be subjected to certain considerations. These considerations can hinder the production of wider roads in India Accordingly. Expansion of cities in most of the cases has been observed to be taking place in an unplanned manner. Hence, private properties might have to be demolished as well as vacated [20]. This process, in turn, would consume a significant amount of time due to legal considerations associated with It [19]. Apart from this, Sanctioning of proper funding timely would also influence construction of such projects accordingly. Hence, this can be considered as a long term solution to reduce road traffic concessions

4.2. Construction of Flyovers
Construction of Quality Flyovers has been observed to play a significant role in ensuring streamlined flow of Traffic. However, in this context, it can be stated that plenty of time is
being saved while avoiding major congestions in roads. Apart from reducing pollution, chances of accidents have been observed to be reduced significantly. However, heavy vehicles would have to be barred from flyovers, as it would reduce the lifespan of construction. One of the iconic flyovers in India is the electronic city flyover located in Bangalore. In this context, it can be stated that, it is a 9 KM long flyover and have successfully reduced traffic flows during peak time on Hosur Road (Refer to Appendix-2 for data). Construction of Flyovers can also be considered as a fine example of creating additional Road space overhead and minimizing acquisition of built-up lands. This can be considered a short term solution for reducing traffic pressures. However, it might also be subjected to legal considerations that might increase the duration of project accordingly.

4.3. Spreading Awareness about Traffic Rules and Road Safety

Accidents can be considered as one of the major reasons for acute road blockages accordingly. This condition, in turn, can be considered as one of the main reasons for diverted traffic. Since Diverted traffic is an add-on to existing traffic, hence, traffic pressures through existing routes can be pressurizing. Hence, it is essential for the government to promote the concepts of traffic safety rules and Regulations. Commissioning traffic guards could also be reflected as one of the effective measures for treating traffic conditions accordingly. Traffic lights are to be obeyed to ensure road safety accordingly. This can be done by implementing theoretical examination while scoring driving licenses. This would also ensure that people are aware about the basic traffic rules. Based on the views of experts, it can be suggested that it is one of the quick as well as short term modes through which traffic congestion on roads can be reduced significantly. Punishments through fines and Imprisonments is expected to make the process more effective accordingly.

4.4. Encouraging usage of Public Transport Systems

Public transport can be considered to reduce traffic exit through a particular point accordingly. Hence, the government of India has been promoting the utilization of public transport for daily commute. BMTC has been observed to commission various air-conditioned as well non-air B conditioned buses for convenience for daily commuters. Apart from this, it can be stated that public transport like Buses would have to stop at specific locations specified by BMTC and BBMP to reduce impacts of Traffic congestions. Based on the views of experts, it can be suggested that this can also be considered as one of the quickest measures that can be used in order to reduce Traffic congestion. However, this process is expected to be expensive as the government would have to spend financial capital for commissioning new buses accordingly.

4.5. Construction of Ring Roads

In accordance with the views of experts, it can be stated that Ring Roads are often constructed with the aim of reducing traffic pressures within the existing roads of the city. These types of roads are constructed encircling the entire city. However, the outskirts of the city are mostly preferred. These types of infrastructures are constructed keeping in mind the process as well as the existing rate of future expansion of cities accordingly. Apart from this, it can be stated that it helps in maintaining environmental sustainability accordingly. BBMP has sanctioned an outer ring road as well as inner ring roads for managing diversity of traffic conditions accordingly (Refer to Appendix-3). This can be considered as a long term procedure and is expected to consume more time. Hence, it can be considered as a long term problem for treating road traffic congestion accordingly.
5. CONCLUSION

The conditions of traffic congestions have been observed to be characterized by slower traffic conditions and increased queuing of vehicles accordingly. Therefore, it can be stated that the problems associated with Road traffic congestions can be considered to be problematic for citizens accordingly. Massive delays have been observed to be dominant condition that has resulted from increased traffic congestion. Apart from this, fuel and financial wastages can be considered as one of the main problems that have been generated due to increased traffic congestion. Traffic rules and regulations have been observed to be framed in order to regulate the mobility of vehicles along with pedestrian movements effectively. However, in most of the cases, it has been observed to be violated. Hence, it results in increased traffic conditions within the locality accordingly.

Construction of Quality Flyovers has been observed to play a significant role in ensuring streamlined flow of Traffic. This might be subjected to various legal proceedings, hence, this can be considered as one of the long term solutions. Road traffic conditions can be considered as one of the major ways that can be used for reducing traffic conditions. This can also be considered to be problematic due to unplanned expansion of cities. Hence, it would consume more time accordingly. In accordance with the views of experts, it can be stated that Ring Roads are often constructed with the aim of reducing traffic pressures within the existing roads of the city. These types of roads are constructed encircling the entire city. This can be considered to be time taking, yet, it can be suggested as one of the effective measures for controlling road traffic conditions.

REFERENCES


Evaluating the Feasibility of Different Approaches to Decrease Road Traffic Congestion in India


M. Durga, Dr. A. Shanmuganathan and Dr. Paritosh Srivastava


APPENDIX-1: QUESTIONS FOR INTERVIEW
Q1. Could you please introduce yourself and your Job role in BBMP?
Q2. What is your views in context to the increasing traffic congestion within the city?
Q3. What are your views regarding Unplanned expansion within the city?
Q4. What is the role of the government in reducing impacts of Road Traffic conditions?
Q5. How has you managed to manage existing traffic within Bengaluru city?
Q6. What are you views regarding widening roads?
Q7. What is your views regarding implementation of public transport?
Q8. How does ring road construction helps in managing traffic?

APPENDIX-2: IMPACTS OF ELECTRONIC CITY FLY OVER

<table>
<thead>
<tr>
<th>RoadName/Region</th>
<th>Type of Carriageway</th>
<th>Design of Traffic Flow</th>
<th>No. of Lane Asscociated with</th>
<th>Road hierarchy</th>
<th>Design capacity lane</th>
<th>Existing peak hour Volume (PCU/h)</th>
<th>CUF (PCU)</th>
<th>LOS (BCB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K.S.R. (Subway)</td>
<td>North Bound</td>
<td>7.9</td>
<td>2.0</td>
<td>Arterial (21,42,2W)</td>
<td>1070</td>
<td>3100</td>
<td>1960</td>
<td>0.65</td>
</tr>
<tr>
<td>South Bound</td>
<td>7.9</td>
<td>2.0</td>
<td>Arterial (21,42,2W)</td>
<td>1070</td>
<td>3100</td>
<td>1960</td>
<td>0.65</td>
<td>C</td>
</tr>
<tr>
<td>Mysore Road</td>
<td>North Bound</td>
<td>7.9</td>
<td>2.0</td>
<td>Arterial (6,12,2W)</td>
<td>1300</td>
<td>3800</td>
<td>1500</td>
<td>0.49</td>
</tr>
<tr>
<td>South Bound</td>
<td>7.9</td>
<td>2.0</td>
<td>Arterial (6,12,2W)</td>
<td>1300</td>
<td>3800</td>
<td>1500</td>
<td>0.49</td>
<td>C</td>
</tr>
<tr>
<td>HOSDURU</td>
<td>North Bound</td>
<td>7.9</td>
<td>2.0</td>
<td>Arterial (6,12,2W)</td>
<td>1700</td>
<td>3500</td>
<td>2605</td>
<td>0.83</td>
</tr>
<tr>
<td>South Bound</td>
<td>7.9</td>
<td>2.0</td>
<td>Arterial (6,12,2W)</td>
<td>1700</td>
<td>3500</td>
<td>2605</td>
<td>0.83</td>
<td>E</td>
</tr>
</tbody>
</table>

NOTE: V= Volume in PCU/h include C= Capacity in PCU/h

Capacity of the roadway was based on the IEC 106-1990.

LCW-Left of Carriageway, RCW-Right of Carriageway, 4L-Four Lane, D-Divided, UD-Undivided, 2W-Two-way.

http://www.iaeme.com/IJARET/index.asp editore@iaeme.com
Evaluating the Feasibility of Different Approaches to Decrease Road Traffic Congestion in India

<table>
<thead>
<tr>
<th>V/C</th>
<th>LOS</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.2</td>
<td>A</td>
<td>Excellent</td>
</tr>
<tr>
<td>0.2 - 0.4</td>
<td>B</td>
<td>Above Average</td>
</tr>
<tr>
<td>0.4 - 0.6</td>
<td>C</td>
<td>Average</td>
</tr>
<tr>
<td>0.6 - 0.8</td>
<td>D</td>
<td>Below Average</td>
</tr>
<tr>
<td>0.8 - 1.0</td>
<td>E</td>
<td>Poor</td>
</tr>
<tr>
<td>1.0 - 1.2</td>
<td>F</td>
<td>Very Poor</td>
</tr>
</tbody>
</table>

APPENDIX -3: OUTER RING ROAD AND INNER RING ROAD BANGALORE