

# Analysis of Traffic Congestion at CBS proximity Kolhapur

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**Abstract.** Traffic congestion has been an area of major bother across the globe. The existing infrastructure is not able to cope with the new traffic demand. Further-more the restriction of the space and outside activities influencing the traffic congestion. The emerging country like India, where the traffic conditions comprise heterogeneous traffic with no lane discipline, further creates more complicated scenarios for the researcher. A substantial portion of working hours is getting wasted on the roads because of traffic congestion, which imposes the negative effect on the overall economy. There has been numerous of literature and studies for analysis of the traffic congestion and its impacts. However, the result has not been much satisfying. In the present study congestion forecast is aimed under mixed traffic with no lane discipline towards identifying the inherent viability of the diversified traffic situation and presents better recommendations in controlling and evading these prolonged traffic jams. The urban highway systems were considered as a study area. Required particulars were collected by a License Plate Matching method using video graphic survey for the day rush timing considered from 8:00 AM to 10:00 AM and off -peak hours to estimate the travel time of a distinct class of motorized vehicles for selected sections of the urban roadway. Congestion indices for both the up and down traffic of a particular road were evaluated from the data collected from the video recording. Traffic congestion impacts were analyzed and possible mitigation measures have been suggested. The study mainly focused on traffic jam indices with regarded to travel time reliability measures to observe the functional effectiveness of the urban road network.

**Keywords:** Traffic congestion, Traffic management, Environment, Impact.

## 1. Introduction

Kolhapur is a developing city of west Maharashtra & historical importance with rich heritage. Kolhapur city. It is a famous pilgrimage center due to Ambabai Mandir also known as Dakshin Kashi one of the three Shakti Peethas. Kolhapur is a unique and important site like religious, historical, forest, water, agricultural, industrial, educational, nature and ecotourism, museums etc. Central bus stand is a place of arrival to any known, unknown, tourists visiting a Kolhapur city. Central bus stand is the nucleus of the transportation network within a city also connecting other parts of nearby cities or villages.

In Kolhapur vehicle registration population is increased from last few years which cause many transportation and environmental issues. Traffic congestion stops the growth of city.

Indirect effects of congestion include those on quality of life, stress levels, and safety, as well as effects on non-vehicular road space users including those who use sidewalks and properties along roads.

A key component of the transportation system is parking. Lack of parking issue caused by the urban area's rapid car population growth. Studying the availability and demand for current parking spaces is necessary in order to establish plans and policies. There is a need to of effective solution for current parking spaces because Kolhapur city has a growing vehicle population and little parking facilities.

Traffic congestion also influences accessibility and mobility. Traffic congestion increases travel time and fuel costs, which adversely effecting organizations and employees distributing goods and services. There is extensive mental as well as physical stress on drivers because of traffic congestion and increases their aggression which might induce unfortunate incidents like road crashes. Every day by many people across the globe are directly affected by the traffic congestion. Traffic congestion originates significant air pollution and noise pollution consequently aggravate the whole atmosphere surrounding. Different techniques for congestion mitigation have been suggested by the majority of the researcher. The impact of traffic congestion can be related to Fuel expenditure cost, Transit cost, Health associated matters and Environment concerned matter. The current traffic framework is inadequate to encounter the traffic demand due to increase increase in population as well vehicle. This research aims to analyze the traffic congestion reasons its impact on Kolhapur CBS proximity. Finally, the study examines the traffic congestion reasons impacts and recommendations to mitigate the congestion.

## 2. Literature review

Reasons for Traffic Congestion: Study in context with foreign country cities

*Ukpatha, J.O., & Etika, A.A. (2012).* authors identified the root reasons of traffic congestion. They used questionnaires to gather data, which were given out to participants and planning professionals in transportation, such as engineers, the manager of the bus terminal, and drivers. The results showed that poor driving habits and poor road networks, insufficient road capacity, and a lack of parking facilities are the main causes of traffic congestion.

*Mahmud, K., Gope, K. & Chowdhury, S. M. R. (2012).* The author noted that there are many other factors contributing to traffic congestion, including poor traffic signaling systems, insufficient manpower, short road spaces, drivers' propensity to overtake, traffic law violations, lack of city road design, rickshaws, etc discovered through group discussion. According to the author's evidence people roughly spend 55% of their daily time due to traffic congestion which in turn caused a decrease in ambient air quality.

*Shamsher, R. & Abdullah, M. N. (2013).* The authors identified an increase in vehicles, insufficient traffic enforcement, narrow roads, and unlawful parking as the root reasons of traffic congestion. To tackle traffic congestion, they proposed clear bus services, tight lane management, limiting rickshaw routes, enforcing penalties against law breakers, establishing bus stops, enlarging roads,

franchising bus routes, parking limits, and congestion pricing.

*Chama, N. C. C. (2013)*. The author noted that inadequate town planning, bad road traffic management and a lack of area for expanding road infrastructure are some of the causes of traffic congestion. They used image processing technique to analyze CCTV video feeds from cameras in order to pin point the key locations with traffic congestion. Poorly planned cities, careless drivers, alternate modes of transportation, tighter budgets, etc. are among the issues that have been acknowledged as creating traffic congestion.

Study in context with Indian cities:

*Bhargavi, P. S. & Raja, N. K. (2011)*. According to authors, the reasons for traffic jams include a growth in the large number of vehicles on the road, the availability of cheap cars, the movement of people from rural to urban regions, inadequate road infrastructure, etc

*Vidya, K. & Banu, A. B. (2014)*. According to the author, the major causes of traffic congestion were identified as encroachment by pavement dwellers, street vendors, illegal car parking on roads, improper construction of road dividers in between two lanes, unscientific construction of speed breakers, lack of planning of city roads, lack of road spaces, unplanned stoppage and car parking, etc.

*Talukdar, M. H. (2013), Harish, M. (2013)* They shed some light on the public transportation issue in the city by describing journey times, delays, traffic, and parking author has demonstrated that the rise of the vehicle population has showed an increasing tendency. To lessen the threat of traffic congestion, the author suggested carpooling, automated toll collection, the installation of LED-based signals, the construction of flyovers, and other measures.

*Singh, G. & Chakrabarty, N. & Gupta, K. (Undated)*. Authors says Inadequate management of the demand for and supply of transportation services are another factor contributing to traffic congestion. The authors believed that VANETs can help reduce traffic congestion.

*Rahane, S. K., Patil, D. Y., & Saharkar, U. R. (2013). Bhatt, B. V., & Gandhi, F. R. (2014)*., the author concluded that inadequate traffic enforcement, narrow streets, illegal parking, growing population, increased public spending power, and improper city development planning are other factors that contribute to traffic congestion in urban areas.

### 3. Data collection and analysis

CBS Kolhapur was chosen as the research region since it is the city's nucleus and network hub. Kolhapur city is rapidly growing and crowded due to presence of transit station, commercial complexes, restaurants, hotels and offices in surrounding area at CBS. The lag of development has resulted in increased strain on road and infrastructure. The stress level on road creates lot of problems. Reasons like Increase in volume of traffic, poor traffic control, lack of awareness, encroachment of hawkers, vendors insufficient parking to obtain accurate and detailed results, a variety of data collection methods can be used. CBS Kolhapur was chosen as the research region since it is the city's nucleus and network hub. Both primary and secondary data have been collected in order to identify the reason of traffic congestion, its impact on socio and economical.



Figure 1- Connectivity and road network from CBS, Kolhapur

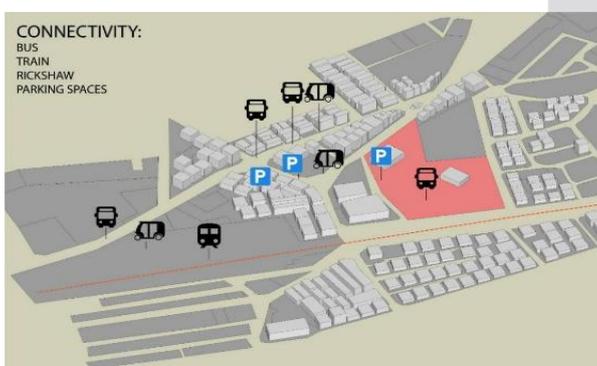


Figure 2- Transportation available at CBS Kolhapur proximity

On site visual observation of traffic movement, i.e., live case study survey of CBS. Data collection from transport users, vendors, hotel owners, shopkeepers and traffic police.

Data collection for both peak and off-peak hour, weekends, seasonal, festive and vacation time. Data collection from KMC, Divisional control office, traffic department & RTO office. Snapping photographs of the region to emphasize the congestion is the first step. To collect primary data, a survey approach was used to count the vehicles movements from 9.30 a.m. to 10.30 a.m., totaling 3247 vehicles, while standing at various meeting sites around the study area to illustrate the number of movements. Taking pictures during peak and non-peak hours to offer a comparison of different situations at different times.

To acquire a better understanding of the situation and possible solutions, a number of the above questionnaire were asked at random among pedestrians, bus, rickshaw, taxi, and Tonga drivers, private car owners, and retailers.

Parking index is calculated to find out the utilized capacity of the parking space in separate time interval. Parking spillover has been calculated to find out the deficiency in the existing parking provision in any certain time period.

Parking turn-over is the rate of each bay of parking space is used. Lower value of turnover means the parking bay utilized by less vehicles and higher turnover means the parking bay utilized by more vehicles of 16 hours of time duration.

From the parking duration of different vehicle in both parking spaces probable scenario of revenue can be generated in 16 hours.

Analysis from Visual observation:

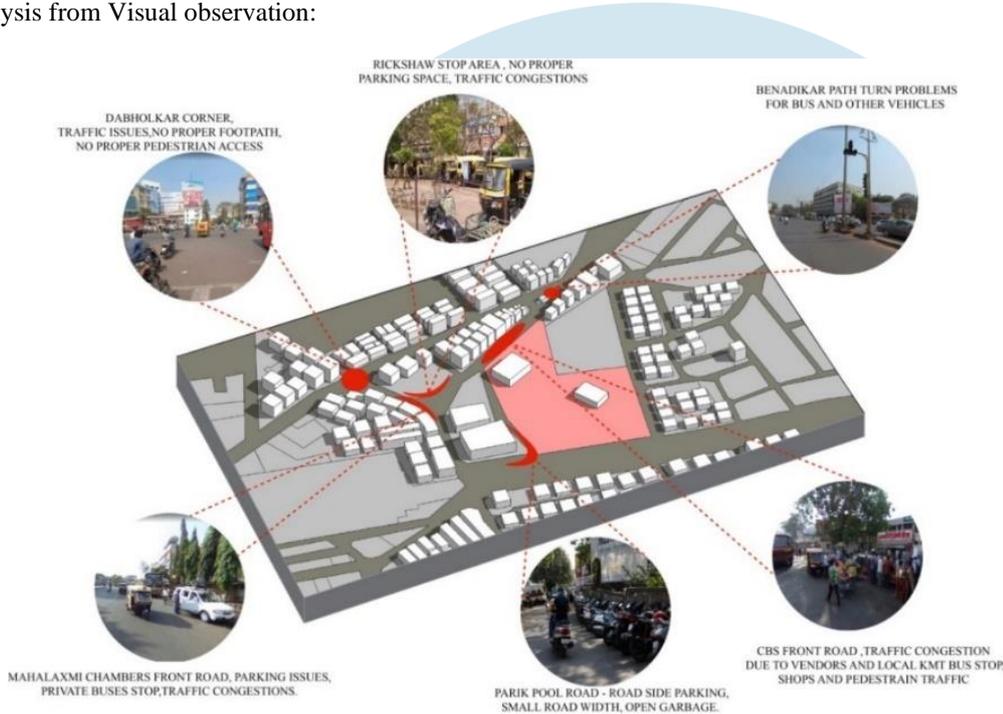


Figure 3 – Cause of Traffic congestion at CBS Kollhapur

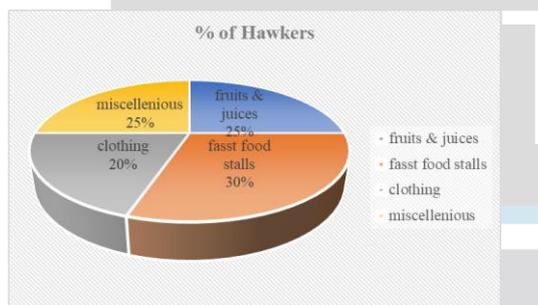
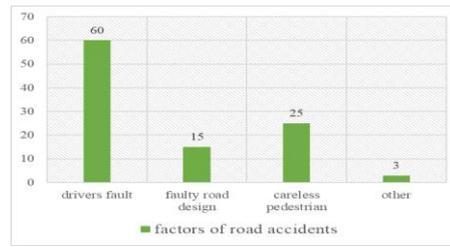
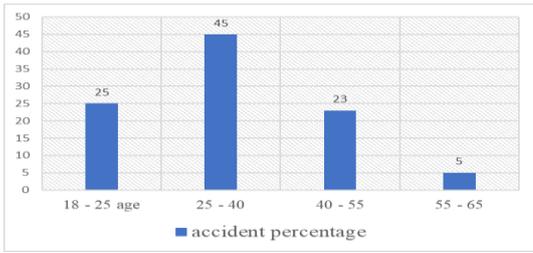


Figure 4 – Hawkers count near CBS



Road, vehicle, and driver-related issues are some of the things that cause accidents. Three things factors that cause various accident: Vehicle, Driver, and Road Environment

Figure 5 - Bar graph showing accident age group at CBS Kolhapur  
 Figure 6- Bar Graph showing factors that are responsible for accidents

Slower speeds, queues, and longer travel times are all symptoms of congestion, which raises economic expenses and has an effect on urban areas and the people who live there. Indirect effects of congestion include those on quality of life, stress levels, and safety, as well as effects on non-vehicular road space users including those who use sidewalks and properties along roads. Congestion also has a variety of direct effects. Here are some of the more severe socioeconomic effects of traffic congestion on the environment. Congestion means just waste of valuable time and health. The time wasted in congestion could effectively be used in doing some productive work. The quick stop-and-go driving style in congested areas increases fuel consumption in the city, which increases the pollution level by releasing more carbon into the atmosphere.

The slow-moving traffic also causes some hydrocarbons and nitrogen oxides to be released, which is the main cause of what is known as photochemical smog.

Traffic congestion creates loud noise (over 90 dB), which makes the atmosphere uncomfortable.

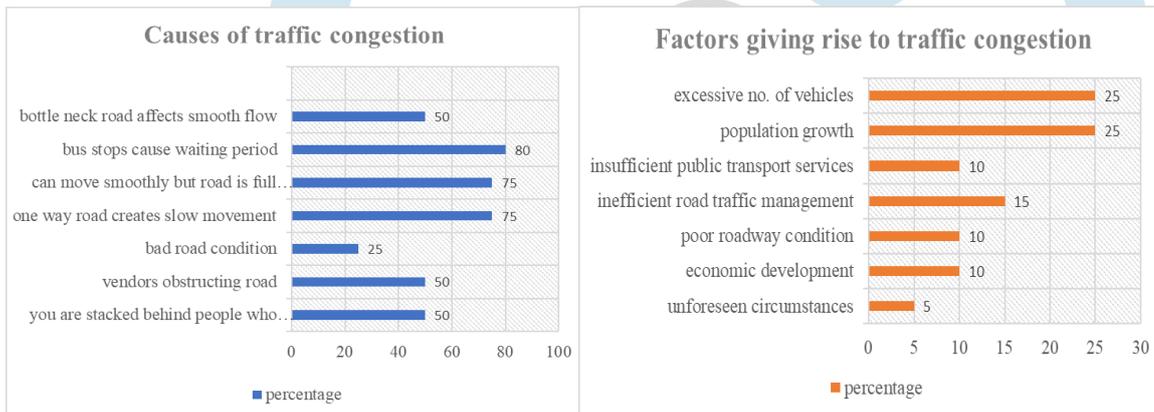


Figure 7- Factors giving rise to Traffic congestion at CBS Kolhapur  
 Figure 8- Factors giving rise to Traffic congestion of Kolhapur city

**Analysis of parking near CBS Kolhapur**

There is a need to of effective solution for current parking spaces because Kolhapur city has a growing vehicle population and little parking facilities. For data collecting, the survey was conducted of parking usage.

Parking accumulation curve gives the information that parking demand is in peak position during the overall working time period. In this parking area there is encroachment of rickshaw parkin

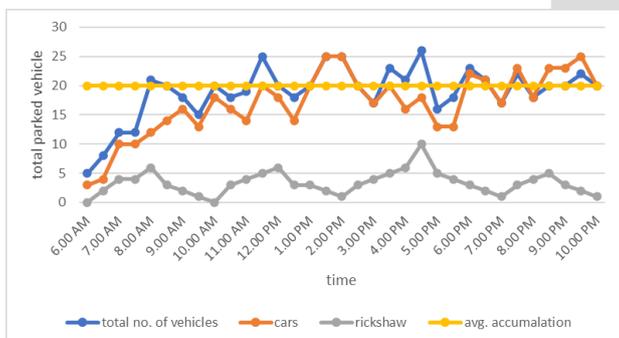


Figure 9 – Parking Accumulation curve of CBS Parking space in Nonworking Day

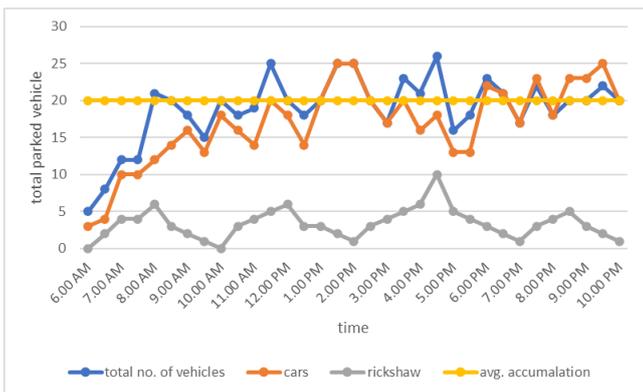


Figure 10 – Parking Accumulation curve of CBS Parking space in Working Day

#### 4. Impacts of traffic congestion

The impact of congestion can be studied in three ways, such as impact on economy, impact on the environment and impact on health. For the current research work the relevant information has been assembled from various activities, e.g., group conversation, questionnaire review, physical monitoring, individual Interaction, journals and articles, website articles, and preceding works on the relevant matter to study the impact of traffic congestion on various parameters.

Impacts of Traffic Congestion on the Society – avoid traffic by leaving earlier in the morning and returning home later than normal in the evening

Impacts of Traffic Congestion on the Economy – those late arrivals to work due to traffic congestion create a loss in production, missing deliveries, decreased productivity, and constrained economic growth. assert that traffic congestion tends to raise fuel consumption and vehicle depreciation as well, causing commuters to pay more on fuel.

Impacts of Traffic Congestion on the Individual –High levels of tension and annoyance among commuters, particularly drivers, who must pay closer attention to and concentrate when driving under difficult circumstances. The survey's findings also demonstrated that accidents put commuter s safety at risk.

#### Fuel Consumption & Pollution

Fuel is burned more quickly by vehicle stopping and starting during traffic jams than by moving along at a steady speed. The increased gasoline costs incurred by commuters as a result of this increase in fuel usage also add to the number of emissions produced by the vehicles. These emissions contribute to global warming and air pollution.

#### 5. Suggested mitigation measures

After making in-depth analysis of traffic congestion by various methods and data collected from various sources some suggestions can help to solve problems at CBS Kolhapur

Provision of more traffic signals where necessary. Road widening is necessary at some points. middle circle is provided and the radius of circle is more which causes traffic congestion hence the radius of middle circle should be reduced. Traffic signs such as mandatory signs, mandatory signs, mandatory signs and regulatory signs should be provided. Dividers should provide. Date wise odd even parking. Car plus scooter pooling. Changing the location of KMT bus stop Speed breakers should be provided. Avoiding heavy loaded vehicle entry, road widening, separation of Buslane, Building flyovers.

Minimal throughways for private cars, building more park-and-rides, avoiding private buses entry, Policy like congestion charges and traffic laws can be applied, installation of CCTV, more furniture street and sign boards where ever necessary.

#### 6. Conclusions and recommendations

Following conclusions can be drawn from the present study and analysis of traffic congestion data collected. Study reveals those problems such as deteriorating ambient air quality due to increase in vehicle harm human health. It is found that poor driving habits, poor road networks inadequate capacity, lack of parking facilities, faulty signals, inadequate manpower, narrow space, overtaking of drivers, traffic rule violation, increase in two wheelers, illegal parking, lack of adequate city planning, lack of space for expansion of road infra structure, unplanned cities, poor discipline of drivers, migration of rural population to urban areas, increase in number of 2 wheelers, encroachment of pavement dwellers, street hawkers, unscientific construction of speed breakers, unplanned stoppages, over use of road, no sufficient and alternative public transport, mismanagement between demand and supply of transport which are identified as common factors which causes traffic congestion. Proper planning of city is required for development of city and human welfare. Indian cities reveals that a sustainable development of city with integrated transportation management plan is required that can regulate heavy traffic smoothly to facilitate pedestrian friendly development. Kolhapur has a good potential to develop as smart city. It is also seen that occupancy of various menace can cause congestion. Flyovers, BRT, subway, ITS, TOD, PAMP such new technologies and solutions can help in traffic management plan, infra structure and development of city to change Kolhapur into a smart city. Redesigning of Bus terminus can solve traffic congestion and change city scenario. It's time to take action to ease the suffering of commuters. Government agencies are not the only ones who need to step up; we all do as well. There are various strategies to limit traffic jams while maintaining a safe route, including the use of new technology, the construction of more roads, the expansion of available public transportation options, and many more.



Figure 11- Suggestions to solve problems at CBS Kolhapur

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