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Pollution caused by vehicles in Bangalore: An Overview

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Abstract

Throughout the years, there has been a gigantic increment in road transportation and vehicular traffic because of an exponential development in monetary improvement and utilization propensities all through the world. The impact of vehicular emission outflows is essentially progressively articulated in an urban situation, when contrasted with territorial or worldwide scale. There is a general inclination of uncontrolled development of both business and private exercises at traffic intersections offering ascend to high human introduction to vehicular emission. Vehicles discharges harmful gases directly into the breathing zone; engine vehicles have the best air contamination potential when related with different sources. This is to a great extent because of high quantities of vehicles in congested urban zones and the amount of pollution they emit, causing different unfavorable impacts. It is quite known fact that about 60% - 70% of the air pollution is caused by the vehicular emissions in the city.

Keywords: *Vehicle, Air pollution Index, vehicle and Population.*

Introduction:

Bengaluru is the 5th largest populated city in India and it is the capital of Karnataka state. Major IT sector are located in Bengaluru and it is generally known as ‘Silicon Valley’. The Bengaluru metropolitan region covers an area of 1294 sq.km and with a population of 9.1 crore according to 2011 census. The main municipal corporation area is 712.54 sq.km with a population of 8.4 crore.

The population of Bengaluru city has been growing at fast rate during the last decade. In the same way the vehicles numbers are increasing in bengaluru. The vehicle number also increasing due to increase in per capita income because of IT sector boom in the Bengaluru city. The private vehicle registration already crossed sixty lakhs. The traffic and transportation problems increasing and a perspective urban planning and development are must for city like Bengaluru. The vehicle population throughout India growing rapidly from 1980 and mostly due to increase of two-wheeler users. The above situation happened in Bengaluru because of liberalization policy of the country, rapid growth of IT sector, affordability of individual and coupled with inadequate comfortable and convenient public transport. Hence issues related to land use, planning and development control, public transportation, private transportation work place need to be mingled and solved properly.

The increasing development of the cities makes many problems such as air pollution, energy consumption of motorized transport, insufficient public transport network and land use pattern. The intensity of travel and travel demand is more in urban areas than the rural areas. Due to the migration of the people to the urban cities the population of the cities increases.

Literature Review

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Feiqi Liu, et al. (2020) [1] In this paper the author describes that due to increase in vehicles it causes traffic problems, energy is consumed more. The government has imposed restriction in the purchase of the private vehicle which effectively increased the usage of public transport and limited the growth of the private passenger. The people who purchase electrical car owner get the number plate without waiting in queue.

Sashikanth Gurram, et al. (2017) [2] Overall, this dissertation has implications for population exposure to traffic pollution and public health through transportation and land use interventions. Results presented here may be applicable to other study regions that have similar composite sprawl scores as the Tampa Bay area.

Shaikh HaqueMobassir Imtiyaz, et al. (2015) [3] This paper investigates the ITS techniques and technologies for the reduction of fuel consumption and minimization of the exhaust pollutant. It highlights the environmental impact of the ITS application to provide the state-of-art green solution. y. Both the environmental concern and availability of fuels greatly affect fuel trends for transportation vehicles.

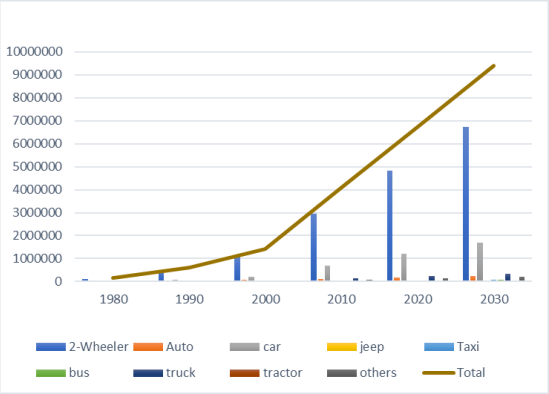
Stefan M. Knupfer, et al. (2018) [4] In this report Elements of success of urban transportation systems of 24 global cities" the author has ranked the cities based the availability, affordability, efficiency, convenience, sustainability and overall

quality in urban transportation system. The author stated that even the leading cities in terms of cumulative results score not more than 65 percent out of 100 percent maximum, which implies that every city has its own areas for improvement.

ZHANG Kairan, et al. (2013) [5] A sustainable transport system means supporting economic growth in a low carbon world, addressing transport's wider environmental impacts on the natural environment, improving people's quality of life whilst promoting health, a greater equality of transport opportunity and maintaining our high standards of safety and security. It can also be used as an effective way to solve the vehicular emission problem.

Increase in the Private vehicles

The condition becomes worse since the migration population increase, comfort of the individual and increase in per capita income the registration of the private vehicle increase exponentially. The following table shows a clear picture of increasing private vehicles in the bengaluru city.



Bangalore registered vehicles and forecast

From the above chart it is understood that the people are mostly using bikes and cars for their transportation. People are using private transportation for their convenience and comfort, since the public transportation standards, routes availability, time consuming and convenience are not

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matching with their expectation. Hence the number of 2-wheeler and cars are increased enormously which results the consumption of energy and making the air pollution.

The total number of vehicles in bengaluru has increased to 70.28 lakhs out of which 48.26 lakhs are two wheelers. Since it is metropolitan city, IT hub and more central government officers are situated the other state registered vehicle are also boosting the number of private vehicles. One survey state that bengaluru is 2nd largest in terms vehicle in India and the annual growth of the vehicles is 10%. If the same growth continues bengaluru city likely to have 10.8 million vehicles by 2020. There is no article to limit vehicles per family or any system to reduce the new registration of the vehicles the number of private vehicles is increasing. Easy availability of bank loans and bad condition of public transport system increased the number of private vehicles. Hence the vehicle numbers are more than the length of the road from 1976.

The number of 2 wheelers registered were 1446807 in 2007 has increased to 2324707 in 2011 and for car the registration were 344053 to 14 lakhs. Though the condition of roads is poor, the number of registrations of two-wheeler have crossed 50 lakhs in 2018, which has resulted 70% hike in the number of private vehicles.

Vehicular air pollution

The acceptable suspended particle in air 60gm for residential area a study in this city done by academic members have reviewed that the suspended particle quantity was 71 in 2006 and 128 in 2013 in the residential area of bengaluru city. During this period the number of vehicles increased exponentially and it can be ascertained that the vehicle pollution made important role in polluting the air.

The above graph shows $PM_{2.5}$ contributors and the single high source is vehicular pollution which contributes 26.5%. It is clearly seen that the vehicular contribution towards air pollution is high and recent past years the number of private vehicle increased many times compared to government public transportation for which infrastructure made by cutting the trees etc., hence it is very clear the judicial land use can be achieved only by improving public transportation.

During the lockdown because of Covid 19 the air quality in all over India improved significantly equal to its allowable standards. This has happened only due to the shutdown of plying of vehicles on road. Now it is in everyone's that the forced lock down should be followed at least once in every month throughout the world will the quality of air will be improved in the absence of traffic flow.

Concertation of Pollution in Bengaluru city

The vehicle numbers are increasing day by day naturally the vehicular pollutant will increase side by side. Vehicular pollutants are emitted through exhaust pipe system of the vehicle are called as emitted pollutants. Vehicular pollutants are formed due to combustion of the fuel in the engine. These are the harmful to atmosphere and particularly habitant living things. The main pollutants due to vehicles movements are:

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PM Particulate matter	Particulate matter are tiny solid or liquid suspended particles may lead to lung cancer, heart diseases.
O_3	These are formed when combustion of petrol and NOx which produces this gas. When the gas is formed at ground level it is very harmful to people and atmosphere.
NO_x	These are formed when combustion of petroleum products under pressure. Due to this respiratory problem.
SO_x	Sulphur oxides colour less gas are formed due to combustion of petroleum. It causes respiratory problem and further oxidation forms acid rain because of sulphuric acid.
CO	At the time of partially oxidation carbon monoxide forms. It is toxic and reduce the flow of blood in human bodies.

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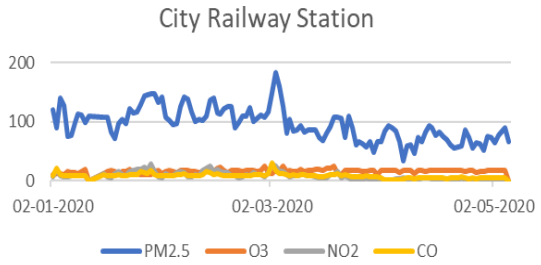
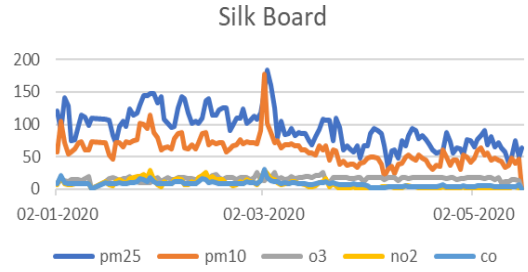
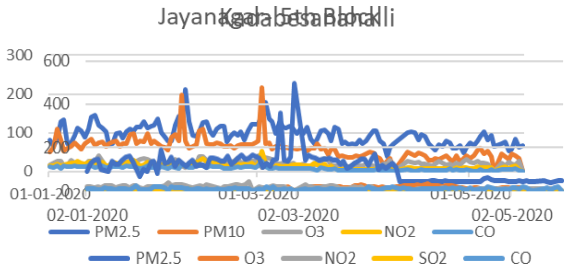
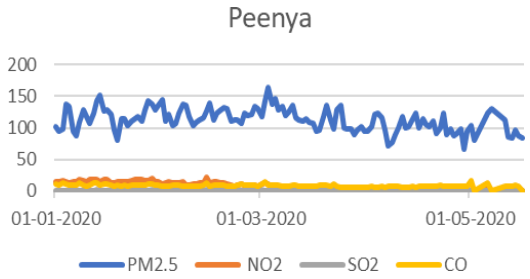


The following graphs shows the air quality of seven different prime locations namely Silk board, City Railway station, Kadabesanahalli, Peenya, Hebbal and Jayanagar 5th Block during the period of 2020(Jan) to 2020(May).







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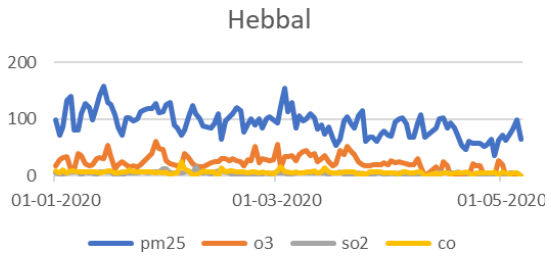

As per the data of Air Pollution from the year 2020 (Jan – May), the graph shows values of PM2.5, PM10, SO2, NO2, CO and O3 generally the highest value shows the index of that place. It is understood as the private vehicle numbers increasing AQI is also increasing year by year which can be reduced by minimizing the number of private vehicles, we can reduce the air pollution. But it is visible the index value decreasing during the month of April and May because of 'corona' lockdown. So now it is common man's view we can also make a forced lockdown one day in every month will reduce air pollution caused due to the vehicles.

Conclusion

- From the overall study it is observed that due to transportation sector development energy consumption increasing drastically. Energy saving measures are in vain. Energy consumption increasing air pollution which is another major problem. We should promote E-vehicle transportation.
- To overcome this many strategic interlinked plans to be taken up in public transportation system such as Rail

  infrastructure, Public transport affordability, efficiency, convenience and safety. Also, by Enlarging non-motorized mode of transportation and less travel intensive urban land use pattern.
- Enlarging electric motor vehicles in transportation system and metro train system.
- Barriers should be imposed at the time of registration of private vehicles.

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