



Aerial Transport Systems for Daily Commutation – Analysis Based on Present Day Traffic Conditions

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Abstract: Flying has always fascinated man, who constantly wishes to go beyond his limits. From the basic design of a flying machine by DaVinci to modern day jet planes have noted a significant development in aerial vehicles, thus realizing man's dream to fly. On road vehicles are a product of industrial revolution which made day to day commutation a lot faster and less tiresome. According to Indian MoSPI, the statistical year book of 2015 states that there has been a huge increase in the number of vehicles in India which has resulted in traffic congestion. The delay period in Metropolitan cities in India due to traffic congestion is about 3hours per day, during peak time. This is where the need for more room for travel arises as well as the need for faster travelling methods. It is true that Metro rail systems have contributed to a bridge this hardship in a few cities, but still a major share of the population still face the consequences of a large number of vehicles on the road. Small personal aircrafts and UAVs for hobby purposes have found their way into a lot of households. This gives us a line of thought which may turn out to be the solution for the huge traffic congestion issues we are facing nowadays. This paper analyses the traffic congestion issues faced across India and will discuss about using small aerial vehicles for day to day transport.

Keywords: Flying Machine, Road Traffic, Commutation, Traffic Congestion, Aircrafts, UAVs

I. INTRODUCTION

Flying machines are quite common nowadays. We can see a huge range of size among these fascinating machines. Right from the small UAVs with the size of a rupee coin to huge aircraft carrying war machineries to the battle zones. Flying, an intriguing activity for most is opted by more and more people nowadays owing to the generally progressive trend in the lifestyle. Mankind has always searched for ways to make his life easier. All the revolutionary technologies found their utility and market, thanks to this desire of mankind. According to the statistical year book of 2015, published by the Ministry of Statistics and Programme Implementation, there has been an increase of 190%* in the total number of vehicles registered in India between 2001 and 2012. An independent study by Statista suggests that only 10% of the funds spent on infrastructure development in the major cities has been put into road development in the same period. This implies that the number of vehicles on the road increased drastically even though there weren't much increase in the road infrastructure, which increases the traffic density by a lot. A more recent report in Times of India in 2017 states that people in Bangalore lose about 60 crore** hours, which amounts to about 3700 crore rupees, a year to road congestion. A similar situation exists in most of the major cities across India. This calls for a drastic action. Widening the roads to lower the traffic density is an obvious solution to this problem, but this is a quite expensive solution and tiresome, not to mention that there would be a lot of demolitions required while widening roads. This solution gives rise to even greater problems, albeit it solves the problem only partially.

II. PRESENT DAY TRAFFIC CONDITIONS

The following graphs, or the data obtained from the Statistical Yearbook of India 2018, shows the increase in the number of vehicles registered in India, which occupies the road infrastructure in the country and the development of the road in the past 15 years. The scatter chart in the figure 1 shows the increase in the number of motor vehicles including buses, taxis, Light Motor Vehicles (Passengers), goods vehicles, two-wheelers, cars, jeeps etc, that have been registered in India and allowed to traverse on the roads of the country. The number of vehicles in the country was barely over 50



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million in the year 2001 which has substantially increased to well above 200 million in the year 2015. The general trend of the number of vehicles is almost exponential with a rare faltering in the growth rate.

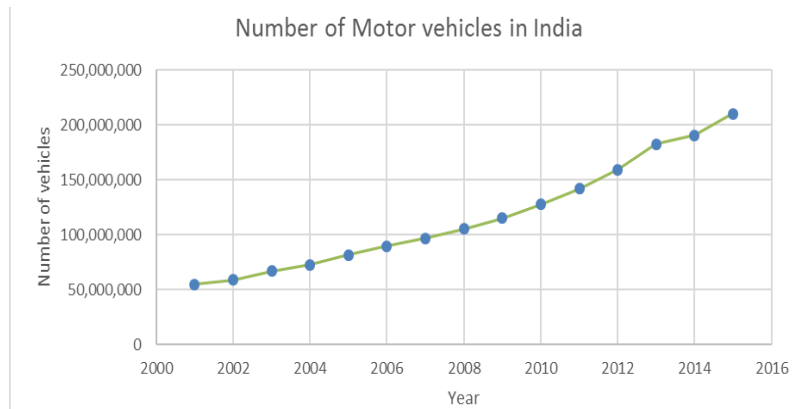


Figure 1

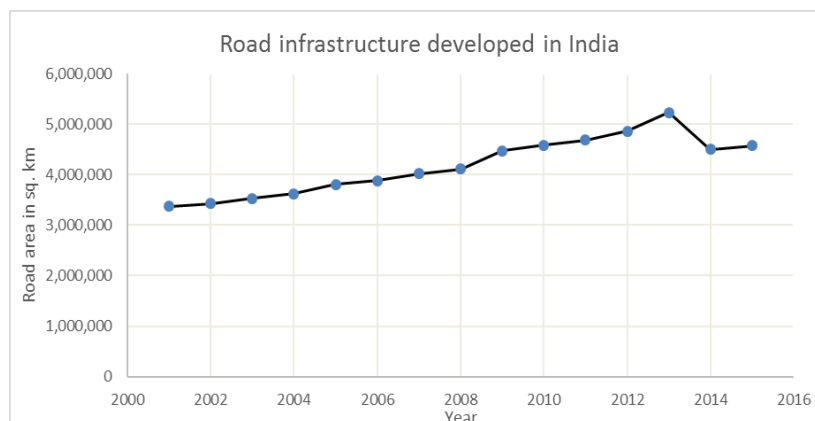


Figure 2

On the other hand, the road infrastructure in India is following a sluggish development trend, which is clearly illustrated in the scatter chart in figure 2. The 3.5 million sq. kms of roads just increased to just above 4.5 million sq.kms. Even though the road development followed a considerable growth rate till 2013, by which time it peaked out to a total of above 5 million sq. kms, it has come crashing down to 4.5 million sq. kms in 2014 and the development has been stagnant since.

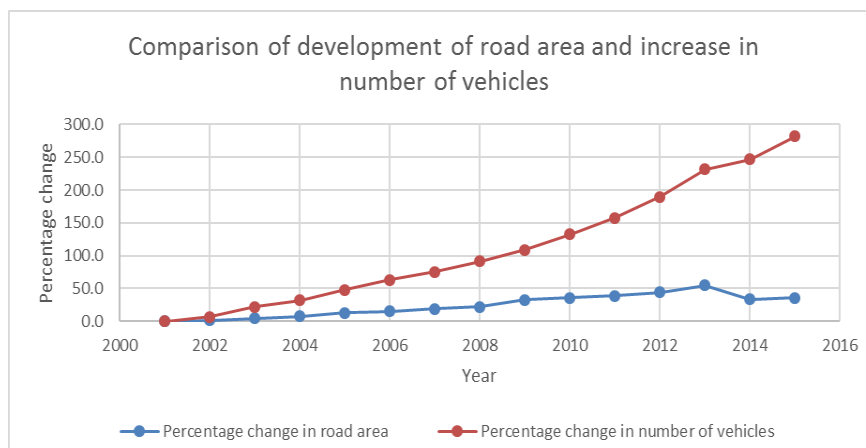


Figure 3



The comparison of the percentage growth in the number of vehicles on the road and the total road infrastructure is quite flabbergasting. The scatter chart in the figure 3 represents the comparison of the change in road infrastructure and the number of motor vehicles. It is evident that although the number of vehicles increased by almost 300%, the road infrastructure has registered a mere increase of 50% in the same period.

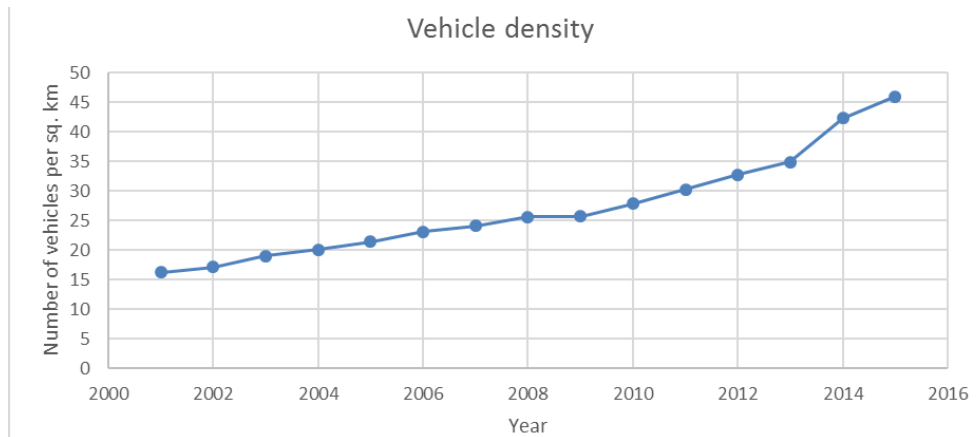


Figure 4

The figure 4 represents the increase in the vehicle density in the Indian scenario. By 2015, the density has almost become almost thrice the value of what it was in 2001. This undoubtedly is the prime cause of increased road accidents and the frustrating traffic congestion faced across the country. If immediate measures are not taken, then the conditions are going to escalate beyond control, and pretty soon the nation will face untraversable roads.

III. AERIAL VEHICLES – A PROBABLE SOLUTION

There is not much further avail in relying on roads for commutation, this is when sky opens up new possibilities for transportation. Small aircrafts, a hybrid of helicopters and smaller drones, which if developed has the capability to replace LMVs are a potential solution for the crisis that we are about to face. The small aircrafts commonly known nowadays as passenger drones are not as farfetched as it may sound to a few people. Many conceptual vehicles have been prototyped by independent organizations, which has the capacity to carry a person into the air for short distance travels. This revolutionary concept will bring down the travelling time by a considerable amount, along with making travel a lot more amusing. Rather than using the limited space on earth as a medium for travel, using the airspace which is very much vast will solve a lot of issues in one scoop.

IV. ADVANTAGES OF USING AIR TRANSPORT

The advantages of using air transport far outweigh the consequences it may produce. The travelling distance is reduced while using air transport, as we can follow a straight path to our destination, which would certainly be not possible in most road transport destinations, the concept depicted in fig.1. This reduction in travelling distance will in turn reduce travelling time and the fuel requirement by a considerable amount. Another major advantage from the point of view of the passenger is the manoeuvrable space. Most accidents which occur in the road could have been avoided if there were spaces to manoeuvre to at the time of the accident. As we are talking about special movement rather than planar movement, air vehicles have more degree of freedom and more space to manoeuvre, thus avoiding a major share of accidents. These kinds of vehicles will be a huge support in emergency services. With quick response and transportation times, the rate of success will drastically go up for emergency services like mainly ambulance, providing relief materials to disaster struck areas, search and rescue

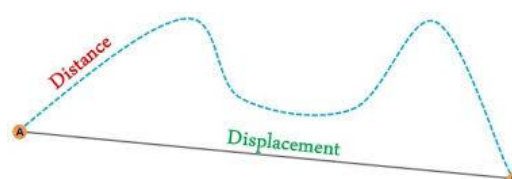


Figure 5



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V. LIMITATIONS

Controlling a vehicle with more degrees of freedom calls for an expertise of its own class. A layman cannot control the vehicle as it is, so opting or automatic controls are necessary. Compared the on-road vehicles, aerial vehicles need more power to transport the same payload at the same speed, ie the propeller efficiency is lower than the tyre efficiency. In the present scenario, there exist no rules or regulation regarding small aircrafts for used for daily travels. Establishing these takes up a considerable time before implementing these.

VI. WHAT A PASSENGER LOOKS FOR

The predominant conditions any passenger drones which aims to capture the market, any vehicle for that matter, should possess are simplicity, utility, ease of access and should be aesthetic. The passenger should be able to lift off and land at any place he desires, i.e the vehicle should not call for a long runway to take off and land, like aero planes, they should be more like a helicopter. The controls need to be relatable, ie the passenger should not have to undergo rigorous training like aircraft pilots. The controls should be simple and should be similar to what the passenger is familiar with, like bikes and cars. Sufficient protective equipment and failure prevention measures need to be present. If anything happens, the person is going to fall from a height, there should be equipment to ensure his safe landing. The prime factor which will decide the fate of these vehicles are going to be their cost, they should not cost high like present day aircrafts, they may cost similar to today's bikes and cars.

VII. CONCLUSION

The fact that we can conclude from the general lifestyles and habits of people and the increasing traffic congestion statistics is that aerial vehicles which will replace road traffic and put an end to traffic congestion will be a very welcome product for the general mass, provided it meets all the expectations of the end users. The vehicles which reduce the travelling time, which frees mankind of traffic block, which augments emergency services, above all which satisfies the desire for flying on a daily basis will definitely be accepted and is definitely anticipated product.

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