

## **PROBLEM OF URBAN TRAFFIC CONGESTION IN JAIPUR CITY, RAJASTHAN**

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### **ABSTRACT**

*In modern life we have to face with many problems one of which is traffic congestion becoming more serious day after day. It is said that the high volume of vehicles, the inadequate infrastructure and the irrational distribution of the development are main reasons for increasing traffic jam. The ever increasing population has aggravated the vehicular density on roads and hence, vehicular congestion is now the driving issue in modern day world. One can very well observe the storm of rapid urbanisation, which has taken its toll almost everywhere leading to congested city cores and its cons equals to vehicular congestion on roads. Traffic congestion is a public policy issue and solicits a policy response which can strike a balance between urbanization and urban mobility. In the case of India, several policy initiatives have been undertaken but have not yielded desired outcomes. This is primarily because the focus has only been on public transport improvement measures, while traffic demand management measures have largely been neglected. Therefore, Improper traffic management is one of the leading causes of the issue, focused in this paper, leading to various other consequences like densification of prime city roads, encroachment of street sides and areas marked for parking and worsening air quality. This paper also presents some general recommendations based on the identified issues as discussed in the paper.*

**KEYWORDS:** *Traffic Congestion, Traffic Jam, Vehicular Density, Rapid Urbanization, Traffic Management.*

### **Introduction**

Most of the Indian cities are experiencing multi-faceted problems as a result of rapid urbanization. Urban congestion is one such problem afflicting urban agglomerations in India and has multiple effects on urban economies. Urban congestion is broadly defined as excess demand for travel over its supply. In fact, the reason why governments are forced to revisit their policies for urban mobility is because of growing demand for travel with limited supply of services. Well developed and evolved transportation system is a prerequisite for development of an urban system and is necessary for the ease of fulfillment of various day to day activities. The efficiency of the transport system is one of the primary indicator of the wellness and livability of a city. The unprecedented growth in population, steep increase in vehicle ownership, and increase in various allied activities have resulted into various traffic and transportation related problems in Jaipur city such as vehicular congestion, parking difficulties, time delays, very low traffic speeds, bottlenecks and hazards, accidents and poor state of environment. Jaipur is the capital city of Rajasthan state of India and is the largest city in the state in terms of population.

### **Background**

Jaipur is one of the first planned cities of India. According to the City Development Plan, Jaipur is a very fast growing metropolitan city, ranking 11th in the list of Indian mega cities with a population of 3.5 million and annual growth rate of 4.5%. Jaipur was founded by Maharaja Sawai Mansingh II in 1727 A.D. The city was developed according to the traditional pattern of a city being circled by a wall with nine entry gates. By 1734, the main markets of the town including Jauhari Bazaar, Sireh Deorhi Bazaar, Kishanpole

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Bazaar and Tripoliya Bazaar had been built. One of the unique features of the walled city is its compactness and walk ability from one market to the other. Jaipur district has population of 66.26 lakh. The population density is 598 per sq km with 48% people living in rural areas. The decadal growth of population in Jaipur district is around 26%. In urban areas of Jaipur district, the growth is 34%. Jaipur city's population is around 3.07 million (2011 census), with 17% of total urban population of Rajasthan. As per census, Jaipur city witnessed 32.2% population growth during the decade. The city has a skewed population density. City area maintained by JMC is around 467 sq km, out of which 6.7 sq km (2.32% of the total area of the corporation) is in walled city. Population distribution is uneven in Jaipur. The Walled City, despite the lowest area has the highest population density of 58,207 persons per square kilometre. The Walled city has been used beyond its capacity and is now facing the problems of congestion, traffic and parking.

Besides being the capital city of Rajasthan, the city of Jaipur is a major tourist centre in the country as well. Major portion of economic activities of the city are located in walled city area, spreading over 6.7 km. This area is, besides having heavily concentrated activities, a very important tourist centre and attracts tourists from all over the globe. Vehicular growth is an important issue in the Walled City and an emerging one outside it. It not only causes on road congestion by reducing the carriage way, but the time spent in cruising to find a free on-street parking also slows down the traffic and adds to traffic congestion. This cruising further adds to the accumulated pollution in this area. The year 2016-17 shows registration of 14900562 motor vehicles in the state of Rajasthan, which shows a rise of 9.3% over the previous year where it was 13632176 [2]. These figures are highest in terms of percentage growth in the country and it accounted for 6.49% of the total registrations (210023289) in India, though in numbers it ranked sixth overall. Within Rajasthan, Jaipur was the leading city where 2791139 were registered with the RTO in 2017 which account for 18.73% of the total registrations in the state [2]. This is in contrast to the percentage share of population of Jaipur district which is 10.67 (approx.) of the population of state of Rajasthan [1]. In the non-metro category, Jaipur ranked second, next to Pune in terms of registration of vehicles. Rajasthan had a total road network of 145807 kms (upto 31st March, 2017) and accounted for a total of 14900562 registered vehicles (up to March 2017) of which 18.73% were in Jaipur district itself thereby clearly implying one in every 5 registered vehicle in the state of Rajasthan is registered in Jaipur district [2]. Comparing the road network, Jaipur district has about 4.3% of the total road length of Rajasthan [2].

**Table 1**  
**Share of Jaipur District in Road Length Available and Registered Vehicles in Rajasthan State [2]**

Location	Road Length (in km)	Registered Vehicles	Road Length per 100 Vehicle
Jaipur	6301	2791139	0.226
Rajasthan	145807	14900562	0.979

**Table 2**  
**Showing Road Length and Vehicle Density in Jaipur District and Rajasthan [2]**

Location	Area (in sq km)	Road Length per 100 sq km Area	Vehicles per sq km
Jaipur	11143	57	25048.36
Rajasthan	346689	42	4298.96

Jaipur has got roughly 5.8 times more vehicular density of registered vehicles in comparison to the vehicular density of the entire state of Rajasthan, i.e. 25048 vehicles per sq km in Jaipur district as compared to 4299 vehicles per sq km in Rajasthan [2]. Jaipur district has got a denser network of roads, with about 57 km road length per 100 sq km area in comparison to road density in Rajasthan state which has 42 km road length per 100 sq km (Table 2) [2].

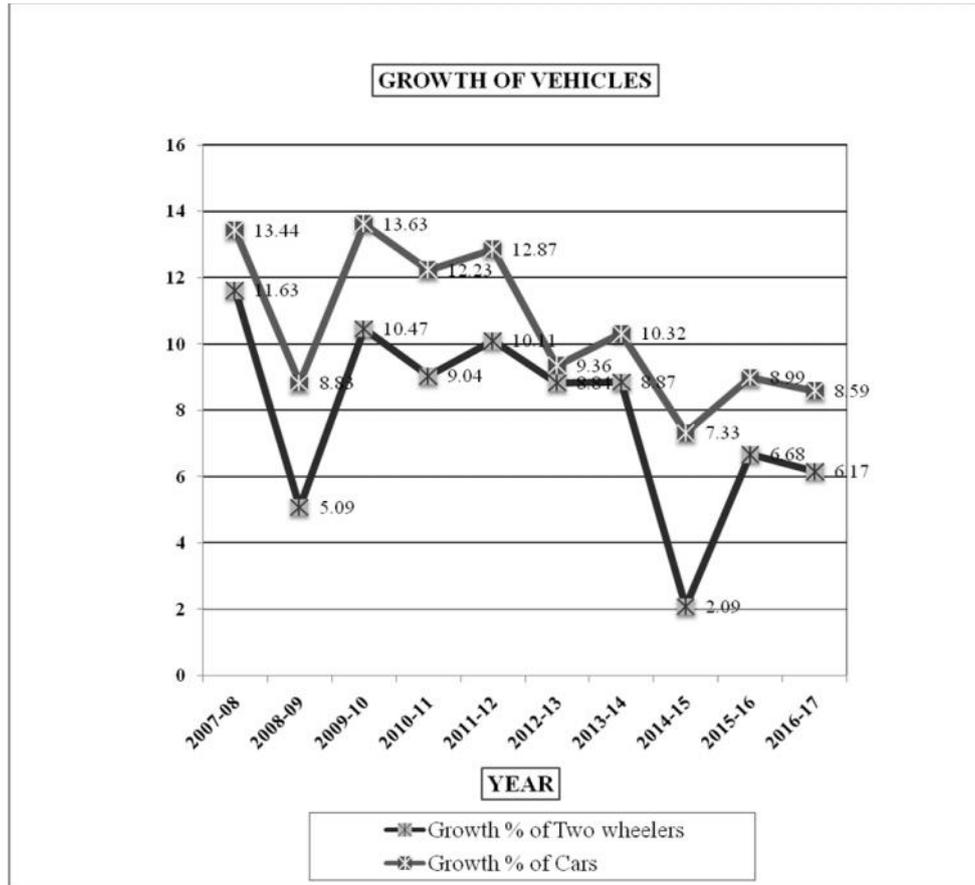
**Table 3**  
**Growth of Two-Wheelers and Cars in Jaipur District over the Past 10 Years [2]**

Year	Growth Percentage of two Wheelers	Growth Percentage of Cars
2007-08	11.63	13.44
2008-09	5.09	8.83
2009-10	10.47	13.63
2010-11	9.04	12.23
2011-12	10.11	12.87
2012-13	8.84	9.36
2013-14	8.87	10.32
2014-15	2.09	7.33
2015-16	6.68	8.99
2016-17	6.17	8.59

There has been a constant decline in the no. of registered two wheelers and cars in Jaipur district. The percentage growth of both two wheelers and cars are declining from 2012-13 to 2016-17, but the annual growth percentage of cars has outpaced the growth percentage of two-wheelers in the district (Fig. 1). It means the growth percentage of two wheelers is declining more rapidly than cars as shown in year 2016-17 (Table 3) [2]. During the year 2014-15 the growth percentage of two wheelers was only 2.09%. There has been only one instance, in 2012-13, when the annual growth rate of cars in the district has been similar to growth of two wheelers (Table 3) [2].

Fig.1

Comparison of Annual Growth Trend between Registered Cars &amp; two-Wheelers in Jaipur District [2]



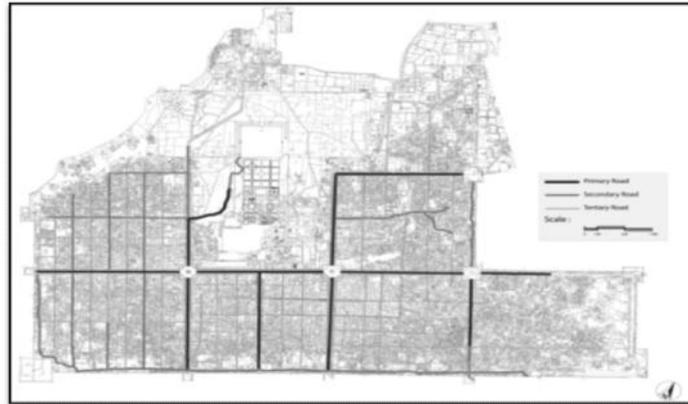
#### Study Area: Walled City of Jaipur

Walled city of Jaipur was planned and constructed in the 18th century. Vidhyadhar Bhattacharya was the chief architect and planner of the city. It was planned with well laid out wide roads and shaded walkways for pedestrian movement. One of the unique features of the walled city is its compactness and walk ability from one market to the other. The Walled City, in 2011-12 had a very high population density of 58,207 persons per square kilometer [3]. Since the area has developed over the years as the Central Business District (CBD), it has seen an unprecedented rise in the commuter numbers. The situation has worsened due to the rise in no. of 4-wheelers occupying the roads.

#### Traffic Issues

- Classifications of Roads:** Roads in the walled city of Jaipur can be classified according to the road widths into primary (eg. *Johari Bazaar, Kishanpole Bazaar etc.*). With road width of 10m or more, secondary with road width less than 10m but more than 3 m and tertiary streets with widths equal to or less 3 m. (Fig. 2)

**Fig. 2: Road Categorization in the Study Area**



The effective carriage-way of the primary streets is reduced due to various reasons, like on-street parking, encroachment, informal activities, constructions, trees etc. So, for six lane road, effective carriage-way is reduced to four lanes, which is roughly a 33% reduction in effective carriage way.

- Volume/ Capacity Ratio of Important Roads:** *V/c* or 'Volume/capacity' ratios for few important roads in the walled city of Jaipur are listed in *Table 4*. *V/C* ratio in the range of 0.75-0.90 represents traffic operations approaching unstable flow of heavy congestion, and characterized by restrictions in maneuverability [3]. Since increasing the road capacity to meet the future traffic requirements is not an option due to the limitation in road widening and other issues, we need to optimize the use of present infrastructure which includes optimal use of available carriage way, pedestrian walkways, on street parking lots etc.

**Table 4: Volume/ Capacity Ratio Of Important Roads in and Around Walled City, Jaipur [3]**

Road Name	Location	Peak Hour Traffic Volume (PCU)	Capacity of Road (PCU)	V/C Ratio
Surajpole-Chandpole Road	Tripolia Bazaar	3831	5100	0.75
Amber Road	Johari Bazaar	4347	5100	0.85
<b>MI Road</b>	<b>Ghat Gate to Sanganeri</b>	<b>4123</b>	<b>5100</b>	<b>0.81</b>

- Mixed Traffic Conditions:** Several issues need to be addressed for to achieve efficient use of available carriage way. Mixed traffic, which is evident in many other Indian cities as well, is one of the key reasons for the slow traffic speed in the walled city area of Jaipur. Being the commercial hub of the city, shops, stores and showrooms dealing with a variety of articles and goods, the area experiences a heavy freight activity which employ a range of transportation modes from heavy vehicles to manually or animal pulled cart (See *Image 1*).



**Image 1: Mixed Traffic Conditions in Tripolia Bazaar**

- Absence of Lane System:** In absence of lane system and time specific freight activity hours, they mix with other traffic, and lead to further congestion of the roads, and slowing down average traffic speed. Mixing of slow and fast moving traffic eventually reduces the average traffic speed. Motorists and cyclists tend to move forward through any available *gap* in the traffic volume, while car drivers tend to drive in the lane nearest to the median irrespective of the driving speed. In absence of any dedicated bus lane, buses are forced to merge with the traffic, blocking the traffic behind every time it makes a stop. While the government buses have marked bus stops, private buses also sometimes make stops according to the potential rider.

Generally, traffic in the first lane next to median moves with the fastest speed, but it seen that frequent cuts in the median, in absence of lane system, substantially slows the traffic speed (*See Image 2*) as commuters tend to cross the traffic flow abruptly which might sometimes also lead to accidents. Many of the cuts in the median have been blocked by barricades in the past few years, but still many remain which disrupt the traffic flow.



Image 2: Traffic at a Node at *Johari Bazaar*

- Markets in the Interior Area of the Walled City:** In the walled city area of Jaipur, commercial activities have penetrated in the interior areas along secondary and tertiary streets, and over the period of time have evolved in established markets. Hence, a substantial volume of traffic infiltrates the inner streets. Since many of these markets have so less road widths which restrict car traffic, so people generally commute with two-wheelers, manual rickshaws, or as pedestrians. But in absence of two wheeler parking along these secondary markets, customers and other users use the already narrow carriage way for parking. Even the average traffic speed along these markets in the interior are slowed down by the slow moving manual rickshaws and pedestrians occupying carriage way in absence of footpaths.

#### **Parking**

Parking space has become an indispensable requirement in the 21<sup>st</sup> century, with the constant increase in number of vehicles. With the increasing traffic volume on the prime roads in the walled city of Jaipur which is evident by the *V/C ratio* (*Table 4*), available parking spaces are fast being outnumbered by the demand. In absence of available parking spaces, people tend to halt their vehicles, especially cars and autos, on the carriage way waiting for their co-riders to finish their work and return. This in turn, proves obstruction to the already slow moving traffic (*See Image 3*).



Image 3: Autos Waiting for Customers in *Tripolia Bazaar*

Parking spaces provided for auto rickshaws and manual rickshaws are less in comparison to the required numbers. Hence these vehicles can be seen, waiting for potential customers along the road side (See Image 3).

Though separate loading areas have been allocated along prominent markets in the Walled City area, they prove to be an obstruction to traffic and also potential contenders for parking space, which otherwise could have been for customers in case the freight activity hours were kept reserved for non-business hours. Structures like transformers, ramps, un-used tree-guards and hand-pumps also prove to be an obstruction in optimization of the available on-street parking space.



Image 4: Encroachment of Walkway in Tripolia Bazaar

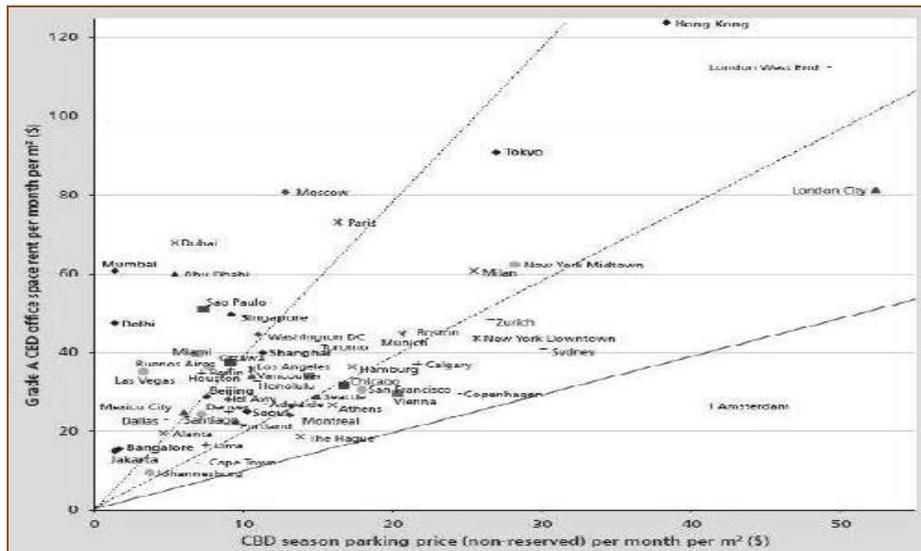
Various informal activities and *spillage* of products on the pedestrian walkway and parking space force the users to occupy additional space on the carriage way and hinder the traffic (See Image 4).

**Recommendations**

Availability of space and cost of infrastructure for building new parking spaces are the two important factors which will guide the construction of parking lots in the coming future. Hence the limitation of these two factors, guide us to find a solution in discouraging the demand, rather than to supplement the requirement. And, to optimize the present on street and off-street parking spaces. Hence, to discourage the demand some of the possible solutions can be in terms of parking charges and congestion taxation. Parking prices are must be governed by market oriented approach, which justifies the cost of the land which the vehicle is occupying.

**Fig 3:**

**CBD Parking Prices Compared With CBD Grade an Office Rents in Many International Cities [4].**



Indian cities lies mostly in the leftmost upper or middle regions of the chart shown (Fig. 3), whereas ideal case should be in the central V (cone) which is the region for value of 1 to 4 for a ratio between the office rent prices and CBD parking prices in various cities [4]. Promotion of public transport will ideally reduce the traffic congestion on the streets by discouraging the use of privatized vehicles. One important factor which can help in this regard is the provision of dedicated bus lanes, which will greatly improve the speed of the bus traffic and may help in turning people to use public transport by establishing it as a faster mode of travel. Also, eradicating or controlling the mixed traffic situation will help in easing the stress level in traffic. De-centralization of the activities in the Walled city *area* will help to split the traffic and distribute it to other regions rather than concentrating it into the CBD. But as evident from the past, it must have social acceptance and public participation which is necessary to make most of the proposed solutions a success. The above discussed measures are not the only solutions, but only some are discussed here in this paper. Solutions must be sought in the light of social acceptance, economic feasibility and practical applicability in local context.

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