



A Geographical Analysis of the City Transport and Vehicular Traffic: A Case Study of Patna

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Abstract : *Most of the Indian cities in the recent years have gone through a marked change in the nature of urban transport and have witnessed an unprecedented increase in the volume of vehicular traffic. In Patna also the vehicular population growth has been quite high in recent years. Patna roads present a distinct heterogeneity regarding the forms of vehicular traffic and the absence of adequate and proper public transport against the rising travel demand that has caused more complications in the traffic system on the city roads. The existing road network of Patna is inadequate to cater to the ever increasing volume of vehicular traffic. As a*

consequence there have been perennial problems of congestion, environmental pollution and road accidents. Amid this scenario, an effort has been made in the present study to furnish a geographical analysis of the current status of the city transport and vehicular traffic of Patna M.C. Area at territorial, quantitative and qualitative perspectives. The study has been carried out specifically in the two circles of PMC Area: New Capital of West and Bankipur of East Patna respectively.

Key words: Vehicular traffic, Urban transport, Congestion, Pollution, Road accidents.

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Context and Background :

The urban centres of our country have been growing at a rapid rate: both in terms of their population size and functional areas. Most of these cities and towns in the recent years have gone through a marked change in the nature of urban transport and have witnessed an unprecedented increase in the volume of the vehicular traffic. Patna, the capital city of Bihar has been no exception in this particular regard. Quite obviously, the ever increasing growth of city traffic has been causing an ever increasing pressure on the existing system of city transport on one hand, and

has given rise to a series of problems on the other. The roads of Patna present a distinct heterogeneity regarding the forms of vehicular traffic which range from slower modes like cycle rickshaws, 'thelas' and even bullock carts to zooming two-wheelers and most modern ranges of cars and other utility vehicles.

The existing road network of Patna is inadequate to cater to the ever increasing volume of vehicular traffic. In addition nearly all of the city roads, lanes and by-lanes have been highly encroached by unauthorized and/or temporary dwellings, parked vehicles, hawkers and roadside business. The inadequacy in city transport seriously affects the cities' economic growth by hindering the socio-economic activities of the people and when it is inefficient, it certainly influences the quality of life negatively (Adhikari, 2005).

Hypotheses :

The study is based on the hypotheses that the existing city transport system, road network and the overall pattern of the vehicular traffic in Patna are not satisfactory; the urban dwellers are faced with problems like congestion, encroachment, pollution and accidents; and combined efforts are needed to minimize the problems related with city transport and traffic.

Objectives :

The main objectives of the study are (i) to analyze the characteristics of the city transport and vehicular traffic in Patna; (ii) to examine the pattern of intra-city variations if any, in terms of the density of vehicular traffic, nature of utilization and traffic problems faced by the people; (iii) to review the status of traffic management persisting in the city; and (iv) to suggest certain remedial measures for resolving the traffic problems and the smooth functioning of city transport in the Patna M.C. Area.

Methodology and Database :

The methodology of the present study involves conceptual as well as the applied techniques of research. The research is based on a distinct methodology, which follows the three stages: (i) **Pre Field Survey** including literature survey and collection of secondary data and maps from government offices and NGOs; (ii) **Field Survey** comprising of preparation of questionnaire and generation of primary data; and (iii) **Post Field Survey** including the tabulation, cartographic representation and analysis of data.

The database of the present study is constituted of 100 samples (vehicle owners/users), 50 each collected from the New Capital and Patna City circles of PMC Area respectively.

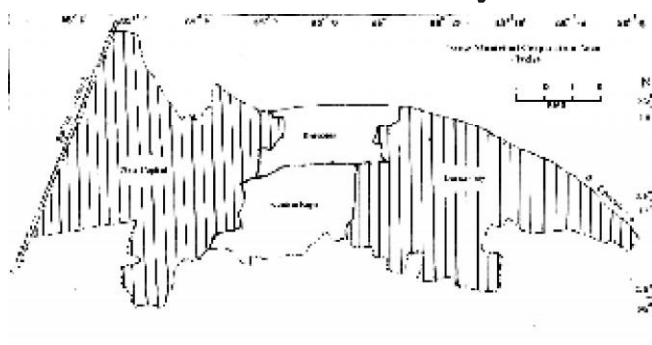
Study Area :

The present study concerns Patna M.C. Area, which is situated at a crossroad of 25°36'22" N latitudes and 85°72'02" E longitudes. Patna, the capital city of Bihar and the largest urban centre of the state spreads over an area of 99.45 sq. km. The Patna M. C. Area has been divided into 72 wards, which have been further re-arranged into 4 Circles, namely- New Capital, Bankipur, Kankarbagh and Patna City respectively (District Gazette, 2007).

The study has been carried out specifically in the two circles of PMC Area, the New Capital and Patna City (**Figure – 1**). Lying in the western part of PMC, the New Capital circle consists of newer settled localities, broader road network, concentration of relatively higher income class settlers and understandably larger share of vehicular population. On the other hand, Patna City circle occupies the eastern most part of the city which incidentally happens to be the oldest part of Patna, characterized by narrow arterial road and still narrower lanes and by lanes.

Figure – 1

Patna M.C. Area – The Study Area



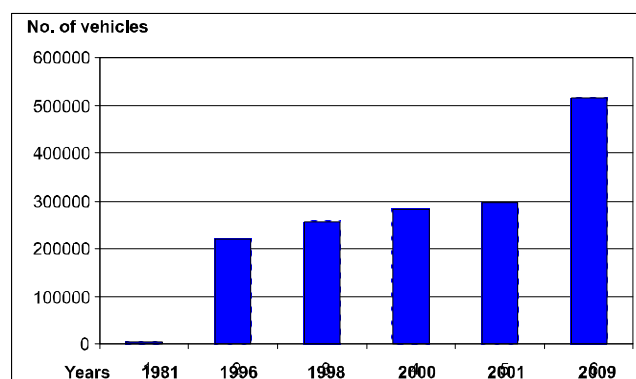
Growth of City Transport and Vehicular Traffic:

The vehicular population growth in the Patna M. C. Area has been quite high in the recent years (**Figure – 2**). The number of registered vehicles swelled from 4,384 in 1981 to 2,94,164 in 2001; an increase of 67 fold in a span of two decades (DTO, 2001). Incidentally this increase has been as much as 75 fold in the case of personalized mode of vehicles. As per the current records of District Transport Office, the number of registered vehicles in the city rose to as high as 516,000 in the year 2009 (DTO, 2010). Every month around 7,000 vehicles are registered only at Patna itself. At the same time more than 50,000 driving licenses are issued every year (Choudhury, 2012).

The share of personalized modes of transport has been very high and public transport has been distinctively inadequate. Public transport system in Patna primarily relies on its IPT (Informal Public Transport) modes. Rail and bus transport plays a negligible role in the urban transportation system in Patna. The share of buses is negligible in Patna (only 01.4%) while two-wheelers and cars account for 80.1% of the total vehicle population (Ministry of Road Transport & Highways, 2010). The lack of effective mass transport has given rise to a tremendous rise in personalized vehicles. The number of personalized vehicle, especially two wheelers, has increased by 280% on the city's roads in the last three years (Sinha, 2010).

Figure – 2

**Growth of Vehicular Population in Patna M.C. Area
(Based on DTO Reports, 2001-10)**



The findings reveal that less than half of the population under review, precisely 34.3 % in New Capital and 36.6 % in Patna City, depend on public transport on regular basis; which is definitely much below for a million plus city like Patna. The most preferred mean of public transport has come out to be the auto-rickshaws, followed by cycle rickshaw and bus (**Table – 1**).

Table – 1

Type of Public Transport Used (In %)

Type of transport	New Capital	Patna City	Total
Auto rickshaw	61.4	93.3	77.4
Cycle rickshaw	17.2	06.7	11.9
Bus	21.4	-	10.7

Source: Primary Field Survey, 2012.

Out of the total number of respondents who use public transport, as high as 61.4 % in New Capital circle and 93.3 % in Patna City circle have no choice other than to rely on the auto-rickshaws; which unlike many other Indian cities ply on some selected routes only. It is interesting to note that owing to the inadequate public transport facilities, the age old cycle rickshaws still have remained popular among the citizens of Patna, especially in New Capital circle where lie some localities with relatively wider lanes and open areas. The bus service in Patna is merely perfunctory, more so in

Patna City circle which is necessarily characterized by narrow road network and heavy encroachment.

The Problem Areas :

The increasing volume of heterogeneous traffic has outpaced the growth of road capacity in the city of Patna and aided by the inefficient traffic management has introduced the perennial problems like congestion, pollution and road accidents (Chowdhury and Prasad, 2008). The findings reveal that more than half of the population under review faces the traffic congestion almost everyday; while more than one - third of them face this menace quite often. There have been certain marked spatial variations regarding the frequency of congestion faced by the public. In spite of the presence of broader road network and upcoming over bridges, more than 70 % of the people in the New Capital circle are faced with daily traffic jams in comparison to a little more than 30 % of them in Patna City circle facing the same problem (**Table –2**). Quite obviously the excessive growth of vehicular traffic in the western part of the city during recent years has been the primary reason behind this.

Table 2

Traffic Congestion Faced by Public (In %)

Congestion Faced	New Capital	Patna City	Total
Almost everyday	70.0	33.3	51.7
Often	17.1	56.7	36.9
Sometimes	12.9	10.0	11.4

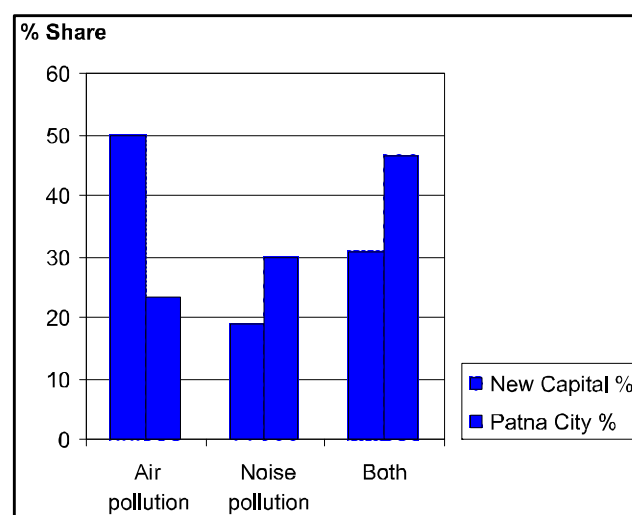
Source: Primary Field Survey, 2012

It has been estimated that 60% of the urban air pollution has been caused by vehicular traffic flow (BSPCB, 2010-11). Apart from concentration of vehicles in an urban centre like Patna, other reasons for increasing vehicular pollution are the types of engines used, age of vehicles, predominance of private vehicles especially cars and two wheelers (owing to unsatisfactory public

transport systems), thereby causing higher idling emissions and congested traffic and poor road conditions (<http://www.dieselnet.com>, 2012). As per the reports furnished by the BSPCB, the presence of nitrogen oxide and RSPM (respirable suspended particulate matter) in air has doubled in last five years. During 1997-98, nitrogen oxide's presence in Patna was 32 mg/cubic mt which went up to 60.1 mg/cubic mt in 2009-10 in the highly polluted areas of the city. The level of RSPM went up from 70 mg/cubic mt in 1997-98 to 121 mg/cubic mt in 2009-10 in less polluted areas of Patna.

The figures of the BSPCB further unveil the fact that in all of its sampling zones of Patna, the average noise level is higher than the WHO standard. The unchecked growth in the vehicular traffic added with the ill-maintenance of transport modes and rampant violation of traffic rules is considered to be responsible for the environmental pollution in the urban centres (CPCB, 2009). During peak hours on almost every roads and lanes of the city the excessive traffic congestions, idling vehicular emissions, constant blowing of horns and automobile high pitch noise give rise to a very chaotic and annoying situation.

Figure – 3
Incidence of Pollution Faced by People (In %)
(Based on Primary Field Survey, 2012)



The findings of the study support the BSPCB and CPCB figures to a considerable extent. The

Figure – 3 shows that as far as the intensity of pollution menace is concerned, the city dwellers of eastern Patna, i.e. the Patna City circle seem to be more affected than their counterparts living in the New Capital circle. The reason is being the combined effects of over congestion, idling emissions and rampant usage of adulterated fuel prevalent in Patna city relatively in greater degree than in the New Capital. Too much vehicular traffic has come out to be the leading cause behind the growing pollution on city roads in both the circles of PMC; the other important reasons being the ill-maintenance of vehicles, inadequate road network, encroachment on roads and poor traffic management respectively.

Accidents are another major problem arising due to multi-faceted aspects related with the traffic movement on the city roads. The phenomena like swelling growth of faster transport modes and heterogeneity of traffic, rash and/or erratic driving; violation of traffic rules and road safety measures; absence of footpaths etc. have come out to be the major reasons behind the accidents on Patna roads. It becomes evident from the public feedback that there have been many cases of traffic rule violations like irregular usage of helmets and seat belts by the bikers and the drivers of four-wheelers adding to the occurrences and severity of road accidents (**Table – 3**).

Table - 3
Usage of Helmet and Seat Belts (In %)

Frequency of Usage	New Capital		Patna City		Total	
	Helmet	Seat Belt	Helmet	Seat Belt	Helmet	Seat Belt
Regularly	41.4	61.4	43.4	53.4	42.4	57.4
Sometimes	34.3	22.9	40.0	40.0	37.2	31.4
Rarely	10.0	04.3	13.3	03.3	11.6	03.8
Never	14.3	11.4	03.3	03.3	08.8	07.4

Source: Primary Field Survey, 2012.

Regarding the usage of helmets, it has been shocking to find that nearly one-fourth of the bikers

of the New Capital, most likely the upcoming teenage riders either use the helmets rarely or do not use them at all. As far as the use of helmets for the pillion riders is concerned, hardly any one is seen with a helmet irrespective of any spatial variations. The negligence towards the usage of helmet added with rash riding has definitely aggravated the rate and seriousness of road accidents. As far as the usage of seat belts of cars is concerned, it has been heartening to see that more than half of the population under review is in habit of using the seat belts on regular basis, more so in New Capital circle where one can find a wider range of modern four-wheelers. In addition to the irregular usage of road security measures, many people were found to be using their cell phones while driving/ riding; which is indeed very risky from the accident point of view.

However, the fatality rate of the road accidents i.e the number of deaths/ 10,000 vehicles in Patna was recorded to be well below the national average (Singh & Misra, 2007: 60-75), probably because there is high density of slow moving vehicles plying on the city roads which reduces the severity of accident to a considerable extent, especially the fatal ones.

Traffic Management–Efforts and Expectations:

Traffic management involves directing vehicular and pedestrian traffic along the city road network ensuring a smooth, undisrupted and hazard free flow of traffic. In addition the efficient traffic management in a city is aimed towards prevention and reduction of accidents; effective enforcement of traffic regulations; development of a sense of responsiveness and sensitivity to the needs of the public; rendering assistance to public in various stressful conditions such as prompt first aid to accident victims; assistance to various agencies in coordinated development infrastructure for smooth and safe flow of traffic;

ensuring protection of the environment taking appropriate steps for prevention of noise and air pollution; and encouraging participation and involvement public in traffic management (<http://en.wikipedia.org>, 2012).

Patna is perhaps the only capital city in India which does not have automatic and proper traffic management system. It is very surprising that Patna traffic police's strength is not even 25% of the sanctioned number of traffic constables. According to official records, there are only 150 traffic constables against the sanctioned strength of 660 (Inputs from DTO, 2012). The traffic management in Patna at present suffers with problems like lack of human resource; growth of vehicular traffic beyond capacity; scarcity of public parking space; heavy encroachment; negligence, ignorance and apathy on the part of common public; and above all a lacklustre and inefficient I & M (Inspection and Maintenance) machinery.

Considering the dire need of an efficient traffic system in Patna, the government machinery has come forward with a series of measures such as prohibition of parking on road sides and junction points of roads; construction of planned public parking space at various places; construction of pedestrian over bridge on major intersections; construction of a new bridge parallel to Mahatma Gandhi Setu on river Ganga to ease the traffic flow; improvement in city bus service; initiating the mandatory use of speedometers in every vehicle; clearing of encroachments on major roads; prohibition of processions and rallies on busy roads; ban on motorized 'thelas'; strict handling of the drivers under influence of alcohol; installation of CCTV cameras at strategic points to monitor the traffic; and installation of VMS (Variable Message Signboards) to inform motorists about diversions and blockades.

The common people of Patna have responded with expectations to these traffic management measures in the hope that they would bring some comfort and safety in their day to day intra-city travel. The findings reveal that in both the circles of PMC covered in the study, the respondents have shown preference to the measures like installation of CCTV cameras for proper monitoring of city traffic, mandatory use of speedometers in all of the vehicles, construction of public parking and over bridges, and urgent removal of illegal encroachment on roads.

Findings and the Way Forward :

As a final conclusion it could be inferred that there has been an unprecedented growth of vehicular traffic in Patna, especially during last few years. Public transport system in the city is inadequate, inefficient and unplanned and is not able to serve the travel needs of the public in the best possible way. This has caused a tremendous pressure on the personalized vehicles resulting into swelling number of vehicular traffic on the city roads paving way for congestion, accidents and the degradation of urban environment. Poor driving behaviour and lack of appropriate civic sense of the public make the matter worse. The working hypotheses of the study have been thus proved to a considerable extent. There have been efforts on the part of the government and concerned authorities to implement an effective and safe traffic management system in the city but the results have not been very satisfactory till date.

Some probable yet not so strictly adopted measures for improvement in the city traffic system could be mandatory emission testing and issuing of PUC (Pollution Under Control) certificate for all vehicles at regular intervals; stringent checking of PUC certificates by the traffic controllers on duty; initiating effective periodic I&M programmes; involvement of NGOs and other corporate bodies

in this process; and availability of improved and efficient public transport facilities. Most cities of the country have improved the city bus services and a few have started developing metro networks. Patna is yet far behind to match their standard. Some of these measures are eagerly awaited by the residents of Patna at this moment of time.

Along with the government machinery and the concerned authorities; the common citizens, vehicle owners and the passenger traffic have to come ahead with their respective shares of effort to ease the negative consequences arising out of swelling growth of vehicular traffic. First and foremost the general public of Patna needs to behave and act like responsible and civilized citizens abiding with the existing traffic rules. Some effective yet very simple measures which every vehicle owner/user must adhere to are: adopting and popularizing car-pooling system; using the public transport wherever and/or whenever available; avoiding the congested roads and rush hours to the extent possible; regular pollution checking of the vehicles; reducing the temptation of unnecessary blowing of horns and talking on cell phones while driving; stringent usage of helmets and seat belts; and encouraging and promoting plantation of trees / conservation of urban green. These sincere and honest efforts on the part of the common public would definitely prove to be effective and successful in the smooth functioning of city transport.

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