

Growth of Road Network in Nagpur District: A Geographical Analysis

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Abstract

Road transport is among key mode of surface transport as its act as a feeder services for other modes of transport. Road surface facilitates communication and administrative convenience between more developed capital city to less developed nook and cranny of the country. In the last few decades' steady growth of road transport in nagpur is observed which created strong multiplier effect for other associated socio- economic activities. Road network provide base for complex indices of road traffic density accessibility and connectivity. Thus it is necessary to study the growth of road network for nagpur district. Road network means connectivity between nodes and edge as a complete circuit. Nagpur district lies in the heart and vicinity of vidarbha having profound impact on the development of district. Present paper reveals the analysis of growth of road network, decadal increased in road length and increasing number of vehicles in nagpur district.

Key words: Road, Road length, increasing registered vehicles.

INTRODUCTION:

Road network refers to connectivity between edges and node in complete circuit or cyclic manner. Multiple edges drawn from single nodes indicate higher order of connectivity. Growth of road network comparing with previous decades reflect increasing number of economic activities and social wellbeing off the district. Flat or plain landscape reflect rapid growth of road network and hilly areas comparatively low growth of road network. In the present paper growth of different surface road like National Highway, state Highway, District Road, village roads, surface roads, cement or tar roads, WBM roads have been studied meanwhile number of decadal growth of registered vehicles for Nagpur district and its impact on road surface also been analysed for study region.

Objectives of the Study:

The main objectives of the present research paper as follows,

- To compare tehsil wise growth of road length in percentage for Nagpur district.
- To analyse surface wise increase in road length for Nagpur district.
- To analyse decadal growth of registered vehicle for Nagpur district.

Data Source and Methodology:

Present paper is based on mainly secondary source of data. the road data and base map is collected from PWD office Nagpur and growth of registered vehicle from social economic review to calculate the growth of road length in percent in Nagpur district.

$$GR = \frac{RL1 - RL0}{RL0} \times 100$$

GR - Growth Rate

RL1 - Current Road Length

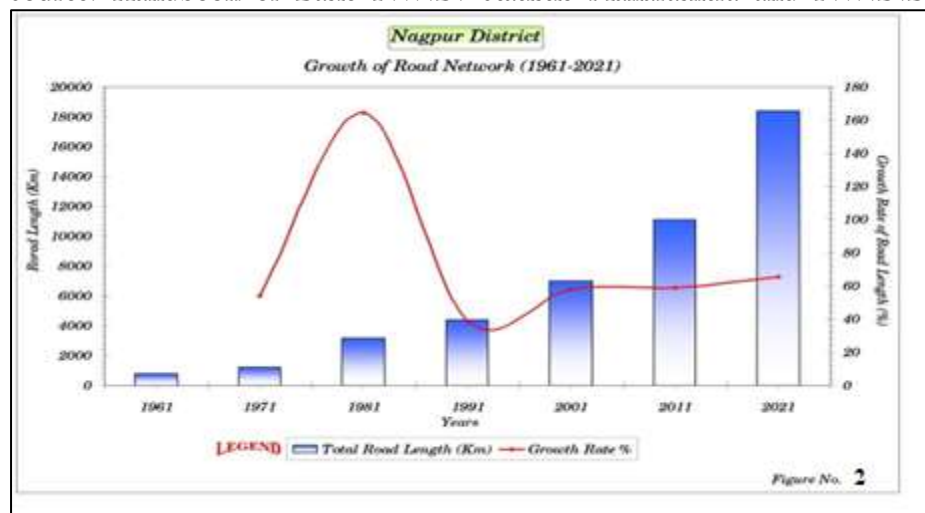
RL0 - Previous Road Length

Study Area

Nagpur city is the sub-capital city of the state of Maharashtra, situated in the eastern part of Maharashtra state of Vidarbha, Latitudinal extension of Nagpur district is in between 20°35'09" north to 21°44'15" north and longitudinal extension is in between 78°15'05" east to 79°40'36" east. District covered total 9892 Sq.Km. area it is observed that the geographical area of Nagpur district is only 3.22%, while in some parts of this district, the minimum height above the sea level is 274 meters and the maximum height in some parts is found to be 652 meters. Nagpur district is divided into 14 tehsils from the point of view of administrative management and there are 12 assembly constituencies. Also, 14 Municipalities, 6 Nagar

2021	18372	65.56
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Source: Handbook of Basic P.W.D. Statistic Maharashtra and P.W.D.District Office, Nagpur⁴



Source : Ref. 4

Surface wise Road Network in Nagpur District

- **Unsurfaced Roads:** The construction of these types of roads is in the preliminary stage. It is a road connecting two places, but the construction of such roads is not complete.

- **Surfaced Roads:** Such roads are also called paved roads. There are two types of such roads.

Water Bound Macadam: These roads are gravel; their surface is covered with mud and gravel. These roads are later converted into cement or asphalt roads. That is, these roads are in the middle stage of cement or asphalt roads.

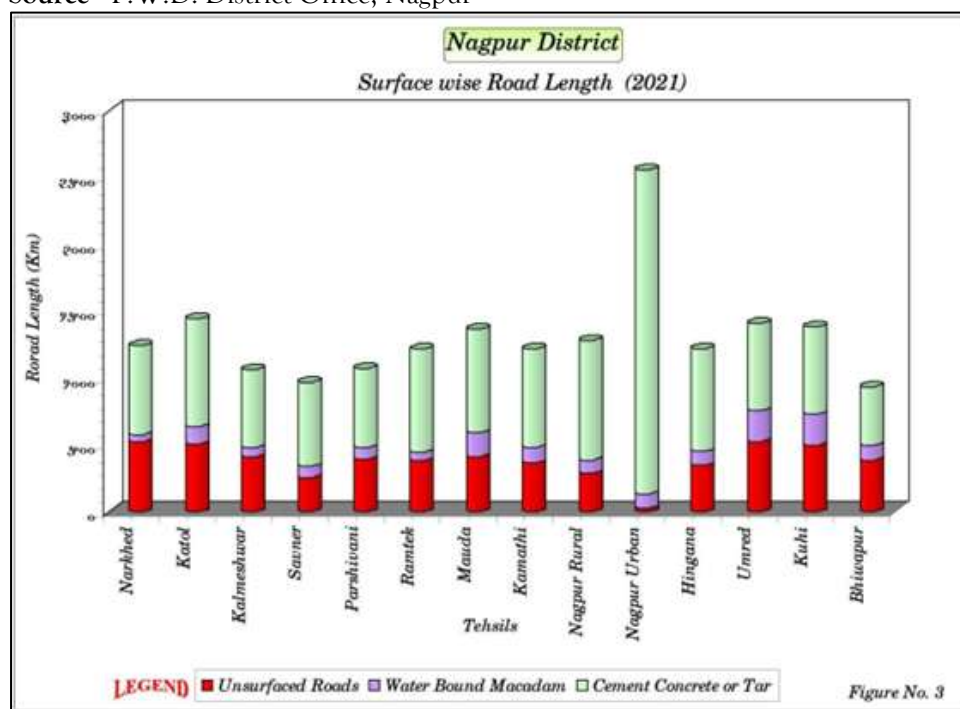
Cement or Asphalt: The surface of these roads is cement or asphalt. At present, national highways and state highways are mainly made of cement. Whereas district roads and some state roads are tarred. The total length of such roads in Nagpur district in 2011 was 8143 km and the proportion of total roads was 73.38%. So in 2021, the length of these roads is 11383.28 km and it is found to be 61.96% of the total roads.

Nagpur District – Surface wise Road Length – 2021

Tehsils	Road Length in Km				Grand Total
	Unsurfaced Roads	Water Bound Macadam	Cement Concrete or Tar	Total Surfaced	
Narkhed	526.96	51.91	663.36	715.27	1242.23
Katol	509.42	127.46	804.36	931.82	1441.24
Kalmeshwar	411.17	72.46	580.60	653.06	1064.23
Savner	254.95	81.70	630.63	712.33	967.28
Parshivani	395.40	86.15	592.14	678.29	1073.69
Ramtek	383.44	64.17	767.64	831.81	1215.25
Mauda	410.71	179.77	771.96	951.73	1362.44
Kamathi	365.50	117.56	737.71	855.27	1220.77
Nagpur Rural	287.50	98.60	895.73	994.33	1281.83
Nagpur Urban	25.51	110.31	2423.27	2533.58	2559.09
Hingana	346.78	103.13	771.86	874.99	1221.77

Umred	527.37	227.51	653.36	880.87	1408.24
Kuhi	499.53	229.70	650.85	880.55	1380.08
Bhiwapur	386.36	108.15	439.81	547.96	934.32
Total District	5330.60	1658.58	11383.28	13041.86	18372.46

Source- P.W.D. District Office, Nagpur



Source : Ref. 4

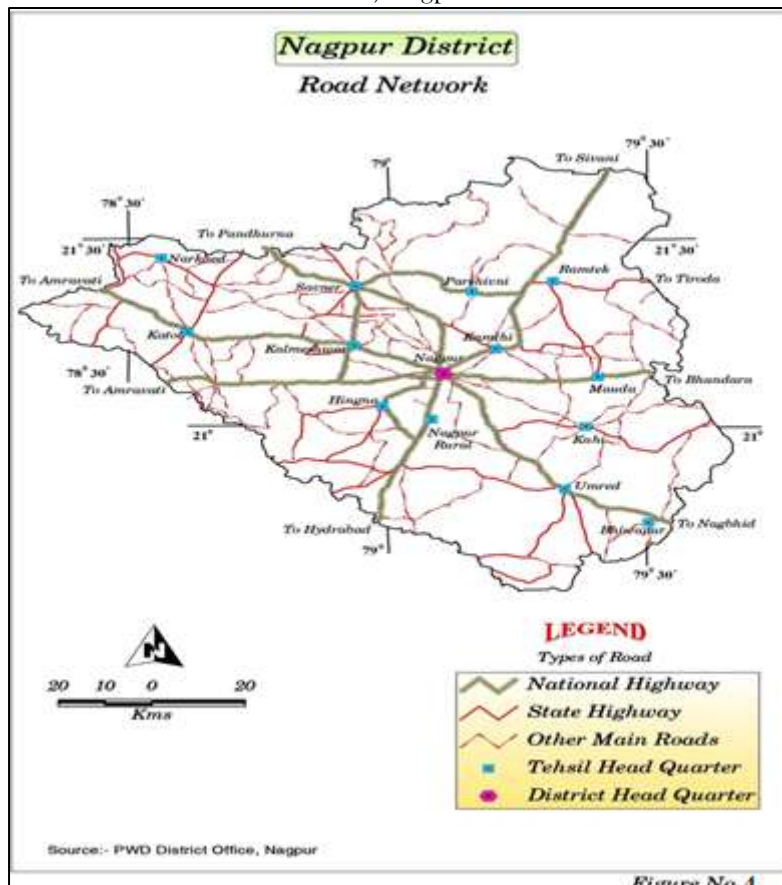
Classification of roads as per Nagpur road plan 1920:

- National Highways:** - It is constructed and maintained by PWD. This road is meant for inter - state and strategic defence movement, and connect the state capital with big cities, link up other borders Roads. In Nagpur district, the length of national highways in 2011 was 308 km, while the proportion of total roads in the district was 2.78%. Nagpur district has the highest length of national highway in Vidarbha region National Highway No. 53 (Old No. 6), Highway No. 47 (Old No. 7), Highway No. 44 (Old No. 3) have already passed through Nagpur district. The highway from Nagpur to Katol, the national road from Nagpur area to Kalameshwar has been given the status of National Highway. Also, National Highway No. 53 and 47 are connected by National Highway No. 44. Therefore, in 2021, the length of national highways is found to be increased.
- State Highway:** These are constructed and maintained by state government .and it joined state capital with district headquarter and other important towns. These roads are also connected to national highway. The total length of state highways in Nagpur district was 1112 km in 2011 and its ratio to total roads was 10.02%. In the year 2021, the length of state highways was 870.68 km and the proportion of total roads was 4.74%. Compared to the year 2011, the length of state highways has decreased because many state highways have been increased in width and raised to the status of national highways.
- District Roads:** These roads join the district headquarter with the other place of districts development. and maintenance of these roads fall within purview of zilla parishad. The length of district roads in Nagpur district was 3059 km in 2001 and this ratio was 27.57% of the total roads. In the year 2021, the length of the district road is increased to 7491 km
- Rural Roads:** The village roads are mainly the responsibility of village panchayat and connect village with the neighbouring town, and cities. Between 2011 and 2021, the maximum length of rural roads has increased in the district. Rural roads are mainly unsurfaced. The total length of rural roads in the district in 2011 was 6618 km and the proportion of total roads was 59.64%. So in 2021, the total length of rural roads is 9196.77 km and this ratio is found to be 50.06% of the total roads.

Nagpur District – Category wise Road Length – 2021

Tehsils	Road Length in Km				
	National Highway	State Highway	District Roads	Rural Roads	Total
Narkhed	13.30	89.15	339.47	800.31	1242.23
Katol	51.80	87.10	375.60	926.74	1441.24
Kalmeshwar	70.20	83.04	268.32	642.67	1064.23
Savner	90.25	17.00	289.58	570.45	967.28
Parshivani	37.10	45.80	373.35	617.44	1073.69
Ramtek	74.21	49.00	364.15	727.89	1215.25
Mauda	56.67	57.50	544.40	703.87	1362.44
Kamathi	75.32	17.10	475.05	653.30	1220.77
Nagpur Rural	103.03	36.50	452.61	689.69	1281.83
Nagpur Urban	53.10	37.30	2468.69	0.00	2559.09
Hingana	76.83	136.60	325.65	682.69	1221.77
Umred	60.00	70.99	503.30	773.95	1408.24
Kuhi	18.00	88.40	433.48	840.20	1380.08
Bhiwapur	34.20	55.20	277.35	567.57	934.32
Total District	814.01	870.68	7491.00	9196.77	18372.46

Source – P.W.D. District Office, Nagpur



Source : Ref. 4

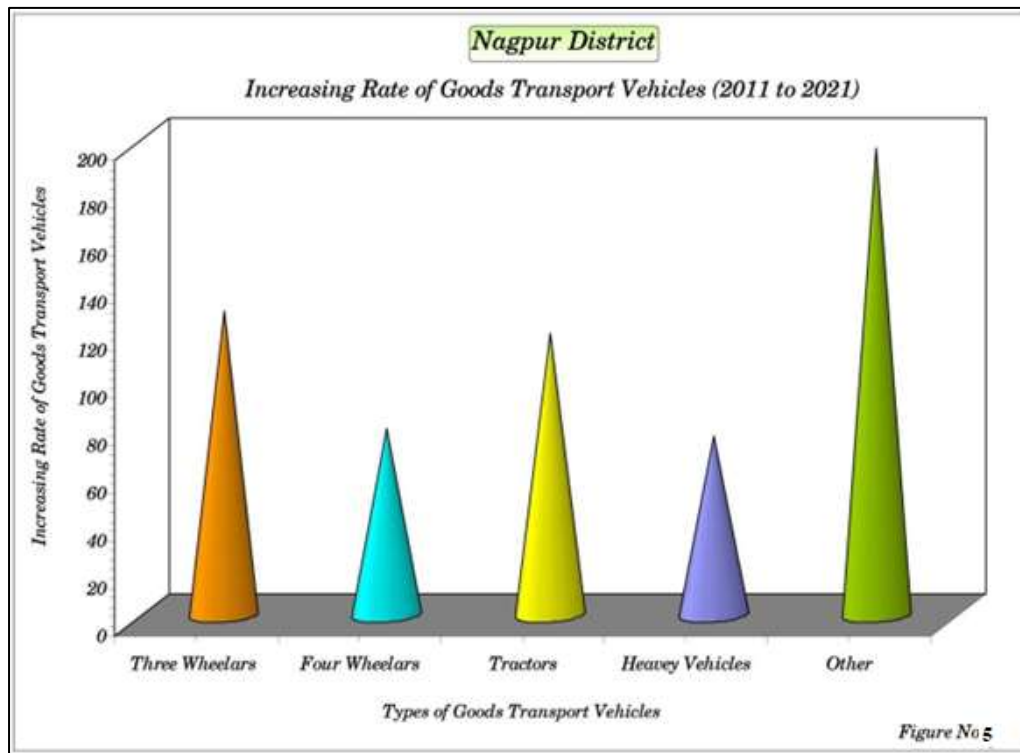
Increasing Number of Registered Vehicles in the District

Roadway development is based on the frequency of daily vehicle plying on the road. Widening of roads where heavy vehicles are frequented is necessary. The length of roadways does not increase in proportion to the increase in the number of vehicles; in fact, it cannot increase in proportion .85.81% of the total passenger vehicles in the district are two-wheelers. While the lowest 0.03% is for 6 seater rickshaws. The number of vehicles running on petrol is the highest in the district and the proportion of two-wheelers is also high. The number of vehicles running on LPG is very less and includes only a few cars and three wheeler rickshaws.

Nagpur District - Increasing Number of Registered Vehicles in the District (2011 to 2021)

Particulars	Total Vehicles	Types of Vehicles by Fuels			Number of Vehicles in 2011	Increasing Rate (2011 to 2021)
		Disel	Petrol	CNG /LPG		
Passanger Vehicles	1	2	3	4	5	6
Buses	6686	6686	0	0	5677	17.77
Moters and Station Wagons	230227	55865	170576	3786	97658	135.75
Jeep	58182	58179	3	0	32655	78.17
Taxi	11475	8990	2445	40	3065	274.39
Three Wheelars (Rikshwa)						
3 Seeter	32589	2983	29280	326	15135	115.32
6 Seeter	647	647	0	0	3805	83.00
Two Wheelars	2086605	0	2086605	0	1111090	87.80
Ambulance	1258	1180	78	0	590	113.22
School Buses	3906	3569	337	0	689	466.91
Total Passenger Vehicles	2431575	138099	2289324	4152	1270364	91.41
Goods Transport Vehicles						
Three Wheelars	16643	15421	1210	12	7302	127.92
Four Wheelars	63928	62547	1372	9	35803	78.55
Tractors	24130	24130	0	0	11033	118.71
Heavey Vehicles	12101	12101	0	0	6910	75.12
Other	4765	4758	7	0	1608	196.33
Total Goods Transport Vehicles	121567	118957	2589	21	62656	94.02
Total Vehicles in District	2553142	257056	2291913	4173	1333020	91.53

Source – Socioeconomic Review of Nagpur District-2022⁵



Source : Ref. 4

CONCLUSION: We have observed intra tehsil difference for increased in road length. Even in the year 2021, most cement and asphalt roads are found in Nagpur city. During this period, 2423.27 km of roads are of cement and asphalt surface and about 95% of the roads in the city are also found to be of this type. Even during this period, it is observed that the least 439.81 km of roads are asphalted in Bhiwapur tehsil. Although the network of such roads in Bhiwapur tehsil has increased, it is very low compared to other tehsils. In other tehsils, roads ranging from 500 to 900 km are of cement and asphalt surface. In Nagpur district, Bhiwapur tehsil still has less surfaced road network while Umred and Narkhed tehsils have more unsurfaced road network. It can be seen from this that good road network is still not developed in this tehsil. That is why traffic jams and accidents are more common in such areas. more flyovers needed to accommodate increased in number of vehicles to reduce fuel consumption and travel timing. Next is increasing growth rate of cement and tar road as compared to WBM road having environmental consequences which can be resolved by mixing Steel slag with it. we can observe significant increasing number of registered vehicle in but not increasing road length thus it creates traffic congestion during pick hours. more increasing number of three wheelers, school buses, auto rickshaw can be complement with public transport and EV to reduce environmental damages. behind for the growth in road network for Nagpur increasing road length in future.

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