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Measuring Road Infrastructure Development: Paradox of Density Measures

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ABSTRACT

One of the conventional measures of road infrastructure development is the density measure. In respect of the measurement of magnitude of road infrastructure development of a region there exists three conventional density measures. Whether or not all the three measures can be applied for judging the road network development of a region depends on the characteristic of the regions under consideration. The researcher measured the road infrastructure development of West Bengal by applying all of the three density measures. The present study discloses that there exists paradox in the conventional density measures of road infrastructure development.

Key Words : Density Measure, Road Infrastructure Development, West Bengal, Paradox

INTRODUCTION

Road transport network includes all roads in the country: motorways, highways, national roads, regional roads, and other urban and rural roads. Road infrastructure is the vital sector of each of less developed country (LDC) in the World. The development of road infrastructure plays the role of a catalyst for economic development of LDC, like, India. The Government of India considers road network as critical to the country's development, social integration and security needs of the country (G.O.I., 2011). India has the World's second highest road network (G.O.I., 2018). India's road density measured in terms of road availability per land area has gradually increasing. The use of the other measures of road density is very limited in practice.

METHODOLOGY

The simplest road density measure, that is, road density by area measured by the length of road per unit of area, is widely used to judge the level of development of road infrastructure of regions. Levels of road infrastructure development in terms of road densities of regions by area (e.g. districts) could be used only when population as well as the villages and towns in the regions are uniformly and homogenously distributed over the regions. This rarely happens in reality in the LDCs, and in the state of West Bengal extensive heterogeneity is noticed in distribution of population as well as the villages and towns in the blocks and in the districts. One has not only to consider the area but also to consider the size of population and the number of villages and towns in the density measures. The three conventional density measures of road network are expressed as –

R_A = Road length in km. /100 sq. km. of area

R_P = Road length in km. /1000 population

R_V = Road length in km. /number of villages and towns

In this study, the researcher applies all of these three density measures for judging the magnitude of road infrastructure development of the state of West Bengal.

RESULTS AND DISCUSSION

The state of West Bengal has four categories of roads: national highways, state highways, district roads and roads. The state is served by 2,01,484.94 km (surfaced

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plus unsurfaced) of roads, excluding national highways, maintained by PWD, Municipalities and Municipal Corporations, Zilla Parishad, and Panchayat Samity and Gram Panchayat (Statistical Handbook West Bengal, 2015). Estimated length of roads of the districts of West Bengal is shown in Table 1.

Table 1: Length of Roads in the Districts of West Bengal (in 2013)

Sr. No.	Districts	Road Length (in Km)
1.	Burdwan	11988.61
2.	Birbhum	11805.94
3.	Bankura	10620.20
4.	Medinipur-East	16056.00
5.	Medinipur-West	27566.00
6.	Howrah	6381.47
7.	Hooghly	10991.69
8.	North 24 Parganas	8910.84
9.	South 24 Parganas	32413.98
10.	Nadia	6460.53
11.	Murshidabad	9801.10
12.	Uttar Dinajpur	6976.19
13.	South Dinajpur	4712.34
14.	Malda	7675.78
15.	Jalpaiguri	7096.00
16.	Darjeeling	4502.93
17.	Coochbehar	8434.21
18.	Puruliya	7090.13

Source: Statistical Handbook West Bengal, 2015

The road densities in the districts of West Bengal as well as in the state of West Bengal as a whole are shown in Table 2. The road density per 100 sq. km in the state as a whole was 222.82. In respect of this density measure Howrah district was in first position followed by Hooghly district and Medinipur-East district. In this measure the worst position was of Puruliya district and the next worst position was of Darjeeling district. The road densities per 100 sq. km in the districts of Medinipur –West, North Dinajpur, North 24 Parganas, South Dinajpur, Malda, Murshidabad, Jalpaiguri, Darjeeling, Burdwan, Nadia, Bankura and Puruliya were lower than the state average. On the other hand the road densities per 100 sq. km in the districts of Coochbehar, Birbhum, South 24 Parganas, Howrah and Medinipur –East were higher than the state average.

The road density per 1000 population in the state of West Bengal was 2.30. Medinipur-West district was in the 1st position followed by South 24 Parganas district in the 2nd position in respect of this measure of road density. North 24 Parganas district was in the worst position and the next worst district was Nadia in this density measure. The road densities per 1000 population in the districts of Hooghly, Malda, Jalpaiguri, Burdwan, Murshidabad,

Table 2 : Road Densities of the Districts of West Bengal

Districts	R_A	Rank of R_A	R_P	Rank of R_P	R_V	Rank of R_V
Burdwan	170.39	14	1.55	14	4.53	12
Birbhum	259.76	5	3.37	3	4.77	9
Bankura	154.32	16	2.95	6	2.77	17
Medinipur-East	339.02	3	3.15	4	5.31	8
Medinipur-West	222.62	7	4.64	1	3.16	15
Howrah	435.00	1	1.32	16	7.52	3
Hooghly	349.05	2	1.99	11	5.57	6
North 24 Parganas	217.66	9	0.88	18	5.38	7
South 24 Parganas	325.44	4	3.98	2	14.54	1
Nadia	164.52	15	1.25	17	4.63	11
Murshidabad	184.09	12	1.38	15	4.33	13
Uttar Dinajpur	222.17	8	2.32	10	4.64	10
South Dinajpur	212.36	10	2.82	7	2.88	16
Malda	205.62	11	1.92	12	4.23	14
Jalpaiguri	170.99	13	1.83	13	9.17	2
Darjeeling	143.57	17	2.44	8	6.26	5
Coochbehar	249.02	6	2.99	5	6.92	4
Puruliya	113.28	18	2.42	9	2.62	18
	222.82		2.30		4.81	

Source: Calculated by researcher from the collected data from Statistical Handbook, 2015, and Census of West Bengal, 2011

Howrah, Nadia and North 24 Parganas were lower than the state average. On the other hand the road densities per 1000 population in the districts of North Dinajpur, Puruliya, Darjeeling, South Dinajpur, Bankura, Coochbehar, Medinipur-East, Birbhum, and South 24 Parganas were higher than the state average

For the state of West Bengal the average road density per villages and towns was 4.81. The districts of Birbhum, North Dinajpur, Nadia, Burdwan, Murshidabad, Malda, Medinipur-West, South Dinajpur, Bankura and Puruliya had the road density per villages and towns lower than state average. The districts of Medinipur-East, North 24 Parganas, Hooghly, Darjeeling, Coochbehar, Howrah, Jalpaiguri and South 24 Parganas had the road density per villages and towns higher than that of the state as a whole. South 24 Parganas district was in the 1st position followed by Jalpaiguri district was in the 2nd position in this density measure. In this measure Puruliya district was in the worst position and the next worst district was Bankura.

In terms of conventional density measures, except districts of South 24 Parganas, Birbhum and Medinipur-East road infrastructure in most of the districts was poor in respect of the three conventional density measures; and the condition of Malda district , Murshidabad district and Nadia district seemed to be miserable in respect of the three conventional density measures.

Paradox of Density Measures:

The rank of Medinipur -East district was 3rd in road density per 100 sq. km, 4th in road density per 1000 population, and 8th in road density per villages and towns. The rank of Jalpaiguri district was 13th in road density per 100 sq. km and road density per 1000 population and 2nd in road density per villages and towns. The rank of Howrah district was 1st in road density per 100 sq. km, 16th in road density per 1000 population and 3rd in road density per villages and towns. The rank of Medinipur-West district was 7th in road density per 100 sq. km, 1st in road density per 1000 population and 15th in road density per villages and towns. The rank of Darjeeling district in respect of road density per 100 sq. km was quite bad but in terms of the other two measures of density it is comparatively better. The rank of South Dinajpur district was not so bad in respect of road density per 100 sq. km and that per 1000 population, but was rather poor in respect of road density per villages and towns.

Conclusion:

The question arises – how can one decide about the level of development of road infrastructure in districts by these pure density measures? Which districts will be considered as more developed in road network? Similarly, which districts will be considered as less developed in road network? Hence, it can be concluded that density measures alone cannot describe the nature of development of road infrastructure of less developed economies.

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