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Impact of Density of Rail route on Manufacturing Industries in Maharashtra

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Abstract

Transportation geography also studies different modes of transportation such as road, rail, aviation and boat and their relationship to the people, the environment and areas. Railway is important mode of transportation particularly in developing country. A well developed rail route would be an efficient transportation network to move people and goods from two nodes. Manufacturing industries is an important secondary economic activity of human being, which generate employment and strengthen the economy of any country. Rail transportation play important role in establishment and development of industries. Therefore an attempt is made her to study the impact of density of rail route on number of industries. The Paper is based on the secondary data sources. To examine the impact of density of rail route on number of industries the Pearson's Coefficient of Correlation technique and regression equation has been utilized. The study reveals that the density of rail route is explaining only 26.94 per cent of the total variations in dependent variable (Y) i.e. the number of industries in the State.

Key Wards: Rail route, Industries, Correlation, Regrassion.

Introduction

Human activity involves spatial interaction. Transportation is significant topic in geography because of world's economy depends on transportation. The accessibility study is a part and parcel of networks analysis (hulluar and Sinha, 1974). Accessibility of any region increases with the development of transportation facilities. Transport system is an essential requirement and has an important role in proper development of any city. (Dr. Neelam Pal, 2015). All the places are physically interrelated and areas are functionally integrated by network of transportation and communication. (Dixit, 1984). Transportation and communication are the important aspects of transportation geography. Transportation geography studies transportation and all aspects related to it and geography of area. Transportation geography also studies different modes of transportation such as road, rail, aviation and boat and their relationship to the people, the environment and areas (Hanson, Susaned. And Genvieve Giuliano ed., 2004) Railway is important mode of transportation particularly in developing country. The world's economy began to modernize and develop due to railway and maritime shipping. Transportation geography could possibly look at the link between the presence of a railway route in an area and the percentage of commuters using rail to get to work in developed area. A well

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developed rail route would be an efficient transportation network to move people and goods from two nodes.

Manufacturing industries is an important secondary economic activity of human being, which generate employment and strengthen the economy of any country. Establishment and development of industry depend on several factors such as availability of capital, raw material, skilled labour force, markets and development of transportation. Rail transportation play important role in establishment and development of industries. Therefore it is hypothesed that higher is the density of rail routes more is the number of industries. So an attempt is made her to study the impact of density of rail route on number of industries.

The Study Area

The Mahrashtra lies in Southern part of India, which is a one of the advance States in the country. Absolute location of State is 17^0 45' to 21^0 6' North Latitude and 72^0 16' to 72^0 36' East longitudes. The adjoining States are Gujarat and Madhya Pradesh to it's North, Chhattishgarh to it's East, Andra Pradesh , Karnataka and Goa to it's south, Arebian sea to it's West. The State is divided into 35 districts for administrative purpose. The geographical area of State is 307762 square Kilo meters, and it ranks fifth in area in the country. Out of total geographical area 92 per cent is under cultivation. The Maharashtra state has three brad physical divisions i.e. The Konkan Coast land, Western Ghat and Plateau region. The Kokan coast land is characterized by rocky headlines and small crescent- shaped beaches. It is intersected by creeks and rivers. Western ghat runs a long chain of lofty hills for a stretch of 400 Kilometers. These have average elevation of about 800 to 1300 meters above mean sea level. The Plateau region has average height about 900 meters. The elevation of central portion is in between 300 to 400 meters (Sharama, 2004). The State has wet and warm climate in western part, hot and dry climate in remaining part with an average annual rainfall ranging from 400 to 6000 mm. The population of state is 115997674 in 2011. The occupational structure of state indicates that the agriculture is the main occupation of people in the State.

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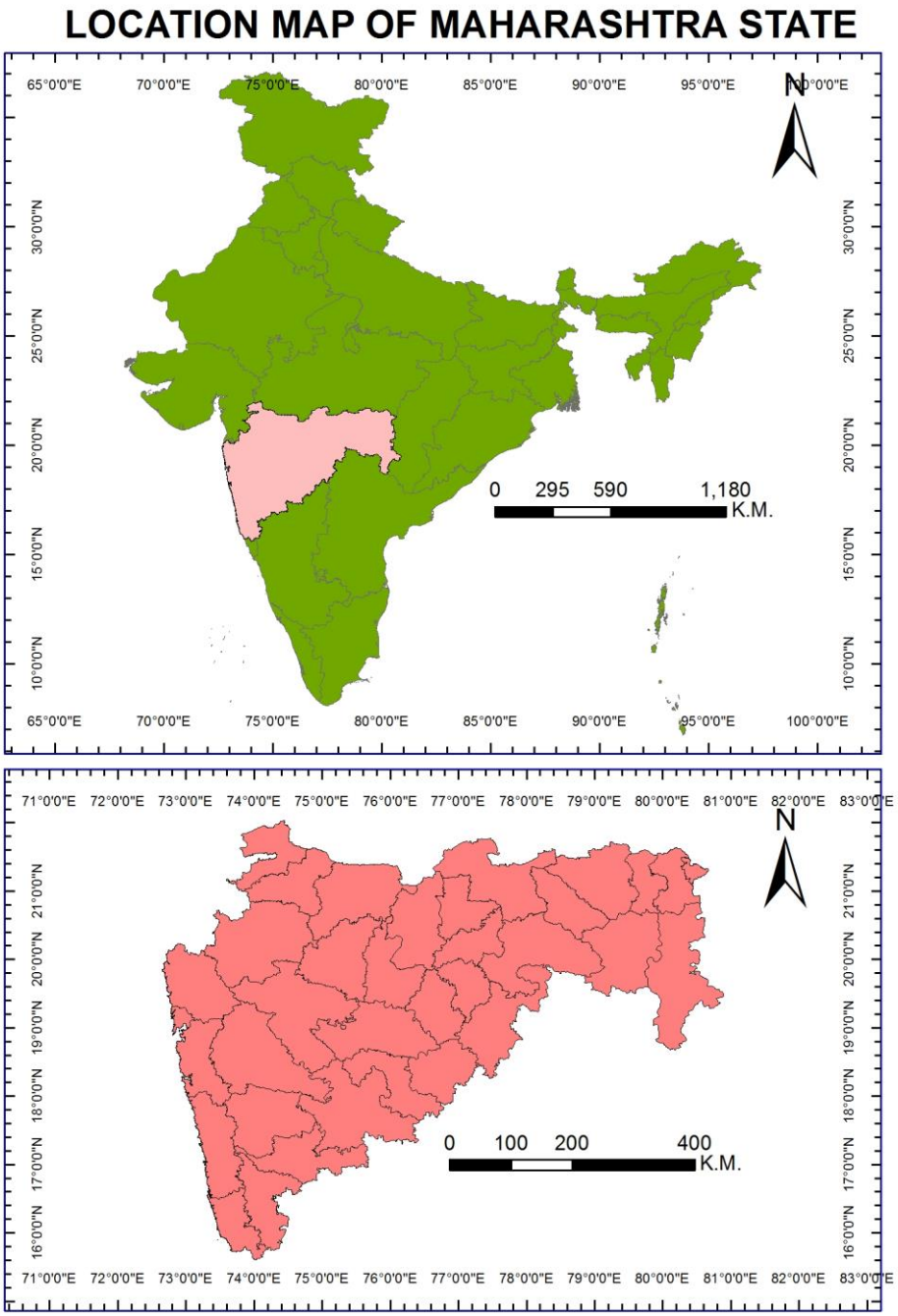

Figure-1

Objectives

The main objectives of this paper are as following.

1) To examine the impact of density of rail route on number of industries.

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2) To estimate the rate of change in number of industries in relation to density of rail route.

Data collection and Methodology

In order to meet these objectives the relevant information and data regarding District wise length of rail route, geographical are and number of registered industries collected and used for the year of 2018 area based on the Secondary Sources. Information and data was collected from Director of Economic & Statitics , Mumbai, Office of railway Division Collected rough data are processed. To examine the impact of density of rail route on number of industries the Pearson's Coefficient of Correlation technique has been utilized. The degree of relationship by considering percentage of density of rail route as an independent variable 'X' and number of industries as dependent variable 'Y' is measured.

The functional form of linear relationship has been measured by using regression equation Y on X i.e. y = a + bx. The rate of change in dependent variable has been estimated with the help of 'b' coefficient, which is the line of best fit. Analysis of the study has been made with help of the statistical techniques and on the basis of this results and conclusion are drawn.

Discussion

Density of rail route and number of registered industries

The table-1 indicates that on an average the State as a whole has 2.6 kilometer length of rail route per 100 Square kilometers in 2018. The table also indicates that density of rail route of districts is ranging in between 0.13 Km and 17.32 Kms. In Maharashtra, there is 11.76 per cent districts those have more than 4 Kms. density of rail route, while 52.94 (18 district) per cent districts have less than 2 Kms density of rail route.

The average number of industries is 1252.46 in the study region during the 2018, but spatial distribution varies from district to district. Number of registered industries is ranging from 45 to 7165 in the 2018. On an average number of industries

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are high of those districts that have high density of rail route. But there are some exceptions that have high density of rail route but number of industries is low.

Table-1 **Density of rail route and number of industries in Maharashtra** (2018)

Sr No	Name of districts	density of railway route per 100Sq. Kms.	number of industries	Name of districts	density of railway route per 100Sq. Kms.	number of industries
1	Ahemadnagar	1.15	1040	Nagpur	4.3	1925
2	Akola	3.55	609	Nanded	1.98	394
3	Amrawati	1.6	410	Nandrbar	1.79	124
4	Aurangabad	1.01	1103	Nashik	1.85	2105
5	Beed	0.45	166	Osmanbad	0.66	45
6	Bhandara	3.59	139	Parbhani	3.97	181
7	Buldhana	1.1	459	Pune	1.99	6029
8	Chandrapur	3.33	298	Raigad	4.18	1654
9	Dhule	1.01	375	Ratnagiri	2.36	373
10	Gadchiroli	0.13	55	Sangli	2.03	898
11	Gondiya	2.6	135	Satara	1.19	619
12	Hingoli	2.39	121	Shindhudurg	1.98	146
13	Jalgaon	2.97	1062	Solapur	2.52	5433
14	Jalna	1.14	300	Thane	3.23	6793
15	Kolhapur	0.46	1970	Wardha	6.29	200
16	Latur	2.07	189	Washim	0.99	155
17	Mumbai & Mumbai suburban	17.32	7165	Yawatmal	1.1	368
				State average	2.60	1265.82

Source: Compiled by author on the basis data of Director of Economic & Statistics Govt. of Maharashtra, Mumbai and Office of Central railway Mumbai.

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In the context of objective following findings have come to light

1) The moderate positive relationship between the density of railway route (X) and number of industries (Y) has been observed in the state. The coefficient of correlation in this regard is at r = + 0 .519057. It indicates that there is a moderate positive relationship between the variables 'X' and 'Y'. The degree of linear association between these two variables obtained by using the coefficient of determination (r^2) is found to be at 0.26942, which reveals that the independent variable (X) i.e, density of rail route is explaining 26.94 per cent of the total variations in dependent variable (Y) i.e. the number of industries in the State. It is a good explanation because 26.94 per cent of the variations in (Y) number of industries to be influenced by the variable (X) i.e. density of rail route and about 74.06 per cent of the variation is left to be influenced by other variables.

2) The functional form of linear relationship of Y on X found to be at Y = 350.8 + 352.4x. The line of best fit is shown in the Figure-2.

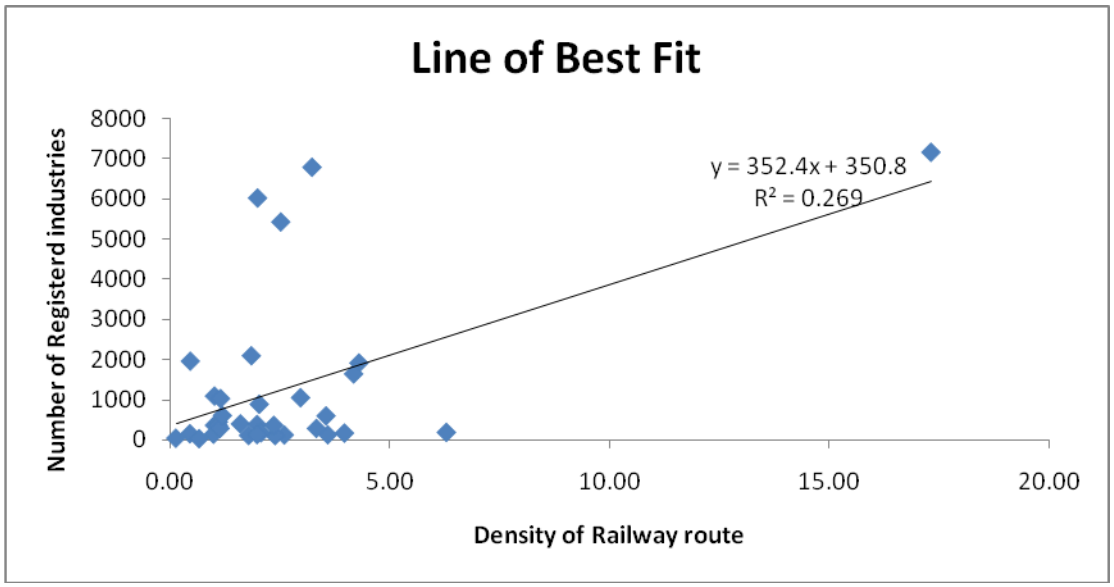

Figure-2

The regression coefficient indicates that increase of one kilometer density of rail route per 100 square kilometers causes for an increase of 352.4 industries of districts of Maharashtra State.

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3) In order to understand the degree of fit of regression equation and the accuracy level of predicted values (y) for the district of Maharashtra State the standard error (SE) of estimate is being done with the equation SE (Y) = SY √1-r2, where SE (Y) is the standard deviation of residuals (Y-y); and 'SY' is the standard deviation of 'Y'.

The confidence interval of the predicted values are worked out at Y = Y ± SE (Y) (The SE (Y) for the present exercise is 1696.42 and SY is the 1984.72). Thus it is assumed that if the values of 'Y' (Y-y) lie within the range of Zero to ± SE, the prediction could be expected to be accurate. In other words, the role of independent variables in explaining the change in dependent variable can be accepted as correct.

Table -2 Residuals from regression of number of industries.

Districts	Y	y	Y-y	Districts	Y	y	Y-y
Ahemadnagar	1040	756.06	283.94	Nagpur	1925	1866.12	58.88
Akola	609	1601.82	-992.82	Nanded	394	1048.55	-654.55
Amrawati	410	914.64	-504.64	Nandrbar	124	980.84	-856.84
Aurangabad	1103	706.72	396.28	Nashik	2105	1002.74	1102.26
Beed	166	509.38	-343.38	Osmanbad	45	583.38	-538.38
Bhandara	139	1615.92	-1476.92	Parbhani	181	1749.83	-1568.83
Buldhana	459	738.44	-279.44	Pune	6029	1052.08	4976.92
Chandrapur	298	1524.29	-1226.29	Raigad	1654	1823.83	-169.83
Dhule	375	706.72	-331.72	Ratnagiri	373	1182.46	-809.46
Gadchiroli	55	396.61	-341.61	Sangli	898	1066.17	-168.17
Gondiya	135	1267.04	-1132.04	Satara	619	770.16	-151.16
Hingoli	121	1193.04	-1072.04	Shindhudurg	146	1048.55	-902.55
Jalgaon	1062	1397.43	-335.43	Solapur	5433	1238.85	4194.15
Jalna	300	752.54	-452.54	Thane	6793	1489.05	5303.95
Kolhapur	1970	512.9	1457.1	Wardha	200	2567.4	-2367.4
Latur	189	1080.27	-891.27	Washim	155	699.68	-544.68
Mumbai & Mumbai suburban	7165	6454.37	710.63	Yawatmal	368	738.44	-370.44

Source: Compiled by author on the basis data of Director of Economic & Statistics Govt. of Maharashtra, Mumbai and Office of Central railway Mumbai.

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In this context it has been observed that the predicted values (given in table- 2) of 30 districts out of 34 districts in the present study lie within the range of ± SE, 01 and within ± SE to ± 2 SE and 03 above± 2 SE.

Now the obvious inference is that the 88.24 per cent of the total number of observation (n is 34) the regression is a good indicator meaning there by that the variations in number of industries is the function of the variations in density of rail route per 100square kilometers. In the case of other districts with residuals between > ± SE to ± 2 SE the situation is different because here the regression is a poor indicator. It clearly indicates that these are the districts whom the influence of variables other than the independent one. The variations in number of industries in district in the latter case may be due to the variation in capital variation in raw material, variation in technical development, variation in market.

Conclusions

This study reveals that there is positive correlation between density of rail route and number of industries in the Maharashtra State. The coefficient of correlation in this regard is at r = + 0 .519057. It indicates that there is a moderate positive relationship between the variables 'X' and 'Y'. The density of rail route is explaining only 26.94 per cent of the total variations in dependent variable (Y) i.e. the number of industries in the State. It is a good explanation because 26.94 per cent of the variations in (Y) number of industries to be influenced by the variable (X) i.e. density of rail route and about 73.06 per cent of the variation is left to be influenced by other variables. This indicates that density of rail route is not found to be more effective than the other variables considering number of industries. It is found that increase of one kilometer density of rail route causes for an increase of 352.4 industries in the districts of Maharashtra. Therefore it is to be stated that the increase in density of rail route is helpful to increase in number of industries. Government should pay attention to increase the rail route.

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