

Infrastructure and Economic Development in Uttarakhand: An Inter District Study

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Abstract: *In this paper an attempt has been made to provide a comparative picture of inter- district infrastructure and economic development in Uttarakhand. It is based on district level secondary data. In order to measure the inter-district disparities in infrastructure and economic development, the indicators have been identified and composite index of Infrastructure and economic development has been formed by using first principal component for two time of periods.*

I. Introduction

Infrastructure is an umbrella term for several activities. These include public works like railways, road, major irrigation work etc., as also public utilities like power telecommunication, tap water supply, sanitation and sewerage etc. Although diverse in their service these activities share amount themselves similar technical features, such as economies of scale and economic features (Agrawal, 2005).¹ Infrastructure promotes economic efficiency of the region by enhancing accessibility to productive resources and physical mobility of raw material, finished product and factor of production (Chaudhari and Dasguta, 1985).² It is well recognized fact that in order to promote substantial growth, a big amount of investment is necessary for developing and building the infrastructure in the country as a whole as well as in the different regions and areas of the country. The existence of infrastructure facilities stimulates more economic growth in agriculture and industries. The absence of adequate infrastructure facilities adversely effects the growth of agriculture and industries (Vasadevarajan, 1980).³ Economic development is the necessity of the economy. The economic development depends on the availability and utilization of various natural, human and derived resources. Better developed socio-economic infrastructure attracts more investment to developed states while backward state face multiple problems, as they are not in a position to provide infrastructural facilities on their own. Due to a lack of invertible funds, they are also fail to attract investment, resulting in less developed states with better developed infrastructural facilities have high degree of economic prosperity. A certain minimum efforts should be taken for the development of infrastructure because it is necessary for the economic development and it spread the effects in all leading sector. The hill economies of Uttarakhand infrastructure development, both in terms of the scale of infrastructure stock and the institutional context have been discussed in this paper. The economic and social development of any state depends mostly on efficient system of transport, road, communication, banking and health services. The physical as well as institutional infrastructure is also necessary for sustainable development of the economy.

II. Objectives

The study related to the infrastructure and economic development in Uttarakhand an inter district study has been taken in the view to achieve the following objectives:-

- To examine the status of infrastructure and economic development in Uttarakhand.
- To examine the inter-state disparities in infrastructure and economic development of Uttarakhand.
- To identify the backward districts so that this could be helpful in formulating regional plan for balance regional development.

a. Methodology

The most crucial task was to analyse the patterns of infrastructure and economic development at the district level, where multi-area unit analysis has been used. For this purpose construction of composite index of development was felt imperative for the analysis of the study. Further, in order to examine the inter-district disparities in the levels of infrastructure and economic development, some simple statistical tools such as coefficient of range, coefficient of variation etc., were also used. The methods which have been generally used for construction of composite index of development by pooling several indicators are those of indexing, ranking and Principal Component Analysis (including Factor Analysis). To determine the weights of selected indicators and to identify basic factors, which are crucial for constructing Principal Component Analysis (PCA) based on statistical techniques termed as Factor Analysis.⁴

DISTRICT-WISE COMPOSIT INDICES OF INFRASTRUCTURE DEVELOPMENT

The district-wise level of infrastructural development have been analysed with the help of composite indices of infrastructural development. These indices have been calculated by taking first principal component matrix derived from the inter-correlation matrix of 19 variables. It includes roads, post offices, irrigation, banking, primary agricultural co-operative societies, education and health. All the indicators have been analysis with relation to per hundred square km. of area and per lakh of population.

The inter-correlation matrices of the selected 19 variables of infrastructural development separately for the years 2000-01 and 2010-11.

The composite index of infrastructure development for each district at two selected point of time was computed. Such an index for 2000-01 was computed using the following equation:

$$ID_1 = (0.779)Z_1 + (-0.175)Z_2 + (0.95)Z_3 + (-0.910)Z_4 + (.0.872)Z_5 + (0.851)Z_6 + (0.218)Z_7 + (0.580)Z_8 + (0.075)Z_9 + (-0.868)Z_{10} + (0.702)Z_{11} + (-0.902)Z_{12} + (6.86)Z_{13} + (-0.683)Z_{14} + (0.121)Z_{15} + (-0.135)Z_{16} + (-0.839)Z_{17} + (0.783)Z_{18} + (0.594)Z_{19} \quad \text{----- (1)}$$

Where ID_1 is composite index of infrastructure development for a district, $Z_1, Z_2, Z_3, \dots, Z_{19}$ are the standardized values of variables and figures in parentheses are factor loading or weights.

The above equation (1) shows that the coefficient of correlation of infrastructural development range between + 0.974 to - 0.936

The composite index of infrastructure development of a district for 2010-11 was prepared by using the following equation:

$$ID_2 = (0.908)Z_1 + (-0.536)Z_2 + (-0.128)Z_3 + (-0.876)Z_4 + (0.889)Z_5 + (0.850)Z_6 + (0.019)Z_7 + (0.458)Z_8 + (0.032)Z_9 + (-0.909)Z_{10} + (0.782)Z_{11} + (-0.946)Z_{12} + (0.537)Z_{13} + (-0.835)Z_{14} + (-0.298)Z_{15} + (0.353)Z_{16} + (-0.919)Z_{17} + (0.760)Z_{18} + (0.407)Z_{19} \quad \text{----- (2)}$$

Where ID_2 is composite index of infrastructure development for a district, $Z_1, Z_2, Z_3, \dots, Z_{19}$ are the standardized values of variables and figures in parentheses are factor loading or weights.

The district-wise indices are shown in Table 1. All the districts have been ranked according to their level of socio-economic infrastructural development during the two selected year i.e. 2000-01 and 2010-11. The rank correlation coefficient is statistically significant at 1 per cent level of significance. Inter temporal analysis of the indices shows in that there is no significant change in the ranking pattern during 2001-11 as rank correlation coefficient is 0.91.

Table 1: District-Wise Indices of Infrastructure Development in Uttarakhand

Sr. No.	Districts	2000-01		2010-11	
		Index	Rank	Index	Rank
1.	Almora	9.59	5	8.67	7
2.	Bageshwar	4.90	9	11.67	5
3.	Chamoli	0.00	13	0.74	12
4.	Champawat	7.40	7	8.46	8
5.	Dehradun	21.47	2	22.59	3
6.	Haridhwar	19.90	3	24.19	1
7.	Nainital	15.95	4	15.46	4
8.	Pithoragarh	0.22	12	0.00	13
9.	Pouri Garhwal	5.24	8	3.71	10
10.	Rudraprayag	3.44	10	3.89	9
11.	Tehri Garwal	8.18	6	8.68	6
12.	Udam Singh Nagar	22.57	1	23.2	2
13.	Uttarkashi	0.823	11	1.01	11
Eigen value		9.21		10.17	
Percentage Variance		8.15		8.40	
Cumulative Variance (%age)		88.54		82.54	

Rank correlation coefficient is 0.91

It is observed from the table that the level of infrastructural development in Uttarakhand during 2000-01, district Udam Singh Nagar was at the top, followed by Dehradun and Haridhwar. While in the same period district Chamoli was at the bottom, followed by Pithoragarh. However during 2010-11, district Haridhwar was at the top, followed by Udam Singh Nagar and Dehradun. During the same period Pithoragarh was at the bottom, followed by Chamoli. The absolute average index for the state as a whole has not changed significantly though it increased marginally by 0.97 points during the same period. The value of coefficient of variance

decreased from 88.54 in 2000-01 to 82.54 in 2010-11. This indicates that the disparities in the level of infrastructure development have decreased during 2000-11.

DISTRICT-WISE COMPOSIT INDICES OF ECONOMIC DEVELOPMENT

To analysed the extent of inter-district disparities in terms of various indicators of economic development. Economic development index is prepared with the help of per capita income, urban population, main worker, agricultural worker, net sown area, area under commercial crops, cropping intensity, irrigation intensity, fertilizer consumption, registered factories, factory workers, small scale industrial units, literacy rate and household with latrine (toilets) facilities. It is now imperative to present an aggregated picture for different districts with the help of composite indices of development. It has been calculated by the technique of 'Frist principal Component Analysis'. The inter-correlation matrices of the selected 20 variables of economic development for the years 2000-01 and 2010-11.

The composite index of economic development for each district at two selected point of time was computed. Such an index for 2000-01 was computed using the following equation:

$$ED_1 = (0.921)Z_1 + (0.861)Z_2 + (-0.610)Z_3 + (-0.793)Z_4 + (0.821)Z_5 + (0.929)Z_6 + (-0.203)Z_7 + (-0.607)Z_8 + (0.890)Z_9 + (0.955)Z_{10} + (0.882)Z_{11} + (0.965)Z_{12} + (0.963)Z_{13} + (-0.089)Z_{14} + (0.289)Z_{15} + (-0.265)Z_{16} + (0.068)Z_{17} + (-0.088)Z_{18} + (-0.785)Z_{19} + (0.878)Z_{20} \quad \text{----- (1)}$$

Where ED_1 is composite index of economic development for a district, $Z_1, Z_2, Z_3, \dots, Z_{20}$ are the standardized values of variables and figures in parentheses are factor loading or weights.

The above equation (1) shows that the coefficient of correlation of economic development range between + 0.92 to -0.87.

The composite index of economic development of a district for 2010-11 was prepared by using the following equation:

$$ED_2 = (0.925)Z_1 + (0.893)Z_2 + (-0.367)Z_3 + (-0.871)Z_4 + (-0.178)Z_5 + (0.818)Z_6 + (-0.073)Z_7 + (-0.419)Z_8 + (0.647)Z_9 + (0.887)Z_{10} + (0.931)Z_{11} + (0.714)Z_{12} + (0.699)Z_{13} + (-0.318)Z_{14} + (0.480)Z_{15} + (-0.254)Z_{16} + (0.119)Z_{17} + (-0.509)Z_{18} + (-0.802)Z_{19} + (0.763)Z_{20} \quad \text{----- (2)}$$

Where ED_2 is composite index of economic development for a district, $Z_1, Z_2, Z_3, \dots, Z_{20}$ are the standardized values of variables and figures in parentheses are factor loading or weights.

Table 2: District-wise Indices of Economic Development in Uttarakhand

Sr. No.	Districts	2000-01		2010-11	
		Index	Rank	Index	Rank
1.	Almora	1.66	10	0.94	11
2.	Bageshwar	1.33	12	0.79	12
3.	Chamoli	3.57	9	3.59	8
4.	Champawat	7.07	5	4.19	6
5.	Dehradun	22.28	3	20.34	3
6.	Haridhwar	29.04	1	22.35	2
7.	Nainital	16.63	4	12.10	4
8.	Pithorgarh	4.83	8	3.39	10
9.	Pouri Garhwal	5.81	6	9.59	5
10.	Rudraprayag	0.00	13	0.00	13
11.	Tehri Garwal	4.99	7	4.10	7
12.	Udam Nagar Singh	27.79	2	22.50	1
13.	Uttarkashi	1.59	11	3.27	9
Mean		9.74		8.24	
S.D.		9.76		9.79	
C.V.		100.21		118.41	

Rank correlation coefficient is 0.86

The district-wise indices are shown in Table 2. All the districts have been ranked according to their level of socio-economic infrastructural development during the two selected year i.e. 2000-01 and 2010-11. The

rank correlation coefficient was statistically significant at 1 per cent level of significance. Inter temporal analysis of the indices shows in that there is no significant change in the ranking pattern during 2001-11 as rank correlation coefficient is 0.86.

It is observed from the Table 2 that level of economic development in district Haridhwar was at the top, followed by Udam Singh Nagar and Dehradun in 2000-01. On the other hand, district Rudraprayag was at the bottom, followed by Bageshwar. The comparative levels of economic development shows that district Udam Singh Nagar was ranked at the top, followed by Haridhwar and Dehradun in 2010-11. Again district Rudraprayag falls at the bottom, followed by Bageshwar. The absolute average index for the state as a whole has changed significantly as it decreased by 1.50 points during 2001-11. The value of coefficient of variance increased from 100.208 in 2000-01 to 118.42 in the year 2010-11. This indicates that the disparities in the level of economic development have increased 2000-11.

In case of Uttarakhand the comparative assessment between infrastructure development and economic development during the reference period is also presented graphically in figure VI.(iii) and VI.(iv)

Figure 1: Comparative Assessment between Infrastructure Development and Economic Development in Uttarakhand (2000-01)

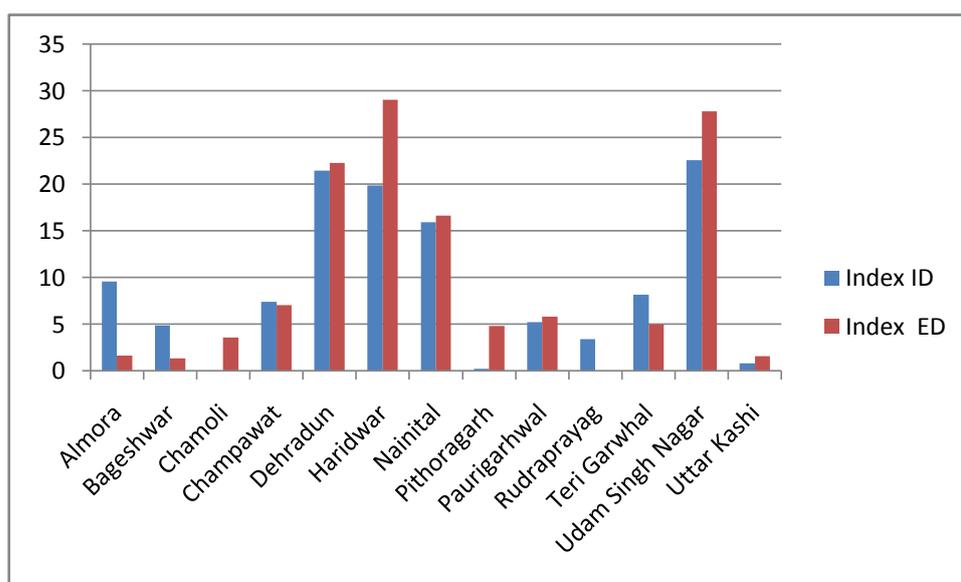
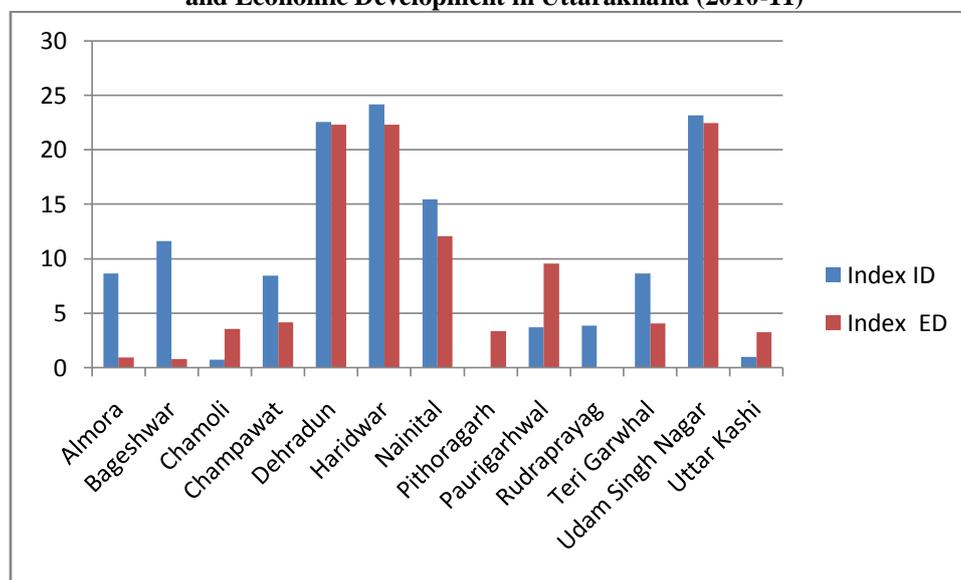


Figure 2: Comparative Assessment between Infrastructure Development and Economic Development in Uttarakhand (2010-11)



For the topographical condition Chamoli district is having lowest value of composite indices of infrastructural development and followed by Pithoragarh and Uttarkashi. Regarding composite index of economic development during initial period of study Haridhwar district of Uttarakhand achieved highest value (29.03) of the index of economic development followed by infrastructurally developed districts. The main region of achievement of higher economic development in Haridhwar district is religiously famous for religious purposes. Consequently the people of the region were getting good income sources and hence achieving better economic life. Other plain areas of the state were also getting good return from their resources and programmes. Ruderprayag district of Uttarakhand has the lowest value of economic development in spite of 3.44 of infrastructure development index during the same period and reason may be thinly populated. Again in 2010-11 Pithoragarh is recorded lowest indices value while the districts of plain area of state have more than 22 point. These districts are Udam Singh Nagar, Haridhwar and Dehradun. In the higher ranking the reason is same as was in 2000-01. Regarding composite index the only district Ruderprayag in Uttarakhand have not achieved a single point during the decade.

III. Results And Conclusions

The analysis in the study shows that there is direct relationship between infrastructure and economic development and it can be concluded that high (low) level of infrastructure is accompanied by high (low) level of economic development. The fact that infrastructure development is an important factor of economic development is very much evident from the study. Haridhwar, Udam Singh Nagar, Dehradun, and Nainital have occupied the top position in term of both infrastructure development and economic development, Pithoragarh followed by Chamoli, Uttarkashi, Ruderprayag occupied the bottom position for the reference period. The analysis of the study shows that in Uttarakhand the electricity sector is leading in achieving highest growth as compare to other sectors like banking, road and education. Similarly postal sector, irrigation, co-operative movements are showing negative growth. Being hilly state Uttarakhand is showing very good progress in the development of electricity sector particularly hydro-electricity generation. Education contributes directly to the human skill and quality of life. The state government is progressing towards provision of education to all. Consequently state capital Dehradun is required an important centre of education in North India. Uttarakhand has some of the best boarding school in the country especially in area around Massorie, Dehradun and Nainital. Fortunately Dehradun become national level institution particularly in foresting sector. Due to infrastructure development the state economy has grown rapidly. The GSDP at constant prices and current prices and per capita income in has been increased manifold during the reference period. The state of Uttarakhand after separation from Uttar Pradesh, has recorded tremendous growth in GSDP and per capita income during the last decade and the state of Uttarakhand has good potential of development in various sectors also.

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Dr. Sunil Dutt. "Infrastructure and Economic Development in Uttarakhand: An Inter District Study" *IOSR Journal of Economics and Finance (IOSR-JEF)*, vol. 11, no. 4, 2020, pp. 76-80.