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Infrastructure Disparity In Odisha: An Inter-District Analysis

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Abstract

The present study attempts to analyse inter-regional disparity in infrastructure in the state of Odisha. Three separate indices have been developed for different categories of infrastructure: physical, social and financial - with the help of the Principal Component Analysis (PCA) before unifying them to a single index known as the Composite Infrastructure Index (CII). The study finds the existence of vertical inequality in the spread of different categories of infrastructure in the state. Disparity is sharp in the case of financial infrastructure. The study attributes underdevelopment of Kalahandi- Balangir -Koraput (KBK) belt and some of districts of western- central Odisha to the underdevelopment of infrastructure. The analysis concludes that the formation of special plans such as the KBK plan and the formation of Western Odisha Development Council (WODC) by the government are good steps.

Keywords: Infrastructure index, Disparity, Principal component analysis, Odisha

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Introduction

Infrastructure is essential for the development of any economy. Recognizing their importance for economic development economists have referred these as "Social Overhead Capital" (Hirschman, 1985). Depending on their nature, infrastructure can be categorized as "Physical Infrastructure", "Economic Infrastructure" and "Social Infrastructure". The first one includes Transport and Communication, Irrigation facility, Power Plants. The second one includes Banking and Insurance etc. Social infrastructure includes Hospitals, Schools and Colleges etc. Infrastructure encompasses activities that share technical features (such as economies of scale) and economic features (such as spillovers) from users to non-users (WDR, 1994). Regional disparities in economic development can be explained in terms of the varying levels of infrastructural facilities available in different regions. Improvement in infrastructural services is essential for enhancing efficacy of the productive process and for raising productivity of any economic entity.

The linkage between infrastructure and economic growth is not one-dimensional, rather it is bi directional and complex. Infrastructure promotes growth and economic growth promotes infrastructural development.

Review of literature

Chotia and Rao (2015) investigates the interlinkages between regional infrastructure disparities, economic growth, and poverty in the 21 major Indian States. To measure regional disparities the study calculated Composite Infrastructure Index (CII) for each Indian state using the Principal Component Analysis technique (PCA). To analyze the regional disparities between states in terms of infrastructure, states are ranked based on the calculated CII. The study found clear evidence of dispersion or disparities between Indian states with respect to the CII, calculated from the major sectors of health, education, transport, agriculture, and energy. The study also found that composite infrastructural growth and economic development go hand in hand.

Kaur and Kaur (2018) studied the role of social and economic infrastructure in economic development of Punjab from 2001-2016. The paper uses multiple regression model for finding the impact of social infrastructure viz. education & health and economic infrastructure on the NSDP per capita. To calculate education, health and economic infrastructure index the study used principal component analysis (PCA). The study found that there exists a significant impact of the health infrastructure index and the economic infrastructure index on economic development; however insignificant impact of education infrastructure index on the economic development of Punjab. The study concluded that that economic infrastructure has shown better growth as compare to social infrastructure.

Patra and Acharya (2011) examine the spatial disparities in infrastructural facilities across 16 major states of India and analyses its impact on regional economic growth. The study used simple multivariate method to compute a composite Infrastructure Development Index (IDI) by combining various infrastructural services available at the state level. The effect of different infrastructural variables on economic growth is observed using correlation matrix and path regression analysis. Empirical evidence suggests that there is a positive

relationship between Infrastructure Development Index & Per Capita Net State Domestic Product and negative relationship between Infrastructure Development Index & Poverty.

Ghosh and De (2004) tried to find out the role played by economic and social infrastructure facilities in economic development across Indian states over the last quarter century. Infrastructure services have been indexed with the help of principal component analysis. The study found there is the regional disparities in infrastructure development. The findings are statistically very significant to warrant new regional policies under the overall framework of globalization in order to remove rising regional disparities in both infrastructure and income.

Majumder (2004) examines the relationship between infrastructural availability and development using indices. The study prepared composite indices of infrastructure and indices of development viz. physical, financial and social at the district level by using modified principal component analysis (MOPCA). Significant association between infrastructural and development levels of regions is observed, the findings suggest that identification of specific requirements of different regions, benefit-cost analysis, followed by infrastructural expansion are major planks of balanced regional development.

The present study attempts to analyses the disparity in infrastructure in the state of Odisha. This eastern Indian state is considered to be one of the most backward states of India having a lot of potential. Measuring infrastructure development involves several problems like selection of factors, assignment of weights, specifying time-dimensions, and problem of aggregation. These issues have been addressed in this paper. This study also has prepared composite indices of different categories of infrastructure.

Objectives

The present paper focuses on the following objectives:

1. To analyse the inter district infrastructure disparity by using Composite Infrastructure Index (CII) of Odisha.
2. To analyse the interlinkage among the different types of infrastructure indices.

Database and Methodology

This is a cross-section study based on secondary data for the year 2017-18. Data has been collected from different published sources like, District Profile of Odisha 2018, District Statistical Handbooks 2018(Directorate of Economics and Statistics, Government of Odisha). Agricultural Statistics of Odisha, 2018-19 (Directorate of Agriculture and Food Production, GoO) of all the districts of Odisha for these years.

Categorization of infrastructure

Infrastructure has been categorized into three broad groups, viz. Physical, Social and Financial infrastructures. The details of finally selected items in each category of infrastructure have been presented in Table 1.

Table 1: Categorization of Infrastructure

Categories of infrastructure	Variables Taken	Abbreviation of variables
Physical	Percentage of gross irrigated area to gross cropped area Percentage of households with electricity connection Length of road per 1000sq km Length of railway route per 1000sq km Percentage of household with tele communication	PGIA PHHELCT ROLPA RALPA PHWTC
Social	Literacy Rate(percentage) Beds Available in Allopathic Hospital Hospital and Dispensaries per 1000sq km % of household having improved drinking water source Pupil teacher ratio in secondary school	LR BDHOSP HDPA PHIDW PTRS
Financial	No of post office per lakh population Bank branches per lakh population Credit deposit ratio (%) Bank branches per 1000 sq km	POPP BBPP CDR BBPA
Weighing method: Principal Component Analysis (PCA)		

Normalisation

Since the units of measurement of the selected factors are different, they may result in the problems of aggregation. So, the items have been normalized. To standardize the indicators min–max normalization technique has been used to normalize the variables, and the normalized values for all variables come up within a limit of 0–1. Let X_{ij} represent the size or value of the i_{th} development indicator in the j_{th} district. The following formula has been applied to normalize values of i_{th} variable for j_{th} district:

i= 1,2, 3,……..,,m and

j = 1, 2,, ……n

$$NV_{ij} = \frac{Xi - Min\ Xij}{Max\ Xij - Min\ Xij}$$

Preparation of Composite Indices

The study prepared three composite indices such as Physical Infrastructure Index (PII), Social Infrastructure Index (SII), and Financial Infrastructure Index (FII) encompassing all the desired factors of infrastructure in the respective category and then combined them into a single composite index for infrastructure, known as composite Infrastructure Index (CII).

Contrary to the conventional methods of indexing by subjective weight assignment, the present study has employed the Principal Component Analysis (PCA) which is one of the approaches of factor analysis. Factor analysis attempts to identify the underlying variables or factors, which explain the pattern of correlations within

a set of observed variables. Factor analysis is often used in data reduction by identifying a small number of factors, which explains most of the variance observed in a much larger number of manifest variables. In the PCA approach, the first principal component is that linear combination of weighted items, which explain the maximum variance across the observations at a point in time. Here the sole objective of the weighing mechanism is to explain the maximum variance for all individual indicators taken together across the districts at a point in time. The rationale for using the PCA is to reach an aggregate representation from various individual indicators. The infrastructure index is a linear combination of the unit free values of the individual factors such that

$$Index_i = \Sigma W_k X_{ki}$$

where Indexi = index of the ith district, W_k = weight of the kth factor and X_{ki} = unit free value of the kth factor for the ith district.

Results and Discussion

The present study has used both the Eigen value and the Bartlett Criterion for selection of principal components. It is observed that the first principal component explains around 58%, 43% and 53% of variances in the chosen normalised variables of physical, social and financial categories of infrastructure. The first principal component satisfies the Bartlett‟s criterion in all the three cases. Accordingly, the indices are constructed as follows:

Physical Infrastructure Index (PII)

$$PII = 0.724\ PGIA + 0.760\ PHHELCT + 0.810\ ROLPA + 0.527\ RALPA + 0.933 PHWTC$$

It is observed that tele communication (PHWTC) has got the maximum weight followed by road length (ROLPA) and percentage of household having electricity (PHHELCT). However, percentage of gross irrigated area to gross cropped area (PGIA) and railway length (RALPA) has got minimum weight. An analysis of the simple pair-wise correlation between the above factors reveals that highest weighted variable i.e. percentage of household with tele communication (PHWTC) is highly correlated to other three variable excluding the lowest weight variable i.e railway length (RALPA). This may be a reason for the inconsequential weight of RALPA. But all the variables are positively corelated to each other.

Table 2: Correlation Table (Physical Infrastructure)

	PGIA	PHHELCT	ROLPA	RALPA	PHWTC
PGIA	1.000	0.443	0.605	0.031	0.575
PHHELCT	0.443	1.000	0.342	0.342	0.718
ROLPA	0.605	0.342	1.000	0.355	0.706
RALPA	0.031	0.342	0.355	1.000	0.466
PHWTC	0.575	0.718	0.706	0.466	1.000

Social Infrastructure Index (SII)

SII= *0.889 LR+ BDHOSP + 0.860 HDPA + 0.280 PHIDW + (-)0.726 PTR*

It is observable that literacy rate (LR), assumes the highest weight in the social infrastructure category followed by Hospital and Dispensaries per 1000sq km (HDPA) and percentage of household having improved drinking water source (PHIDW). However, Beds Available in Allopathic Hospital (BDHOSP), the representative of health infrastructure in the study, has surprisingly been assigned zero weight. It is evident from Table 3 that BDHOSP is negatively correlated to the other items of social infrastructure except literacy rate. An analysis of the simple pair-wise correlation between the above factors reveals that Pupil teacher ratio in secondary school (PTR) is negatively correlated to the other three factors. This may be a reason for the unexpected sign as well as inconsequential weight of PTR.

Table 3: Correlation Table (Social Infrastructure)

	LR	BDHOSP	HDPA	HIDW	PTR
LR	1.000	0.106	.670	0.113	-0.551
BDHOSP	0.106	1.000	-.140	-0.225	-0.161
HDPA	.670	0.140	1.000	0.316	-0.407
HIDW	0.113	-0.225	.316	1.000	0.066
PTR	-0.551	-0.161	-.407	0.066	1.000

Financial Infrastructure Index (FII)

FII = 0*.854 BBPP+ 0.371 CDR+0.656 POPP+0.904 BBPA*

Bank branches per 1000 sq km (BBPA) has received the highest weight, which is closely followed by Bank branches per lakh population (BBPP). Credit deposit ratio (CDR) has got the lowest weight (0.371). It is seen in Table 4 that there is significant correlation between (BBPA) and BBPP but CDR is almost uncorrelated.

Table 4: Correlation Table (Financial Infrastructure)

	BBPP	CDR	POPP	BBPA
BBPP	1.000	0.043	0.317	0.806
CDR	0.043	1.000	0.316	0.187
POPP	.317	0.316	1.000	0.380
BBPA	0.806	0.187	.380	1.000

Composite Infrastructure Index (CII)

The Composite Infrastructure Index (CII) is the composite index of PII, SII and FII. This indexing has been done by using the PCA approach too. The similarities of the factors have been tested by the test of communalities. Since the first component explains around 83per cent of total variance of the factors and the Eigen values of the other two components are less than unity, we have extracted the first component only.

CII = *0.951 PII + 0.945 SII + 0.837 FII*

It is notable here that out of the three separate indices, PII has got the highest weight followed by SII and FII. All the three indices have been assigned positive weights in the making of CII. This is in line with expectations.

Disparity in Infrastructure Development in Odisha

The study makes use of coefficient of variation (CV) as the criteria to understand the spread in different aspects of rural infrastructure. The districts have been ranked and categorised on the basis of CII.

Disparity in Physical Infrastructure

As per the level of development of physical infrastructure, the districts have been categorised as high physical infrastructure (High PII), medium physical infrastructure (Medium PII) and low physical infrastructure (Low PII) districts. All the thirty districts of the state have been vertically divided among the above three categories; comprising 10 districts each. It is found that Jagatsingpur is way ahead of the other districts of the state in physical infrastructure (Table 5). The worst performer district is Kandhamal in terms physical infrastructure development.

The study finds that most of the erstwhile undivided coastal districts of the north-eastern Odisha occupy relatively higher positions in PII in comparison to their south-western counterparts mostly inhabited by tribal people. Jharsuguda is the only district from western Odisha, which could occupy a position, that too, the last position among the High PII districts category. Otherwise, the districts in the Middle PII group are located in the Central and in the Western Odisha.

Table 5. Physical Infrastructure Index: District-wise Classification

High PII			Medium PII			Low PII		
Rank	District	PII	Rank	District	PII	Rank	District	PII
1	Jagatsingpur	3.294	11	Subarnapur	1.755	21	Keonjhar	1.072
2	Puri	2.749	12	Bargarh	1.584	22	Rayagada	1.013
3	Khurda	2.610	13	Sambalpur	1.530	23	Gajapati	0.960
4	Bhadrak	2.555	14	Dhenkanal	1.486	24	Malkangiri	0.944
5	Balasore	2.517	15	Nayagarh	1.453	25	Nuapada	0.928
6	Cuttack	2.475	16	Sundargarh	1.444	26	Koraput	0.850
7	Jajpur	2.449	17	Angul	1.306	27	Nabarangpur	0.680
8	Kendrapada	2.250	18	Balangir	1.202	28	Deogarh	0.671
9	Ganjam	2.040	19	Boudh	1.174	29	Kalahandi	0.541
10	Jharsuguda	1.791	20	Mayurbhanja	1.136	30	Kandhamal	0.316

There is vertical inequality in physical infrastructure among the coastal, western and southern regions of the state. Apart from Sonepur and Balangir , all other KBK (undivided Kalahandi, Rayagada and Koraput) districts are clubbed in the Low PII category. The tribal dominated Sundargarh district seen in medium PII category having 16 rank and Deogarh of the undivided Sambalpur district are also seen in the Low PII club.

The analysis also explores development in the sub-items of physical infrastructure. Given the higher weights of tele connectivity and road length, it is well understood that the districts which fare well in these two infrastructure items are better performer in physical infrastructure development than the other districts of the State (Table 6). The districts categorized as high PII have also with top rank in tele connectivity and road length. Amongst all the districts of the state, the KBK districts are the discriminated lot in physical infrastructure items, especially in road length and tele-connectivity. Almost all the KBK districts have poor electricity infrastructure too. While Sonepur has got the 8th position, Balangir has got distant 29th position in the development of irrigation infrastructure. The above analysis, therefore, clearly indicates that there is both inter-regional and intra-regional diversity in the development of physical infrastructure in the state.

Table 6: District-Wise Ranks in Physical Infrastructure Items

District	PGIA	PHHELCT	ROLPA	RALPA	PHWTC	PII
Angul	20	15	29	13	15	**17**
Balasore	6	11	7	5	9	**5**
Bargarh	2	20	20	22	17	**12**
Bhadrak	5	16	2	15	2	**4**
Balangir	29	21	9	6	22	**18**
Boudh	7	17	22	25	23	**19**
Cuttack	4	8	12	11	6	**6**
Deogarh	23	23	15	26	21	**28**
Dhenkanal	13	12	21	14	18	**14**
Gajapati	27	13	6	18	27	**23**
Ganjam	10	9	14	21	5	**9**
Jagatsingpur	3	5	1	2	1	**1**
Jajpur	14	4	4	3	7	**7**
Jharsuguda	18	7	24	4	10	**10**
Kalahandi	19	30	19	20	25	**29**
Kandhamal	30	25	26	27	30	**30**
Kendrapada	9	6	10	28	4	**8**
Keonjhar	16	27	25	12	19	**21**
Khurda	22	1	5	1	3	**3**
Koraput	17	26	23	9	29	**26**
Malkangiri	12	18	30	29	26	**24**
Mayurbhanja	15	28	13	16	16	**20**
Nabarangpur	24	29	11	30	24	**27**
Nayagargh	26	3	16	24	11	**15**
Nuapada	25	22	28	23	20	**25**
Puri	1	2	8	17	8	**2**
Rayagada	28	24	18	7	28	**22**
Sambalpur	11	14	27	10	13	**13**
Subarnapur	8	10	3	19	14	**11**
Sundargarh	21	19	17	8	12	**16**

Disparity in Social Infrastructure

The classification of districts in social infrastructure has been presented in Table 7. Here too we see the undivided coastal districts (except for Jharsuguda) are in High SII category whereas the undivided KBK districts with exceptions of Subarnapur come in Low SII category. Most of the districts of central Odisha are in the Medium SI category. Some Western Odisha districts maintain their positions in the middle. The rank of SII is the highest in Jagatsingpur and the lowest in Nabarangpur. The findings here are similar, with one or two exceptions, to the finding in case of physical infrastructure. Ganjam of the coastal Odisha has marginally slipped to the medium SII category. Nayagargh have swapped their places from low medium SI category to high SII category.

Table 7: Social Infrastructure Index: District-Wise Division

High SII			Medium SII			Low SII		
Rank	District	SII	Rank	District	SII	Rank	District	SII
1	Jagatsingpur	1.939	11	Bargarh	0.953	21	Balangir	0.467
2	Cuttack	1.632	12	Subarnapur	0.872	22	Kalahandi	0.317
3	Khurda	1.620	13	Keonjhar	0.872	23	Kandhamal	0.245
4	Kendrapada	1.591	14	Ganjam	0.792	24	Nuapada	0.182
5	Bhadrak	1.536	15	Sundargarh	0.778	25	Boudh	0.116
6	Jajpur	1.516	16	Dhenkanal	0.772	26	Koraput	0.041
7	Puri	1.467	17	Sambalpur	0.768	27	Rayagada	0.037
8	Balasore	1.466	18	Angul	0.674	28	Gajapati	0.015
9	Jharsuguda	1.080	19	Mayurbhanja	0.619	29	Malkangiri	0.014
10	Nayagargh	1.030	20	Deogarh	0.575	30	Nabarangpur	0.013

Some unusual revelations are brought about when we go for an item-wise analysis in social infrastructure. The districts, which are ranked higher in the health infrastructure, have got lower ranks in overall social infrastructure. This is due to the negative weight of PTR, the selected parameter of education infrastructure.

A general impression is that the spread of health infrastructure is better in some of the coastal districts such as Cuttack, Khurda and Ganjam in comparison to that of the western and southern districts of the state. The study observes that BDHOSP is lower in some coastal districts than the KBK (Kandhamala and Malkangiri) districts. The population factor explains this anomalous observation. The KBK districts and some of the districts of Central Odisha are sparsely populated. This makes BDHOSP higher in these two districts in comparison to that of the coastal districts. Similarly, in PHIDW three KBK districts (Nabarangpur, Nuapada and Koraput) are in top rank.

It is clear from Table 8 that the districts, which are in better positions in LR and HDPA, are also better ranked in social infrastructure. This is due to the highest weight assigned to these factors, which indicates that literacy rate and no of hospital and dispensaries is a positive and strong factor in social infrastructure in Odisha. Once again it is seen that most of the coastal districts are in higher positions in relation to HDPA whereas most of the KBK districts have got the bottom ranks. Here we notice an inter-regional disparity is more severe. Almost all the KBK districts (except Subarnapur) are in bottom positions, whereas almost all the coastal districts except Jharsuguda have occupied top slots in SII. Therefore, there exists inequality in the distribution of social infrastructure among and across the three major regions of the state.

Table 8: District-Wise Ranking in Social Infrastructure Items

District	LR	BDHOSP	HDPA	PHIDW	PTR	SII
Angul	12	22	24	27	15	**18**
Balasore	9	23	5	4	20	**8**
Bargarh	14	30	18	7	23	**11**
Bhadrak	6	26	3	1	10	**5**
Balangir	21	21	16	18	4	**21**
Boudh	18	17	29	10	1	**25**
Cuttack	3	2	6	14	29	**2**
Deogarh	17	14	30	21	19	**20**
Dhenkanal	11	9	14	30	16	**16**
Gajapati	26	7	27	28	13	**28**
Ganjam	19	5	9	15	6	**14**
Jagatsingpur	2	28	2	5	30	**1**
Jajpur	8	29	4	19	24	**6**
Jharsuguda	10	10	15	13	25	**9**
Kalahandi	24	13	20	11	7	**22**
Kandhamal	22	4	22	29	14	**23**
Kendrapada	4	27	7	2	27	**4**
Keonjhar	20	20	12	22	28	**13**
Khurda	1	11	1	24	11	**3**
Koraput	28	12	23	23	8	**26**
Malkangiri	29	6	28	16	12	**29**
Mayurbhanja	23	19	13	25	18	**19**
Nabarangpur	30	25	17	3	2	**30**
Nayagargh	7	3	11	26	22	**10**
Nuapada	25	18	26	8	5	**24**
Puri	5	8	8	9	26	**7**
Rayagada	27	24	21	12	3	**27**
Sambalpur	13	1	25	20	21	**17**
Subarnapur	15	16	10	6	9	**12**
Sundargarh	16	15	19	17	17	**15**

Disparity in Financial Infrastructure

The districts too have been divided into three categories such as high financial infrastructure (High FII), medium financial infrastructure (Medium FII) and low financial infrastructure (Low FII) districts. The district-wise ranking has been presented in Table 9.

Table 9: Financial Infrastructure Development Index: District-Wise Division

	High FII			Medium FII			Low FII	
Rank	District	FII	Rank	District	FII	Rank	District	FII
1	Khurda	1.974	11	Balasore	0.413	21	Kendrapada	0.233
2	Cuttack	0.925	12	Ganjam	0.392	22	Nuapada	0.205
3	Jajpur	0.838	13	Nayagargh	0.379	23	Boudh	0.200
4	Jharsuguda	0.837	14	Angul	0.358	24	Rayagada	0.152
5	Subarnapur	0.656	15	Sambalpur	0.355	25	Nabarangpur	0.151
6	Jagatsingpur	0.648	16	Sundargarh	0.348	26	Keonjhar	0.081
7	Puri	0.575	17	Balangir	0.336	27	Malkangiri	0.065
8	Bargarh	0.545	18	Koraput	0.315	28	Mayurbhanja	0.041
9	Bhadrak	0.485	19	Deogarh	0.261	29	Gajapati	0.037
10	Dhenkanal	0.439	20	Kalahandi	0.259	30	Kandhamal	0.029

Here we can see that Cuttack, Khurda, puri and Jagatsingpur, which are ahead in PII and SII, are ahead in FII too. But coastal districts Kendrapara have been placed in the Low FII districts category. On the other hand, tribal dominated Sonepur of the KBK districts; and Bargarh of North-Western Odisha have occupied positions in the High FI districts category.

The distribution of financial infrastructure is not as asymmetric as it is in case of the other two categories of infrastructure. Though the southern districts including the KBK districts are far below their coastal and western counterparts in terms of development of financial infrastructure, yet the spread of FII between coastal and western Odisha is almost evenly balanced.

It is seen that out of the three tribal dominated districts of North Odisha, Mayurbhanj and Keonjhar have been placed in the low FI category, whereas Sundargarh has got a place in the medium FII category. It is noteworthy here that amongst the financial infrastructure items BBPA has been assigned the highest weight, closely followed by BBPP whereas POPP has been assigned the negative weight (Table 10). As regards BBPA, all the coastal districts are well placed whereas all the KBK districts except have been ranked in lower stratum. The districts of Central Odisha have been ranked in middle stratum.

Table 10: District-wise Ranking in Financial Infrastructure Items

District	BBPP	CDR	POPP	BBPA	FII
Angul	6	26	19	14	14
Balasore	17	12	7	5	11
Bargarh	18	2	24	16	8
Bhadrak	22	6	9	7	9
Balangir	23	14	21	18	17
Boudh	16	4	3	22	23
Cuttack	4	15	29	2	2
Deogarh	8	27	18	27	19
Dhenkanal	15	5	11	13	10
Gajapati	19	29	4	25	29
Ganjam	12	22	16	8	12
Jagatsingpur	5	20	15	3	6
Jajpur	13	1	26	4	3
Jharsuguda	2	7	28	10	4
Kalahandi	26	9	13	21	20
Kandhamal	25	21	1	29	30
Kendrapada	27	25	12	9	21
Keonjhar	14	23	5	20	26
Khurda	1	8	30	1	1
Koraput	28	13	27	26	18
Malkangiri	29	28	10	30	27
Mayurbhanja	21	24	2	19	28
Nabarangpur	30	11	23	28	25
Nayagargh	10	10	8	12	13
Nuapada	24	19	20	23	22
Puri	7	18	22	6	7
Rayagada	20	16	6	24	24
Sambalpur	3	30	14	17	15
Subarnapur	9	3	25	11	5
Sundargarh	11	17	17	15	16

The cash deposit ratio (CDR) is another factor in the making of the FII.It is interesting to observe that by Bargarh, Subarnapur, Kalahandi and Nabarangpur have in top category rank on CDR (Table 10). Similar in case of POPP that some KBK districts have in top rank than the costal districts. Here also disparity is more of inter-district type.

Disparity in Overall Infrastructure in Odisha

The positions of different districts regarding infrastructure have been presented in Table 11. It is noticeable that there is vertical division among the three broad regions of the state in terms of infrastructure development. The coastal districts are ahead of their counterparts in the Southern and the Western Odisha.

Table 11: Composite Infrastructure Development Index: District-wise Division

	High CII			Medium CII			Low CII	
Rank	District	CII	Rank	District	CII	Rank	District	CII
1	Khurda	5.666	11	Ganjam	3.017	21	Deogarh	1.399
2	Jagatsingpur	5.507	12	Bargarh	2.863	22	Boudh	1.393
3	Cuttack	4.670	13	Nayagargh	2.673	23	Nuapada	1.226
4	Puri	4.482	14	Dhenkanal	2.510	24	Rayagada	1.125
5	Jajpur	4.462	15	Sambalpur	2.477	25	Koraput	1.111
6	Bhadrak	4.287	16	Sundargarh	2.401	26	Kalahandi	1.031
7	Balasore	4.125	17	Angul	2.178	27	Malkangiri	0.877
8	Kendrapada	3.838	18	Keonjhar	1.911	28	Gajapati	0.837
9	Jharsuguda	3.425	19	Balangir	1.866	29	Nabarangpur	0.755
10	Subarnapur	3.043	20	Mayurbhanja	1.610	30	Kandhamal	0.207

It is noteworthy that Khurda, which entails the state capital Bhubaneswar, is way ahead of the other districts of the state in Composite Infrastructure Index (CII) (Table 11) out of the 30 Odisha districts of Odisha. This is due to better performance of the district in telecommunication, road length and banking infrastructure. Otherwise, all the other districts in the high CII category are from the undivided coastal districts of Odisha except Jharsuguda and Subarnapur. The pace of industrialisation and the rural-urban linkage may perhaps be one of the factors for a relatively higher attainment of these basic infrastructures in Jharsuguda district.

Mostly districts from the Western Odisha, mainly from undivided Balangir and Sambalpur, are in the medium CII category. Similarly, two northern districts Keonjhar and Sundargarh are in medium CII and another northern district Mayurbhanj is the last district of medium CII district. Deogarh is in the first districts of low CII. Though carved out of Sambalpur district, this district lags far behind the other districts of erstwhile Sambalpur. The vertical division between the sibling districts Gajapati (28th rank in CII) and Ganjam (11th rank on CII) is also evident. So, in addition to inter-district variation, the study finds intra-district variations (within the erstwhile undivided districts) in infrastructure in the state. It is observed that all the present districts from undivided Koraput and Kalahandi districts have been categorised in the low CII group and almost all the districts in the low CII category are predominantly inhabited by the tribal people. Therefore, the governmental efforts to focus the Southern and Western Odisha through the KBK and the Western Odisha Council plans are steps in the right direction.

The scatteredness of different categories of infrastructure has been studied with help of Coefficient of Variation (CV) (Table 12).

Table12: Descriptive Statistics

Indices	Mean	Standard Deviation	coefficient of Variation
PII	1.559137	0.759712	48.72645
SII	0.79895	0.589015	73.72363
FII	0.391943	0.415324	105.9653
CII	2.565804	1.508864	58.80668

It is observed that the CV of FII is the highest and it is the lowest for PII among all the indices. So, disparity is more severe in case of financial infrastructure than the other two infrastructure i.e physical infrastructure and social infrastructure.

Relationship between Different Categories of Infrastructure

It is normally expected that there is a positive correlation between different categories of infrastructure. The Karl Pearson‟s correlation coefficients have been calculated for this purpose (Table 13). It is found that the zero-order correlation coefficients between all the categories of infrastructure are highly significant. The physical infrastructure index is more associated with the social infrastructure index than the financial infrastructure index. Roughly speaking the set of base variables (PGIA, PHHELCT, ROLPA, RALPA and PHWTC) of PII is more associated with the set of base variables (LR, BDHOSP, HDPA, PHIDW and PTRS) of SII than (BBPP, CDR, POPP and BBPA) of FII.

Table 13: Pearson'Correlation Coefficients relating to Indices

Indices	FII	SII	PII
FII	1	0.652	0.67
SII	0.652	1	0.914
PII	0.67	0.914	1

Summary, Conclusion and Recommendations

The cross-section analysis in our framework develops composite indices for different categories of infrastructure viz., physical, social and financial infrastructure in the state of Odisha at district level. It is observed that the three indices are significantly correlated pair-wise, which indicates that underdevelopment in one aspect leads to the underdevelopment in another aspect of infrastructure. These indices are further combined together to construct an index for the overall rural infrastructure. The analysis points towards existence of vertical inequality in the spread of different categories of infrastructure in the three principal regions of the state viz., Coastal, Southern and Western-Central Odisha. Disparity is more severe in case of financial infrastructure followed by social and physical infrastructure. The coastal region of the state is relatively better-off than the west-central and the southern regions of the state. The KBK districts, comprising districts mostly from Southern-Western Odisha, are in the lowest bracket of development in every aspect. This

calls for proactive and participative role from concerned quarters so that all categories of infrastructure develop in synchrony and become adequate for development. Government efforts through the KBK plan and formation of the western Odisha Council are laudable steps in this direction. There is greater need for a time bound delivery system and certain region-specific measures in place. The present study calls for revitalizing the existing infrastructure and evolution of a policy both at regional and national levels encompassing both the benefactors and the beneficiaries.

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