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A Study of Inter-State Variations in Rural Development in India

Since rural development is a comprehensive and multi-dimensional process, a composite index of rural development is needed. This study seeks mainly (a) to find out a suitable methodology to construct a composite index, (b) to examine the degree of inter-state variations in rural development in India and (c) its convergent or divergent trend over the decade.

METHODOLOGY AND DATA BASE

Methodology

For this study Iyengar and Sudarshan's (1982) method is used because it is simple and it does not have the restrictive assumption of linearity in relation to indicators. This method is a refinement on Hellwig's approach (Appendix).

Sixteen states of India have been taken into consideration and 30 broad indicators reflecting agricultural development, infrastructural facilities, village and cottage industry development and level of different rural development programmes have been used. In the list of indicators used in our analysis, some important and highly relevant indicators such as the per capita calorie intake, per capita consumption of proteins, per capita consumption of cloth, life expectancy, unemployment rate, etc., have not been included because of non-availability of such data for the years under study. In this list of indicators, prominence has been given to the infrastructural indicators. This deliberate exercise recognises the fact that infrastructural development is a necessary pre-condition for rapid development and promotion of social justice. This point has been established well by the remarkable changes that have taken place in Taiwan and Korea as a result of infrastructural development. The selected indicators have been divided into four groups. Their values are non-negative. These are (i) infrastructure, (ii) agriculture, (iii) rural industry and (iv) general index of overall development.

Data Base

The study is based on the secondary data collected from different official sources like *Fertiliser Statistics* (Fertiliser Association of India), *Hand Book of Rural Development Statistics* and *Rural Development Statistics* (National Institute of Rural Development, Hyderabad), *Comparative Study of Inter-State Variations in India* (State Planning Institute, Uttar Pradesh, Lucknow), *Statistical Hand Book* and *Agricultural Statistical Compendium: Foodgrains* (Techno-Economic Research Institute, New Delhi). The years covered in this paper are 1970-73 and 1986-89. The year 1970-71 is chosen purposely as a reference year, because a lot of development has taken place due to the impact of green revolution in India. For the study cross-section data have been used. Since the development is a dynamic concept which requires a number of years to be visible, cross-section analysis at different points of time with a gap of at least one decade is more appropriate and useful.

RESULTS AND DISCUSSION

An attempt has been made to measure the spatial differences in the level of rural development in different states of India on the basis of composite indices. The total weightage assigned to infrastructure has increased from 0.3813 in 1970-73 to 0.3863 in 1986-89 (Table I). The weightage of education and health has also marginally increased while the weightage

TABLE I. DEVELOPMENT INDICATORS AND THEIR WEIGHTS

Sector/Indicators (1)	Weights	
	1970-73 (2)	1986-89 (3)
Infrastructure		
1. Density of population	0.0310	0.0318
2. Schools	0.0312	0.0335
3. Surface roads	0.0338	0.0276
4. Hospitals	0.0324	0.0298
5. Post offices	0.0325	0.0341
6. Villages with electrification	0.0264	0.0220
7. Villages with drinking water facilities	0.0348	0.0399
8. Fertiliser depots	0.0279	0.0345
9. Daily market	0.0348	0.0372
10. Veterinary dispensary	0.0359	0.0367
11. Credit-deposit ratio	0.0317	0.0291
12. Members of co-operative societies	0.0289	0.0291
	0.3813	0.3863
Agriculture		
13. Irrigation intensity	0.0299	0.0302
14. Cropping intensity	0.0339	0.0309
15. Fertiliser consumption	0.0321	0.0377
16. HYV area	0.0311	0.0305
17. Agricultural workers	0.0283	0.0290
18. Tractors	0.0349	0.0329
19. Pumpsets	0.0354	0.0374
20. Average holdings	0.0309	0.0313
21. Yield of foodgrains	0.0366	0.0369
22. Livestock	0.0372	0.0359
23. Per capita net cropped area	0.0330	0.0314
	0.3633	0.3681
Education and health		
24. Literacy rate	0.0369	0.0398
25. Infant mortality	0.0374	0.0376
26. Per capita consumption expenditure	0.0309	0.0320
	0.1052	0.1094
Off-farm income and employment		
27. Beneficiaries of Integrated Rural Development Programme (IRDP)	0.0359	0.0333
28. Number of small scale industrial units	0.0373	0.0281
29. Employment in village industry	0.0426	0.0382
	0.1158	0.0996
General		
30. Per capita state domestic product	0.0344	0.0366

of off-farm income has gone down. From this it can be observed that the weightage of infrastructure has got first priority followed by agriculture and so on. Some of the indicators chosen in this study may not be related to the rural development directly, but they definitely describe some dimension of development affecting it. The values of the indicators chosen are average for the period 1970-73 and 1986-89 separately. Table I indicates that employment in village industry has got the maximum weightage (0.0426) during 1970-73, whereas literacy rate has scored the highest weightage (0.0398) during 1986-89. It clearly shows that with the change of time span, priorities have shifted significantly. The indicator for rural electrification, i.e., the percentage of villages electrified, has got the lowest score in both the periods.

The composite indices of development for all the 16 states have been constructed for the periods 1970-73 and 1986-89 with the help of weighting method of Iyengar and Sudarshan. Table II indicates that with the exception of three states (Gujarat, Karnataka and West Bengal) where the index of development over the decade has declined, in all other states there has been an increasing trend of development. Though the declining trend is insignificant in the case of Gujarat (-0.12 per cent), it is quite significant in the case of West Bengal (-3.27 per cent) and Karnataka (-3.15 per cent). In the ranking of development the position of West Bengal has slightly deteriorated, as its rank shifted from 5 to 6, whereas the ranking position of Karnataka has declined from 6 to 9 and of Gujarat from 8 to 10. It indicates that both in relative and absolute terms development in these three states has deteriorated over the decade.

TABLE II. LEVEL OF DEVELOPMENT OF DIFFERENT STATES AND THEIR RANKS DURING 1970-73 AND 1986-89

State (1)	Composite index of development		Percentage change (4)	Rank	
	1970-73 (2)	1986-89 (3)		1970-73 (5)	1986-89 (6)
Andhra Pradesh	32.64	35.64	+ 9.19	9	8
Assam	19.43	22.96	+18.17	16	16
Bihar	30.91	31.59	+ 2.20	11	11
Gujarat	33.83	33.79	- 0.12	8	10
Haryana	39.19	45.97	+17.30	4	4
Himachal Pradesh	27.36	29.43	+ 7.57	12	13
Karnataka	34.94	33.84	- 3.15	6	9
Kerala	47.17	53.74	+13.92	3	2
Madhya Pradesh	20.24	29.10	+43.77	14	14
Maharashtra	31.15	35.96	+15.44	10	7
Orissa	20.24	27.97	+38.19	15	15
Punjab	55.37	63.90	+15.41	1	1
Rajasthan	25.23	29.90	+18.51	13	12
Tamil Nadu	49.79	52.12	+ 4.68	2	3
Uttar Pradesh	34.12	41.31	+21.07	7	5
West Bengal	39.18	37.90	- 3.27	5	6
Coefficient of variation (per cent)	30.18	28.22			

Another interesting observation from Table II is that the relative change of development during 1986-89 compared to 1970-73 is the maximum in the case of Madhya Pradesh (43.77 per cent), followed by Orissa (38.19 per cent) and Assam (18.17 per cent), though their ranking positions have remained unchanged over the period. It may be argued that the starting

point of development of these states has lagged far behind the other developed states. The development status of Uttar Pradesh and Rajasthan has improved (21.07 per cent and 18.51 per cent respectively) both in relative and absolute terms. The ranking of Uttar Pradesh has improved from 7 to 5 and of Rajasthan from 13 to 12. It is clear from the table that the relative ranking position of development index between 1970-73 and 1986-89 is static mainly for six states, viz., Assam, Bihar, Haryana, Madhya Pradesh, Orissa and Punjab. The states lagging behind in rural development however have improved in absolute terms. It indicates that the development programme has little overall impact to push up the backward states. For example, with the given level of indicators, Orissa and Assam ranked at 15th and 16th place respectively during 1970-73 and 1986-89. Table II also reveals that the relative position of the states like Gujarat, Himachal Pradesh, Karnataka, Tamil Nadu and West Bengal has gone down during the late eighties as compared to the early seventies. Some of the states like Maharashtra, Uttar Pradesh, Kerala, Andhra Pradesh showed improved trends in the process of development.

The main reasons for the extreme position of Assam are its inadequate infrastructure, the peculiar problem in the sphere of agriculture, inadequate credit and storage facilities. At the other extreme, Punjab has ranked first in both the periods. It is mainly due to its basic institutional and economic infrastructure along with the outlook of the farmers, which moved its economy to the developed stage. The present state of development in Punjab has been the result of huge public investments in irrigation during the last 100 years and it has had a long experience of the canal colonies of Montgomery and Lyallpur.

Out of the total 30 indicators, only 13 indicators showed divergent trend while the remaining 17 showed converging trend. The degree of divergency shown (Table III) by the 13 indicators varied from 0.87 to 77.28 while that for converging indicators varied from 3.34 to 70.18. The maximum divergent trend has been shown by the agricultural sector, followed by infrastructure, health and education and so on.

The number of tractors per thousand of gross cropped area has shown the maximum degree of imbalances. It is followed by the number of pumpsets and percentage of villages having safe drinking water facilities. Irrigation intensity has shown the least degree of variations and it is followed by the monthly per capita consumption expenditure (at constant prices) during 1970-73. The coefficient of imbalance has been found varying from 15.41 in the case of irrigation intensity to 173.15 in the case of number of tractors.

The extent of variability in the coefficients of imbalances for some of the indicators during 1986-89 is almost the same as in 1970-73. These indicators are cropping intensity, irrigation intensity and per capita consumption expenditure. Cropping intensity shows the least imbalance during 1986-89 also, followed by irrigation intensity and monthly per capita consumption expenditure. The most interesting finding that emerges from Table III is that the relative imbalance in the percentage change of drinking water facility has declined drastically (-92.87), followed by the number of post offices and the area under high-yielding varieties (HYVs). The imbalances in crucial factors which directly influence the productivity, growth and quality of life have shown an increasing trend. For example, the imbalance in the number of hospitals has been increasing over the decade. Its relative change is maximum (77.28 per cent). Similarly, imbalances in irrigation intensity and productivity of

foodgrains are also increasing. The ultimate effect of it is on the per capita state domestic product where the relative imbalances have increased by 33.45 per cent between 1970-73 to 1986-89.

TABLE III. COEFFICIENTS OF IMBALANCES FOR INDICATORS FOR RURAL INDIA

Relative indicators (1)	Coefficient of imbalance		Relative change (per cent) (4)
	1970-73 (2)	1986-89 (3)	
1. Density of population	60.09	58.08	- 3.34
2. Number of schools/'00 sq.km	66.05	67.71	2.50
3. Length of surface roads ('00 km)	79.87	60.14	-24.69
4. Number of hospitals/'000 sq.km	55.92	99.13	77.28
5. Number of post offices/'000 sq.km	43.40	43.78	0.87
6. Electrified villages (per cent)	64.62	19.27	-70.18
7. Villages with drinking water facility (per cent)	102.81	7.32	-92.87
8. Fertiliser depots within 5 km (per cent)	46.23	38.27	-17.23
9. Daily market facility within 2 km. (per cent)	68.76	54.11	-21.30
10. Veterinary dispensary	35.99	31.84	-11.52
11. Credit-deposit ratio	46.23	29.05	-37.15
12. Member of co-operative society/village	60.87	82.67	35.82
13. Irrigation intensity (GIA/NIA x 100)	15.41	17.42	13.06
14. Cropping intensity (GCA/NCA x 100)	19.25	15.23	-20.89
15. Fertiliser consumption (per ha)	75.93	60.75	-19.99
16. Area under HYVs (per cent of GCA)	73.96	35.61	-51.85
17. Agricultural workers/'000 ha of GCA	70.72	44.72	-37.29
18. Number of tractors/'000 ha of GCA	173.15	133.29	-23.02
19. Number of pumpsets/'000 ha of GCA	138.99	99.16	-28.65
20. Average size of land holdings (ha)	54.07	56.14	3.91
21. Productivity of foodgrains (kg)	37.96	46.39	22.23
22. Livestock/'000 rural population	46.85	52.75	12.60
23. Per capita net cropped area (ha)	54.56	46.54	-14.69
24. Literacy rate (per cent)	31.57	35.46	12.34
25. Infant mortality 1/4'000 of population	26.85	28.02	4.32
26. Monthly per capita consumption expenditure (Rs.)	16.68	17.76	6.50
27. Number of beneficiary families under IRDP ('000)	96.53	79.55	-17.59
28. Number of small scale and cottage industry ('000)	68.76	56.69	-17.55
29. Percentage of non-agricultural work force	39.99	48.57	21.47
30. Per capita state domestic product (kg) at 1970-71 price	26.57	35.45	33.45
Range	157.74	118.06	
Coefficient of range	0.9110	0.8857	

Notes: GIA = Gross irrigated area; NIA = Net irrigated area; GCA = Gross cropped area; NCA = Net cropped area.

From the above discussion, it is clear that some of the important factors like drinking water facilities, the area under HYVs have helped to reduce the rural imbalances but at the same time the factors like irrigation intensity, productivity of foodgrains has further widened the rural imbalances. It may be argued that the counter-balance effect of these factors has helped to reduce the rural imbalances but at a very slow pace. Taking all the indicators together, it showed converging trend.

It may be argued that the wide range of diversities among the indicators may be largely due to the policies and priorities of the government. The government has given priority to indicators such as literacy, drinking water facilities which no doubt help to reduce the rural imbalances but in general it has not reduced much of the overall imbalances in the rural economy as their impact is indirect and very remote.

The overall relative imbalance of different indicators over the decade has decreased

(-166.18). It indicates that these factors contributed to narrow down the inter-state imbalances in the Indian economy.

It may be expected that the degree of imbalances would be still high at the spatial levels below the state. The factors which affect the imbalances in the economy as a whole are education, health, off-farm employment, infrastructure and agriculture. But there is a high degree of sectoral interlinkages between these sectors and it is very difficult to identify a single sector which is responsible for the imbalances in the rural economy. Among the individual indicators, mention may be made of tractors, pumpsets, drinking water facility, cottage and small scale industries which significantly influence the regional imbalance in a significant way. The factors considered in the analysis are not exhaustive. However, a clue to the factors which affect the imbalances may be obtained from the examination of the effects of these indicators. The present study suggests that man-made factors have accounted for a greater degree of imbalances over space and these, therefore, have significant impact on a region's imbalance. Thus the hypothesis that imbalance is largely man-made finds some support in the analysis. Nair (1971) has also concluded that man-made factors are more important in explaining the variations in the state income.

It has also been observed from the analysis that the states at higher levels of development are more divergent than the states at low levels of development. Further, with the rise in the level of development, divergent trend accentuates.

There are two major findings which have emerged from the above analysis. These are: (1) There is a slow decline in the coefficient of variation of composite indices for different states from 30.18 per cent in 1970-73 to 28.22 per cent in 1986-89 (Table II). It suggests that the inter-state disparities in the levels of rural development have shown a tendency of convergence at a slower rate during the period of study. (2) There appears to have been no remarkable change in the inter-state variations in the pattern of rural development during this period. The coefficient of correlation between the two series of composite indices for the two selected points of time (0.95) also confirms the aforesaid findings.

The interesting feature that emerges is that during the period the development process in the backward states has been further leading them to the category of developing states. So to induce further rural development of the developing states as well as to remove the imbalances, priority must be given to the development of infrastructure and agricultural sector in the states.

The present exercise brings out the quantitative changes in the development achieved by different states and their position on the ladder of stages of development over the decade.

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APPENDIX

In this study, the weights have been assumed to be inversely proportional to the standard deviation. The choice of the weights in this manner ensures that the large variation in any one of the indicators will not unduly dominate the contribution of the rest of the indicators and distort inter-state comparisons.

A random variable, Z has a Beta distribution in the interval $(0,1)$ if its probability density function $f(z)$ can be written as:

$$f(z) = \frac{1}{\beta(a,b)} z^{(a-1)}(1-z)^{(b-1)} \quad \dots(1)$$

$$0 < z < 1 \text{ and } a, b > 0$$

where $\beta(a,b)$ is the integral.

$$\beta(a,b) = \int_0^1 z^{(a-1)}(1-z)^{(b-1)} dz \quad \dots(2)$$

Let $(01, Z1)$, $(Z1, Z2)$, $(Z2, Z3)$, $(Z3, Z4)$ and $(Z4, 1)$ be linear intervals, such that each interval has the same probability weight of 20 per cent. These fractile groups are used to characterise the various stages of development. The parameter (a,b) is assumed. Beta distribution can be estimated by solving the following simultaneous equations.

$$(1 - \bar{Y})^a - Y^b = 0 \quad \dots(3)$$

$$(\bar{Y} - m_2)^a - m_2^b = m_2 - Y \quad \dots(4)$$

where \bar{Y} = overall mean of the state indices,

$$m_2 = S\bar{Y}^2 + \bar{Y}^2,$$

$S\bar{Y}^2$ = the variance of the state indices.

The cut-off points $Z1$ to $Z4$ can be obtained from the tables of incomplete Beta function. Iyengar and Sudarshan (1982) hold that the clustering of the districts is not unduly affected by assigning equal weightage. In this method, the Beta distribution is not a normal distribution and is used for graduating the state indices because of its skewness and its finite range. The Chi-square test of goodness of fit has also confirmed that the Beta distribution is more appropriate. (Detailed formulation of the method is given in Milton and Stegun, 1970.)

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