Raj. J. Extn. Edu. 20 : 44-49, 2012

MEASUREMENT OF AGRICULTURAL DEVELOPMENT IN RAJASTHAN

Bhupendra Upadhyay*

ABSTRACT

The present study was conducted for three points of time i.e. year 1980-81, 1990-91 and 1996-97. The district was considered as the unit of analysis and twenty six districts as existed in the year 1980-81 were included in the study which covered the entire geographical area of the state. For measuring agricultural development, 21 indicators were used to construct the composite indices of development for each district of Rajasthan. The values of mean composite index for the year 1980-81, 1990-91 and 1996-97 were obtained as 0.851, 0.836 and 0.824 respectively. The difference between the periods 1980-81 & 1996-97 and 1990-91 & 1996-97 was found significant whereas difference in agricultural development between the year 1980-81 and 1990-91 was observed to be non-significant.

INTRODUCTION

Rajasthan is the largest State in the Indian Union with a geographical area of 3.42 lakh sq. kms.. Rajasthan being a predominantly agrarian State, 77 per cent of the population is living in rural areas and about 70 per cent depends on agriculture as source of livelihood. Agriculture plays a vital role in the economic development of the State. Agriculture, the single largest sector of the economy contributes about 50 per cent of State domestic product and employs about 60 per cent of labour force. The geographical features of Rajasthan are dominated by the Aravalli range which divide the State into two distinct zones. The region to the west and north-west, comprising of eleven districts and nearly 61 per cent of the total area of the State, is known as the great Indian Thar Desert. The soil type in this region is sandy which is poor in nitrogen and has low water holding capacity. The south-east and eastern part of the Aravalli Hills is productive for agriculture purposes having clay loam soil type. The rainfall fluctuates from 200-550 mm in the western and semi arid parts to 550 -1000 mm per annum in south eastern and eastern part of the Aravalli Ranges. Agriculture in Rajasthan is primarily rain fed. The period of monsoon is short, around three months. Its onset is late and withdrawal early, in comparison to other States. In addition to spatial variation in rainfall there is great variation in the yearly pattern. Surface water resources are scarce as there are no perennial rivers traversing the south eastern region of the state. Therefore to a great extent agriculture is dependent upon the vagaries of monsoon. Consequently there is a severe shortage of food, fodder, fuel and drinking water. Frequent droughts lead to temporary outmigration of human and cattle population (Centre for Monitoring Indian Economy, 1991).

Developmental programmes in various fields were taken up in the country in a planned way through various five year plans with the main objective of enhancing the quality of life of general masses by providing the basic necessities of life as well as effecting improvement in their social and economic well-being. The "green revolution" in agriculture sector have certainly increased the total production in agriculture but there is no indication that this has been able to reduce substantially the inequality and poverty. In India, Rajasthan is considered as an economically backward state. However, all the districts of the state are not at the same level of development. Some districts are more developed while others are less developed or underdeveloped.

The impact of development in different dimension cannot be fully measured by any single indicator. Moreover, a number of indicators when analysed individually, do not provide an integrated

* Professor and Head, Department of Agricultural Statistics and Computer Application, RCA, Udaipur.

and comprehensible picture of reality. Hence there is need for building up of a composite index of agriculture development based on various indicators combined in an optimum manner. Therefore the present study was conducted with the following specific objectives:

(i) To construct the various indices of development for each district of Rajasthan and classify the districts on the basis of their agricultural development.

(ii) To examine the significance of overall change in development indices over three points of time.

RESEARCH METHODOLOGY

In order to assess the development of Rajasthan state, the study was carried out for three points of time i.e. 1980-81, 1990-91 and 1996-97 with the purpose of examining the significance of change and variability in development. The study is based on the data gathered for 26 districts of Rajasthan as existed in the year 1980-81 in spite of separate information for 32 districts existing in 1997. The information of newly formed districts have been included in the original districts from which they have been bifurcated, since the data related to new districts were not available for all the three selected points of time.

To measure the agricultural development, 21 indicators were identified after reviewing the literature as under:

(i) Percentage of area sown more than once to net area sown.

(ii) Percentage of gross area sown under food grains to total cropped area.

(iii) Percentage of net area irrigated to net area sown.

(iv) Percentage of forest area to total geographical area.

(v) Percentage of gross irrigated area to gross area sown.

(vi) Average size of operational holding (hectares)

(vii) Percentage of area under commercial crops to total cropped area.

(viii) Number of cows and buffaloes per 1000 human population.

(ix) Production of food grains (000 tons)

(x) Percentage of agriculture workers to the total work force.

(xi) Forest area per lakh of human population (hectares).

(xii) Gross value from agriculture per hectare at current prices (Rs.).

(xiii) Gross value of agriculture output per capita (rural) at current prices (Rs.)

(xiv) Fertilizer consumption in terms of nutrients (tons).

(xv) Yield in Kg./hectare of foodgrains.

(xvi) Total cattle (00).

(xvii) Irrigation intensity (gross area irrigated x 100/ net irrigated area).

(xviii) Cropping intensity (gross cropped area x 100/ net sown area).

(xix) Percentage of animal power (total number of live stock x 100/ net sown area).

(xx) Use of pumps and oil engines per '000 of population (Total number of pumps + oil engines/Gross irrigated area) x 100

(xxi) Use of tractors per '000 of population (Total number of tractors x 1000/net sown area).

The composite indices for various districts for agriculture sector were obtained through the formula suggested by Narain et al. (1991). The value of composite index is non-negative and it lies between 0 and 1. The value of index closer to zero indicates the higher level of development while the value of index closer to 1 indicates the lower level of development. In order to examine the significance of overall change in development indices over three selected points of time, slippage test proposed by Rai (1987) was utilized.

RESULTS AND DISCUSSION

I. Construction of composite indices of agricultural development for each district of Rajasthan

This section describes the construction of

indices of agriculture development for each district of Rajasthan. To construct composite indices of development, variables were standardised. The best district for each indicator (with maximum/ minimum standardised value depending upon the direction of the indicator) was identified and the deviations of different indicators from their best value were obtained for each district. The districts were ranked on the basis of development indices.

Perusal of Table 1 reveals that out of 26 districts included in the analysis for the year 1980-81, district Chittorgarh ranked first followed by Bhilwara, Udaipur, Bundi and Kota. Desertic districts namely Jodhpur, Sikar, Jhunjhunu, Bikaner and Jaisalmer were placed at the bottom ranks on the basis of their agricultural development. The values of composite indices varied from 0.677 to 0.997 during this period with mean index 0.816 and coefficient of variation (CV) 11.05 per cent.

Almost similar findings were revealed by Bhargava (1987) who used 3 variables i.e. consumption of chemical fertilizers, use of tractors, electric pumps and oil engines and percentage of cultivators and agriculture workers to total workers to compute the index of agricultural development in Rajasthan for the year 1980-81. The findings indicated that Bundi, Ganganagar, Jaipur, Bhilwara and Chittorgarh districts obtained the first five ranks whereas districts namely Nagaur, Bikaner, Barmer, Jaisalmer and Churu got the last five ranks respectively.

It can be seen from Table 1 that district Ganganagar, which was placed at tenth position in the year 1980-81, was ranked first during this year 1990-91. This was followed by Chittorgarh, Kota, Udaipur and Sawai Madhopur districts. Again the desertic districts namely Sikar, Jhunjhunu, Bikaner, Barmer and Jaisalmer continued to obtain the lower ranks. The values of composite indices varied from 0.689 to 0.998 with mean index 0.827 and CV 10.036 per cent.

Further the table depicts that in the year 1996-97, Kota district ranked first followed by Udaipur, Bundi, Bhilwara and Chittorgarh in the ranking of agricultural development. Again desertic districts i.e. Jodhpur, Jhunjhunu, Jaisalmer, Barmer and Churu continued to obtain the lower ranks during this period. The values of composite indices varied from 0.642 to 0.996 with mean index 0.803 and CV 12.309 per cent.

II. Significance of overall change in development indices over three points of time

Having obtained the measure of development (composite index) for each district over different points of time, attempt was made to examine the significance of change in development indices over time. Data in Table 2 illustrate the composite indices of agricultural development of each district and their ranking over three points of time. The rankings over different points of time have been examined by the slippage test proposed by Rai (1987). The value of test statistic M was worked out to be 7.15 which is significant at 5 per cent level of significance. This indicates the rejection of null hypothesis of no change in development in districts over time. From this, it can be concluded that the level of agricultural development is significantly different over three points of time. Since the null hypothesis was rejected, multiple comparisons to determine the significance of difference in agricultural development over individual pairs of time periods i.e. 1980-81 (t1) and 1990-91 (t2), 1980-81 (t1) and 1996-97 (t3) and 1990-91 (t2) and 1996-97 (t3) were made. Following differences of sums of ranks were obtained :

$|Rt1 - Rt2| = 3$

$|Rt1 - Rt3| = 15$

$|Rt2 - Rt3| = 18$

The critical difference (C.D.) at 5 per cent level of significance was computed as 12.21. The difference between the periods 1980-81 & 1996-97 and 1990-91 & 1996-97 was found significant whereas difference in agricultural development between the year 1980-81 and 1990-91 was observed to be non-significant.

The perusal of the table further reveals that mean value of composite index has increased from 0.816 in the year 1980-81 to 0.827 in the year 1990-91 which indicates that level of agricultural development has gone down during these periods. It can be further observed from the table that mean composite index value has decreased from 0.827 in the year 1990-91 to 0.803 in the year 1996-97 which

depicts the improvement in the agricultural development. This may be due to the programmes initiated by the government for the development in agricultural sector.

Table 1. Composite indices of agricultural development of each district for three points of time

Districts	1980-81		1990-91		1996-97	
	Composite index	Rank	Composite index	Rank	Composite index	Rank
Ajmer	0.817	15	0.872	20	0.843	18
Alwar	0.733	7	0.832	13	0.754	9
Banswara	0.810	14	0.840	14	0.780	13
Barmer	0.898	20	0.996	25	0.961	25
Bharatpur	0.746	8	0.816	12	0.765	12
Bhilwara	0.698	2	0.778	7	0.696	4
Bikaner	0.949	25	0.921	24	0.891	21
Bundi	0.710	4	0.747	6	0.695	3
Chittorgarh	0.677	1	0.695	2	0.697	5
Churu	0.886	18	0.863	17	0.996	26
Dungarpur	0.807	13	0.842	15	0.822	16
Ganganagar	0.756	10	0.689	1	0.709	6
Jaipur	0.729	6	0.780	9	0.717	7
Jaisalmer	0.997	26	0.998	26	0.952	24
Jalore	0.858	17	0.867	19	0.836	17
Jhalawar	0.798	12	7840.	10	0.757	10
Jhunjhunu	0.923	24	0.909	23	0.930	23
Jodhpur	0.909	22	0.890	21	0.901	22
Kota	0.718	5	0.705	3	0.642	1
Nagaur	0.897	19	0.866	18	0.885	19
Pali	0.841	16	0.802	11	0.798	14
Sawai Madhopur	0.755	9	0.746	5	0.758	11
Sikar	0.914	23	0.904	22	0.890	20
Sirohi	0.786	11	0.779	8	0.732	8
Tonk	0.900	21	0.843	16	0.816	15
Udaipur	0.700	3	0.731	4	0.666	2
Mean	0.816		0.827		0.803	
S.D.	0.090		0.083		0.099	
CV	11.052		10.036		12.309	

Table 2. Ranking of composite indices of agricultural development of each district over three points of time

Districts	1980-81		1990-91		1996-97	
	Composite index	Rank	Composite index	Rank	Composite index	Rank
Ajmer	0.817	1	0.872	3	0.843	2
Alwar	0.733	1	0.832	3	0.754	2
Banswara	0.810	2	0.840	3	0.780	1
Barmer	0.898	1	0.996	3	0.961	2
Bharatpur	0.746	1	0.816	3	0.765	2
Bhilwara	0.698	2	0.778	3	0.696	1
Bikaner	0.949	3	0.921	2	0.891	1
Bundi	0.710	2	0.747	3	0.695	1
Chittorgarh	0.677	1	0.695	2	0.697	3
Churu	0.886	2	0.863	1	0.996	3
Dungarpur	0.807	1	0.842	3	0.822	2
Ganganagar	0.756	3	0.689	1	0.709	2
Jaipur	0.729	2	0.780	3	0.717	1
Jaisalmer	0.997	2	0.998	3	0.952	1
Jalore	0.858	2	0.867	3	0.836	1
Jhalawar	0.798	3	7840.	2	0.757	1
Jhunjhunu	0.923	2	0.909	1	0.930	3
Jodhpur	0.909	3	0.890	1	0.901	2
Kota	0.718	3	0.705	2	0.642	1
Nagaur	0.897	3	0.866	2	0.885	1
Pali	0.841	3	0.802	2	0.798	1
Sawai Madhopur	0.755	2	0.746	1	0.758	3
Sikar	0.914	3	0.904	2	0.890	1
Sirohi	0.786	3	0.779	2	0.732	1
Tonk	0.900	3	0.843	2	0.816	1
Udaipur	0.700	2	0.731	3	0.666	1
Rank Total (R_i)		56		59		41
Mean	0.816		0.827		0.803	

CONCLUSION

(i) For the selected points of time, Chittorgarh, Ganganagar, Kota, Udaipur, Bundi, Sawai Madhopur and Bhilwara districts were found to be better developed in comparison with other districts. Jaisalmer, Bikaner, Barmer, Jhunjhunu, Sikar, Jodhpur and Churu were identified as poorly developed in agricultural sector.

(ii) The composite index increased from 0.816 in the year 1980-81 to 0.827 in the year 1990-91 which indicates that level of agricultural development has gone down during these periods. The mean composite index value decreased from 0.827 in the year 1990-91 to 0.803 in the year 1996-97 which depicts the improvement in the agricultural development.

REFERENCES

Bhargava, P. 1987. Regional Economic Planning in India. Twenty-First Century Publishers, Meerut, pp. 221-223.

Centre for Monitoring Indian Economy (CMIE), 1980. "Basic statistics relating to Indian Economy" States Bombay.

Narain, P., Rai, S.C. and Sarup, S. 1991. Statistical Evaluation of Development on Socio-economic Front. *Jour. Ind. Soc. Ag. Statistics*, 43(3), pp. 329-345.

Rai, S.C. 1987. Multi-sample Slippage Test for Ordered Observations. *Biom. J.*, Vol. 29 No. 4, pp 449-454.

Upadhyay, B. 2001. Statistical Assessment of Development in Rajasthan - a Spatial and Inter-temporal Analysis. An unpublished Ph.D. Thesis submitted to MPUAT,Udaipur,Raj.

❐❐❐