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Research Article

Intra-regional disparities in the agricultural development of Kerala

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SUMMARY : The level of agricultural development of different districts of Kerala was obtained with the help of composite index based on optimum combination of forty-eight indicators by the method of principal component analysis. The district wise data for the period of 2003-2008 were utilized for all the fourteen districts of state Kerala. Wide ranges of disparities were observed in the level of agricultural development among different districts. The district of Palakkad was ranked first and the district of Pathanamthitta was ranked last in agricultural development. The districts were categorized into three groups based on mean and standard deviation of composite index. Six districts namely, Pathanamthitta, Alappuzha, Kottayam, Idukki, Kozhikode and Kasaragod were categorized as the low developed districts where as Thiruvananthapuram, Kollam, Wayanad and Kannur districts were categorized as moderately developed districts. Four districts namely, Ernakulam, Thrissur, Palakkad and Malappuram, were classified as highly developed districts.

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KEY WORDS :
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BACKGROUND AND OBJECTIVES

Agriculture occupies an important place in the economic life of Kerala, as it provides the key to economic growth and fluctuations there in; overall economic growth of the state is greatly influenced by growth achieved in agricultural sector.There are marked regional differences in the pace of agricultural development in Kerala because of natural resource endowments, farming practices, adoption of technology, availability of irrigation facilities, attitude of farmers etc., in different districts of the state. Regional disparities in the development of the state can become a threat to its unity and integrity. An unplanned process of growth leading to regional imbalances results in several social, economic, cultural, and political problems. Regional imbalances not only promote fissiparous forces but also lead to underutilization and even non utilization of resources, both natural and human. The regional disparities in agricultural development show that there is scope to boost the pace of agricultural development and thereby, economic development in the state.

It would be quite interesting and useful to study the level of development at district level since there has been a growing consensus about the need of micro level planning in the country. Knowledge of level of agricultural development at district level will help in identifying where a given district stands in relation to others. Therefore, it is required to quantify the status of development at district level in respect of agricultural development.

RESOURCES AND METHODS

For the purpose of the study the secondary data for a period of five years from 2003 to 2008 were collected from Department of Economics and statistics, Government of Kerala . The collected data set included 48 indicators which affect the development of agriculture across the 14 districts of the Kerala state. Principal component analysis (PCA) was employed after transforming the data for the construction of agricultural development index for the districts of the state. The index is determined by the following formula:

$$I_j = \frac{\sum_{i=1} X_i W_i}{\sum_i W_i}$$

where

I_j is the index for j^{th} district

X_i is the i^{th} indicator

L_{ij} is the factor loading of i^{th} variable on j^{th} factor

E_j is the eigen value of j^{th} factor

W_i is the weight of the variable = $\sum_j |L_y| E_j$

i=1, 2,……48 indicators and j= 1, 2,… Principal components (PCs)

From the above obtained index, all the districts are classified into three groups based on the mean value (μ) and standard deviation (ó) of the indices.

From the indices the value of $\mu \pm \frac{1}{2}\sigma$ is calculated. Using these values the districts were classified as

Low developed if, $I_j \leq \mu - \frac{1}{2}\sigma$

Average if, $\mu - \frac{1}{2}\sigma < I, < \mu + \frac{1}{2}\sigma$

Developed if, $I, \geq \mu + \frac{1}{2}\sigma$

OBSERVATIONS AND ANALYSIS

The first PC has captured the maximum variability of 23 per cent, the second PC has captured 20 per cent of the variability, third PC has captured 14 per cent of the variability, and so on. It is evident from the Table 1 and Fig. 1 that the eight PCs together account for nearly 91 per cent of the total variability present in the transformed data. The rotated component factors loadings are presented in Table 2. The factor loadings represent the weights assigned to each variable in construction of PC.

The composite indices of agricultural development (Table 3 and Fig.2) obtained for fourteen districts of Kerala were ranked in descending order. It indicates that, Palakkad (0.5137) was found to be the most developed district followed by the Ernakulam (0.4516) and Thrissur (0.4201) districts. The districts Pathanamthitta, Kottayam and Kozhikode were ranked as 14, 13 and 12, respectively. The Pathanamthitta district (0.2745) was found to be the least developed.

Table 1 : Eigen values and extraction of variability

PC No.	Eigen values	% of Variance	Cumulative %
1	11.2884	23.07994	23.07994
2	10.161	20.77489	43.85484
3	7.1849	14.69004	58.54488
4	5.3428	10.92374	69.46862
5	3.2808	6.707831	76.17645
6	3.1457	6.431609	82.60806
7	2.3313	4.76651	87.37457
8	1.7332	3.543652	90.91822

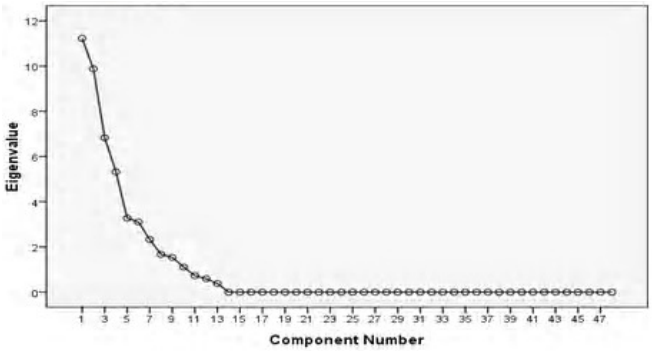

Fig. 1 : Scree plot

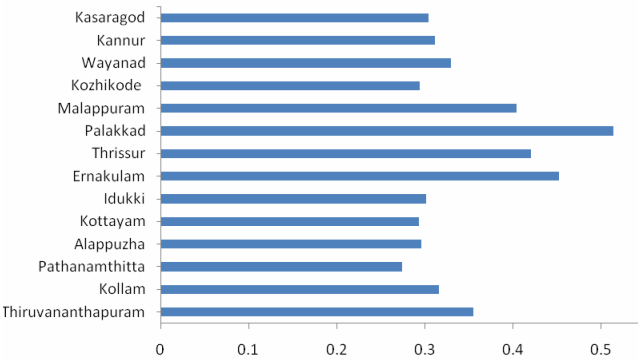

Fig. 2 : Agricultural development indices for the districts of Kerala

The highly developed district was Palakkad, according to the ranking with the composite index 0.5137. Similar results were obtained in previous studies (Narain *et al.*, 1994 and 2005). But the ranking of Pathanamthitta and Thiruvanathapuram districts were different from previous studies. This may be due to the fact that more indicators were considered in the present study.

Classification of the districts based on the index:

Considering Mean ± 1/2 standard deviation as yard stick, composite development index calculated for districts are classified into three groups (Table 4).

Pathanamthitta, Alappuzha, Kottayam, Idukki, Kozhikode and Kasaragod were classified as low developed districts. These six districts covered 40.01% net sown area with 34.24% of rural population of Kerala. Thiruvananthapuram, Kollam, Wayanad and Kannur were classified as moderately developed districts. The moderately developed districts covered around 27.79% net sown area and 26.34% of rural population of the state. The highly developed districts (Ernakulam, Thrissur, Palakkad and Malappuram) contributed to 39.42% of total rural population of the state, with 32.20% of net sown area. It was observed that there were wide disparities in the level of development of different districts across state.

Table 2 : Factor loadings corresponding to eight principal components

Indicators	Principal components							
	1	2	3	4	5	6	7	8
Net sown area(NSA)	0.482	0.479	-0.172	0.566	0.243	-0.138	0.284	-0.084
Net irrigated area per NSA	0.33	-0.055	-0.152	-0.154	-0.254	0.794	-0.213	0.007
Net irrigated area by Govt. canal	0.695	-0.244	-0.108	-0.105	0.017	0.594	-0.064	-0.174
NIA by private canal	-0.073	0.167	0.572	0.358	0.386	-0.436	-0.219	0.11
Rainfall (mm)	-0.029	-0.03	-0.035	0.976	-0.202	-0.011	0.005	0.036
Fert. consumption/NSA	0.347	-0.21	0.024	0.127	-0.03	0.577	0.407	-0.268
Area under HYV	0.939	-0.114	-0.072	-0.171	-0.05	0.199	-0.024	0.023
RRB Credit/1000haNSA	-0.158	0.913	0.133	-0.195	-0.162	-0.077	-0.158	-0.101
Comm. bank credit/1000haNSA	-0.128	-0.488	-0.061	-0.221	0.564	0.337	0.082	-0.458
Percentage of coastal line	-0.33	0.391	-0.362	-0.273	0.298	0.154	-0.405	-0.345
Area under paddy	0.954	-0.063	-0.049	-0.198	-0.064	0.197	-0.033	0.044
Area under other food grains	0.716	0.203	0.183	0.361	0.03	-0.084	-0.106	0.063
Area under sugarcane	0.915	-0.001	-0.072	0.303	-0.083	-0.094	0.045	0.19
Area under ginger	0.119	0.024	0.919	0.021	-0.126	-0.094	-0.109	0.121
Area under turmeric	0.818	0.106	0.06	0.117	0.113	-0.041	0.113	-0.206
Area under banana	0.942	-0.081	0.23	0.158	-0.145	0.088	-0.095	0.112
Area under other plantains	-0.042	-0.13	0.426	0.38	-0.048	-0.18	0.777	0.172
Area under coconut	-0.014	0.599	-0.528	-0.226	0.33	0.007	-0.239	-0.283
Area under arecanut	-0.088	0.714	-0.058	-0.078	-0.17	0.09	-0.052	-0.052
Area under rubber	-0.052	-0.148	-0.181	0.073	0.047	-0.109	0.938	0.064
Area under coffee	0.021	0.046	0.921	0.103	-0.121	-0.073	-0.107	0.119
Area under tea	0.002	-0.109	0.175	0.942	-0.103	-0.107	-0.028	0.158
Productivity of coconut Nos/ha	0.07	0.243	-0.589	-0.505	0.357	0.18	-0.212	-0.021
Productivity of arecanut Kg/ha	-0.119	0.208	-0.232	0.118	-0.042	-0.128	0.002	-0.037
Productivity tapioca Kg/ha	-0.166	-0.035	0.604	0.248	0.015	-0.006	0.259	0.288
Productivity of cashewnut Kg/ha	-0.169	0.645	0.061	-0.032	-0.051	-0.263	-0.059	-0.197
Productivity of black pepper Kg/ha	-0.198	-0.304	0.231	0.695	-0.016	-0.242	-0.04	0.207
Productivity of rubber Kg/ha	0.129	-0.149	-0.857	-0.056	0.202	0.163	-0.105	-0.128
Productivity of banana	-0.15	0.362	0.191	-0.152	-0.456	0.124	0.604	-0.211
Productivity of rice	0.107	-0.241	0.18	0.207	-0.091	0.335	0.113	0.782
RRBs/1000 ha of NSA	-0.154	0.91	0.037	-0.223	-0.171	-0.02	-0.115	-0.13
Comm. banks/1000 ha of NSA	-0.154	-0.529	-0.278	-0.403	0.217	0.474	0.004	-0.258
Rural road length/1000NSA	-0.307	-0.628	0.244	-0.458	0.183	0.2	-0.193	0.312
No. of fish markets	-0.081	-0.238	-0.105	-0.09	0.715	-0.26	-0.135	-0.131
No. of diary coop. societies	0.199	-0.493	-0.501	-0.066	0.603	0.075	0.029	-0.156
House hold size	0.153	0.462	-0.081	-0.071	0.001	-0.014	-0.054	0.143
Percentage of SC population	0.503	-0.615	-0.323	-0.185	0.231	0.194	-0.04	0.072
Percentage of ST popuation	0.013	0.054	0.989	-0.063	-0.059	0.029	0.01	-0.028
Percentage of cultivators	0.112	-0.267	0.639	-0.159	0.017	0.186	0.299	-0.157
Percentage of agri. labour	0.628	-0.149	0.592	-0.325	0.075	0.039	0.1	0.06
Total fisherman population	-0.295	-0.012	-0.334	-0.189	0.645	0.074	0.39	-0.265
Percentage of rural population	0.113	-0.078	0.279	0.217	-0.225	-0.123	0.01	0.852
No.of cattle per NSA	0.277	-0.64	-0.175	-0.484	-0.185	0.106	-0.28	-0.106
No.of buffaloes per NSA	0.309	0.173	0.01	-0.062	0.288	0.783	-0.198	0.296
No.of sheep+pig+goat per NSA	0.054	-0.459	-0.241	-0.102	0.741	0.264	0.06	0.195
No.of Poultry per NSA	-0.015	-0.34	-0.2	-0.338	0.221	0.788	-0.003	-0.006
Marine fish production	-0.215	0.034	-0.145	-0.209	0.765	0.084	-0.102	-0.23
Inland fishing	0.088	-0.125	-0.111	0.847	-0.129	-0.105	0.361	0.223

Table 3 : Ranking of districts based on the composite development index

District	Index	Rank
Thiruvananthapuram	0.355346	V
Kollam	0.31562	VII
Pathanamthitta	0.274516	XIV
Alappuzha	0.295533	XI
Kottayam	0.293148	XIII
Idukki	0.301471	X
Ernakulam	0.451669	II
Thrissur	0.420176	III
Palakkad	0.513703	I
Malappuram	0.404271	IV
Kozhikode	0.293937	XII
Wayanad	0.329112	VI
Kannur	0.311617	VIII
Kasaragod	0.304234	IX

It has been noted from the PC factor loadings that, area under paddy, area under high yielding varieties, area under banana, area under other food grains, area under turmeric, RRB credit per 1000 ha of net sown area, number of regional rural banks per 1000 ha of net sown area, area under ginger, area under coffee, productivity of rubber etc. contributes maximum weightage to the development index. Hence the improvement in these factors will help to bring the development in the agricultural sector. The increase in the area under crops of banana, increase in agricultural credit through RRBs, improvement in the rubber production through high yielding varieties in the low developed districts will help to bring the development indices of these districts to higher level and there by the development of these districts. The increase in area under spices like ginger and turmeric in the districts Pathanamthitta, Alappuzha, Kottayam, Idukki ,Kozhikkode and Kasargode will help to bring the development in agricultural sector, in these districts. The changed economic scenario of world trade in agriculture has imparted a new momentum for the trade of spices (Krishnadas and Mundinamani, 2011). The intercropping of spices in coconut plantations may help in the development of these districts. Establishment of more regional rural banks and disbursing of credit through RRBs will help to encourage the agricultural sector and there by the development.

Table 4 : Classification of districts based on agricultural development

Group	District
Low Developed < (Mean-1/2 SD)	Pathanamthitta, Alappuzha, Kottayam, Idukki, Kozhikode, Kasaragod
Moderately developed (Mean-1/2 SD to Mean+1/2 SD)	Thiruvananthapuram, Kollam, Wayanad Kannur
Highly Developed > (Mean+1/2 SD)	Eranakulam, Thrissur, Palakkad Malappuram

Conclusion and policy implications:

The districts Ernakulam, Thrissur, Palakkad and Malappuram were classified as highly developed districts. Four districts namely Thiruvananthapuram, Kollam, Wayanad and Kannur were classified as moderately developed districts. Low developed districts include six districts, Pathanamthitta, Alappuzha, Kottayam, Idukki, Kozhikode and Kasaragod. Kerala Government has laid more emphasis on district planning. However, there is a need to prepare detailed sectoral plan at district level for better utilization of available resources to achieve desired growth. Being the key to augment productivity of crops to a great extent, agricultural extension should begin to broad base its programmes. Moreover, high emphasis should be given to increase area under paddy cultivation in the state, which is crucial factor in improving agricultural development in majority of the districts of the state. The conversion and reclamation of paddy cultivated areas to non agricultural uses is the major land use change that occurred in Kerala affecting the food security of the state. Higher emphasis should be given to conserve the paddy land and wetland and to restrict the conversion or reclamation thereof, in order to promote growth in the agricultural sector and to sustain the ecological system, in the State of Kerala.

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