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DISTRICT-WISE COMPOSITE INDICES, DEVELOPMENT INDICES ANALYSIS AND REGIONAL DIFFERENCES OF AGRICULTURAL DEVELOPMENT IN TAMILNADU

R. LAKSHMI PRIYA[1] , MANJULA DEVI N.[2] and MANIMANNAN G[3]

[1]Assistant Professor, Department of Statistics, Dr. Ambedkar Govt. Arts College, Chennai
[2] Biostatistician, Department of Community Medicine, Karpaga Vinayaga Institute of Medical Sciences, Chengalpattu.
[3]Assistant Professor, Department of Mathematics, TMG College of Arts and Science, Chennai

Abstract

This research paper to measure the extents of regional differences are in agricultural development of various districts in Tamil Nadu. This study is entirely based on the secondary sources of data and it has brought into the analysis of two different periods of time in the year 2008-09 and 2017-18 with the help of Composite Indices (CI) and Development Indices (DI) analysis. In addition, the study areas have taken 31 out of 38 districts and the rest of the districts recently split into administrative purpose. Rest of Districts considered as outliers due to insufficient database. Extensive disproportion in the level of agricultural development has been observed in different districts. The northern and north-eastern part of the state was found to be highly developed whereas some of the western and southern districts of Tamilnadu were low developed. While compared with the results of the composite index of development in two benchmark years, the districts of Villupuram and The Nilgiris persistently have a high and least in the level of agricultural development respectively based on the selected indicators. This research paper has a efficient impact to measuring the degree of regional differences in the level of agricultural development and classifies districts of Tamil Nadu into three categories like High Level Developed Districts (HLDD), Middle Level Developed Districts (MLDD) and Low Level Developed Districts (LLDD) based on their agriculture composite indices of Tamilnadu. Additionally, the study is that it takes more districts than previous studies, virtually 82 percent of the districts in Tamil Nadu and it covers the most recent time.

Keywords: Agricultural development, Composite Indices, Development Indices, Regional Differences and Visualization

I. INTRODUCTION

After independence, centralized planning was implemented for eliminating regional inequalities, but it remained a serious problem in India. Regional disparities in India have widened day by day [1]. The basic cause of regional disparities is the states lacking an inherent mechanism to ensure that, in the long run, the benefits of economic change are distributed equally on a per capita basis. Regional differences are to a large extent built-in due to large unequal natural endowments and lack of infrastructure facilities which form the basis for rapid economic growth [2]. The regional disparity in India is now a matter of serious concern. There are solemn regional disparities among different states of our country. Similarly, we have regional inequalities among different regions in a state. Even in a district, there are disparities among different blocks. India is a large federal nation and it is well known that there are wide disparities in the levels of economic and social development between the different regions of the nation. The extent of regional inequality generally arises as an economy shifts from agriculture to manufacturing, but the degree of the shift may depend on the rapidity by which consumers increase their expenditure shares in manufacturing [3].

The identification of backward regions is a significant policy procedure of every planning process of the Indian economy. It begins from the 9th plan (1997-2002) and the 10th plan (2002-2007). Thus in this concern, the policymakers have been preparing village plans by collecting village requirements at block levels, and finally, they are put together at the district level for

district plans. But such attempts were confined only on paper. Removal of regional imbalance in development has remained the avowed goal of planning in India. In such a scenario it is important to identify the backward regions of the country, state, and even at the district level in terms of sectorial development of major components as well as to measure the level of disparities amongst different regions.

Most of the existing studies do not highlight the inter-district or inter-region variation in agricultural development and view mainly in terms of the overall state or just one region of it but, contribute to finding the variables that should be taken to measure the level of agricultural development in different regions of the state. No logical attempt has been made to analyze and classify the imbalances in agricultural development by underlying indicators. Against this backdrop, this study attempts to take care of some recent issues of agricultural development in Tamil Nadu. In such a scenario, it is important to identify the backward regions of the country, state, and even at the district level in terms of the development of major components as well as to measure the level of disparities amongst different regions. The present study also gets hints and impetus from the study done so far in identifying the appropriate indicator and bridging the gap in the literature about the comprehensive treatment of agricultural imbalances. In the light of this perspective, the present study has great relevance and significance in national as well as regional context.

1.1. Recent scenario of Agricultural growth in Tamilnadu

Agriculture is the primary source of livelihood for more than 60 percent of the population of the state of Tamil Nadu. Tamil Nadu performed well ahead of other major states in terms of the productivity of important crops. It ranked second in the productivity of paddy next to Punjab and came first in the yield of maize and oilseeds. The performance of the state as a whole is commendable. Moreover, as compared with the inter-state level, the expansion of agricultural development of the state is being elevated but there is no much significance at the inter-district level. As of, Tamil Nadu economic appraisal report of 2014-15, the growth oscillations of food production in 2011-12 has been interrupted due to the severe drought conditions caused by a large rainfall deficit and the non-release of water in the Cauvery by Karnataka during 2012-13 [4].

II. REVIEW OF LITERATURE

There have been many attempts in the prevalence of the issue of regional disparities in development and observed wide disparities as insists that there is a significant relationship between economic development and occupational structure [5]. The development will take place with a reduction of the proportion of the population engaged in the primary sector and an increase in that employed in non-agricultural activities. This relationship between economic development and change in the structure of employment is empirically proved. The empirical studies conducted by [6] of the U.S.A, [7] and [8] for the U.K. have proved the hypothesis. Studies show that a few regions have experienced a relatively high rate of growth over time, resulting in a high level of development in comparison to other regions, which have experienced a slower rate of growth and a low level of development. Economists often believe that regional imbalances are inherent in the process of development. According to the [9], structural changes and organization are a crucial factor, which determines economic development of the economy. In Agrarian countries, the structural changes mean a reduction in the proportion of the rural population in the agriculture sector has to be reduced, and simultaneously other non-agriculture sectors will have to be expanded.

In [10] his growth pole theorem made clear the fact that “growth doesn’t appear everywhere at the same time, it spreads by different channels and with variable terminal effects for the economy as a whole”. Once the growth pole has appeared, powerful forces make for a spatial concentration of economic growth around the initial starting points. The growth pole is filled by one or more dynamic industries, which attract service and linked industries offering imputes or taking inputs from them and as this relationship grows, so do economies, which serve to attract a wider spectrum of industries. Social indicators are often referred to as the basic needs for development. The direct provision of such basic needs as health, education, food, water, sanitation, and housing affects poverty more than per capita GNP strategy.

One of the important theories of regional disparities in the "Concentration-cycle hypothesis" developed by [11], [12]. This hypothesis states that regional disparities diverge initially and the forces of divergence as backwash effects and the forces of convergence as spread effects. Myrdal concentrates his attention on the divergent phase. Myrdal hypothesized the cumulative causation. He pointed out that economic and social forces will create cumulative expansion in the favored multiplier effect will cause increasing return in one region at the expense of the surrounding region. Alonso also keeps the same view and holds that the emergence of town and its growth is a feature of divergent phase. [13] feel that the basic forces inducing development are disequilibrium in nature. Once the process of divergence starts often it will further be accelerated as a result of new development. Myrdal recognizes that the spree effects are stronger when the economy develops and the backwash effects are more powerful than the spread effects in the beginning. [14] analyzed regional disparities in socio-economic development in Tamil Nadu based on composite index analysis for 1994-95. The study has observed wide disparities in the levels of development among different districts and also found northern and North-eastern districts were better [15].

Finally, this study recommended that to examine and evaluate the level of development at a lower level says taluka or block level would be useful. [16] Analyzed regional disparity in the agricultural development of Maharashtra. The study has found that the inequality, across the regions in the last three decades in agricultural development in Maharashtra [17] assessed that the pattern of disparities in socio-economic development at the district level in India. For this analysis, he used the Wroclaw Taxonomic technique based on the optimal combination of selected socio-economic development indicators. This study observed wide disparities which exist among different districts within and between regions. Finally, the study suggested that low developed districts require improvement in most of the indicators for enhancing their levels of overall socio-economic development. [18] Investigated agricultural imbalance in Tamil Nadu by using Principal Component Analysis (PCA) techniques with nine indicators. This study suggested that the problem of imbalance should be viewed and tackled at area-levels and macro-level planning should be area-based planning which would take proper care of the disparity of different areas to frame their potentialities, needs, and priorities to ensure regional imbalance. The agriculture productivity index values were calculated using Crop Productivity Index (CPI), Enyedi's method based on these the researcher identified and differentiated the productivity regions as High Productivity Region (HPR), Moderate Productivity Region (MPR) and Low Productivity Region (LPR) [19].

III. DATA AND MODEL DESCRIPTION

The study is entirely based on secondary data and it has brought into the analysis of two points of time i.e. 2008-09 and 2017-18. The sources of the data were obtained from Tamil Nadu economic appraisals, Human development reports, and Statistical Hand Books for each district of Tamil Nadu, etc. Thirty-one districts of Tamil Nadu were incorporated in the study. The study has taken seven agricultural development indicators. The years have been chosen to observe the decennial variation, which is a reasonable time frame for the policy to get translated into actual plans and see its consequent impact on different indicators of development. It was not possible to take back exercise, because of insufficient data on all selected variables, for which certain adjustments had to be made. In the case of 2007-08 and up-to-date data on some selected variables are not available and this study has been expelled purely urban district i.e. Chennai.

Development Agricultural Indicators

The composite indices of agricultural development for different districts have been obtained by using the data on the following indicators:

1. Net area sown under food crops in Hectares
2. Net area irrigated under food crops in Hectares
3. Area under food crops (Paddy)
4. Fertilizers consumption (N+P+K) in Million Tonnes
5. Agricultural labour (2001 and 2011 census)
6. Number of Regulated Markets
7. Number of Electrified pump sets

IV. METHODOLOGY

A single factor cannot be evaluated completely with any development. Besides, several indicators when analyzed individually do not provide an integrated and easily understandable portrait of the reality. Therefore, it is necessary for building a composite index of development based upon the optimal combination of different development indicators. There are numerous methods used for instance, the Coefficient of regional imbalances, Principal Component Analysis (PCA), Index of Regional Imbalance, Index of Backwardness, and Index of Inter-regional Variation Development of the Region) for merging the consequences of various indicators. Whereas one cannot refuse the utility of these methods but most of these methods are having their limitations.

4.1. The Coefficient of Regional Imbalances

The coefficient of imbalances is defined and used because of its sensitivity to the choice of norm region unlike the coefficient of variation which is neutral to scale. A higher norm reduces imbalances and the value of the coefficient when the balance ratio is greater than unity and vice versa. The important use of the coefficient of imbalance lies in testing the representative character of the balance ratio at the aggregative level. The coefficient of imbalance has operational significance in deciding priorities among different relative indicators. The objective of balanced development suggests higher priorities to the relative indicators having higher coefficients.

4.2. Index of Regional imbalance of the Region

The index of regional imbalance is a summary measure describing the imbalances given regarding a particular norm-region and specified relative indicator. It has no operational utility. As such it is used as comments only.

4.3 .Index of inter-regional Variation

This technique has been used by the planning commission of India for analyzing inter-regional disparities. This technique takes the absolute value of the indicators and is therefore not able to make consideration for variation in the regions. It lacks operational utility.

4.4. Index of Backwardness

The index of backwardness indicates to what extent a region lags in the process of development in comparison with the economy. This technique does not take full account of all dimensions of development and again it does not quantify the intensity of regional imbalances.

4.5. Principal Component Analysis (PCA)

This technique explicitly takes into account the problem of Multicollinearity among original indicators by orthogonalization of the whole set of variables and gives objective mathematical weights for construing a composite index. It is quite a sophisticated one but is not suitable if the variable indicators are artificial orthogonal variables not directly identifiable with a particular economic magnitude, one cannot attach any specific economic measures to them.

4.6. Measuring the Level of Development

There have been several studies that were approved with the use of the composite index of development as [19], [20] have suggested its relevance and suitability. Moreover, the present paper has kept in mind the flaws and inappropriateness of the aforementioned techniques. Therefore, the present study has chosen the following technique.

4.7. Composite Index of Development (CID)

The various steps involved in the computation of the composite index of development are presented below:

Let $[X_{ij}]$ be the data matrix giving the values of the variables of the ith district $i = 1, 2, 3, .. n$ (number of districts) and j^{th} indicators $j = 1, 2, 3, .. k$ (number of indicators). For combined analysis is transformed to $[Z_{ij}]$ as follows:

$$[Z_{ij}] = \frac{X_{ij} - \overline{X}_j}{S_j}$$

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Where,

X_{ij} = mean of the jth indicator

S_j = Standard deviation of jth indicator

$[Z_{ij}]$ is the matrix of standardized indicators.

From $[Z_{ij}]$ is identifying the best value of each indicator. Let it be denoted as Z_{oj}. The best value will be either the maximum value or minimum value of the indicator depending upon the direction of the indicator on the level of development. For obtaining the pattern of development C_i of i^{th^h} district, first calculate P_{ij} as follows:

$$P_{ij} = (Z_{ij} - Z_{oj})^2$$

Pattern of development is given by

$$C_i = \sqrt{\sum_{j=1}^{k} \frac{P_{ij}}{(CV)_j}}$$

$(CV)_j$ = Coefficient of Variation in X_{ij} for j^{th} indicator Composite index of development is given by

$$D_i = \frac{C_i}{C}$$

$$C = \overline{C} + 3S_{Di}$$

$$\overline{C} = \text{Mean of} C_j$$

$$S_{Di} = \text{Standard Deviation of } C_i$$

Smaller value of D_i will indicate high level of development and higher value of D_i will indicate low level of development.

V. RESULTS AND DISCUSSIONS

The Level of Agricultural Development

The Composite Indices (CI) of development have been worked out for different districts for agricultural development. The districts have been ranked basis on Development Indices (DI). Table 1 presents the composite indices (CI) of development along with the ranks of different districts (Fig. 1 and Fig. 2).

It can be observed from Table 1, the 31 districts of Tamil Nadu studied, the district of Villupuram was ranked first in 2008-09 and the district of Nilgris was ranked last in agricultural development in terms of selected variables. The value of composite indices varied from 0.38 to 0.97 and also observed from the results of composite index analysis is that Villupuram is topped whereas the district of Nilgris was last. The composite indices of development varied from 0.24 to 0.96. As compared to 2008-09 and 2017-18 the districts of Villupuram and Nilgiris persistently have been secured first and last respectively and the rest of the districts are being varied based on the selected indicators of agricultural development in Tamil Nadu.

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Table 1: Composite Indices of Development

S .No.	Districts	2008-09			2017-18		
		CI	DI	Rank	CI	DI	Rank
1	Ariyalur	1.3565	0.95023	29	1.23664	0.86352	27
2	Coimbatore	0.83368	0.58399	5	0.89995	0.62842	13
3	Cuddalore	0.85055	0.59581	7	0.71653	0.50034	5
4	Dharmapuri	1.06218	0.74406	17	1.07499	0.75064	22
5	Dindigul	0.96356	0.67497	11	0.88638	0.61895	11
6	Erode	0.70563	0.49429	2	0.77029	0.53788	6
7	Kancheepuram	0.98475	0.68981	13	1.11805	0.78072	24
8	Kanniyakumari	1.30977	0.91749	28	1.31475	0.91807	30
9	Karur	1.2324	0.86329	26	1.27794	0.89237	29
10	Krishnagiri	1.27066	0.89009	27	1.03599	0.72341	16
11	Madurai	1.04419	0.73145	16	1.09768	0.76649	23
12	Nagapattinam	0.99805	0.69913	15	0.87733	0.61262	10
13	Namakkal	1.12845	0.79047	20	1.06947	0.74679	20
14	Nilgris	1.39248	0.97543	30	1.38841	0.9695	31
15	Perambalur	1.11747	0.78278	19	1.25362	0.87538	28
16	Pudukottai	0.97324	0.68175	12	0.96474	0.67366	15
17	Ramanathapuram	1.17415	0.82249	25	1.05229	0.7348	18
18	Salem	0.84469	0.5917	6	0.69437	0.48487	4
19	Sivagangai	1.16495	0.81604	22	1.13686	0.79384	25
20	Thanjavur	0.79202	0.55481	4	0.64945	0.4535	3
21	Theni	1.15159	0.80669	21	1.06231	0.74179	19
22	Tiruchirapalli	0.90002	0.63046	10	0.81121	0.56645	7
23	Tirunelveli	0.89852	0.62941	9	0.82019	0.57272	8
24	Thiruvallur	1.06734	0.74767	18	1.07461	0.75038	21
25	Thiruvannamalai	0.72662	0.509	3	0.63418	0.44283	2
26	Thiruvarur	0.98525	0.69016	14	0.89566	0.62542	12
27	Tuticorin	1.1683	0.81839	24	1.04223	0.72777	17
28	Vellore	0.88266	0.6183	8	0.85456	0.59672	9
29	Villupuram	0.54781	0.38374	1	0.35362	0.24693	1
30	Virudhunagar	1.16753	0.81785	23	1.18634	0.8284	26
31	Thiruppur	NA	NA	NA	0.95028	0.66356	14

Source: Author's Calculation

A simple ranking of the districts based on the level of development has been presented. This is sufficient for classification purposes. A suitable classification of the districts can be made by using the average level of development and its standard errors. The districts having the composite index equal to or less than (mean – 2SE) are classified in category I as developed districts. The districts with composite index lying between (mean ± 2 SE) are classified in category II as middle level of developed districts and the districts having the composite index equal to or greater than (mean + 2SE) are classified in category III as low developed districts are presented in Table 2.

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Table 2: Level of Development: Classification of Districts

Level of Development	2008-09	No. of Districts	2017-18	No. of Districts
I (Mean-2SE)	Coimbatore, Cuddalore, Villupuram, Vellore, Thiruvannamalai, Thiruvarur, Tiruchirapalli, Tirunelveli, Thanjavur, Salem, Erode	11	Coimbatore, Cuddalore, Dindigul, Erode, Nagapattinam, Salem, Thanjavur, Tiruchirapalli, Tirunelveli, Thiruvannamalai, Thiruvarur, Vellore, Villupuram	13
II (Mean±2SE)	Dharmapuri, Dindigul, Kancheepuram, Madurai, Nagapattinam, Namakkal, Pudukottai, Thiruvallur	8	Pudukottai, Ramanathapuram, Tuticorin, Thiruppur	4
III (Mean+2SE)	Ariyalur, Kanniyakumari, Karur, Krishnagiri, Nilgris, Perambalur, Ramanathapuram, Sivagangai, Theni, Tuticorin, Virudhunagar	11	Ariyalur, Dharmapuri, Kancheepuram, Kanniyakumari, Karur, Krishnagiri, Madurai, Namakkal, Nilgris, Perambalur, Sivagangai, Theni, Thiruvallur, Virudhunagar	14

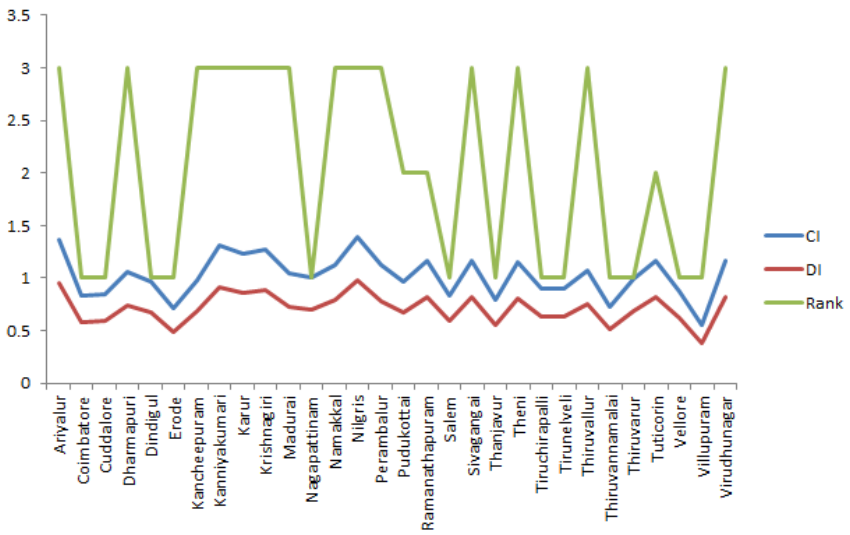

Figure 1. Visualization of Composite Indices, Development Indices and Ranks in the year 2008-2009

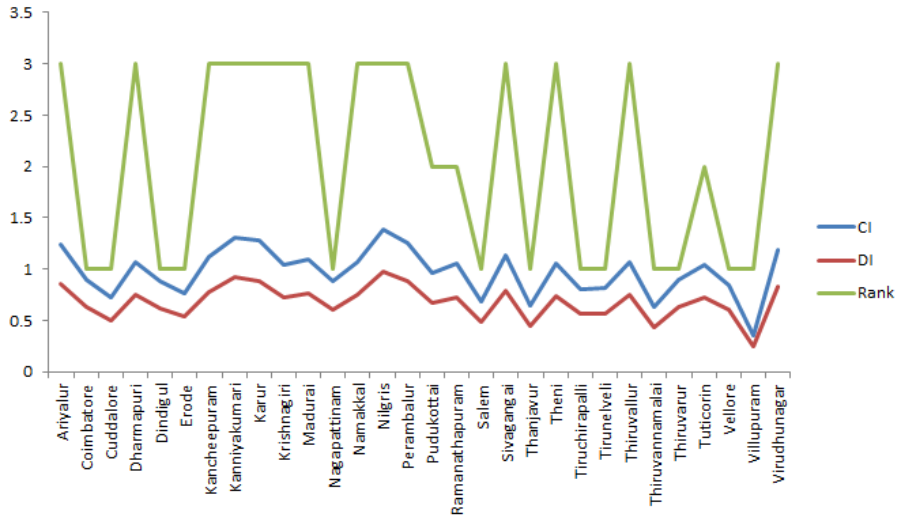

Figure 2. Visualization of Composite Indices, Development Indices and Ranks in the year 2017-2018

It would be quite interesting and examine the actual reasons for having backward districts in terms of relative influencing factors of agricultural development apart from those selected variables for the study. Although, here we have discussed the following districts which are having high composite index value as compared with two points of time 2008-09 and 2017-18.

1. Ariyalur

The district of Ariyalur is considered as the backward district and agriculture is the major bread earning activity. The major crops being cultivated are paddy, Groundnut, Sugarcane, Cashew nut, Drumstick, Onion, Cotton, and pulses. The net cultivated area is 1.02 lakhs Ha. The water sources are bore wells, open wells, canals, and river water. The mean of annual rainfall is 915 mm which is erratic, and irregularly hinders agricultural operation, and affects yield. Sugarcane is grown in and around the district as a major commercial crop. The predominant soil in the district is red soil with scatter packets of black soil. The soil in the district is best suited for raising dry crops. The district has high means of temperature and a low degree of humidity. This district has the Vellar River in the north and the Kollidam River in the south and it has no well-marked natural divisions [20].

2. Dharmapuri

Agriculture is the vital source of livelihood in this district. Almost 74 percent of the workforce is dependent on agriculture, 43% are cultivators, and the rest 31% agricultural laborers. The net sown area was 3.93 lakh Hectares in 1999-2000 and the gross cropped area was 4.70 lakh Hectares. The district is one of the most backward and drought-prone areas in the state. Paddy, Ragi, Pulses, Groundnut, Sugarcane, Cotton, Coconut, and Samai are the major crop cultivated. Dharmapuri is the major horticultural belt in the state. It has accounted for 12 % of the area under fruits in the state. In the view of agricultural development, its absorption only depends on the fruits and horticulture cultivation. Moreover in this district, there is no much exertion in paddy cultivation.

3. Kancheepuram

The total farming in this district is largely dependent on the monsoon. The northeast and southwest monsoons are the major donors, with 54 percent and 36 percent contribution each, to the total annual rainfall. During a normal monsoon, the district receives rainfall of 1200 mm. The Palar river is the most important river running through the district. Though most of the year it remains dry, attributed to the construction of dams across the river in Andhra Pradesh. The total forest area in the district is 23,586 hectares. Agriculture is the main occupation of the people with 47 percent of the population engaged in it. Paddy is the major crop cultivated in this district. Groundnuts, Sugarcane, Cereals & Millets, and Pulses are the other major crops cultivated. 76.50

Metric Tonnes lands are cultivated in fuelwood and 8.039 Tonnes in Cashew. Palar river along with tanks and wells are the main sources of irrigation in this district.

4. Kanniyakumari

The district comprises four out of the five traditional land categorizations namely the Kurunchi, Mullai, Marutham, and Neidhal. The district also represents a varied cropping pattern from Rice being cultivated in Yela condition to Tea and coffee cultivated in higher elevations. The district has a unique advantage of rainfall during both the southwest and northeast monsoons. The district of Kanniyakumari extends over a geographical area of 1, 67,200 Hectares with a net sown area of 74,712 Hectares which accounts for 44.6 percent of the total area. Paddy is the main food crop in the district. It is grown in two seasons (April-June and September - October). Pulses are raised as rice-fallows. The Black gram and Coconut are cultivated extensively in this district.

5 Karur

Karur district is a part of the Cauvery delta region and utilization of land area in the district is up to 44.59%. 4.76% of the land area remains as other uncultivated lands. 2.74% is forest area in the district. The district has a maximum area covered in cultivable waste with 65,536 hectares. Black soil is the predominant soil type in this district accounting for 35.51% followed by laterite soil for 23.85%. The principal crops of the district are paddy, millets, pulses, oilseeds, sugarcane and banana, oilseeds, tropical vegetables, and medi herbals. The average rainfall of the Karur district is 652.2 mm. The major rainfall occurs during the north-east monsoon. Intact the district is being covered by Amaravathy and Cauvery irrigation channel.

6. Krishnagiri

Krishnagiri district is one of the prospective districts of Tamil Nadu state for the cultivation of agricultural and horticultural crops. The total cultivated area of 2, 24767 Hectares, out of which 1, 80902 Ha of the net cultivated area against the 5, 14 325 Ha of total geographical area. The total normal area cultivated under all crops is 2, 24767 Hectares out of which 73,046 Ha is irrigated and 1, 51720 Ha area under rainfed crops. The major crops in the district are Paddy, Ragi, Red gram, Cowpea, Maize, Cumbu, Groundnut, Horse gram, and minor millets. The major cultivated areas of crops are rainfed. The total number of 2, 81733 farmers engaged in agriculture out of which 2, 13,023 are Marginal farmers (76%), 45970 are Small farmers (16%), remaining 4615 farmers (8%) are medium and large farmers.

7. Madurai

Madurai is traditionally an agrarian society, with paddy as the main crop. Cotton crop cultivation in the regions with black soil in this district was introduced during the Nayaka rule during the 16th century to increase the revenue from agriculture. The paddy fields cultivated in the Vaigai delta across Madurai North, Melur, Nilakottai, and Uthamapalayam are known as “double-crop paddy belts”. Farmers in the district supplement their income with subsidiary occupations like dairy farming, poultry-farming, pottery, brick making, mat-weaving, and carpentry. Madurai is illustrious for its jasmine plantations, called “Madurai Malli”, primarily carried out at the foothills of Kodaikanal hills and traded at the Madurai morning flower market. In terms of the yield rate of paddy apart from that other food, crops are very low because nearly 58 percent of the area is rainfed with fewer irrigation facilities, and some parts of the land having good irrigation conveniences.

8. Namakkal

Agriculture is the main occupation for most of the people in the district. It covers the geographical area of 3, 36719 Hectares. Of which the net area cultivated is 1, 41537 Hectares. Out of which about 60,939 Ha are irrigated and about 80,598 Ha are rainfed. The Mettur East Bank Canal covers an area of 4,585 Ha in Pallipalayam Block. The normal annual rainfall is 716.54 mm. Multi crops are grown in this district. Moreover, the district notably has 77 percent of red soil. The major soil series in Namakkal district are Irungur, Tulukanur, and Pilamedu. In this district on average, only 20 percent of food crops have been cultivated because of soil nature and lack of irrigation facilities.

9. The Nilgiris

The district is a horticulture district. The main cultivation of this district is plantation crops such as tea and coffee, but with some cardamom, pepper, and rubber too. The area also produces eucalyptus oil and temperate-zone vegetables. Potatoes and other vegetables are raised throughout Udhagamandalam and Coonoor Taluks. Paddy (rice), ginger, pepper, and rubber are grown in Gudalur and Pandalur taluks. Paddy is also grown in the Thengumarahada area in Kotagiri Taluk. Besides these crops, millet, wheat, fruit, and vegetables, etc. are also cultivated throughout the district. The crops are mainly rain-fed. There are no proper irrigation schemes in this district. In this connection, the district administration by enhancing the check dams have been constructed wherever possible to exploit natural springs, then it would be raised in the existing cultivation.

10. Perambalur

Agriculture is the primary occupation of the Perambalur district. The district has 1, 75,739 Ha of geographical area, of which 93,581 Ha is cropped area. Moreover, the district receives an average annual rainfall of 861 mm. Maize and Cotton are the important crops of this district which accounts for 80 percent of the total cultivated area. The district stands first in Maize and Cotton cultivation in Tamil Nadu. Perambalur is being rain fed that produces on an average of 4.0 lakh metric tonnes of food grains per year.

11. Theni

Agriculture continues to be the most predominant sector of the district economy, as 30 percent of the population is engaged in Agriculture and allied activities for their livelihood. The utilization of land area for cultivation in this district is 40.33 percent of the total geographical area. The Principal crops of this district are sugarcane and paddy, as compared with paddy the sugarcane production is very high. Despite this, the overall growth of agriculture is nominally high but it is being a very low contribution to District Domestic Product (DDP) because some parts of the district are having fertile land and well-irrigated facilities especially the land near Vaigai river belts and Cumbam valley.

12. Thiruvallur

Agriculture and allied activities were once the major occupations of the people in this district. But due to the use of modern technology in agriculture, the role of people has been reduced in agricultural production. In the Thiruvallur district agricultural types of machinery for plowing, tilling, sowing, weeding, and harvesting are very extensively applied. These technologies have slowly driven the agricultural laborers from their occupation. Irrigation is important for agricultural development. Kesathaliar, Aravar, Nandi, Kallar, Coovam, and Buckingham are the important sources of irrigation in this district. Since these rivers are seasonal and supply water only during rainy seasons, water facilities are not available for agriculture throughout the season. Hence, farmers have to depend on tanks, tubes, or open wells for water.

13. Virudhunagar

The area under cultivation of the district has 37 percent of the total geographical area. Agriculture provides sustenance to only 52 percent of the working population. The productivity of agriculture is influenced by numerous factors such as soil, climatic condition, irrigation facilities, regulated markets, and credit facilities, etc. The soils of this district are of poor productivity and are mainly black loamy soil which is locally called Karisal. The soil is not perfect for the cultivation of food crops, especially paddy. Moreover, we observed from the district that it has lacked in the sense of those irrigation facilities and most of the land depends on rain fed crops.

On detailed examination of agricultural development differences, it was found that the entire area of the district is not backward. Some parts of the district are low developed whereas other parts are well developed or middle level developed. Therefore, it would be desirable to examine and evaluate the level of agricultural development at a lower level say Taluka or block level. This will give an idea regarding the low developed part of the district where major improvements are needed in the selected indicators.

VI. CONCLUSION

The extensive findings and suitable policy implications emerging from the study with respect to selected indicators of agricultural development, the districts of Coimbatore, Cuddalore, Dindigul, Erode, Nagapattinam, Salem, Thanjavur, Tiruchirapalli, Tirunelveli, Thiruvannamalai, Thiruvarur, Vellore, and Villupuram were found to be better developed as compared to the remaining districts of the State. Most of these districts belong to the northern part and north-eastern part of the State. Similarly, the districts of Ariyalur, Dharmapuri, Kancheepuram, Kanniyakumari, Karur, Krishnagiri, Madurai, Namakkal, Nilgiris, Perambalur, Sivagangai, Theni, Thiruvallur, and Virudhunagar were low developed districts. Most of these districts belong to the western and southern parts of the State. The level of development in the rest of the districts was of middle-order but most of these districts were tending to improve in the pattern of development. Wide unevenness in the level of agricultural development has been observed in different districts. The northern and north-eastern part of the state was found to be better developed whereas some of the western and southern districts of the State were low developed.

To conclude this paper has recommended that if the government makes out and identifies the possible ways to enhance the developmental indicators of agriculture for the low developed districts then it would be reduced the regional differences. Furthermore, it would be useful to examine and evaluate the agricultural development at a lower level say taluks or block-level for making location-specific recommendations as the entire part of the most of the low developed districts is not low developed but some part is also better developed.

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