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An Economic Analysis of Crop Diversification in Villupuram District, Tamil Nadu

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ABSTRACT

Agriculture is one of the prominent sectors in Tamil Nadu providing livelihood support to 56% of the population. The state accounts 7% of the country's population and 4% of water resources of the country. About 56% of the total cropped area of the state is under irrigated while around 44% of the area is under dry land farming. The contribution of agriculture in SGDP is 13% in 2006-07. The principal crops raised in the state comprise of food crops like paddy, millets, pulses and oilseeds and non-food crops like cotton and sugarcane. The total cropped area and production of principal crops depend on quantum and spread of precipitation and availability of ground water.

Agricultural sector witnessed deceleration from 1990's onwards since the growth in agriculture face major constraints such as growing water scarcity, increasing land degrading, declining farm sizes and rise in cost of labour. Agricultural lands have also come under increasing pressure due to rapid urbanization. Moreover, the crop diversification underwent significant changes in the last two decades in area,

productivity, and production in agricultural sector. In Tamil Nadu agricultural sector underwent significant transformation especially the transition from the traditional crops to the commercial crops which envisages the prominent scope for crop diversification.

The measurements of the crop diversification generally used are the Herfindal Index, Entropy Index, & Modified Entropy Index. This paper used Herfindal Index & Entropy Index for measuring the diversification of crops in Villupuram District from 1998 to 2008.

I. Introduction and Statement of the Problem

The present study focuses on An Economic analysis of crop diversification in Villupuram District during 1998 to 2008. Villupuram District is chosen for the study because the coefficient of variation in cropping intensity is 5.07 which is found to be greater than the coefficient variation for Tamil Nadu State (2.15) during 1998-2008. Crop diversification minimizes the risk of crop failure that might result from the vagaries of the climate and also helps farmers increase their incomes. Crop diversification in India is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops. The crops shift also takes place due to governmental policies and thrust on some crops over a given time. Crop diversification and also the growing up of large number of crops are practiced in rain-fed land to reduce the risk factor of crop failures due to drought or less rain. Crops substitution and shift are also taking place in the areas with distinct soil problem, for example the growing of rice in high water table areas replacing oilseeds, pulses and cotton, promotion of soybean in place of sorghum in vertisoils. The present paper tries to measure the measure the extent of crop-diversification in Villupuram District which has both irrigated and dry land farming. (Palanisami, 2009)

II. Crop Diversification- Empirical Reviews

Ajman and Selvaraj (1996) analyzed the impact of crop diversification on the small tea growers in the Nilgris district of Tamil Nadu. The results showed that there had been a major shift in cropping pattern.

Pramod Kumar et al., (2005) in their study observed that the farmers are encouraged by various agricultural policies to incorporate high value crops in their cropping system. Nevertheless, it is often debated that the increased production has been accompanied by an increase in instability.

According to Pradeep Kumar Mehta, (2009), there are four dimensions of diversification – number of crops, spread of cropping pattern, proportion of high value crops in the cropping pattern and shift in cropping pattern mix. He examined the link between different dimensions of diversification and the growth of output in India, in the last three decades. The results showed that there was great heterogeneity, in terms of typology of diversification within states, with no clear – cut link of one type of diversification with income and risk pattern. The temporal picture showed that the role of crop diversification (change in crop mix) in the output growth is increasing in India, over time.

Prahadeeswaran et al., (2009) in their paper, using secondary data examined the patterns of crop diversification at the district level in Tamil Nadu during 1970-71 to 2005-06 for 40 crops. By applying Herfindal Index, they measured the crop diversification level in Tamil Nadu. They concluded that diversification level showed inter-district variations. They also suggested that agricultural development plans may be designed suitably for each district based on the nature and extent of crop diversification.

Saran and Kaur's (2002) study revealed that in almost all the districts in Punjab, specialization was mainly due to agricultural development. Availability of agricultural inputs and institutional factors and infrastructural facilities are essential for attaining most desirable land use patterns best suited to the region.

Vyas (1996), Kumar and Mruthyunjaya (2002) and Joshi (2005) explained that several states in India, showed patterns towards increased specialization in a few crops due to development initiative, a policy came under pressure, especially after the introduction of World Trade Organization (WTO) in 1995, that demanded reduction in support measures and subsidies. At the same time a sustained economic growth, rising per capita income

and growing urbanization caused a shift in the consumption patterns in favor of high value crops that also substantiated the role of diversification as a policy tool for development in the agricultural sector.

After reviewing a few articles on crop diversification, the present paper has formed the following objectives.

III. Objectives

1. To examine the changes in area cultivated under food and non- food crops during 1998-2008 in Villupuram District.
2. To construct the crop diversification index for food and non- food crops by choosing appropriate indicators.

IV. Hypotheses

1. Food crops show greater variation in area than non- food crops in Villupuram district during 1998-2008.
2. There is significant crop diversification of crops in Villupuram District during 1998-2008.

V. Methodology

The present study is based on secondary data. The information relating to the crop pattern at the district level is collected from Season and Crop Reports for a period of ten years from 1998 to 2008.

VI. Statistical Tools

Co-efficient of Variation

Co-efficient of variation in area under cultivation is calculated by using the formula

$$C.V. = \frac{\sigma}{\bar{x}} \times 100.$$

Crop Diversification Indices

There are several indices, which explain either concentration or diversification of activities in a given time and space by a single quantitative indicator. Important indices used to study the crop diversification are Herfindal Index (HI) Entropy Index (EI), Modified Entropy Index (MEI). This paper uses the HI and EI indices to measure the crop diversification in Villupuram District.

Herfindal Index

$$HI = \sum_{i=1}^{N} P_i^{\,2}$$

Where $P_i = \dfrac{\text{Area Under Crops}}{Gross\ Cropped\ Area}$

$$i = 1, 2, \ldots\ldots N$$

N = Number of Crops

Entropy Index (EI),

$$EI = -\sum_{i=1}^{N} p_i \ln (P_i)$$

$$P_i = 1/N \ (i = 1, 2, 3, \ldots N),$$

Where P_i $\dfrac{\text{Area Under Crop i}}{\text{Gross Cropped Area}}$

The value of HI is bounded by zero (Perfect Diversification) and one (Complete Specification). The value of HI approaches to zero as N becomes large and assumes value one when only one crop is cultivated. As the Index measures the degree of concentration, its deviation from unity measure the degree of diversification. On the other hand, EI tends to zero when there is a perfect concentration and value increases with increase in diversification of the crops. If value lies between zero and log N, then the upper limit of this Index depends on the base of logarithm and the number of crops (Shiyani, 1998).

ANALYSIS

Co-efficient of Variation Analysis for the Crops Grown in Villupuram District During 1998- 2008

In Villupuram district food crops viz, paddy, cholam, cumbu ragi, other millets, pulses, sugarcane and other food crops (sami, varagu, korra and maize) are grown traditionally. The district is also famous for the production of non-food crops especially sugarcane, cotton, gingelly and groundnut. The soil of the district is suitable for the production of above crops.

Food Crops

Bajra (cumbu): Bajra known as cumbu in Tamil Nadu is generally sown under rain fed condition in the state. Villupuram, Thoothukudi, Maduari, Thiruvannamalai, Virudhunagar together accounted for 71% of the total area under this crop during 08-09.

Korra crop accounted for 0.3% (813 ha) of the total area under other cereals. Major part of korra is grown in the districts of Salem, Villupuram, Cuddalore and Namakkal.

Varugu crop is mainly sown under rainfed condition in the districts of Cuddalore, Villupuram and Ariyalur. The area under varagu contributed 1.3% (4086 ha) of the total area under other millets.

Blackgram is one of the important pluses grown in both kharif and rabi seasons. It accounts for 49.2% of the total area under pulses. This crop is extensively grown in Nagapattinam, Cuddalore, Thiruvarur, Thoothukudi, Villupuram and Thanjavur districts and these districts together accounted for 80.2% of the total area under the crop during 08-09.

Villupuram, Erode, Cuddalore, Thiruvannamalai, Namakkal, Dharmapuri, Vellore and Salem district together accounted for 67.9% of the total sugarcane area of the state during 08-09 (Season and Crop Report, 2008).

Non-food crops

Groundnut is the major crop under oilseeds accounting for 8.4% of the total cropped area in the state during 08-09. It is raised as both rain fed as well as irrigated crop .Thiruvannamalai, Villupuram, Vellore, Namakkal, Salem, Kanchepuram, Erode and Pudukottai districts constitute 65.8% of the area under groundnut in the state during 08-09.

Gingelly next to groundnut and coconut, is the major oilseed crop in the state. Erode, Thanjavur, Karur, Cuddalore, Villupuram and Salem district accounted for 62.2% of the total area under this crop during 08-09.

The major cotton growing districts are Perambalur, Salem, Trichy, Virudhunagar, Villupuram and Madurai. These districts together accounted for 64.4% of the total area under cotton during 08-09 (Season and Crop Report, 2008).

Co-efficient of Variation in Area under Food and Non-Food Crops in Villupuram District during 1998-2008.

Inorder to analyse the variation in total area cultivated under food and non- food crops in Villupuram District, the co – efficient of variations are calculated and they are presented in Table -1 & Table-2. The Co-efficient of variation for food crops is 9.78 and for non- food crops it is 7.8.From the calculated co –efficient of variation values it is followed that the area cultivated under food crops show greater variation than the area under non- food crops. This is because the food crops need more and continuous irrigation than non- food crops. Depending on the availability of water the area is brought under cultivation. Scanty rainfall in some years results in lesser area under cultivation. For example in 2002, due to Northwest monsoon failure (only 343.1 mm) the area under cultivation is reduced from 2,79,150 hectares in 2001 to 1,87,985 hectares in 2002.

Likewise in the years 2004, 2006, 2007 and 2008 the rainfall were only 525.3, 599.3, 776.9 and 771.4 mms respectively. In the above stated years the area under cultivation was around 2,65,000 hectares. **Hence the formulated hypothesis that the food crops show greater variation in area than non-food crops in the district is validated.**

Measurement of Crop Diversification for food-crops using Herfindhal and Entropy Indices.

The measurements of the crop diversification generally used are the Herfindhal Index, Entropy Index and Modified Entropy Index. The HI and EI, values for the Villupuram District are presented in Table-3.

The Herfindhal Index for the district for all the years from 1998 to 2008 is nearer to .2, which indicates that the district has experienced crop diversification during 1998-1999 to 2007-2008. However, the index is within the range of 0.184 to 0.185. The Entropy Index for the district from 1998 to 2008 lies between 0.171 to 0.503. The higher values of this index again confirm the diversification of the crops in the district.

Measurement of Crop Diversification for Non- Food Crops using Herfindhal Index and Entrophy Indices

The Herfindhal Index for the district indicates that the district has experienced crop diversification during 1998-99 to 2007-2008. However, the index is within the range of 0.045 to 0.048. Entrophy Index for the district lies between 0.051 and 0.478. The higher value of this index again confirms the diversification of the crops in the district. **From the HI& EI indices calculated for food and non- food crops, it is followed that the second hypothesis framed in the study is validated.**

Conclusion

1. The co-efficient of variation in area analysis shows greater variation in area during 1998-2008 in Villupuram District. From the analysis it is followed that whenever west monsoon fails, the area under food crops cultivation was reduced by the farmers. At the sometime the shift of crop pattern towards non-food crops is not observed.
2. The Herfindhal and Entrophy indices show that there is crop diversification in the district. The HI value ranges between 0.18 to 0.19 and EI value ranges between 0.171 and .50 for food crops. Among the major food crops, depending upon the rainfall, paddy is grown in more area. If the district has scanty rainfall, the area is diverted from paddy to other food crops.

3. The HI and EI indices for Non- Food crops show that there is diversification among the Non- Food Crops grown in the district. The HI value ranges between 0.045 to 0.048.Entrophy index value ranges between 0.05 and 0.48. The index indicates that there is considerable crop diversification in the district among non- food- crops. If monsoon is favourable, more area will be allotted to cotton and sugarcane. Unfavourable monsoon results in the reduction in area under major non- food crops viz., cotton, sugarcane and groundnut.

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References

1. Ajjan, N. and K.N. Selvaraj (1996). Crop Diversification and its Implications in Tamil Nadu – A Micro Analysis, *Indian Journal of Agricultural Economics*, Vol.51, No.4, pp 695.
2. Barah, B.C. and Binswanger, H.P. (1982). *Regional Effects of National Stabilization Policies: The case study of India.* ICRISAT Economics Program Progress Report – 37, Patancheru, A.P., India
3. Birthal, Pratap Singh, P.K. Joshi, Devesh Roy and Amit Thorat (2007), *Diversification in Indian Agriculture Towards High Value Crops* IFPRI, Washington D.C. 2007.
4. Gulati, A and T.G. Kelley,1999: Trade Liberalisation and Indian Agriculture Cropping Pattern Changes and Efficiency Gains in Semi Arid –Tropics. Oxford University Press, New Delhi.
5. Hazra, C.R. (2005), *Crop diversification in India.* Ministry of Agriculture, Krishi Bhawan, New Delhi, India.
6. Joshi P.K. (2006), *Crop diversification in India: Pattern and Drivers.*
7. Lathar, R.K., R.N. Pandey and S.K.Goyal (1996). Diversification for Enhancing the Income on Marginal and Small Farms in Harayana, *Indian Journal of Agricultural Economics*, Vol. 51, No.4, pp. 691.
8. Palanisami, K., P. Paramasivam, C.R. Ranganathan P.K. Aggarwal, and S. Senthilnathan, (2009) *Quantifying Vulnerabilaity and Impact of Climate*

Change on Production of Major Crops in Tamil Nadu, India, From Headwaters to the Ocean – Hydrological changes and Watershed Management, Taylor & Francis Group, London, U.K. ISBN 978 – 0 – 415-47279-1 pp 509-514.

9. Prahadeswaran, C, Ramsamy,(2009) Changing Pattern of crop diversification and Evidence for Commercialization of Agriculture District Level Inquiry in Tamil Nadu. Agricultural Situation in India, April.
10. Saleth, R.Maria, (1995). *Agricultural Diversification in Tamil Nadu: Potentials and Prospects*, Institute of economic Growth, Delhi, pp 710.
11. Sharma, A.K., P. Metha and S.K. Sharma (1996). Evaluation of Risk, in Diversified Crop Farming of Himachal Pradesh –A Case Study of Vegetable Farms, *Indian Journal of Agricultural Economics*, Vol.53, No.4, pp 688.
12. Shiyani, R.L. and Pandya (1998). Diversification of Agriculture in Gujarat: A Spatio – Temporal Analysis, *Indian Journal of Agricultural Economics*, Vol.53, No.4, pp 627-639.
13. Singh, R.P and Barah and Binswanger, (1982)''Farm level Diversification in dry land regions of India". National Institute of Rural Development Hyderbad.

Table-1

Co-efficient of Variation in Area under Food Crops in Villupuram District during 1998 to 2008.

(Hectares)

Year	Area Under Food Crops
1998	2,97,106
1999	2,69,039
2000	2,63,668
2001	2,79,150
2002	1,87,985
2003	2,82,785
2004	2,77,316
2005	2,93,911
2006	2,72,458
2007	2,74,335
2008	2,66,764
Total	2,96,4517
Co-efficient of Variation	9.78

Source: Computed

Table-2

Co- efficient Variation in Area under Non-Food Crops in Villupuram District during 1998 to 2008.

(Hectares)

Year	Area Under Non- Food Crops
1998	1,52,111
1999	1,49,005
2000	1,45,134
2001	1,47,391
2002	1,30,296
2003	1,33,761
2004	1,43,750
2005	1,41,506
2006	1,15,412
2007	1,34,504
2008	1,25,244
Total	15,18,114
Co- efficient of Variation	7.8

Source: Computed

Table-3

Measurement of Crop Diversification For Food Crops using Herfindhal and Entropy Indices:

Year	Herfindhal Index(HI)	Entropy Index(EI)
1998	0.199	0.171
1999	0.198	0.333
2000	0.199	0.503
2001	0.193	0.253
2002	0.171	0.207
2003	0.469	0.208
2004	0.213	0.218
2005	0.217	0.202
2006	0.202	0.254
2007	0.184	0.272
2008	0.185	0.425

Source: Computed

Table-4

Measurement of Crop Diversification for Non- Food Crops using Herfindhal and Entropy Indices

Year	Herfindhal Index(HI)	Entrophy Index(EI)
1998	0.048	0.316
1999	0.062	0.051
2000	0.061	0.133
2001	0.061	0.349
2002	0.0925	0.094
2003	0.574	0.314
2004	0.060	0.114
2005	0.054	0.169
2006	0.043	0.059
2007	0.456	0.166
2008	0.045	0.478

Source: Computed

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