

AN ECONOMIC ANALYSIS OF CROP DIVERSIFICATION IN TAMIL NADU

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ABSTRACT

Crop diversification is considered as a resilience mechanism followed by farmers in different regions. In the present study, it is shown that there exists crop diversification of crops in various districts of Tamil Nadu State, India. This is done by constructing a crop diversification index which provides a basis for ranking the different districts. So in those regions which are more vulnerable for climatic change, more diversification of crops must be diversified in order to avoid risk of crop failure and loss of income and employment to the rural people.

INTRODUCTION

A society faced with diminishing natural resources and every increasing demand for food consumption and food security due to increase in population growth, agricultural intensification is the only course of action agriculture. for future growth of Agricultural intensification can be achieved by changes in cropping pattern or crop diversification. It is certainly an important component of the overall strategy for small farm development. It is usually viewed as a risk management strategy. It also provides for self provisioning in the context of nonmonetized traditional system. As market opportunities develop and or risks are somehow reduced, the enterprise mix begins to respond to market forces and it was this perspective which was more relevant in the context of altered economic environment. Agricultural diversification really started in the early eighties in India and it has picked up momentum over the

recent past and farmers were always quick to diversify into higher value crops as market opportunities developed.

To improve the incomes, to provide gainful employment and to stabilize the income flow, diversification of crops emerges as a major strategy. In several instances cropping systems have been diversified or new cropping systems have been introduced to retain or to enhance the value of natural resources principally land and water. There is also the claim that diversification tends to stabilize farm income at a higher and higher level. This happens when the pattern of diversification is such as to accommodate more and more rewarding crops. This is particularly important for the small farmers who strive to make their farms, viable (saleth, 1995).

The study suggested the establishment of agro processing industries and infrastructural facilities, arrangement for crop protection, construction, maintenance and management of irrigation works, research prioritization, distribution of quality seeds and seed materials of the specific crops in the specific zone on the basis of cropping pattern and need of the people of the region.

The study suggested that for achieving the gains of diversification of farming, there is an urgent need for further strengthening the required infrastructure pertaining to input supply system, marketing system and the existing research and extension programmes to increase the adoption of advanced production technologies.

Saini et al., (1996) in their study on the impact of diversification on small farms economy in Kangra district of Himachal Pradesh observed that the diversification of arable farming systems with commercial enterprises such as high yielding milk animals, poultry birds, beekeeping, floriculture etc, resulted in a marked increase in the farm income from 6 to 138 per cent. Similarly the capital and credit requirement showed an increasing trend with the extent of diversification implying thereby that to diversify the existing farming systems with the most systematically, remunerative and technically feasible enterprises, adequate facilities should be made available by the financial institutions.

Given the importance of crop diversification under the changing scenarios a study was undertaken to examine the crop diversification in Villupuram District, and to suggest suitable policy options for furthering the diversification towards the sustainability of agriculture in the region.

A main objective of this paper is to examine the patterns of crop diversification at the district level in Tamil Nadu since 1970-71. There were several studies relating to the crop diversification towards commercial crops and most of these were carried out during mid 1990s in different states of the country. Few studies crop diversification were also on conducted in selected district of Tamil Nadu (Ajjan and Selvaraj, 1996 and Sunderasan et al., 2002). These evidences showed that there has been a significant change in the cropping pattern and a shift from low value subsistence crop to high value market oriented crops in Tamil Nadu. Since the study results reveal the district wise crop diversification, it will be useful for district level land use planning and effective implementation.

This study relied on secondary data, which were collected from various issues of Season and Crop Report of Tamil Nadu. Information on area under 40 crops at district level for the period between 1970-71 and 2005-06 were used to analyze the growth in area, level of diversification and ranking the districts based on the diversification.

METHODOLOGY

Measuring Crop Diversification

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 corp diversification are Herfindal Indiex, (HI), Simpson Index (SI), Ogive Index (OI), Entropy Index (EI), Modified Entropy Index (MEI) and Composite Entropy Index (CEI). Shiyani and Pandya (1998) and Sundaresan et al., (2002) had applied more than one of the above indices to study the diversification of agriculture in Gujarat and coastal districts of Tamil Nadu respectively. Joshi et al., (2004) used Simpson Index of Diversification to study the patterns of agricultural diversification in South Asia. Due to the simplicity in computation and direct interpretation, the Herfindal index was employed in this study to examine the level of diversification. Modified Entropy index was used to rank the districts based on the degree of diversification.

The Herfindal Index is a measure of concentration. It is bounded by Zero and one: takes a value one when complete specialization and approaches to zero when there is diversification of crops. It was computed as given in equation (1); sum of squares of the acreage proportion of each crop in the total cropped area.

Algebraically,

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Where,

$$P_i = \frac{Area \ under \ Crop \ i}{Gross \ Cropped \ Area}$$

I=1,2....N

N=40 (Number of crops grown int eh district during the year).

Area under 40 major crops under different categories (cereals, pulses, oilseeds. commercial crops, vegetables, fruits, spices and plantations), total cropped area in 14 composite districts (Kancheepuram, South Arcot. North Salem. Arcot. Dharmapuri, Coimbatore, Trichy, Thanjavur, Pudukottai, Madurai, Ramnad, Tirunelveli, Nilgris and Kanyakumari) and state level from 1970-71 to 2005-06 were used in this study.

RESULTS AND DISCUSSION

Table- 1: Crops selected for the Co	mputation of Diversification Indices
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Cereals	Pulses					
Paddy, Sorghum, Pearl Millet, Finger	Balck gram, Horse gram, Green gram, Red					
Millet, Kodo millet, Maize and Foxtail millet	gram and Bengal gram					
Oilseeds	Commercial Crops					
Groundnut, gingelly, Sunflower Castor and	Sugarcane, Cotton and Tobacco					
Niger						
Vegetables	Fruits					
Onion, Tomato, Brinjal, Bhendi, Potato,	Banana, Mango, Guava and Lemon					
Tapioca, Sweet potato and Yam						
Spices	Plantations					
Chillies, Garlic, Turmeric and Coriander	Cocount, Cardamom, Coffee and Tea.					

Table- 2SPREAD INDEX OF CROPS AND CHANGE THE SHARE DURING SELECTED PERIODS IN TAMIL NADU

Crops	1970-71	1980-81	Net change	1980-81	1990-91	Net change	1990-91	2000-01	Net	1970-71	2005-06	Net
Cereals												
Paddy	35.69	35.54	-0.15	35.54	27.98	-7.56	27.98	32.60	4.62	35.69	31.80	-3.89
Sorghum	10.05	9.14	-0.91	9.14	8.16	-0.98	8.16	5.19	-2.97	10.05	639	-3.66
Pearl Millet	6.43	5.07	-1.36	5.07	4.13	-0.93	4.13	2.03	-2.11	6.43	165	-4.77
Ragi	3.84	3.04	-0.80	3.04	2.56	-0.48	2.56	1.99	-0.57	3.84	1.84	-1.99
Kodo millet	2.34	1.60	-0.74	1.60	1.48	-0.12	1.48	0.70	-0.78	2.34	0.57	-1.77
Maize	0.19	0.29	0.10	0.29	0.41	0.12	0.41	1.28	0.86	0.19	3.22	3.03
Foxtail millet	0.26	0.12	-0.14	0.12	0.11	-0.01	0.11	0.04	-0.07	0.26	0.03	-0.23
Pulses												
Black gram	1.32	2.78	1.46	2.78	4.81	2.04	4.81	4.31	-0.50	1.32	3.84	2.52
Horse gram	2.92	2.40	-0.52	2.40	2.20	-0.21	2.20	1.60	-0.60	2.92	1.14	-1.78
Green gram	0.84	1.50	0.66	1.50	2.13	0.63	2.13	2.00	-0.13	0.84	2.63	1.79
Redgram	0.85	0.93	0.08	0.93	1.69	0.76	1.69	0.99	-0.70	0.85	0.73	-0.11
Bengal gram	0.06	0.16	0.10	0.16	0.15	-0.01	0.15	0.09	-0.06	0.06	0.11	0.05
Oilseeds												
Groundnut	13.34	13.01	-0.33	13.01	14.52	1.50	14.52	10.96	-3.56	13.34	10.46	-2.88
Gingelly	1.80	1.56	-0.24	1.56	2.08	0.52	2.08	1.63	-0.45	1.80	123	-0.56
Sunflower	(=)	0.08	0.08	0.08	0.31	0.23	0.31	0.10	-0.20		0.31	0.31
Castor	0.12	0.15	0.03	0.15	0.40	0.25	0.40	0.45	0.05	0.12	0.14	0.02
Niger	0.004	0,02	0.01	0.02	0.02	0.00	0.02	0.03	0.02	0.004	0.00	-0.004
Commercials												
Sugarcane	1.54	2.83	1.29	2.83	3.51	0.68	3.51	4.94	1.43	1.54	3.77	223
Cotton	3.64	3.41	-0.23	3.41	3.61	0.20	3.61	2.66	-0.95	3.64	2.20	-1.46

Crops	1970-71	1980-81	Net change	1980-81	1990-91	Net change	1990-91	2000-01	Net change	1970-71	2005-06	change
Vegetables			another a					0.48	0.15	0.24	0.45	0.21
Onion	0.24	0.35	0.11	0.35	0.33	-0.01	0.33	0.48	0.15	0.2.1	0.43	0.43
Tomato		•			0.24	0,24	0.24	0.48	0.25		0.14	0.14
Brinjal	-	0.14	0.14	0.14	0.11	-0.03	0.11	0.16	0.00		0.08	0.08
Bhendi		0.03	0.03	0.03	0.05	0.01	0.05	0.10	0.05		0.00	-0.07
Potato	0.16	0.16	0.00	0.16	0.08	-0.08	0.08	0.09	0.01	0.10	1.99	1.36
Tapioca	0.52	0.82	0.30	0.82	1.15	0.33	1.15	1.64	0,49	0.52	1.00	1.50
Sweet potato	0.07	0.07	0.00	0.07	0.03	-0.03	0.03	0.02	-0.01	0.07	0.03	-0.04
Yam	1	0.02	0.02	0.02	0.02	0.00	0.02	0.03	0.01			
Spices	1.0							12.12			1.12	0.01
Chilli	1.12	1.11	-0.02	1.11	0.75	-0.36	0.75	1.19	0.44	1.12	1.15	0.01
Garlic	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00
Turmeric	0.28	0.27	-0.01	0.27	0.13	-0.13	0.13	0.52	0.39	0.28	0.37	0.09
Coriander	0.15	0.79	0.64	0.79	0.71	-0.07	0.71	0.39	-0.32	0.15	0.33	0.18
Fruits						1222	2227		0.70	046	1 383	0.72
Banana	0.66	0.97	0.31	0.97	0.91	-0.06	0.91	1.30	0.39	0.00	201	1.57
Mango	0.44	0.56	0.12	0.56	0.83	0.26	0.83	1.69	0.87	0,44	0.14	0.14
Guava	5 m	0.04	0.04	0.04	0.07	0.03	0.07	0.15	0.08		0.14	0.14
Lemon	-	0.04	0.04	0.04	0.08	0.04	80.0	0.12	0.04		0.14	0.14
Plantations	1									1.08	6.06	4 98
Coconut	1.08	1.73	0.66	1.73	2.71	0.97	2.71	5.07	2.36	1.08	0.00	0.02
Cardamom	0.06	0.08	0.02	0.08	0.04	-0.04	0.04	0.08	0.03	0.06	0.08	0.02
Геа	0.47	0.61	0.14	0.61	0.91	0.30	0.91	1.06	0.15	. 0.47		
Coffee	0.32	0.46	0.14	0.46	0.52	0.06	0.52	0.53	0.01	0.32		
Narcotics				2022		0.07	0.16	017	-0.03	0.15	0.10	-0.05
l'obacco	0.15	0.22	0.08	0.22	0,16	-0.07	0.16	0.13	-0.05	0.15		

 Table- 3

 SPREAD INDEX OF CROPS AND CHANGE THE SHARE DURING SELECTED PERIODS IN TAMIL NADU- (Continued)

Agricultural Situation in India

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0.53	0.55	0.54	a de la companya de l				
0.24		0.54	0.57	0.40	0.46	0.46	0.48
	0.24	0.19	0.21	0.15	0.17	0.20	0.20
0.28	0.26	0.24	0.26	0.12	0.16	0.13	0.15
0.13	0.12	0.12	0.11	0.09	0.08	0.07	0.04
0.08	0.11	0.11	0.09	0.09	0.09	0.08	0.07
0.12	0.13	0.04	0.04	0.02	0.03	0.04	0.05
0.13	0.14	0.13	0.12	0.11	0.12	0.13	0.09
0.55	0.52	0.51	0.50	0.41	0.52	0.49	0.49
	0.31	0.33	0.28	0.24	0.28	0.38	031
0.11	0.15	0.12	0.22	0.10	0.09	0.09	0.06
0.19	0.17	0.23	0.48	0.27	0.27	0.30	0.32
0.10	0.12	0.13	0.12	0.12	0.11	0.10	0.09
0.20	0.22	0.26	0.19	0.42	0.42	0.49	0.55
0.29	0.24	0.22	0.17	0.19	0.16	0.15	0.13
0.16	0.16	0.16	0.15	0.12	0.13	0.13	0.12
	0.13 0.08 0.12 0.13 0.55 - 0.11 0.19 0.10 0.20 0.29 0.16	0.13 0.12 0.08 0.11 0.12 0.13 0.13 0.14 0.55 0.52 - 0.31 0.11 0.15 0.19 0.17 0.10 0.12 0.20 0.22 0.29 0.24	0.13 0.12 0.12 0.08 0.11 0.11 0.12 0.13 0.04 0.13 0.14 0.13 0.13 0.14 0.13 0.55 0.52 0.51 - 0.31 0.33 0.11 0.15 0.12 0.19 0.17 0.23 0.10 0.12 0.13 0.20 0.22 0.26 0.29 0.24 0.22 0.16 0.16 0.16	0.13 0.12 0.12 0.11 0.08 0.11 0.11 0.09 0.12 0.13 0.04 0.04 0.13 0.14 0.13 0.12 0.55 0.52 0.51 0.50 - 0.31 0.33 0.28 0.11 0.15 0.12 0.22 0.19 0.17 0.23 0.48 0.10 0.12 0.13 0.12 0.20 0.22 0.26 0.19 0.29 0.24 0.22 0.17 0.16 0.16 0.16 0.15	0.13 0.12 0.12 0.11 0.09 0.08 0.11 0.11 0.09 0.09 0.12 0.13 0.04 0.04 0.02 0.13 0.14 0.13 0.12 0.11 0.55 0.52 0.51 0.50 0.41 - 0.31 0.33 0.28 0.24 0.11 0.15 0.12 0.22 0.10 0.19 0.17 0.23 0.48 0.27 0.10 0.12 0.13 0.12 0.12 0.20 0.22 0.26 0.19 0.42 0.29 0.24 0.22 0.17 0.19 0.16 0.16 0.15 0.12 0.12	0.13 0.12 0.12 0.11 0.09 0.08 0.08 0.11 0.11 0.09 0.09 0.09 0.12 0.13 0.04 0.04 0.02 0.03 0.13 0.14 0.13 0.12 0.11 0.12 0.55 0.52 0.51 0.50 0.41 0.52 - 0.31 0.33 0.28 0.24 0.28 0.11 0.15 0.12 0.22 0.10 0.09 0.19 0.17 0.23 0.48 0.27 0.27 0.10 0.12 0.13 0.12 0.12 0.11 0.20 0.22 0.26 0.19 0.42 0.42 0.29 0.24 0.22 0.17 0.19 0.16	0.13 0.12 0.12 0.11 0.09 0.08 0.07 0.08 0.11 0.11 0.09 0.09 0.09 0.08 0.12 0.13 0.04 0.04 0.02 0.03 0.04 0.13 0.14 0.13 0.12 0.11 0.12 0.13 0.55 0.52 0.51 0.50 0.41 0.52 0.49 - 0.31 0.33 0.28 0.24 0.28 0.38 0.11 0.15 0.12 0.22 0.10 0.09 0.09 - 0.31 0.33 0.28 0.24 0.28 0.38 0.11 0.15 0.12 0.22 0.10 0.09 0.09 0.19 0.17 0.23 0.48 0.27 0.27 0.30 0.10 0.12 0.13 0.12 0.12 0.11 0.10 0.20 0.22 0.26 0.19 0.42 0.42

Table- 4: CROP DIVERSIFICATION AT DISTRICT LEVEL IN TAMIL NADU: HERFINDAL INDEX COEFICENTS

Crop Diversification and Ranking the Districts

Herfindai index is sensitive to the number of crops grown in the year and their share to the total cultivated area in the district. Hence, diversification will not be demonstrated unless the change in number of crops cultivated in the year and their share to total cultivated area in the region is adequately strong to drive the crop diversification. It is also important to note that changes in individual crop acreage as well as in total- cultivated area are taking place simultaneously, which determine the varying level of crop diversification for different regions at different points of time.

Crop agriculture was found highly diversified at the state level. It was understood from Table 4 the calculated Herfinidal Index coefficient at State level, showed that the crop diversification was high (0.16) during 1970-71 and slowly moving towards diversification (0.13) during the period recent (2005-06). However, the diversification level showed variations at the districts level (Table 2). Among the districts in Tamil Nadu. Thanjavur, Kancheepuram, Pudukottai, Kanyakumari and North Arcot districts exhibited less diversification with the index coefficients of 0.54, 0.53, 0.31, 0.29 and 0.28 respectively, during the period 1970-71. Agriculture in Kancheepuram, Kanyakumari and North Arcot districts became more diversified as the Herfindal coefficients declined to 0.48, 0.13 and 0.15 respectively for the above districts during the year 2005-06. Similar trend was reported by an earlier study conducted by Sundaresan et al., (2002). But Pudukottai district has become less diversified which was indicated by the measure of diversification varying between 0.24 and 0.38 during the above periods. Area under minor millets, onion, paddy and sorghum has declined and there was a significant growth in area under green gram, sugarcane, mango and coconut in Kancheerputam distict. Similar pattern was also observed in North Arcot district. In Kanyakumari district, millets, pulses, cotton, mango and tapioca witnessed a decline in area under these crops while coconut and banana gained their acreage significantly. These changes were adequately strong to diversify the crop activities in these districts after the period 1990-91.

Crop activity in Dharmapuri, tirunelveli, Madurai, Coimbatore, Salem and Trichy districts was highly diversified and this fact was supported with the coefficients of 0.08, 0.10, 0.11, 0.12, 0.13 and 0.13 respectively, for the five years interval starting from 1970-71. Among the highly diversified districts, Dharmapuri, Madurai and Salem were moving towards diversification over the years, while Coimbatore and Ramanathapuram became less diversified.

Crop diversification was moderate in south Arcot presently Cuddalore and Villupuram Districts and Nilgris districts during 1970-71. become less Nilgris district diversified (specialization), which was indicated by increasing measure of diversification. However, agriculture in South Arcot has been slowly diversified over the years. Diversification pattern in South Arcot was almost similar to that of Dharmapuri district but the change was almost similar to that of Dharmapuri district but the change was adequate to diversify the crop activities slowly in the district over the years. Diversification pattern in Nilgris district was found unique in the State.

Districts like Trichy, Thanjavur and Tirunelveli were diversified at the same rate over the period of three decades. Herfindal Index has shown the pattern and the level of crop diversification at the district level.

CONCLUSION

Diversification level showed inter- district variations. For effective planning and implementation, agricultural development plans may be designed appropriately for each district based on the nature and extent of crop diversification

Though diversifications reduce the risk at farm level, it would discourage the specialization. Hence, promotional measures to encourage the commodity clutters and production efficiency and necessary. Specialization for instance, grapes in Theni district, turmeric in Erode district, mango in (Krishnagiri) Dharmapuri and Salem districts, maize in Perambalur and Dindigul districts, Chillies in Ramanathapuram district, banana in Tiruchirappalli and Tutcorin, tomato in Dharmapuri district, pepper, tea and coffee in Nilgris can be promoted.

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