INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY ADVANCED RESEARCH TRENDS
ISSN : 2349-7408
VOLUME II, ISSUE 2(2), SEPTEMBER 2015

A STUDY OF RURAL NONFARM SECTOR AMONG THE INDIAN STATES

M. SURESH
School of Economics, University of Hyderabad-46

ABSTRACT

There has been change in factor influencing the rural nonfarm sector among the various regions. There has attempt to the understand the pattern of the growth rural nonfarm sector among major Indian states and factor most influencing the growth of rural nonfarm sector using cluster and discriminate analysis for 2009-10

Introduction

There has been attempt to analysis the cluster or grouping among the Indian states. The multiplicity of rural –urban linkages and other variables influencing the agro-economy of the region, exert their impact in influencing the agro-economy of the RNFE in a given area. All the major states of the country is considered all the major states our country. It is easy to understand that a single variable cannot possibly the capture all the different aspects of the rural nonfarm employment the country. The use of the multiplicity of variables is quite unavoidable. The variables may be expected to be interdependent.

Keeping in the view of variables identified as determinants of RNFE in variables are considered to explore the rural nonfarm employment among the major Indian states. The variables considered for the purpose of their specification and relevance to RNFE are briefly examined.

The main variables for the cluster analysis

1) **Area under the food crops**- food crops supplies raw material for many agro-processing industries, food crop sector is related to rural non-farm sector by consumption and investment linkages(John Mellor 1976, Hazell and steven Haggblade (1991). The specification is total food crops under total cropped area. Food crops is considered as a vital determinant of Rural nonfarm employment among the states
2) **Area under the non-food crops**- farm and non-farm linkages have shown that the degree of commercialisation of agriculture influences the shares and growth of Rural nonfarm economy .Empirical studies have use the percentage of area under non-food crops as an index of commercialisation(Basant and Parthasarathy 1991, Murty and Durga 1992).It shows the commercialisation of the agriculture (Vaidyanathan 1986).It also show the urban linkages and growth of the modern nonfarm sector (Ranis and stewart 1993). The specification Non-foodcrops includes sugarcane and cotton under total cropped area

3) **Irrigation**- Agro economy is directly influenced by irrigation. Irrigation increases the land productivity and uses of modern inputs (Hazell and Haggblade 1991).It changes the agriculture through changing the cropping pattern, extension of cultivation and increases the cropping intensity (Vaidyanathan 1986).It is reason for commercialisation and mechanisation of farm (Peter Hazell and C. Ramasamy 1973). The variable is explained net irrigated area (by govt., private, tanks, tubewells and others)

4) **Occupational pattern**- Occupational patterns classified as cultivators, agricultural labourers, self employment in agriculture, self employed in non-agriculture and others Households. Occupational groups helps in understanding the growth of the rural nonfarm sector among the different states.

5) **Unemployment rate in rural areas**-It helps in understanding the distress in rural areas. Unemployment rate show number of persons who unemployed in the rural areas show the distress led rural nonfarm sector growth in rural India. The specification is unemployment rate (15-59 years) in percent in rural areas

Data and Methodology:

The determinants for the study of rural nonfarm sector taken for NSSO Reports final report on employment and unemployment 2009-10. Hierarchial Cluster analysis is used for grouping the rural nonfarm sector. In hierarchial cluster analysis the vectors (case) are groups together on the basis of their mutual distances. A Hierarchial cluster analysis is visualized through a hierarchial tree called Dendogram. SPSS 20 Version has used for analysis the data.

Results of cluster analysis

There has attempt to identify the groups among states based some homogeneity by using Hierarchical cluster analysis.

Ward linkage

Agglomeration Schedule						
Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	2	14	50883.165	0	0	6
2	7	11	805583.210	0	0	9
3	1	10	1632959.415	0	0	5
4	4	12	2843633.740	0	0	7
5	1	5	4318845.068	3	0	6
6	1	2	6949781.062	5	1	10
7	4	9	10064408.230	4	0	8
8	3	4	16666958.407	0	7	10
9	7	8	32431591.109	2	0	12
10	1	3	49015884.980	6	8	11
11	1	6	82626541.176	10	0	13
12	7	13	171886304.947	9	0	13
13	1	7	486026361.581	11	12	0

In Agglomeration schedule the procedure is followed by cluster analysis at stage1 is to cluster the two cases that have the smallest squared Euclidean distance them. This process continues until all cases are clustered into a single group. This process helps to know the clustering into single cluster from 1 stage to 16th stage

Cluster membership among the states

It is proposed to group the states .It is considered all the major states of the our country

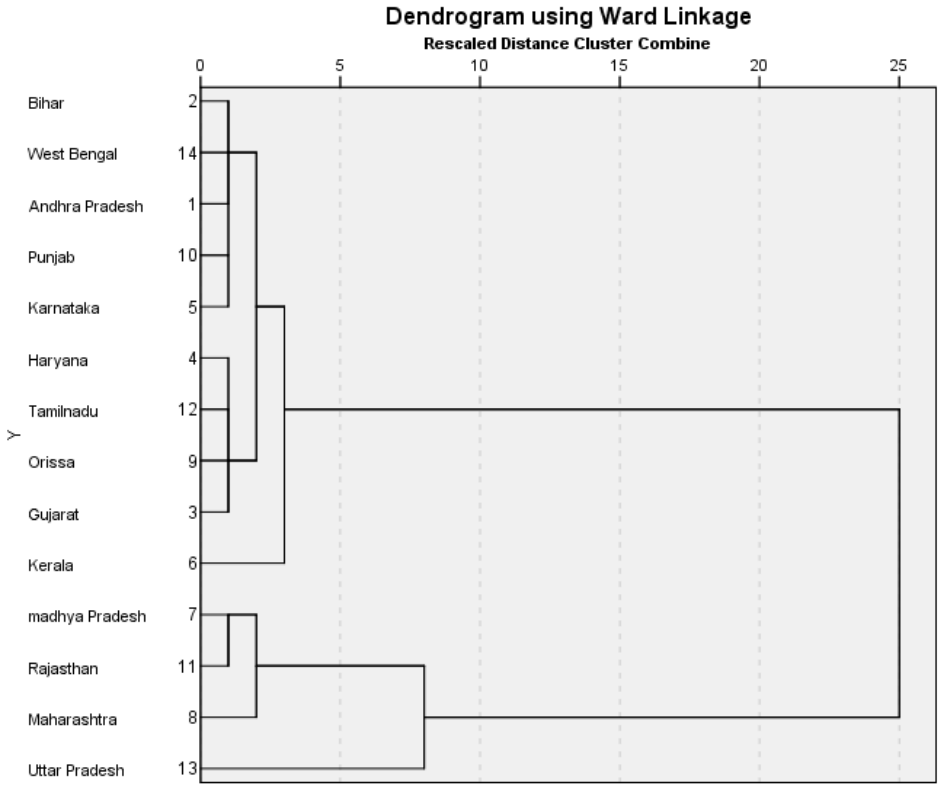
Cluster Membership	
Case	**2 Clusters**
1. Andhra Pradesh	1
2. Bihar	1
3. Gujarat	1
4. Haryana	1
5. Karnataka	1
6. Kerala	1
7. Madhya Pradesh	2
8. Maharashtra	2
9. Orissa	1
10. Punjab	1
11. Rajasthan	2
12. Tamilnadu	1
13. Uttar Pradesh	2
14. West Bengal	1

We can find some justification for the partition into 2 clusters from throughout that the states. The states within each reveals quite a bit of homogeneity with respect to the variable considered.

Majority of states coming under cluster 1 Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Orissa, Punjab, Tamilnadu and West Bengal groups. Madhya Pradesh, Maharastra, Rajasthan, Uttar Pradesh show some form of cluster. Further reasons have to be probed to know the reason behind the grouping of the different states together

Dendogram

Dendogram is tree structured graph to visual the results of the Hierarchical clustering, ward method is used which joins clusters based on minimizing the within-group sum of squares and will tend to produce compact clusters, x-axis is shows some measure of the similarity or distance at which clusters join.



Dendogram shows that under Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Orissa, Punjab, Tamilnadu and West Bengal forming under 1st cluster.Similarly 2nd cluster shows that Madhya Pradesh, Maharastra, Rajasthan and Uttar Pradesh coming under cluster 2

Discriminant analysis in the understanding rural nonfarm sector

The multiplicity of rural-urban linkages and a host of other variables influencing the agro-economy of the region, exert their impact in influencing the pattern and pace of Rural nonfarm employment in a given area. The variables selected for the discriminant functions for estimating the determinants of employment in rural manufacturing are;

1. Area under the food crops
2. Area under the non-food crops
3. Irrigation
4. Occupational pattern
5. unemployment rate in rural areas

Discriminant 2009-10 for the two groups

The chapter an attempt to analysis the determinants of RNFE among the states. There are multiciplicity of factors influence the growth of the Rural nonfarm sector among the states. To identify the characteristics of the states which are grouped as the highest level group and the lowest level group based on which states has highest growth in nonfarm sector based on various factors, using discriminate analysis is used, keeping the discriminating variables in each groups there are two discriminant functions as follows:

Discriminant analysis in the understanding rural nonfarm sector

The multiplicity of rural-urban linkages and a host of other variables influencing the agro-economy of the region, exert their impact in influencing the pattern and pace of Rural nonfarm employment in a given area. The variables selected for the discriminant functions for estimating the determinants of employment in rural manufacturing are;

1. Area under the food crops
2. Area under the non-food crops
3. Irrigation
4. occupational pattern
5. unemployment rate in rural areas

Group statistics

In discriminant analysis we are trying to predict a group membership so firstly, we examine whether there are any significant differences between groups on each of the independent variables using group means and ANOVA results data. The idea of variables that may be important can be obtained by inspecting the groups means and standard deviations.

Group Statistics			
States		Mean	Std. Deviation
1	Cultivators	244.900000	90.1029658
	Agrilabour	149.200000	40.9438640
	Seinagri	244.900000	93.4017012
	Otherlabour	185.300000	62.3057871
	Others	175.700000	60.4373873
	Unmale	2.150000	1.0309111
	Unfemale	4.940000	6.3697549
	Irrigate	2977.300000	1239.5643545
	Foodcrops	5039.800000	2241.0232683
	Nonfood	699.600000	872.0350656
2	Cultivators	345.750000	68.6506858
	Agrilabour	122.750000	21.7006144

	Seinagri	199.250000	78.5466952
	Otherlabour	184.250000	81.6144391
	Others	148.000000	23.3951562
	Unmale	1.200000	.4690416
	Unfemale	1.025000	.6075909
	Irrigate	7344.750000	4306.3503012
	Foodcrops	14503.000000	3706.4303582
	Nonfood	1843.500000	1720.1330375
Total	Cultivators	273.714286	94.5698184
	Agrilabour	141.642857	37.7228907
	Seinagri	231.857143	89.0020373
	Otherlabour	185.000000	64.9994083
	Others	167.785714	53.1386844
	Unmale	1.878571	.9924163
	Unfemale	3.821429	5.6163468
	Irrigate	4225.142857	3087.9611112
	Foodcrops	7743.571429	5131.1705324
	Nonfood	1026.428571	1223.4620307

Note: Area under the food crops (foodcrop), Area under the non-foodcrops (non-food), Irrigation (irrigate), occupation pattern (cultivators, SE in Nonagri, agrilabour, otherlabour, others), unemployment rate in rural areas(unmale, unfemale)

From this output we can find among variables (cultivators, agrilabour, seinagri, other labour, others, unmale, unfemale, irrigate, foodcrops, nonfood) etc in group1 states differ noticeable from group1 states to group2 states.

Tests of Equality of Group Means					
	Wilks' Lambda	**F**	**df1**	**df2**	**Sig.**
Cultivators	.750	3.999	1	12	.069
Agrilabour	.892	1.454	1	12	.251
Seinagri	.942	.736	1	12	.408
Otherlabour	1.000	.001	1	12	.980
Others	.940	.762	1	12	.400
Unmale	.799	3.026	1	12	.107
Unfemale	.893	1.435	1	12	.254
Irrigate	.560	9.415	1	12	.010
Foodcrops	.252	35.531	1	12	.000
Nonfood	.808	2.854	1	12	.117

Wilk's lambda is used to test for significant difference between groups. Wilk's lambdo is between 0 and 1. Wilk's lambda shows that variable which has highest importance in discrimination function as follows foodcrops (.252), irrigate (.560), cultivators (.750), unmale (.799), non-food(.808), agrilabour (.892),

unfemale (.893), others(.940), SEinagri (.942), other labours(1.000). Wilks's lamba, is significant by F test for all independent variables. Foodcrops (35.53), irrigate (9.4) has the high f value.

Box's Test of Equality of Covariance Matrices

The larger the log determinants in the table, the more that group's covariance matrix differs. The "Rank" column indicates the number of independent variables matrix differs. The "rank" column indicates the number of independent variables in this case .The box's test of equality of covariance matrices check the assumption of Homogeneity of covariance across the groups using P<.001 as a criterian.

Log Determinants		
states	Rank	Log Determinant
1	9	70.499
2	.[a]	.[b]
Pooled within-groups	9	73.091
The ranks and natural logarithms of determinants printed are those of the group covariance matrices.		
a. Rank < 4		
b. Too few cases to be non-singular		

Log determinants is significant so there is difference between the two groups.states groups are different.

Test Results[a]
Tests null hypothesis of equal population covariance matrices.
a. No test can be performed with fewer than two nonsingular group covariance matrices.

Variables Failing Tolerance Test[a]			
	Within-Groups Variance	Tolerance	Minimum Tolerance
others	2876.342	.000	.000
All variables passing the tolerance criteria are entered simultaneously.			
a. Minimum tolerance level is .001.			

Others variable has failed tolerance test while rest of the variable have passed tests.

Summary of Canonical Discriminant Functions

Eigen value indicates that proportions of the variable explained.a large eigenvalue is associated with a strong function .The canonical relation is a correlation between the discriminant scores and the levels of the dependant variable. A high correlation indicates a function that discriminates well.

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	7.752[a]	100.0	100.0	.941
a. First 1 canonical discriminant functions were used in the analysis.				

The is percent canonical correlation is .941 is very high (1.00 perfect)

Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.114	16.270	9	.061

Wilks lambda is the ratio of within groups sums of squares to the total sums of squares. This is the proportion of the total variance in the discriminant scores not explained by differences among groups. A lambda of 1.00 occurs when observed group means are equal (all the variance is explained by factors other than difference between those means), while a small lambda occurs when within groups variability is small compared to the total variability .a small lambda indicates that group means appear to differ. The associated significance value indicate whether the difference is significant. Here, the Lambda is .114 which means group is differ (sig=.001).

Standardized Canonical Discriminant Function Coefficients	
	Function
	1
Cultivators	1.743
Agrilabour	1.057
Seinagri	1.949
Otherlabour	2.426
Unmale	.822
Unfemale	-.433
Irrigate	.698
Foodcrops	-2.080
Nonfood	.621

The ‘canonical Discriminant function coefficients’ indicate the unstandardized scores concerning the independent variables. It is the list of coefficients of the unstandarized discriminate equation. Each subject’s discriminant score would be computed by entering his or her variable values (raw data) for each of the variables in the equation.

Structure Matrix	
	Function
	1
Foodcrops	-.618
Irrigate	-.318
Cultivators	-.207
Unmale	.180
Nonfood	-.175
Agrilabour	.125
Unfemale	.124
Others[a]	.091
Seinagri	.089
Otherlabour	.003
Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions. Variables ordered by absolute size of correlation within function.	
a. This variable not used in the analysis.	

Functions at Group Centroids	
States	Function
	1
1	1.630
2	-4.076
Unstandardized canonical discriminant functions evaluated at group means	

Functions at Group centroide indicates the average discriminant scores for subjects in the two groups. More specifically the discriminant score for each group when the variable means (rather than individual values for each subject) are entered into the discriminant equation.

Fisher linear discriminating functions

Classification Function Coefficients		
	States	
	1	2
Cultivators	1.587	1.471
Agrilabour	2.165	2.002
Seinagri	1.472	1.348
Other labour	2.591	2.386
Unmale	18.465	13.387
Unfemale	4.831	5.279
Irrigate	-.003	-.005
Foodcrops	-.016	-.012
Nonfood	.049	.046
(Constant)	-779.947	-682.578
Fisher's linear discriminant functions		

Fisher's classification coefficients are used to classify the cases between the groups. The coefficients of the independent variables which are shown for each case G1 and G2 is computed to know which group has highest.

Classification Results[a, c]					
		states	Predicted Group Membership		Total
			1	2	
Original	Count	1	10	0	10
		2	0	4	4
	%	1	100.0	.0	100.0
		2	.0	100.0	100.0
Cross-validated[b]	Count	1	8	2	10
		2	1	3	4
	%	1	80.0	20.0	100.0
		2	25.0	75.0	100.0
a. 100.0% of original grouped cases correctly classified.					
b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.					
c. 78.6% of cross-validated grouped cases correctly classified.					

Classification results is a simple summary of number and percent of subjects classified correctly and incorrectly. The leave-one-out classification is a cross-validation method of which the results are also presented. The 'leave –one – out classification 'is a cross –validiation method, of which the results are also presented.

This table is used to identify how well the discriminant function works and if its work equally well for each group of the dependant variables. 80 % of the case where classified under group 1 while 20% of the case were classified group 2. Group 1 states has higher in Rural nonfarm growth in the 2 states .states in group 1 follows as Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Orissa, Punjab, Tamilnadu and West Bengal. Among the 2 states as follows Uttar Pradesh, Rajasthan, Maharastra, Madhya Pradesh.

The Territorial Map

The territorial map provides a nice picture of the relationship between predicted group and two discriminant functions. It helps you to study the relationship between the groups and discriminant functions.

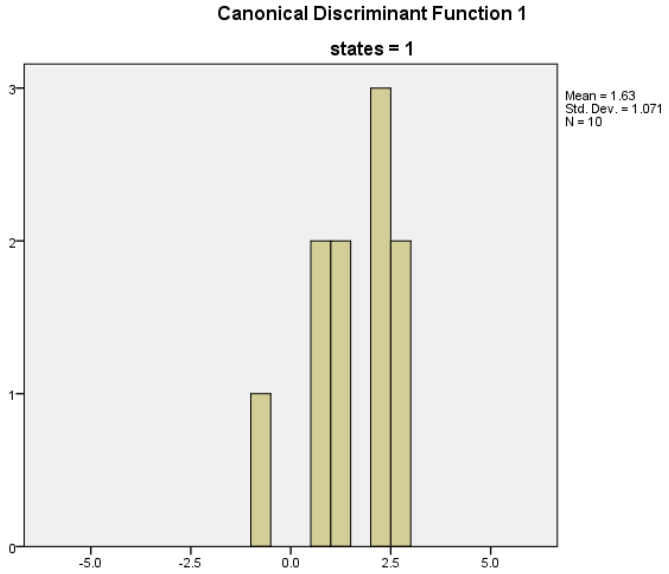
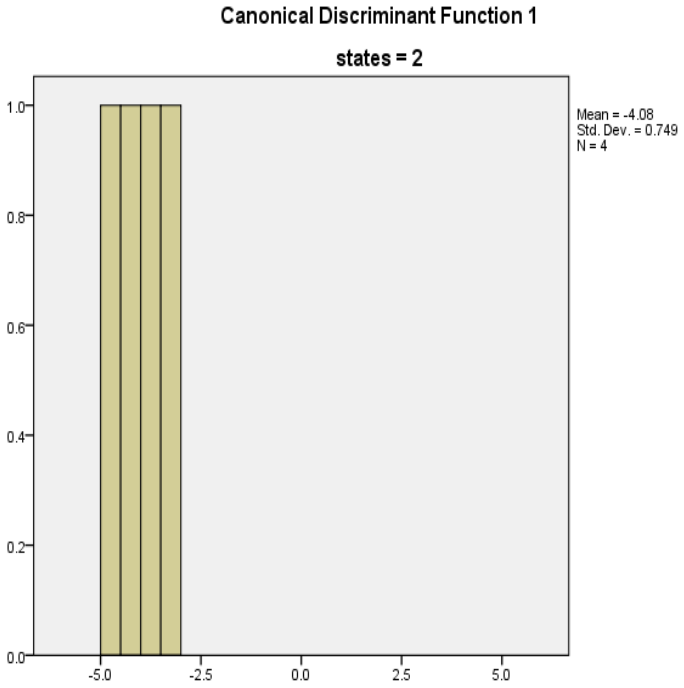


Chart 1 standard distance shows distance of data from mean.it shows that the states group 1 and discriminating functions is standard deviation is 1.071



The chart shows the standard deviation is 0.74. states group 2 are more near to average than group 1 states. states group 1 are more stable than group 2.

Conclusion

There It is difficult to analysis the Regional variations across the region within one framework. Distress and Growth across the region's major factors cause for the movements of labour from agriculture to non-agricultural sector.

1) States (Bihar, Chhattisgarh, Gujarat, Haryana, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Punjab, Rajasthan, Uttarkhand, Maharashtra, Tamilnadu and Orissa) group 1 showed the faster growth in the rural nonfarm employment compared to the Group 2 states which includes Rajasthan, Uttar Pradesh, Maharastra and Madhya Pradesh (see table 12).
2) The wilks's lamba importance of independent variable in discriminant function. wilk's lambda shows that variable which has highest importance in discrimination function as follows area under the foodcrops, irrigation, cultivators, unemployment rate among rural males, area under non-food, agricultural labour, unemployment rate among the rural females, others, Self employed among the non-agriculture and other labour .

BIBLIOGRAPHY

Mellor, John w (1976): The new economics of growth- A strategy for India and the developing world, cornell university press, Ithaca

Lewis, W.A (1954): Economic development with unlimited supplies of labour, Manchester School of economic and social studies, Vol 22, no 2, pp 139-91.

Vaidyanathan, A; 1986, labour use in rural India: a study of spatial and temporal variations' Economic and Political Weekly, Vol.21, No .52

Steven Haggblade, Peter B.R. Hazell, and Thomas Reardon, Introduction, Transforming the rural non-farm economy (Opportunities and Threats in the Developing world (edited Steven Haggblade, Peter B.R.Hazell and Thomas.

Dennis Anderson and Mark W.leiserson (1980), Rural nonfarm employment in developing countries, Economic Development and Cultural Change, Vol -28, No 2 (Jan, 1980) pp 227-248.

Enyinna Chuta and Carl Liedholm (1979) Rural non-farm employment: A review of the state of the art, MSU Rural Development, Paper no-4, 1979.

Peter B.R. Hazell and Steven Haggblade(1991), Rural-Urban Growth linkages in India, Indian Journal of Agriculture Economics, Vol -46, no-4, Oct-Dec, 1991, Pg 515-529

Vinoj Abraham (2009), Employment growth in rural India: Distress –Driven? Economic and Political Weekly, April 18, 2009, Vol XLIV no-16.

Peter Kilby and Carl Liedholm (1986), The role of Non-Farm Activities in The rural economy, EEPA Discussion Paper no-7, Nov, 1986.

McGee, T.G. (1971) rpt.1975, The Urbanisation Process in the Third World, London: G.Bells and Sons ltd.

Manoj Jatav and Sucharita Sen(2013), The Drivers of Non-farm employment in Rural India, Economic and Political Weekly, Vol XLVIII, No 26 and 27.

Gustav Ranis and Frances Stewart (1993). "Rural Nonagricultural Activities in Development: Theory and Application, " Journal of Development Economics, 40(1), pp. 75-101.

Jean O. Lanjouwb and Peter Lanjouw (2001). "The Rural Non-farm Sector: Issues and Evidence from Developing Countries, " Agricultural Economics, 26(1), pp. 1-23

Basant Rakeshand Kumar, B.L. (1989), "Rural Non-agricultural Activities: A Review of Available Evidence", Social Scientist, Vol. 17, No. 1/2 (January-FeBruary), pp. 13-71.

Barbara Hariss (1987), Regional Growth Linkages from Agriculture and Resource Flows in Non-Farm Economy, Economic and Political Weekly, Vol.XXII, Jan-02, 1987.

Hazell, P.B.R. and Haggblade, S. (1991), "Rural Growth Linkages in India", Indian Journal of Agricultural Economics, Vol. 46, No. 4, pp. 515-29.

Kuznets, Simon S. (1966), Modern Economic Growth: Rate, Structure, and Spread, Yale University Press, New Haven.

D. Jayaraj, (1989) Rural nonfarm employment: An analysis of the village level data for Tamil Nadu, MIDS Working Paper No.91

D. Jayaraj (1989) Determinants of rural non-agricultural employment, 1989, Working MIDS Paper No.90

Anderson, Dennis and Leiserson, (1978) Mark. Rural Enterprise and Nonfarm Employment, A World Bank Paper. Washington, D.C.: The World Bank.

Hart, Gillian. (1998). "Regional Linkages in the Era of Liberalization: A Critique of the New Agrarian Optimism," Development and Change. (29), pp.27-54.

Vyas, V. S. and G. Mathai (1978). 'Farm and Non-Farm Employment in Rural Areas: A Perspective for Planning' Economic and Political Weekly, 13(6&7): 333-47.

Basant Rakesh and Joshi Harish (1994), 'Non Agricultural Employment in India: Problems and Perspective', in P. Visaria and R. Basant (ed.) Non Agricultural Employment in India, New Delhi: Sage Publications.

The green revolution reconsidered: P. B. R. Hazell and C. Ramasamy, The Johns Hopkins University Press for the International Food Policy Research Institute, Baltimore and London, 1991.

Murty, C.S and C.Durga (1992) "Rural non-agricultural employment with reference to employment in Handloom weaving in Andhra Pradesh", Manpower Journal., Vol. XXVIII, No.3, December, pp. 5-21.

Chadha G.K(1986) Agricultural Growth and Rural Non-farm Activities: An analysis of India's experience in Rural Industrialisation and Non-farm activities" In YANG-BOO CHOE AND FUCHEN LO(ed.) Asian Farmers, Rural Economic Institute, Asian and Pacific Development Centre, Seoul, Korea, pp. 141-168.

Papola, T.S (1987)"Rural Industrialisation and Agricultural Growth: A case study on India", In Rizwanul Islam(ed.) Rural Industrialisation and Employment in Asia, International Labour Organisation, Asian Employment Programme(APTEP), New Delhi, pp.59-106.