

## Enhancing Small Holders Income through Income Diversification : An Evidence from Tamil Nadu

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### ABSTRACT

Agriculture is a dynamic source of income. More than one-third of economically active population depends on agriculture directly or indirectly for their livelihood. Tamil Nadu by tradition is an agricultural state which is inseparably reinforced by small and fragmented land holdings, having average size of holding about 0.80 hectares. Due to various reasons like changing climatic condition, rising input cost, unremunerative market prices, lack of labour, degrading natural resources and pest & diseases caused serious disaster in agriculture sector. Thereby, these factors have turned farming to be a non-viable proposition and often not profitable. Out of all the States in India, farmers in Tamil Nadu received an income below Rs.5,502 (GOI, 2016). Due to this, a greater number of farmers are moving out of farming which would cause serious crisis. Consequently, enhancing the livelihood status of farmers stands out to be fore most important factor. Hence, the research work was carried out with the main objective to examine the viability of small and marginal farmer's income. The non-farm and off-farm income sources have been found to contribute towards reduction in income inequality. Socio economic variables such as Education, Farming experience, Family size, credit and extension activity certainly influenced farmers to take up income diversification activity. Educating famers, enhancing their skill through various training programs, creating more productive assets are key to enhancement of farmer's participation in more income generating off-farm and non-farm activities.

*Keywords:* Income diversification, On-farm sector, Off-farm sector, Gini-coffecient, Logit model

**I**NCREASE in production and productivity can in no way be a solution to farmers realizing low income. A number of studies from developing countries suggested that diversification of rural economy towards non-farm activities has considerable potential to augment farmers' income and reduce rural poverty (Chand *et al.*, 2015; Singh, 2013 and Gecho, 2017). Income diversification is simply a process in which farming households create multiple income sources (Minot *et al.*, 2006; Chand, 2011 and Minithra, 2021). This paper evaluates the nature of income diversification, its effects and factors affecting income diversification.

### METHODOLOGY

#### Study Area and Data Collection

Based on Human Development Index,(HDI), which is the composite measure of attainment in three core dimensions of well-being: education, health and income, from Tamil Nadu state human development report

2017, It is evident that the bottom two positions of Human Development Index is obtained by Ariyalur (0.282) and Perambalur districts (0.447) respectively (State Planning Commission, Chennai, 2017) and also from analysis of district wise estimates of sectoral income revealed that among the thirty one districts, the primary sector income contribution was the lowest in Perambalur district at Rs.30572.29 followed by Ariyalur district at Rs.47211.39 during 2010-11, where the role of agricultural sector is predominant (Department of Economics and Statistics, Chennai 2015-16).With such supporting evidence, Ariyalur district was selected for the study. The multi-stage sampling method was adopted in the selection of the district as universe, blocks as a stratum, village Panchayats as a primary unit and the number of sample respondents as an ultimate unit. Ariyalur district consists of six development blocks, of which two blocks were selected which consisted of more number of village Panchayats. Primary data was collected from

115 farm households in Ariyalur district through pre tested interview schedule.

**Analytical Procedure**

The extent of income diversification is measured by employing Herfindahl index. It is constructed as the sum of squares of the shares of different income portfolios in the household.

$$HI = \sum_{i=1}^N P_i^2 ; \text{Herfindal Income Diversification Index } HIDI = 1 - \sum_{i=1}^N P_i^2$$

HI - Measure of concentration of diversification

P<sub>i</sub> -The proportion of the i<sup>th</sup> (=3 in this case) sources of income. The value of Herfindahl Income Diversification Index (HIDI) increases with the number of different income sources and approaches one if the number of income sources becomes very large (Minot, 2006)

For the purpose of determining HI, in the present study, different three specific income sources: On Farm Income-Income from crop cultivation and livestock income (dairy, sheet, goat and poultry). Off-Farm Income-Income from Agricultural labour, Rent from leased out land, Rent by hiring out bullock and machine labour. Non-Farm Income-Income from business, manufacturing teaching and others together were considered.

The determinants of households' participation in a particular income-generating source were identified using logit analysis. According to Gujarati (1995), the functional form of the logit model is presented as follows:

$$P_i = E(Y_i / X_i) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_i)}} \text{-----(1)}$$

$$1 - P_i = \frac{1}{1 + e^z} \text{-----(2)}$$

Dividing equation (1) by equation (2) and simplifying gives

$$\frac{P_i}{1 - P_i} = \frac{1 + e^z}{1 + e^{-z}} = e^z \text{-----(3)}$$

Equation (3) represents the odds ratio in favor of farmer participating in income diversification. The logit model is obtained by taking the natural logarithm of equation (4) as follows:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_i X_i \text{-----(4)}$$

Where;

P<sub>i</sub> = the probability that Y=1 (that farmer is participating in income diversification);

1-P<sub>i</sub> = the probability that Y=0 (that a farmer does not participate in income diversification);

L<sub>i</sub> = the natural log of the odds ratio or logit;

β<sub>i</sub> = the slope, measures the change in L (logit) for a unit change in explanatory variables;

β<sub>0</sub> = the intercept.

Thus, if the stochastic disturbance term (U<sub>i</sub>) is taken into consideration the logit model becomes

$$L_i = \beta_0 + \beta_i X_i + U_i \text{-----(5)}$$

**The empirical model used in the study was**

$$FID = \beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 EXP + \beta_4 FSIZE + \beta_5 LH + \beta_6 LSTOCK + \beta_7 CREDIT + \beta_8 EXTEN$$

Variable label	Description and measurement	Expected sign
FID	Farmers Income Diversification , Dependent variable	
AGEEDU	Educational level of the head of the household in years	+
EXP	Experience of the farmer in years	+
FSIZE	Number of member in the family as agricultural labour	+
LH	Land Holding, Farm size in hectares	+/-
LSTOCK	Livestock with famers(in numbers)	+
CREDIT	Credit Availability	+
EXTEN	Contact with the extension personnel, (dummy, 1 if contact with extension personnel; 0, otherwise)	+

## RESULTS AND DISCUSSION

**General Characteristics of Sample Farmers in Study Area**

The general characteristics of the sample farm households were analyzed and presented in the Table.1.

TABLE 1

## General characteristics of the farm households

Particulars	Marginal farmers	Small farmers
Number of farm households(numbers)	68	47
Number of workers in farm households (numbers)	3.91	4.23
Age of the farmer(years)	51.52	50.76
Educational status (years)	6.13	7.09
Farming Experience (years)	27.29	26.83
Assets position (Rs. Lakh/household)	16.32	21.66
Gross cropped area (hectares)	1.75	2.02

Source: Primary household survey (2018-2019)

In the study area, nearly 50 per cent of farms households had the average family size of 4-5 members, the age group of 36 to 55 years which implied that medium aged people were involved in agricultural activities and also indicated that sample farmers were educated only up to primary and secondary level of education. Majority of sample farmers had more than 25 years of farming experience.

**Households' Sources of Income**

Agricultural sector alone cannot be relied upon as the core activity by sample respondents as a means of improving their livelihood. Off farm and Non-farm activities is gaining prominence in off-setting the diverse forms of risks and uncertainties (relating to climate, finance, markets, etc.) associated with agriculture and create a way of smoothing income of farmers sustainably. The income details of farmers is presented in Table 2.

It is evident from Table 2 that the average annual income of marginal and small farmers varied from Rs.1.20 lakhs to 1.46 lakhs per annum across different

TABLE 2

## Income details of the farmers

Particulars	Marginal farmers	Small farmers
Farm income	52955.35 (43.86)	66388.00 (45.40)
Off-Farm Income	26435 (21.89)	35215.96 (24.08)
Non-Farm Income	41354.00 (34.25)	44617.02 (30.51)
Total	120744.40 (100.00)	146221.00 (100.00)

(year / household)

Source: Primary household survey (2018-2019)

categories of farmers. The contribution from crops was about 43.86 per cent and 45.40 per cent, off farm contributed about 21.89 per cent and 24.08 per cent; non-farm contributed 34.25 per cent to 30.51 per cent respectively this confirms that the crop production forms important income sources and assumes critical.

The distribution of farmers based on their different income sources is presented in the Table 3. It is evident from the Table 3, that in Ariyalur district 42.65 per cent of marginal farmers had access to only one source of income *i.e.*, they rely mainly on farm income (Crop Production and Livestock) alone followed by 35.29 per cent of marginal farms have access to two sources of income (farm and off-farm or farm and Non-Farm)

TABLE 3

## Distribution of farmers based on their different income sources

Particulars	Marginal farmers	Small farmers
One source		
On farm	29 (42.65)	16 (34.04)
Two source		
On farm + Off - farm	13	9
On farm + Non - farm	11	10
Sub total	24 (35.29)	19 (40.43)
Three source		
On farm + Off - farm + Non - farm	15 (22.06)	12 (25.53)
Total farmers	68 (100.00)	47 (100.00)
Average number of income sources	1.80	1.91

Source: Primary household survey (2018-2019)

and 22.06 per cent of farmers have access to three sources of income. Correspondingly 34.04 per cent of small farmers in Ariyalur district had access only to one source of income followed by 40.43 per cent with access to two source of income and 25.53 per cent of farmers with three sources of income.

Diversification index for income sources of sample respondents is given in Table 4. Respondents with the most diversified income sources had the largest index and those with the least sources had the smallest index. For marginal farmers as well as small farmers share of farm incomes accounted for about 43.86 per cent to 45.40 per cent of the total income followed by non-farm share of 34.25 per cent to 30.51 and on the other hand off-farm share accounted for 21.89 per cent to 24.08 per cent in the study area.

TABLE 4  
Diversification index for income sources of sample respondents

Particulars	Marginal farmers	Small farmers
On Farm	43.86	45.40
Off-farm income	21.89	24.08
Non-farm income	34.25	30.51
HI measure of concentration	0.35	0.36
Herfindal Income Diversification Index (HIDI) measure of diversification	0.65	0.64

The estimates of Herfindahl Income Diversification Index (HIDI) of rural households also confirmed the extent of income spread across various income sources

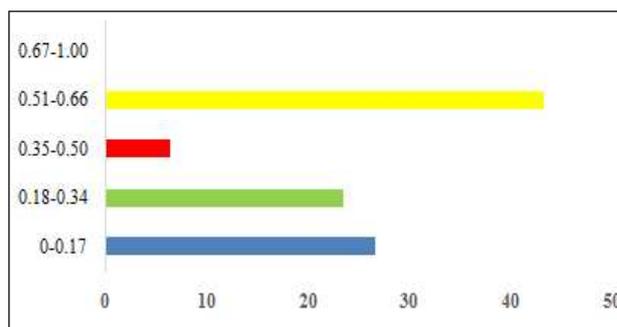


Fig. 1 : Income Diversification Range

among the different household categories. Marginal and small farmers had income diversification range of 0.65 to 0.64 which comes under medium diversification category. These results were similar with survey conducted by Saha and Bahal (2010) and Kumar and Umesh, (2020). By adopting income diversification as important strategy difference in income among sample farmers is shown in Table 5.

Marginal farmers in the Ariyalur district who rely upon On-farm source alone obtained an annual income of Rs.50955.35, farmers having access to two source of income *i.e.*, on farm plus off-farm earned Rs.89216.96 per annum which was Rs.38261.6 higher than the farmers obtaining income from on-farm alone. Similarly, farmers having access to two sources of income *i.e.*, On farm plus non-farm earned Rs.89207.65 per annum which was Rs.38252.30 higher than the income of the farmers with on-farm alone. Likewise, farmers having access to three source of income *i.e.*, on-farm plus off-farm plus Non-farm earned Rs.92887.13 per annum which was Rs.41931.80 higher than the income of the farmers with On-farm alone.

TABLE 5  
Income difference among farmers adopting income diversification (in Rs./annum)

Particulars	Marginal farmers	Difference	Small farmers	Difference
On farm	50955.35	0	66388.98	
On farm + Off-farm	89216.96	38261.6 **	112714.95	46326.0 *
On farm + Non-farm	89207.65	38252.3 *	114921.76	48532.8 **
On farm + Off-farm + Non-farm	92887.13	41931.8 *	115921.67	49532.7 **

Source: Primary household survey (2018); \*, \*\*, \*\*\*- significant difference at 1%, 5% and 10% based on t-test.

Small farmers in the Ariyalur district who rely upon On farm source alone obtained an annual income of Rs.66388.98, farmers having access to two sources of income *i.e.*, on farm plus off-farm earned Rs.112714.95 per annum which was Rs.46326 higher than the income of the farmers with on-farm alone. Similarly farmers having access to two sources of income *i.e.*, on farm plus Non-farm earned Rs.114921.76 per annum which was Rs.48532.80 higher than the income of the farmers with on farm alone, likewise farmers having access to three sources of income *i.e.*, on farm plus off-farm plus Non-farm earned Rs.115921.67 per annum which was Rs.49532.70 higher than the income of the farmers with on farm alone. From Table 5, we can articulate that off-farm and non-farm sectors can serve as budding entry points for farm households to enhance their income level.

### Factors Affecting Income Diversification

The dependent variable in this study was participation of households in income diversification. Household income diversification is a dichotomous variable representing the status of household income diversification taking value of 1 if a household is diversified and 0 otherwise. Households who had generated their income from only agriculture were considered as non-diversified, while farmers who derived additional income from non-farm or off-farm activities were considered as participating in income diversification. It could be seen from Table 6 that the chi-square value was found to be highly significant (75.12) thereby indicating that the logit model was good fit for the observed data.

'Age' can be considered as a proxy for the working capacity of a person. The age of sample respondents had a negative affiliation with diversification, which intended that as heads of farm households progresses in age, the less they diversify their income sources. The odds ratio indicated that as the age of farmer's increases, the logs of odds ratio in favor of income diversification decreases by 0.83 in Ariyalur district. The coefficient obtained for education was positive and significant at one percent level of probability. The

TABLE 6  
Logit model estimates for factors affecting farmers' participation in income diversification

Source of income	Coefficients	SE	Odds ratio
CONSTANT	6.79	4.36	
AGE	-0.175 ***	0.08	0.839
EDU	0.225 ***	0.08	1.252
EXP	0.09 NS	0.07	1.101
F.SIZE	0.633 *	0.261	1.88
LH	-0.944 ***	0.35	0.389
LIVESTOCK	0.10 NS	0.59	1.110
CREDIT	2.41 ***	0.83	11.08
EXTENSION	0.50 NS	0.81	1.662
MEAN	0.669		
STDEV	0.121		
Log-likelihood	-35.40		
Chi square	75.12 ***		

Source : Primary household survey (2018-19)

log odd ratio implies that each additional year of schooling increases income diversification by 1.25.

The coefficient obtained for family size was found to be positively significant at ten per cent. By log odds ratio it is evident that each additional member in the family increases the probability of income diversification by 1.88. Land proved to be a perfect determinant of farm income. However, size of landholding had a negative impact on the household's participation in income diversification. Odds ratio indicated that as land holding size increases, income diversification decreases by 0.38. Furthermore, amount of credit received was positive and significant at one per cent level of probability. Having credit as the proxy of household financial capital, the odds ratio indicated in the model with regard to credit keeping others constant infers that when credit is available with farmers, income diversification increases with a factor of about 11.08. Participation in agricultural extension program was found to influence the level of income diversification positively but it is non-significant. The non-significance of the participation in agricultural extension program could be due to the fact that only small number of households participated in agricultural extension program.

Therefore the results from logit model estimation revealed that Age, Land holding and Livestock Possession negatively influenced the farmers to participate in income diversification whereas Education, Farm experience, Family size and Credit positively influenced the farmers to participate in income diversification.

### Conclusions and Policy Implications

Empirically, income diversification in the study area was medium. Average number of income sources accessed by all marginal farmers was about 1.80 and all small farmers had an average of 1.91 numbers access to income sources. Age and Land holding negatively influenced the farmers to participate in income diversification whereas Education, Family size and credit availability positively influenced the farmers to participate in income diversification

Income diversification index indicated that farmers in the study area have medium income diversification and the result suggested the local government to take serious steps to create employment avenues for smallholders outside agriculture that provide credit, training and necessary inputs to rural households and also recommend for public investment in rural infrastructure, such as roads and bridges, telecommunications, education, energy and water. Education plays vital role in income diversification. Since low level of education prevails in the study area, steps should be taken to promote education through skill training which enhances the technical competence and risk-taking ability.

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