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RESEARCH ARTICLE

ESTIMATION OF ANNUAL INCOME OF TRIBAL FARMERS OF TRIPURA : AGRO-ECONOMIC AND SOCIO-ECOLOGICAL INTERPRETATION

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ABSTRACT

In India, farmers concentrate mainly on crop production which is invariably subjected to a high degree of uncertainty in income and employment. To sustain the income and productivity, the farmers has to integrate ancillary propositions with crop production. There are other parameters also which effect the crop production and Annual income of farmers. The objective of the study is to estimate the Annual income of Tribal farmers of Tripura, to estimate the interaction between them and to imply micro level policies. To conclude the work, following independent and dependent variables were taken: Age, Education, Family Education Status, Family Size, Educational Aspiration, Farm Mechanization, Farm Size, Economic Status, Adoption leadership, Scientific Orientation, Risk Orientation, Management Orientation, Orientation towards Competition and Annual Income of farmers. State Tripura, district West Tripura, block Kamalghat and village Shantipara were selected purposively as because there are more number of Tribal farmers and the number of respondents 82 were selected randomly. By analyzing the data with statistical tools, such as, Mean, Standard deviation, Coefficient of variation, Correlation coefficient, Regression analysis and Factor analysis, the following results were obtained: Variables Age, Family Education Status, Family Size, Educational Aspiration, Risk Orientation have exerted positive and significant correlation with the dependent variable Annual Income of farmers. Then the variables Family Education Status, Farm Size and Risk Orientation has recorded a significant causal-effect impact on Annual Income of the farmers.

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INTRODUCTION

Indian agriculture still continues to be the single most important livelihood of the masses. Agriculture policy focus in India across decades has been on self-reliance in food grain which we achieved through Green Revolution. The national economy of India is heading for an inclusive growth and in making this progress a reality livelihood generation from core agricultural and rural sector must have to go all out and sustainable livelihood generation mentoring customization and value addition have got both intrinsic and extrinsic dynamism.

A person's livelihood refers to their "means of securing the basic necessities such as, food, water, shelter and clothing of life". Livelihood is defined as a set of activities, involving securing water, food, fodder, medicine, shelter, clothing and the capacity to acquire above necessities working either individually or as a group by using endowments (both human and material) for meeting the requirements of the self and

his/her household on a sustainable basis with dignity. The activities are usually carried out repeatedly. For instance, a fisherman's livelihood depends on the availability and accessibility of fish. The concept of Sustainable Livelihood (SL) is an attempt to go beyond the conventional definitions and approaches to poverty eradication. Sericulture-based Agroforestry Systems (AFS) have great potential for higher returns in the North-Eastern region with sloping and valley-land conditions (Dhyani *et al.*, 1996). The forests in the Asian context are part of a cultural landscape linked to livelihood concerns of traditional societies particularly those living close to nature and natural resources (Ramakrishnan, 2007).

Conceptually 'livelihood' denotes the means, activities, entitlements and assets by which people make a living. Assets are defined as natural (land and water), social (community, family and social networks), political (participation and empowerment), human (education, labour, health and nutrition), physical (roads, clinics, markets, schools and bridges) and economic (jobs, saving and credit). The sustainability of livelihoods becomes a function of how men

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and women utilize asset portfolios on both a short and long-term basis. Enterprise distribution and economic profile of a model of an integrated farming system (IFS) unit in Balasore district, Orissa, India is used to conclude that the pisciculture dominated pond-based farming system with four broad components like field crop, horticulture, fishery and allied non-crop enterprises (mushroom, apiary, lac etc.) can be advocated for the food security and sustainable livelihood support of small and marginal farmers/farm women of Balasore district (Sahoo *et al.*, 2012).

In the north eastern part of India, there is a concentration of a number of tribes. The main tribes of North East India are Aimol, Anal, Angami, Chiru, Chothe, Gangte, Hmar, Kabui, Kacha, Naga, Koirao, Koirang, Kom, Lamgang, Mao, Maram, Maring, Lushai, Monsang, Moyon, Paite, Purum, Ralte, Sema, Simte, Sukte, Tangkhul, Thadou, Vaiphei, Zou, Tripuri, Mog, Lushai, Jamatia, Chakma, Hrangkhal, Khashi, Bodo, Mishing, Reang, Murasingh, Debarma, etc. For most of the tribal households, forests provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials and non-farm income (Minaketan, 2009). Tripura is a hilly and land locked state located in the south-west extreme corner of the north eastern region of India. The agro-climatic conditions (humid subtropical) are fertile and acidic so good depth and abundant rainfall favour the cultivation of different minor fruit crops (Chandra and Das, 2011). Shifting cultivation locally called jhum is an integral part in tribal life of the northeastern hill regions of India and has direct bearing on their socio-cultural systems (Tomar *et al.*, 2012). Orissa is one of the most backward states of India with 47% of its population living below poverty line. Forests constitute 37% of the state's geographical area and are the major source of income for the poor, particularly tribes. A work was carried out at Chandel Khullen village of Chandel hill district of Manipur during 2010-11 to 2012-13. The average holding size of the farmer was 1.33 ha in 2010-11, 1.96 ha in 2011-12 and 2.21 ha in 2012-13. The tribal farmer adopted seven components, i.e. crop production, vegetables, fruits, piggery, backyard poultry, fishery and water management as suggested by ICAR Manipur Centre (Ansari *et al.*, 2014)

### Objectives

- 1) To analyze the relation of different parameters with Annual Income of Tribal farmers of North Eastern State Tripura.
- 2) To estimate the level of income (y) as dependent variables as against a set of independent variables ( $x_1$ - $x_{13}$ )
- 3) To estimate the interaction between income and the set of exogenous variables
- 4) To generate a micro level policy from the empirical research conducted under the topic.

### Research Methodology

Locale of research; Variables selected; Tools and Techniques of Data collection; Statistical Analysis and interpretation of data.

### Locale of Research

- Keeping in view agriculturally and socio-economically developing area and the area where most of the villagers

are engaged in Integrated Farming System, West District of Tripura was selected for the study.

- Kamalghat Block of West Tripura district was purposively selected for the study. This block was selected because the researcher has close familiarity with the area, the people, their culture and the local dialect, which facilitate the study and the process of data collection and the area was also easily accessible to the researcher in terms of transportation and place of residence.
- Village Shantipara under the Block kamalghat was selected purposively for the study. The main reason behind selection of Shantipara village was due to the presence of large number of farmers involved in Integrated Farming System.

### Variables selected

Dependent variables selected are Age ( $x_1$ ); Education ( $x_2$ ); Family Education Status ( $x_3$ ); Family Size ( $x_4$ ); Educational Aspiration ( $x_5$ ); Farm Mechanization ( $x_6$ ); Farm Size ( $x_7$ ); Economic Status ( $x_8$ ); Adoption Leadership ( $x_9$ ); Scientific Orientation ( $x_{10}$ ); Risk Orientation ( $x_{11}$ ); Management Orientation ( $x_{12}$ ); Orientation towards Competition ( $x_{13}$ ). Independent variable selected is the Annual Income of the farmers (y).

### Tools and Techniques of data collection

The major tool used for collection of primary data in the study was structured schedule and secondary data were collected from the Agriculture Department of Tripura, College of Agriculture Tripura, internet, journals and departmental library.

### Statistical analysis and interpretation of data

Main statistical tools used in the study are Range; Mean; Standard Deviation (SD); Coefficient of Variation (C.V.); Correlation coefficient; Multiple Regression Analysis and Factor Analysis.

## RESULTS AND DISCUSSION

**Table 1. Descriptive statistics of Independent variables with respect to Mean, Standard Deviation and Coefficient of Variation**

S. No	Variables	Range		Mean	SD	CV (%)
		Min	Max			
1.	Age ( $x_1$ )	25	75	48.45	11.44	23.63
2.	Education ( $x_2$ )	0	5	3.28	1.24	38.10
3.	Family Education Status ( $x_3$ )	3	21	1.96	3.63	30.39
4.	Family Size ( $x_4$ )	1	2	1.47	0.50	34.05
5.	Educational Aspiration ( $x_5$ )	4	10	8	1.45	18.21
6.	Farm Mechanization ( $x_6$ )	0	10	1.92	2.37	123.35
7.	Farm Size ( $x_7$ )	1	4	2.02	0.92	45.90
8.	Economic Status ( $x_8$ )	6	18	10.79	2.80	25.99
9.	Adoption leadership ( $x_9$ )	13	22	17.36	2.67	15.42
10.	Scientific Orientation ( $x_{10}$ )	29	38	33.53	2.13	6.37
11.	Risk Orientation ( $x_{11}$ )	28	37	32.32	2.18	6.75
12.	Management Orientation ( $x_{12}$ )	69	99	80.74	6.66	8.25
13.	Orientation Towards Competition ( $x_{13}$ )	26	32	28.42	2.04	7.18

The Table 1 represents the descriptive distribution of causal variables considered for the present study. Consistency of the variables depends upon the percentage of Coefficient of Variation (CV). If the CV value is less than 50%, then the variable is consistent in nature. If the CV value is in between 50% to 100%, then the variable is inconsistent in nature and if the CV value goes beyond 100%, then the variable is highly inconsistent in nature.

**Table 2. Descriptive statistics of Dependent variables with respect to Mean, Standard Deviation and coefficient of Variance**

S. No.	Variables	Range		Mean	SD	CV (%)
		Min	Max			
1.	Annual income of farmers (y)	42000	303000	139708.53	57945.38	41.47

The Table 1 and 2 represents the descriptive distribution of consequence variables considered for the present study. Consistency of the variables depends upon the percentage of Coefficient of Variation (CV). If the CV value is less than 50%, then the variable is consistent in nature. If the CV value is in between 50% to 100%, then the variable is inconsistent in nature and if the CV value goes beyond 100%, then the variable is highly inconsistent in nature.

**Table 3. Correlation coefficient (r): Annual Income of farmers (y) vs 13 Independent Variables (x<sub>1</sub>-x<sub>13</sub>)**

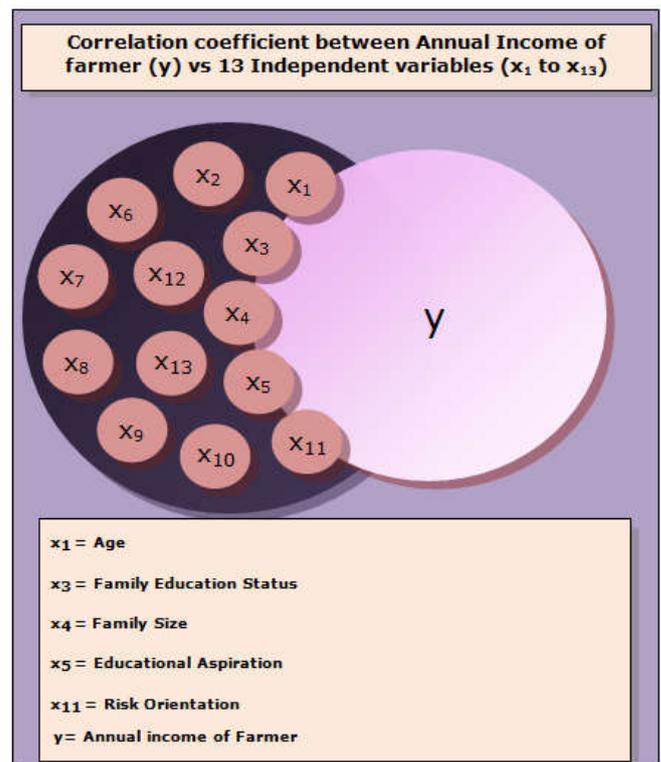
S. No	Variables	r value	Remarks
1	Age (x <sub>1</sub> )	0.227	*
2	Education (x <sub>2</sub> )	0.103	
3	Family Education Status (x <sub>3</sub> )	0.260	*
4	Family Size (x <sub>4</sub> )	0.288	**
5	Educational Aspiration (x <sub>5</sub> )	0.399	**
6	Farm Mechanization (x <sub>6</sub> )	0.151	
7	Farm Size (x <sub>7</sub> )	-0.139	
8	Economic Status (x <sub>8</sub> )	0.152	
9	Adoption leadership (x <sub>9</sub> )	0.054	
10	Scientific Orientation (x <sub>10</sub> )	0.114	
11	Risk Orientation (x <sub>11</sub> )	0.323	**
12	Management Orientation (x <sub>12</sub> )	0.021	
13	Orientation Towards Competition (x <sub>13</sub> )	-0.043	

\*Significant at 0.05 level; \*\* Significant at 0.01 level

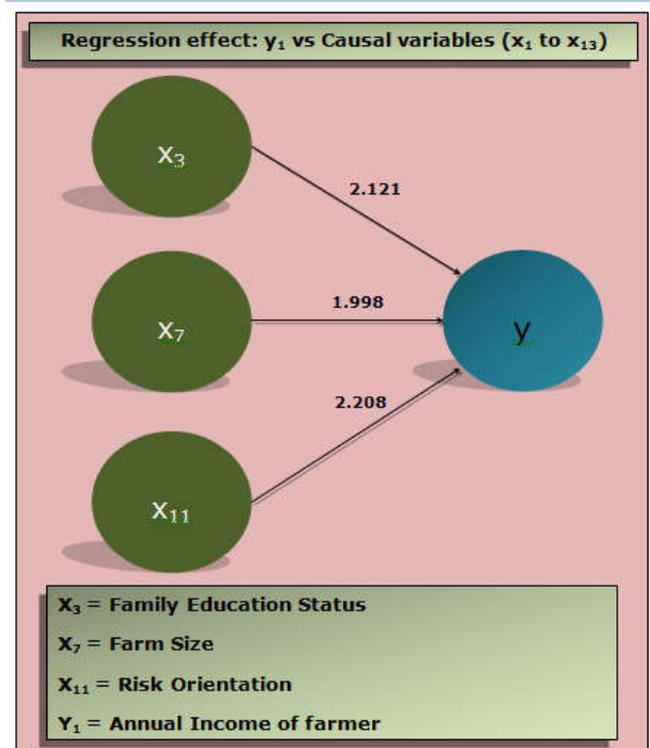
The Table no. 3 shows the Correlation coefficient between Annual Income of farmers (y) and 13 independent variables, where it is found that the variables, Age (x<sub>1</sub>), Family Education Status (x<sub>3</sub>), Family Size (x<sub>4</sub>), Educational Aspiration (x<sub>5</sub>), Risk Orientation (x<sub>11</sub>) have exerted positive and significant correlation with the dependent variable Annual Income of farmers (y).

In the Table 4 it has been shown that at 5% probability level and 68 degrees of freedom

(df = N-X-1, i.e, Total number of respondents – Total number of Independent variables – 1), calculated F<sub>tab</sub> is 1.995. Therefore, if F<sub>cal</sub> > F<sub>tab</sub>, then the respective variable will be significant. From the table no. 4 it has been clear that the variables Family Education Status (x<sub>3</sub>), Farm Size (x<sub>7</sub>) and Risk Orientation (x<sub>11</sub>) has recorded a significant causal-effect impact on Annual Income of the farmers (y).



**Figure 1. Correlation coefficient between Annual Income of farmers (y) vs 13 Independent variables (x<sub>1</sub> to x<sub>13</sub>)**



**Figure 2. Regression effect: y vs Causal variables (x<sub>1</sub> to x<sub>13</sub>)**

It is clear from Table no. 4 and Figure no. 2 that the variable Family Education Status (x<sub>3</sub>) is an important parameter for increasing income of the tribal peoples. It has also been revealed that income increases as the Farm Size (x<sub>7</sub>) increases because in a large farm more number of enterprises can be cultivated and as a result the income increases.

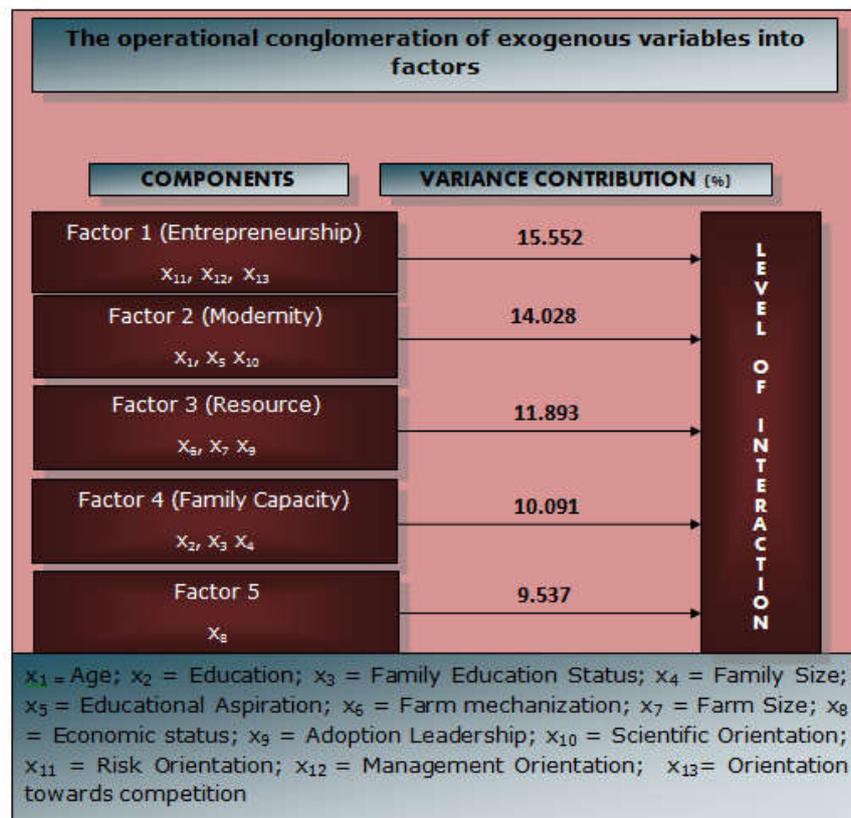
**Table 4. Multiple Regression Analysis: Annual Income of Farmers (y) vs 13 causal variables (x<sub>1</sub>-x<sub>13</sub>), Multiple R sq = 0.319**

S. No.	Variables	Beta	Reg. coef. B	S <sub>e</sub> error B	t-value	Remarks
1	Age (x <sub>1</sub> )	0.049	246.975	752.359	0.328	
2	Education (x <sub>2</sub> )	0.004	175.158	6212.774	0.028	
3	Family Education status (x <sub>3</sub> )	0.017	276.577	2294.088	2.121	*
4	Family size (x <sub>4</sub> )	0.086	10002.871	14275.164	0.701	
5	Educational aspiration (x <sub>5</sub> )	-0.193	-7745.467	5157.250	-1.502	
6	Farm mechanization (x <sub>6</sub> )	0.129	3162.644	3298.261	0.959	
7	Farm size (x <sub>7</sub> )	-0.066	-4086.699	7831.384	1.998	*
8	Economic status (x <sub>8</sub> )	0.164	3385.928	2655.835	1.275	
9	Adoption leadership (x <sub>9</sub> )	0.046	1019.250	2738.328	0.372	
10	Scientific orientation (x <sub>10</sub> )	0.181	4956.490	3668.087	1.351	
11	Risk orientation (x <sub>11</sub> )	-0.167	-4500.657	3537.169	2.208	*
12	Management orientation (x <sub>12</sub> )	0.090	783.850	1148.109	0.683	
13	Orientation towards competition (x <sub>13</sub> )	0.013	380.014	4161.750	0.091	

**Table 5. Factor Analysis - Conglomeration of 13 variables into 5 factors**

Factors	Variables	Factor Loading	Percentage of Variance	Cumulative (%)	Factors Renamed
Factor 1	Risk orientation (x <sub>11</sub> )	0.487	15.552	15.552	Entrepreneurship
	Management orientation (x <sub>12</sub> )	0.578			
	Orientation towards competition (x <sub>13</sub> )	0.673			
Factor 2	Age (x <sub>1</sub> )	0.356	14.028	29.580	Modernity
	Educational aspiration (x <sub>5</sub> )	0.625			
	Scientific orientation (x <sub>10</sub> )	0.685			
Factor 3	Farm mechanization (x <sub>6</sub> )	0.579	11.893	41.473	Resource
	Farm size (x <sub>7</sub> )	0.647			
	Adoption leadership (x <sub>9</sub> )	0.467			
Factor 4	Education (x <sub>2</sub> )	0.473	10.091	51.564	Family capacity
	Family educational status (x <sub>3</sub> )	0.402			
	Family size (x <sub>4</sub> )	0.673			
Factor 5	Economic status (x <sub>8</sub> )	0.637	9.537	61.00	-

The above table shows the conglomeration of 13 homogenous variables into 5 factors.

**Figure 3. The operational conglomeration of exogenous variables into factors**

Again the income will increase if the farmer is more oriented towards Risk taking and if he wills to take more risk. So, this causal-effect relationship highly justifies the cause-effect interaction.

So, the variables Family Education Status ( $x_3$ ), Farm Size ( $x_7$ ) and Risk Orientation ( $x_{11}$ ) can be indicator variables to measure the Annual Income of the farmers ( $Y_1$ ). Since the  $R^2$  value is 0.319, we can conclude that 31 percent of the variability embedded with the consequent variable Annual Income of the farmers ( $y$ ) can be explained with the combination of 13 causal variables, among which, the variables Family Education Status ( $x_3$ ), Farm Size ( $x_7$ ) and Risk Orientation ( $x_{11}$ ) have exerted significant causal-effect relationship with the Dependent variable Annual Income of the farmer ( $y$ ).

It is clear from the Table no. 5 and Figure no. 3 that all the 13 Independent variables

Here, Factor 1 consisting of the variables Risk Orientation ( $x_{11}$ ), Management Orientation ( $x_{12}$ ) and Orientation towards competition ( $x_{13}$ ), has been renamed as Entrepreneurship and they together contribute to 15.552% of variance. Factor 2 consisting of the variables Age ( $x_1$ ), Educational Aspiration ( $x_5$ ) and Scientific Orientation ( $x_{10}$ ), has been renamed as Modernity and they together contribute to 14.028% of variance. Factor 3 consisting of the variables Farm Mechanization ( $x_6$ ), Farm Size ( $x_7$ ) and Adoption Leadership ( $x_9$ ), has been renamed as Resource Factors and contribute to 11.893% of variance. Then the Factor 4 consists of variables Education ( $x_2$ ), Family Educational status ( $x_3$ ) and Family Size ( $x_4$ ) and has been renamed as Family Capacity, which together contributes to 10.091% of variance and last of all, as the Factor 5 consists of only 1 variable, that is, Economic Status ( $x_8$ ) it has not been renamed but it alone contributes to 9.537% of variance. All the Independent variables have been grouped into different factors and have been renamed because of the convenience of further study in this field.

## Conclusion

Farming System as an approach is flourishing comprehensively and robustly in the economy of Tripura. Huge pile of tribal livelihood is generating from it and a belligerent Entrepreneurship has been resulted there with. Along with cultivation practices and other agricultural inputs, there are other parameters such as age, education, economic status, etc, which effect the Annual income of the farmers and here we have studied regarding those parameters and their relation with the income generation of the farmers.

The variables like Age, Family Education Status, Family Size, Educational Aspiration, Risk Orientation have exerted positive and significant correlation with the dependent variable Annual Income of farmers. Again the variables like Family Education Status, Farm Size and Risk Orientation have recorded a significant causal-effect impact on Annual Income of the farmers. So these variables or parameters must be improved in order to increase the income of the farmers and micro level policy may developed by the help of these variables. It is also seen that the exogenous variables can be grouped in 5 factors and can be grouped as Entrepreneurship, Modernity, Resource and Family capacity, which will be helpful for further studies. Livelihood generation of tribal people through Farming System has been studied within a very short span of time and the collection of information based on the responses obtained from the farmers have to be relied upon and on the basis of the information obtained, the entire analysis with the help of standard statistical techniques have been done. The present study includes the basic aspects of Income generation and Livelihood generation of the Tribal farmers of North Eastern state Tripura.

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