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Impact of coffee cultivation on socio–economic conditions of farmers in Visakhapatnam district of Andhra Pradesh

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Abstract
The paper highlights impact of coffee cultivation on socio- economic conditions of tribal farmers at paderu division in Visakhapatnam district of Andhra Pradesh. Data collection was done using pre tested questionnaire administrated on 90 coffee producers selected randomly. The results of multiple linear regression indicate that farm size and farming experience variables were positively significant on coffee production. Observed that number of respondents was maximum in the age group of 41-50 years, average farm size of below 2.5 ha and majority of the farmers having 6 to 10 years of experience. The average annual net income from coffee and pepper was Rs. 67417.60 and the total income was Rs. 97228.15. It was identified that income attained from coffee was thrice than other agricultural crops grown by tribal farmers.75 per cent of coffee farmers reported that their socio-economic conditions were improved through coffee plantation. Livelihood frame work analysis indicates that coffee is a profitable business that can help the farmers to improve their socio- economic condition. Government also initiate development programmes of coffee cultivation because which was nearly three times more profitable as compared to cash crops.

Keywords: Coffee, socio- economic conditions, livelihood frame work analysis

Introduction
Paderu division of Visakhapatnam district of Andhra Pradesh is populated by the tribal inhabitants, who are literate, ignorant, conservative, and custom-bound. Most of the interior villages, where they inhabit, are deprived of social and economic privilege. Agriculture in this region is mostly seasonal, which provide only seasonal employment to them and have to sit idle for the rest of the season. Podu' cultivation practiced by the tribal growers resulted in extensive denudation of forest cover and enormous soil erosion causing siltation of the river basins. Generally, they cultivate annual crops for three years and after the third year, they abandon this land and shift to new forest area. Frequent shifting from one land to the other has affected the ecology of these regions. The area under natural forest has declined; the fragmentation of habitat, disappearance of native species and invasion by exotic weeds and other plants are some of the other ecological consequences of shifting agriculture. To check podu' cultivation and to improve socio-economic status of tribal inhabitants through sustainable farming, coffee cultivation was found to be the best option as it is suitable for cultivation in hilly slopes under the shade of forest cover (Indian coffee 2015).

Subsequently, realizing the positive impact of coffee development, the State Government has taken several initiatives for further development of coffee in the tribal sector. But the social and economic status of the tribal farmers and climatic condition of Non-Traditional Area (NTA) is different from the traditional area. More importantly the farmers do not have capacity to invest money on pesticides and fertilizers. In this background Coffee Board of India envisaged programmes to start coffee cultivation in NTA and established the Regional Coffee Research Station at Raghavendra Nagar, in Visakhapatnam District, Andhra Pradesh to provide support to the tribals of NTA for sustainable cultivation of coffee. Before the plantation they were getting loans from private money lenders which have reduced drastically and they are now more self-reliant dependent upon the Government and other established financial institution. The plantation has brought about visible changes in their livelihood. Coffee plantation has also attracted a number of visitors and Government officials. The life style has changed over the years (Indian coffee 2015).

Methodology
The study was conducted in Andhra Pradesh during the year 2016-17. Multistage random sampling design was used for the study.

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Paderu division was purposively selected as coffee is extensively cultivated in this division. This division occupies first place both in area and production in Visakhapatnam district. Six mandals namely G. K. Veedhi, Chintapalli, G.Madugula, Paderu, Hukumpeta and Dumriguda were purposively selected as they occupy the first six positions in area under coffee. Three villages from each mandal were selected based on highest area under coffee plantation. The coffee growing tribal farmers of the selected villages were listed in each village along with their operational holding and arranged in descending order and five coffee growing tribal farmers were randomly selected to make a sample of 90 respondents for the study. Face to face interview was conducted to fill up the semi structured interview schedule. Focus group discussions were conducted and key informant survey was carried out and secondary data were collected from different sources. The final analysis was done with the help of computer software Statistical Package for Social Science (SPSS V 16), Microsoft Excel 10, livelihood frame work analysis and regression analysis.

Livelihood Framework Analysis: To study the impact of coffee production on tribal farmers in the study area, Livelihood frame work analysis was employed. Livelihood includes the capabilities, assets (both material and social) and activities needed for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets and provide sustainable livelihood opportunities for the next generation and which contributes net benefits to other livelihoods at global and local levels in the long and short term (Chambers and Conway 1992) [6]. The purpose of the study is to determine the impact of coffee cultivation on tribal farmers' income and livelihood pattern.

The sustainable livelihood framework includes the assets pentagon which is composed of five types of capital *viz.* human capital, social capital, natural capital, physical capital and financial capital (Fig.1) (DFID, 2000) [8]. A sustainable livelihood is the outcome of inter and intra relationship between the components of the capitals. Changes in the asset position during one year were discussed as the transformation and improvement of the livelihood of the farmers.
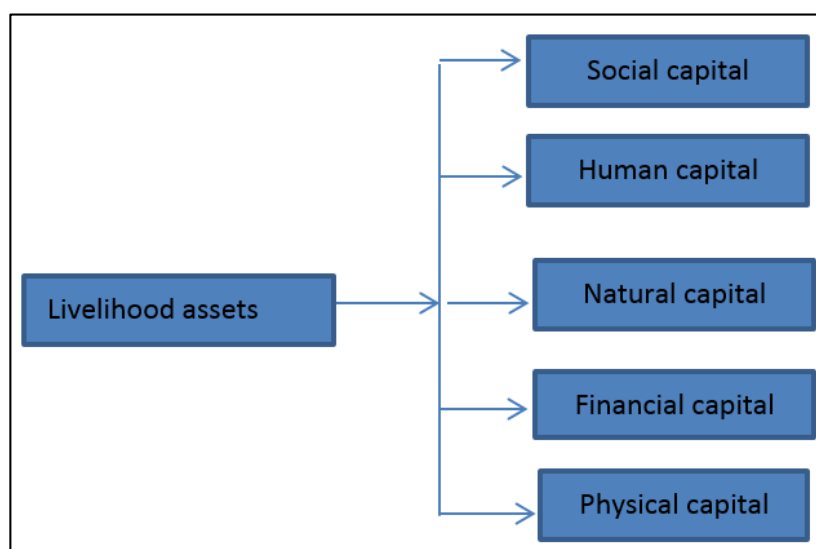

Fig 1: Different categories of assets (Source: DFID 2000)

Regression Analysis: Regression analysis was used to determine the relationship between a farmer's socio-economic status and output of coffee production. The regression model used was specified as:

$$y = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x4 + b_5 x5 + u$$

Where
y = Coffee output (per year kg/ha)
x_1 = Coffee farming experience (Years)
x_2 = Age of farmers (years)
x_3 = Farmers' level of education
x_4 = Age of garden (Years)
x_5 = Area cultivated under coffee (ha)
a = intercept (constant) term
$b_1 - b_5$ = Regression coefficient estimates
u = Random error or disturbance term.

Result and discussion
Socio–Economic Characteristics of Coffee Farmers: Socio-Economic characteristics play significant role in the farmers' lives in the sense that they influence willingness to accept changes which contribute significantly in raising farm productivity and eventually their standard of living. Some of the most commonly used socio-economic variables include age, level of education, farm size, farming experience, source of capital, and source of land.

Socio-economic factors
Age group: It can be observed from table 1 that the number of respondents was maximum in the age group of 41-50, (34.44 per cent) of the total farmer respondents followed by age group of 51-60 years (28.89%), age group of 31-40 years (15.56%), age group of 25-30 years (12.22%) and age group of 61-70 (8.89 per cent). Above findings was similar line of Ayola (2012) [3].

Table 1: Age of the coffee farmers

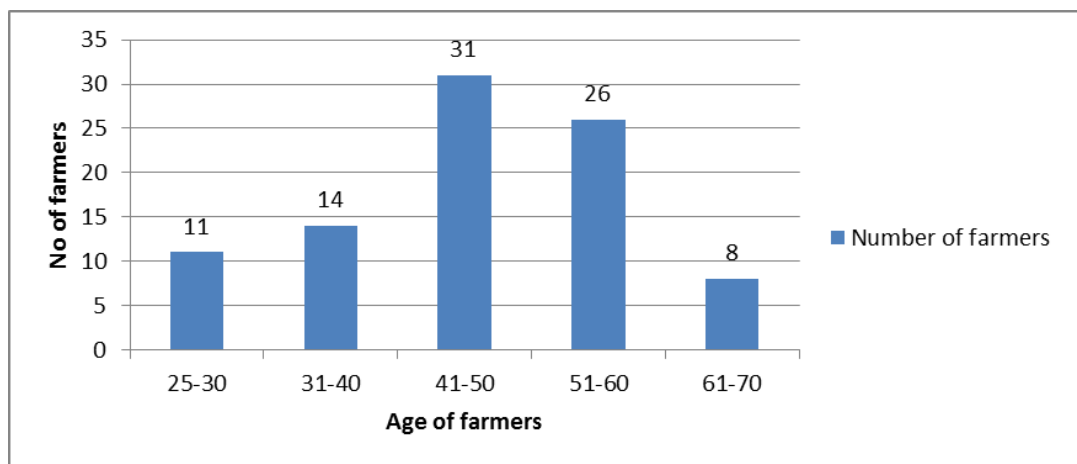| S. No.	Age of farmer (years)	Number of farmers (N=90)	Percentage to total
1	25-30	11	12.22
2	31-40	14	15.56
3	41-50	31	34.44
4	51-60	26	28.89
5	61-70	8	8.89
6	Total	90	100.00

Fig 2: Age of the coffee farmers

Educational level: The particulars regarding the educational level of the respondents is presented in Table 2

Table 2: Education level of the coffee farmers

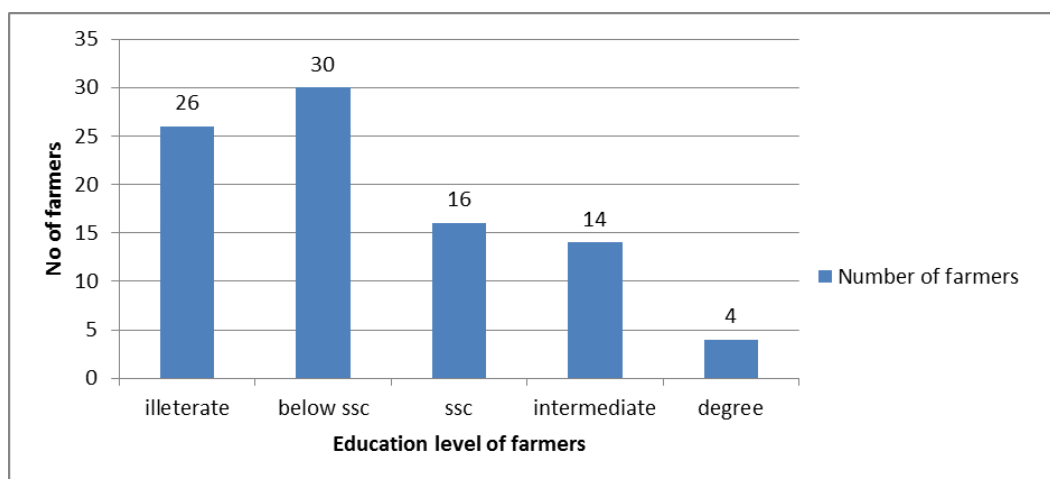| S. No.	Educational level	Number of farmers (N= 90)	Percentage to the total
1	Illiterate	26	28.89
2	Below SSC	30	33.33
3	SSC	16	17.78
4	Intermediate	14	15.56
5	Degree	4	4.44
6	Total	90	100.00

Fig 3: Education level of the coffee farmers

It can be seen from the table 2 that out of 90 farmers, 26 were illiterates, which constituted 28.89 per cent, 33.33 per cent of the farmers having below 10th class level education, while 17.78 per cent of farmers were educated up to class 10th. The number of farmers who completed education up to intermediate and degree level were 15.56 and 4.44 per cent respectively. This low level of education may show an impact on farmer's adoption of modern techniques such as record keeping, technology and efficiency in the use of resource to maximize profits, *etc*. These findings were similar in line of Battese and Coelli (1995) [5].

Farm size: The distribution of farm size of the sample farmers is presented in Table.3

Table 3: Farm size of the coffee farmers

S. No.	Farm size (Ha)	Number of farmers (N = 90)	Percentage
1	<2.5	40	44.44
2	2.5 - 5	28	31.11
3	>5	22	24.44
4	Total	90	100.00
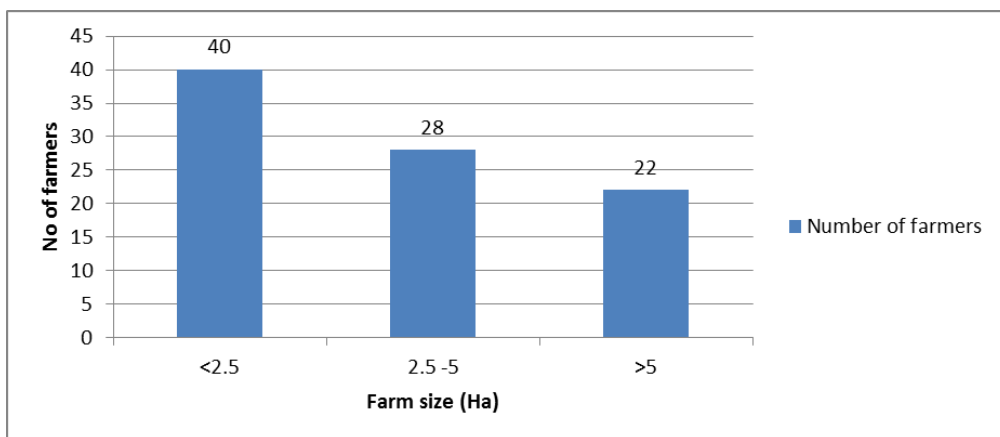
Fig 4: Farm size of the coffee farmers

The table 3 reveals that majority (44.44 per cent) of the farmers were having the average farm size of below 2.5 ha followed by 2.5-5 ha with 31.11 per cent and above 5 ha with 24.44 per cent. These findings were similar in line of Ayola (2012) [3].

Farming experience: The process of gaining knowledge and skill is termed as experience. It is a measure of the period; an individual farmer was involved in coffee production. The more the number of years of production by coffee farmers, the more knowledge and skills gained. Experiences influence individual perceptions and understanding of the management requirements and it is also an important factor determining
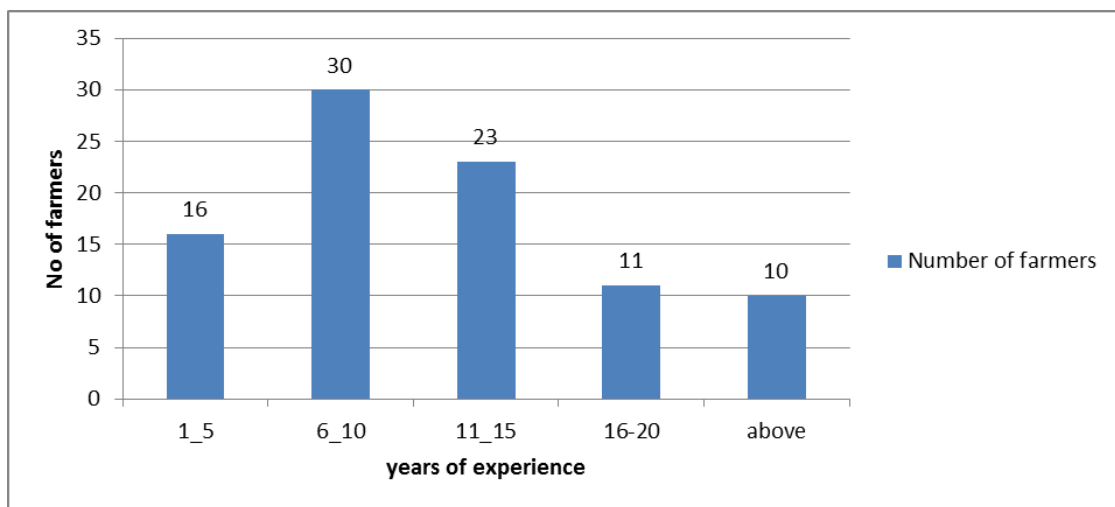
both the productivity and production level in coffee plantations.

Farming experience of the sample coffee farmers was presented in Table 4.

Table 4: Years of farming experience of the coffee farmers

S. No.	Years of experience	Number of farmers (N = 90)	Percentage
1	1 - 5	16	17.78
2	6 - 10	30	33.33
3	11 - 15	23	25.56
4	16 - 20	11	12.22
5	Above	10	11.11
6	Total	90	100.00

Fig 5: Years of farming experience of the coffee farmers

The table 4 indicated that, majority of the farmers having 6 to 10 years of experience constituted 33.33 per cent, followed by 11-15 years with 25.56 per cent, 1-5 years with 17.78 per cent, 16 to 20 years with 12.22 per cent and above 20 years with 11.11 per cent. These results suggest that most coffee plants were relatively old and that these old farmers might still be practicing traditional management practices that had been adopted over many years' experience in coffee production. These findings were similar in line of Ayola (2012) [3].

Source of capital: Source of capital of sample farmers for cultivating coffee is presented in table 5.
Table 5 shows that most of the farmers about 60 (66.67 per cent) depended on their personal savings to finance their

coffee farming enterprise while 33.33 per cent (30) on friends for financing coffee enterprise. These findings were similar in line of Ayola (2012), Mohamamed *et al* (2013) [12, 3]. It is interesting to note that none of the farmer got credit from institutional agencies. Credit requirements needed by coffee growers. These findings were similar in line of Minai (2014) [11].

Table 5: Source of capital of the coffee farmers

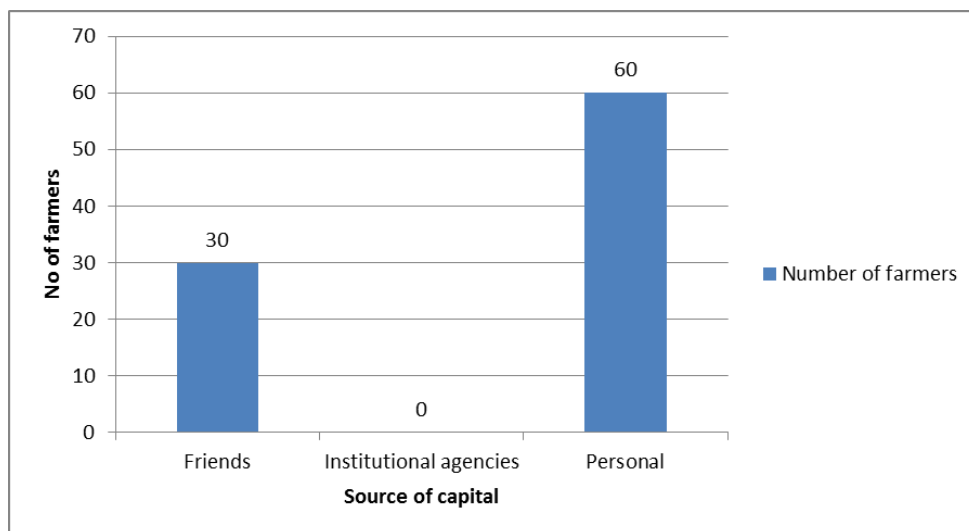| S. No.	Source of capital	Number of farmers (N = 90)	Percentage
1	Friends	30	33.33
2	Institutional agencies	0	0.00
3	Personal	60	66.67
4	Total	90	100.00

Fig 6: source of capital of the coffee farmers

Ownership of land: The type of ownership of land for coffee cultivation is presented in table 6. It could be seen from the table 6 that, majority of the farmers (94.44 per cent) inherited their farm land by 85 in number, while 5.56 per cent of farmers (5) got ownership by purchasing the land from others. Above findings was similar in line of Mohamamed *et al* (2013) [12].

Table 6: Ownership of land of the coffee farmers

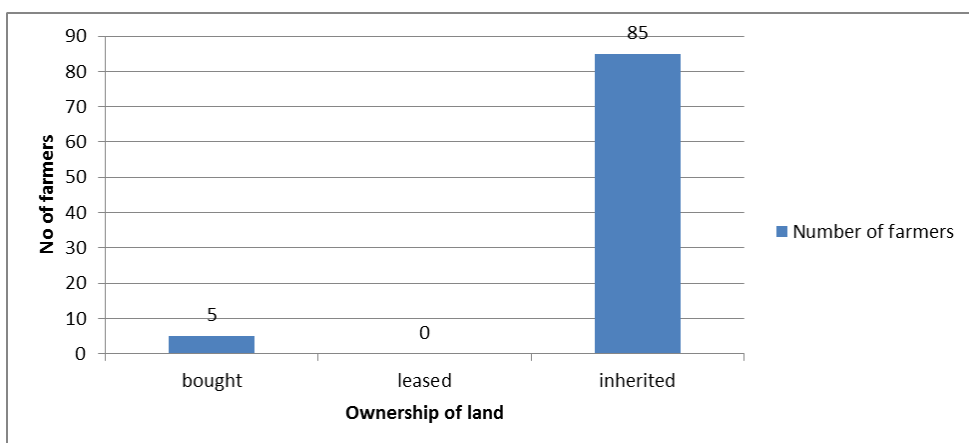| S. No.	Ownership of land	Number of farmers (N = 90)	Percentage
1	Bought	5	5.56
2	Leased	0	0.00
3	Inherited	85	94.44
4	Total	90	100.00

Fig 7: Ownership of land of the coffee farmers

Contribution of socio-economic factors on coffee production: Multiple regression analysis was done to determine the influence of various characteristics of the respondents on the dependent variable *i.e.* coffee production. The model specified, quantity of coffee production (kg) as a function of farm size (X_1) farmers age (X_2) farming experience (X_3) and education (X_4). The result of multiple regression analysis is presented in Table 7.

Table 7: Regression analysis of coffee production

S. No.	Particular	Regression coefficient	Standard error	t - value
1	Intercept	152.694		
2	Farm size	436.599	39.466	11.06*
3	Age of farmer	-55.209	14.508	-3.805*
4	Farming experience	4.732	1.415	3.344*
5	Education	0.014	0.013	1.02
6	F test	867.332*		
7	R^2	0.656		
8	Durbin Watson statistic	2.348		

*Significant at 5% level

It can be observed from the table 7 that the value of coefficient of determination R^2 was 0.656 showing that about 66% of variation in coffee output could be explained by explanatory variables in the stated regression model. The F test was statistically significant at five per cent level and it reveals that all the explanatory variables jointly explained the variation in the output. There is no auto correlation in the data as shown by the Durbin-Watson statistic of 2.348.

Farm size farmers' age and farming experience were identified as the significant factors affecting the output of coffee production in the study area. These findings are similar in line of Oluyole and Sanusi (2009), Amusa (2010) [2]. The positive co-efficient of farm size (X_1) and farming experience (X_3) indicated increase in these parameters resulting increase in output of coffee. The co-efficient of farmers' age was negatively significant *i.e.* the old age farmers were practicing traditional management practices and were not adopting modern technologies in coffee production. These findings were similar in line of Amadou (2007) [1], Ayola (2012) [3]. The regression coefficient of education was positive but non-significant in the production of coffee.

Impact of crops on the livelihood of tribal farmers: Coffee was grown only in the hilly regions of Visakhapatnam district of Andhra Pradesh. In the study area along with coffee, pepper is cultivated as an intercrop. These findings were similar in line of Suneetha and Gangayya (2014) [16]. The annual average income from crops grown by tribal farmers is presented in Table 8.

Table 8: Impact of crops on the livelihood of tribal farmers (per hectare)

S. No.	Crop	Gross returns (Rs.)	Cost(Rs.)	Net returns (Rs.)	Profitability index	BCR
1	Ground nut	39680.00	20998.16	18681.84	0.89	1.89
2	Ginger	34224.00	18352.00	15872.00	0.86	1.86
3	Maize	16534.16	7110.16	9424.00	1.33	2.33
4	Pulses	35912.88	20777.44	15135.44	0.73	1.73
5	Ragi	6795.20	3779.52	3015.68	0.80	1.80
6	Paddy	42611.36	23272.32	19339.04	0.83	1.83
7	Turmeric	55792.56	34065.28	21727.28	0.64	1.64
8	Coffee	84550.39	27674.22	56876.17	2.05	3.05
9	Coffee + pepper	97228.15	29810.54	67417.60	2.26	3.26

The perusal of the table 8 revealed that the average annual net income obtained from coffee and pepper was Rs.67417.60. It was identified that net income attained from coffee was thrice than other agricultural crops grown by tribal farmers. These findings were similar in line of Bajracharya (2003) [4], Srinivas (2009) [15], Sharma *et al* (2016) [14]. Thus, net income from coffee plantation was contributing overall increase in economic status of farmers. In recent years, vigorous interventions of Coffee Board and ITDA spiked the incomes of the farmers. This increased income levels are attracting more farmers into coffee cultivation.

Livelihood out comes: Livelihood out comes of coffee plantation was positive and most of the people had increased their income. The survey indicated that farmers had improved their socio-economic conditions through coffee plantation as confined by 75 per cent of coffee farmers and only 25 per cent of the farmers had not improved their socio-economic conditions due to poor knowledge on coffee plantation. Above findings are similar in line of Cuong (2009) [7], Poudel *et al* (2009) [13], Lyngdoh (2014) [10], Minai (2014) [11]. Low price to processed coffee, lack of road connectivity and lack of water source were considered the main constraints of coffee production.
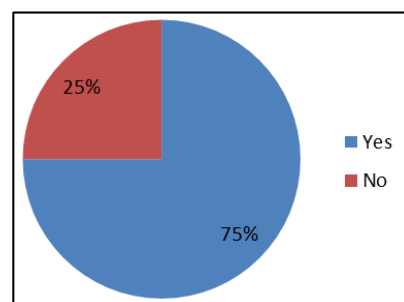
Fig 8: livelihood out come through coffee plantation

Livelihood Frame Work: Table 9 indicated that all respondents expressed that there was 60.80 per cent increase in human capital, 66.13 per cent increase in social capital, 52.69 per cent increase in natural capital, 50.22 per cent increase in financial capital, 66.86 per cent increase in physical capital. The asset Pentagon approach showed noteworthy improvement in different capitals (human, social, natural, physical and financial) of coffee households of Visakhapatnam district of Andhra Pradesh (Table 9), which is illustrated in Fig 9. Similar works are carried out by Islam *et al* (2016) [9].

Table 9: Livelihood frame work opinion survey

S. No.	Asset category	Per cent increase to total respondents
I	Human capital	
a	Health	60.25
b	Education	85.32
c	Training	53.54
d	Access to information	44.12
	Average	60.80
II	Social capital	
a	Social group	64.45
b	Self-managerial capability	67.64
c	Social access	66.32
	Average	66.13
III	Natural capital	
a	Cultivable land	60.25
b	Silvi - pasture	45.13
	Average	52.69
IV	Financial capital	
a	Cash in hand	77.12
b	Savings in bank	23.32
	Average	50.22
V	Physical capital	
a	House	40.59
b	TV	72.65

c	Phone	77.65
d	Sanitary condition	76.58
	Average	66.86

Livelihood frame work analysis indicates that coffee is a profitable business that can help the farmers to improve their
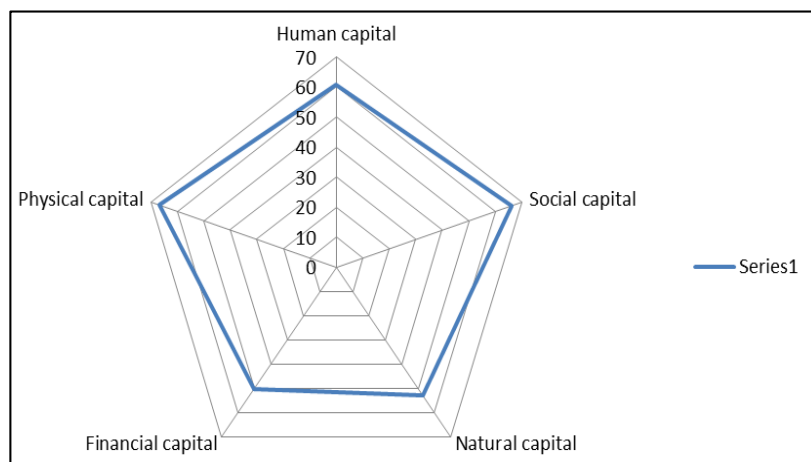
socio- economic condition.

Fig 9: Livelihood status of coffee farmers

Conclusion

Majority of the coffee growers are small size land holders and less farming experience. The results of multiple linear regression indicate that farm size and farming experience variables showing positively significant influence on coffee production. It was identified that net income attained from coffee was thrice than other agricultural crops grown by tribal farmers. Livelihood frame work analysis indicates that coffee is a profitable business that can help the farmers to improve their socio- economic condition. The study revealed that coffee growers gained benefited in financial, social and physical aspects. The overall condition of coffee growing tribal farmers was improved because of more income which was derived from coffee plantation.

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