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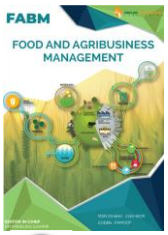

RESEARCH ARTICLE

ECONOMIC ANALYSIS OF COFFEE PRODUCTION IN ARGHAKHANCHI AND GULMI DISTRICTS OF NEPAL

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ABSTRACT

Coffee is a major plantation crop grown in the hilly tracts of Nepal. This study is an attempt to assess the economic production situation of Arghakhanchi and Gulmi districts which were selected through cluster sampling technique. A total of 100 households among coffee growers, 50 each from Arghakhanchi, and Gulmi districts were sampled by using a multistage cluster sampling technique and interviewed with a pre-tested semi-structured interview schedule. Descriptive statistics, chi-square test, and independent-sample t-test were used for data analysis using SPSS version 25 and MS-Excel 2013. The average area under coffee production was 0.88 ropani. The overall average coffee production was 58.11 kg/HH while the coffee production per HH among the coffee growers in Arghakhanchi and Gulmi was 51.68 kg and 64.54 kg respectively. The total cost incurred in coffee production was USD 19.16 per ropani. The share of labor in total cost was 40%. The overall average coffee yield was 75.00 kg/ropani. The average annual income per ropani from coffee was USD 38.66 which was higher for coffee growers in the Gulmi district than that of the Arghakhanchi district. The B:C ratio in the study area was 2.02 while the B:C ratio in Gulmi (2.52) was higher than that of Arghakhanchi (1.52). The contribution of coffee in total household income from agriculture was 5 percent showing is to be one of the major influencing commodities.

KEYWORDS

Annual Income, B:C, Coffee, Labor cost, Gulmi, Arghakhanchi.

1. INTRODUCTION

Nepal has a high potential for exportable and comparatively advantageous crops. The cash and plantation crops holding higher values can have a significant effect on changing the facets of Nepalese agriculture (Karki et al., 2018). Coffee (*C. arabica*) contributes about 0.04 percent to the GDP of Nepal (PSS, 2004). Coffee is one high-value plantation crop that is consumed throughout the world (Daglia et al., 2000). It was originated in the highland forests of Ethiopia and gained its popularity in Nepal after Mr. Hira Giri brought the seeds of coffee from Myanmar in 1938 A.D (Murthy and Naidu, 2012). The coffee planted in Nepal is all Arabica due to its agro-climatic suitability in mid and high hills of Nepal (Giri, 2006). Despite being a hub for ambient coffee production, there is a decline in the productivity of coffee in Nepal in the last five years (Khanal, 2018). The international trade of coffee shows a severe picture of the nation's dependency on imports (Karki et al., 2018).

In 2015/16, Nepal imported 105.04 metric tons of and exported 111.17 mt. In 2017-18, the import was 163.38 mt, and export was 84.22 mt of coffee (Ministry of Agricultural Development, 2017). Lack of environment-specific technologies, limited use of production inputs like irrigation, fertilizers and good quality seeds, and extension of cultivation to marginal land, insufficient processing facilities; the very slow rate of technological dissemination and its limited impact on production has directly impacted towards scattered and remoteness production of coffee in Nepal (Kattel, 2009). Despite the climatic suitability of coffee cultivation, the production, and productivity of both the districts viz. Arghakhanchi and Gulmi are marginally low. The assessment of production and productivity from these regions are yet to be carried out in detail. Therefore, this study aims to explore the production, productivity, cost, return, etc. of coffee farms in the Arghakhanchi and Gulmi districts of Nepal.

2. MATERIALS AND METHODS

2.1 Study area

The study was carried out in Gulmi and Arghakhanchi District of Nepal which includes the command area of the Prime Minister Agriculture Modernization Project (PM-AMP), Project Implementation Unit, Coffee Superzone. The study domain is located in the mid-hills of Province 5 of Nepal.

2.2 Sampling procedure and sample size and selection of respondents

To select a representative sample, a multistage cluster sampling was implemented to select districts, sublocations, and coffee growers. The study was conducted in the Arghakhanchi and Gulmi district of Nepal from February to April 2019. At first, Arghakhanchi and Gulmi were selected purposively considering their great potentiality of coffee production in Nepal. In the second stage, two municipalities/rural municipalities were also selected purposively from each district. In the final stage of sampling 25 farmers from selected municipalities by simple random sampling technique. In this way total of 100 farmers were selected by a three-stage sampling procedure.

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Table 3: Summary of sampling sites and sample size for HH survey of coffee producers		
Districts	Name of Municipality/ Rural municipality	Number of sample Household
Arghakhanchi	Paneni Rural Municipality	25
	Chattradev Rural Municipality	25
Gulmi	Musikot Municipality	25
	Ruru Rural Municipality	25
Total		100

(Source: Field Survey, 2019)

The primary data was collected by conducting field surveys using pre-tested household interview schedules, focus group discussions, key informant interviews, rapid market appraisal, and case study of coffee producers and traders. Secondary data were collected from various publications of National Tea and Coffee Development Board, Agriculture Knowledge Center (AKC), Gulmi, Agriculture Knowledge Center (AKC), Arghakhanchi, Agriculture Information and Communication Centre (AICC), Central Bureau of Statistics (CBS), Nepal Agriculture Research Council (NARC), Prime Minister Agriculture Modernization Project (PM-AMP), Ministry of Agriculture and Livestock Development, various NGO's/INGO's, journals, proceedings, books, and websites.

2.3 Data Analysis

Descriptive analysis was done using SPSS and qualitative analysis was done in STATA.

2.4 Costs, Returns, and Profitability

The method of calculation of costs and return was adapted from a publication of Market Research and Statistics Management Program entitled 'Costs of production and benefit-cost analysis of fruit farming in Nepal 2016/17' (2017) and modified according to the farming conditions of the study area. The total cost of production per hectare was calculated by the summation of variable and fixed cost per hectare (Devi and Pandurangarao, 2003). The variable costs were separately calculated for the first and second years. From 3 to 15 years, the variable cost was increased each year by 10 percent. From 16 to 25 years, the cost was considered the same as that of 15 years, but the production was assumed to be decreased by 20 percent than that of the 15th year.

The variable cost was estimated by using the following formula:

Variable cost = Csapling + Clabor + Cfym + Cirrigation + Cequipments + Cmanagement + Cother

Where:

Csapling= Cost of sapling (NRs.)

Clabor = Cost of human and animal labor used (NRs.)

Cfym = Cost of farmyard manure (NRs.)

Cirrigation= Cost of water/snow pond establishment (NRs.)

Cequipments = Cost of farm equipment like a spade, secateurs, garden saw, harvesting containers (NRs.)

Cmanagement= Cost of orchard management (NRs.)

Cother= other miscellaneous costs (NRs.)

Similarly, the fixed cost was estimated by using the following formula:
Fixed cost = Cland tax + Cdepreciation + Crepair

Where:

Cland tax = Cost of land tax (NRs.)

Cdepreciation = Depreciation cost of farm equipment (NRs.)

Crepair= Repair and maintenance cost (NRs.)

2.5 Gross return

The total gross return was calculated by multiplying the quantity of coffee produced (kg) with the average price of the coffee (USD.).

Benefit-Cost Ratio (BCR) refers to the ratio of discounted benefit to discounted cost. Benefit cost ratio (BCR) is a quick and easy measure of the economic performance of any firm (Acharya and Dhakal, 2014). BCR was worked out by using the following formula:

BCR= Discounted Benefit / Discounted cost

A group researcher used the same formula to calculate the benefit-cost ratio of rubber production in Jhapa, Nepal (Poudel et al., 2020).

3. Results and Discussion

3.1 Annual income share from various sources in a HH

The total annual income was found to be USD 1827.45 per HH ranging from USD 164.95 to USD 6549.38 based on self-food sufficiency. The average total annual income of coffee growers in the Gulmi district (USD 2171.82) was found to be statistically significant to the average total annual income of coffee growers in Arghakhanchi district (USD 1483.08). The average household income from the agriculture sector was USD 754.77. The average household income from agriculture among the coffee growers in the Gulmi district was USD 892.28 which was statistically significant at 10 percent level to the average household income from agriculture among the coffee growers in Arghakhanchi district (USD 617.17 per HH). Similarly, the average household income from the nonagricultural sector was USD 1068.20 per HH. The income from the non-agriculture sector among coffee growers in Arghakhanchi and Gulmi district was found to be USD 862.26 per HH and USD 1274.23 per HH respectively. The distribution of income from the non-agriculture sector among coffee growers on Arghakhanchi and Gulmi district was statistically significant at a 5% level of significance (Table 3). The agriculture sector contributed 41% of the total household income while the nonagricultural sector contributed about 59% of the total household income (Figure 1). The majority of the share in the agricultural sector was contributed by milk and milk product i.e. 43% followed by cereals (23%), animal sale (22%), and vegetables (7%). Coffee holds 5% of the total income from the agricultural sector (Figure 2).

Table 3: Income from agricultural and non-agricultural sector by district					
Income	**Arghakhanchi(n=50)**	**Gulmi(n=50)**	**Overall(N=100)**	**Mean Difference**	**t-value**
Agriculture (USD)	617.17(46.38)	892.28(90.40)	754.77(75.84)	-33.73*	-1.639
Non-Agriculture (USD)	862.26(85.39)	1274.23(121.08)	1068.20(103.52)	-50.51**	-2.08
Total Income (USD)	1479.43(125.34)	2166.50(170.57)	1822.97(154813.97)	-84.24***	-2.81

Note: Figures in parentheses indicate standard deviation. ***, ** and * indicate 1%, 5% and 10% levels of significance respectively.

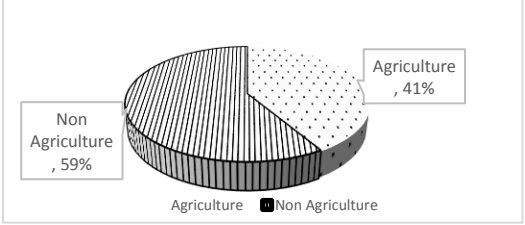

Figure 1: Income share from the agricultural and non-agricultural sectors.

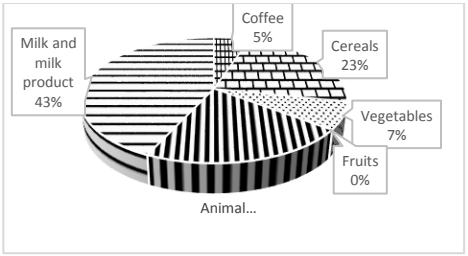

Figure 2: Agriculture Income share from various sources

3.2 Area, number of plants, gender involved and productivity of coffee cultivation

The overall average area under coffee cultivation was 0.88 ropani per HH which was 0.95 ropani per HH in Gulmi and 0.81 ropani per HH in Arghakhanchi. The average number of plants per ropani was 62.99, which was89.01 in Gulmi district and 36.97 in Arghakanchi district and was found to be statistically significant at 1 percent level of significance. Similarly, the average number of plants per HH was 52.87. The number of plants per HH in Gulmi and Arghakhanchi districts was 78.24 and 27.50 respectively and was found to be statistically significant at a 1 percent level of significance. Table13 below reveals that the average productivity of coffee was 8.50kg/ropani. The productivity of coffee among coffee growers in Gulmi district (10.15 kg/ropani) was found to be statistically higher than the productivity of coffee among coffee growers in Arghakhanchi district (6.84 kg/ropani) which was statistically significant at 10 percent level of significance (Table 4).

Overall 74% of the HH had both male and female involved in coffee production while 21% of the HH had only female members involved while only 5% had only male members actively involved in coffee production. The majority of the family members involved in coffee production among the coffee grower in Arghakhanchi were both i.e. 70 percent whereas 22 % and 8% of the members involved coffee production among coffee growers of Arghakhanchi were only female and only male respectively. Among coffee growers in Gulmi district, 78% had both male and female active members in coffee production while 20% and 2% of the HH had only female and only male members actively involved in coffee production respectively (Table 5)

Table 4: Area, numbers of plants and, the productivity of coffee by district

Variables	Arghakhanchi(n=50)	Gulmi(n=50)	Overall (N=100)	Mean difference	t-value
Coffee Area (Ropani)	0.81(0.35)	0.95(0.53)	0.88(0.45)	-0.14	-1.56
No of plants/ropani	36.97(12.02)	89.01(24.01)	62.99(32.26)	-52.04***	-13.7
No of plants/HH	27.50(10.83)	78.24(34.80)	52.87(36.10)	-50.740***	-9.88
Productivity(kg/ropani)	6.84(2.10)	10.15(6.44)	8.50(3.49)	-3.75*	-1.9

(Source: Field survey, 2019) Notes: Figures in the parentheses indicate the standard deviation. ***, ** and * indicate 1%, 5% and 10% levels of significance respectively.

Table 5: Gender of HH members involved in coffee farming by district

Gender of HH members involved in coffee farming	Arghakhanchi (n=50)	Gulmi (n=50)	Overall (N=100)	Chi-square
Male only	4(8)	1(2)	5(5)	
Female only	11(22)	10(20)	21(21)	
Both	35(70)	39(78)	74(74)	4.25

Notes: Figures in the parentheses indicate percent.

3.3 Cost and Return Analysis

The average variable cost incurred was USD 16.61 per ropani which was USD 17.81in Gulmi and USD 15.41 in Arghakanchi and was statistically significant at 5% among the districts. The average fixed cost incurred in coffee production per ropani was USD 1.33. The result was statistically significant at 10% among the study districts. The fixed cost incurred was USD 1.23 and 1.43in Arghakhanchi and Gulmi districts respectively. The total average cost per ropani was USD 17.94. The total cost of coffee production among coffee growers in Arghakhanchi (USD 16.63) and Gulmi (USD 19.24) was found to be statistically significant at a 5 percent level of significance. The average gross return from coffee cultivation was USD 36.89. The gross return from coffee production in Gulmi (USD 48.49/ropani) was higher as compared to that of Arghakhanchi district (USD 25.28/ropani) and was statistically significant at 1 percent level of significance (Table 6).

The benefit-cost ratio (BCR) was 2.02. The benefit-cost ratio among the coffee growers in Gulmi district (2.52) was higher as compared to the BCR in Arghakhanchi district (1.52) and was found to be statistically significant at 5 percent level of significance (Table 6). The total variable cost incurred among coffee growers in Arghakhanchi, the majority of the cost was incurred in labor (40%) followed by fertilizer (25%), plant protection (10%), intercultural operation, and Saplings while 5% on other headings. Similarly, the share of labor cost, plant protection cost, fertilizer cost, sapling cost, and other costs on the total variable cost incurred among the coffee growers in Gulmi district was 33%, 12%, 28%, 12%, 10%, and 5% respectively (Figure 3).

Table 6: Cost and return estimation of coffee production in one ropani of land

Cost (USD/Ropani)	Arghakhanchi (n=50)	Gulmi(n=50)	Overall (N=100)	Mean Difference	t-value
Variable cost	15.41	17.81	16.61	-294.11**	2.26
Fixed cost	1.23	1.43	1.33	-25.00	-0.56
Total Cost	16.63	19.24	17.94	-319.11**	2.65
Gross return	25.28	48.49	36.89	-2838.45***	-3.77
B/C ratio	1.52	2.52	2.02	-1.00	-3.32

Notes: Figures in the parentheses indicate the standard deviation. ***, ** and * indicate 1%, 5% and 10% levels of significance respectively.

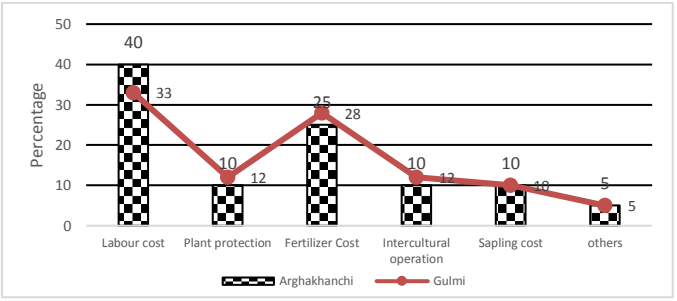

Figure 3: Total variable cost share from various cost incurred

4. Conclusion

The high benefit-cost ratio indicates that coffee production as a profitable enterprise. The coffee production was found to be lucrative in Gulmi than in Arghakhanchi due to its high B:C ratio which is corroborated by higher productivity and higher farm gate price of coffee in Gulmi. Labor cost accounted major share of total variable cost i.e. 40 percent in Arghakhanchi and 33 percent in Gulmi which justifies the low adoption of mechanization in the study area. It is recommended to invest in the coffee sector to uplift the status of mechanization which will reduce the share of labor costs and will ultimately enhance the household economy and living standard of people.

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