Factors Affecting the Adoption of Certification among the Orthodox Tea Growers in Nepal

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Abstract

The study has attempted to identify the factor affecting the adoption of certified orthodox tea production in Eastern Himalayan corridor of Nepal. Total 160 households (80 certified and 80 non-certified tea growers) were selected using random sampling technique from Ilam, Suryodaya, Dewmai Municipalities and Phakphokthum Rural Municipality of Ilam district which were selected purposively in 2018. Data were collected from the pre-tested semi structural interview schedule, direct observation, focus group discussions, key Informant interviews and rapid market appraisal. The certified tea growers were small farmers with the total tea cultivation area 0.64 ha. The average productivity of non-certified tea was 7791.38kg/ha whereas it was 3483.41kg/ha for certified orthodox tea. Average return per kg of green tea leaves among the certified growers was NRs. 70.74 whereas it was only NRs. 41.87 for the non-certified growers, which was statistically significant. This study revealed that access to credit, total cultivated land, livestock holding, education, age, migration, and training received associated positively with the certification while gender of the household head, tea share in income, economic active members and ethnicity were associated negatively with certification. Low production, shortage of labor, low bargaining power, low selling price, problem of local transportation, lack of national level norms and standard for certification scheme, poor extension activities to encourage growers to adopt certification are major reason behinds the reluctance of farmers to adopt the certification in production of orthodox tea. Technical and financial supports to growers to increase the productivity of certified orthodox tea, institutional coordination, effective extension service to encouragement of farmers and efficient development of marketing channel is necessary to promote the adoption of certification in production of orthodox tea.

Keywords: Orthodox tea; Certification; Adoption; Productivity

Information

Tea (*Cammelia sinensis*) rank second in widely consumed beverage after the water [1]. Tea is a high value, flavor intensive perennial crop with a potential for generating foreign exchange, reducing rural poverty, promoting economic growth and improving ecology and environment in Nepal [2]. Tea grown in high altitudes is processed to produce Orthodox type. Orthodox tea is produced with only the top two leaves and a bud from each branch and is partially dried ('withered'), rolled and then fermented to give a light color, unique aroma and fruity flavor. Most of the specialty tea, like green tea, oolong tea, white tea, golden tea, silver tea and hand rolled tea come under the category of orthodox tea.

All the government plans and policies recognize that tea as an important export commodity [3]. Government of Nepal has introduced the National tea policy, 2000 National sector export strategy tea (2017 – 2021), NTIS (2016) that has identified tea as most potential exportable commodity and Agriculture Development Strategy (2015-2035) has also focused on tea sub-for value chain development.

Globalization and market liberalization have creating the huge opportunities to internationalize the agricultural products in the global market. With the opportunities on internationalizing the way of production, processing and delivery of the agriculture product must follow international process to meet the international quality standard. Global market demands not only the quality of product but also environmental and social responsibility. Improper use of chemical fertilizer and pesticides by conventional growers are creating the environment issues, soil degradation and non-tariff barriers like SPS and TBT in pursuance of the global trade regimes. Nepal had received the international trademark but only can be used for the tea that fulfill the international standard or the certified tea [4]. So, Certification was considering the strategy for strengthening the position of orthodox tea producers in the value chain.

Some internationally recognized certifying agencies such as National Association of Sustainable Agriculture Australia (NASAA), the Institute for Market ecology (IMO, Switzerland), the Ethical and Environmental Certification Institute (ICEA, Italy), Ecocert France, One Cert America, Organic Certification, HACCP, ISO, USDA-NOP, JAS, Organic or Fair Trade show their local presence to work on organic product certification [5].

About 10,209 small farmers and 6,943 tea gardens involved for the production of the orthodox tea in Nepal. In Ilam, 6995

numbers of small farmers and 2945 tea gardens produced the tea in 2945ha area with 2213.19MT of green tea leaves. In total, 59% of producer followed the conventional method of production, 11% producers were certified producers and rest were in conversion producer [4].

Despite the high opportunity to enhance the position in global market, why the farmers were reluctant to adopt the certification in production of the orthodox tea? Thus, the main objective of this study is to identify the factor affecting certified production of orthodox tea.

Materials and Method

Ilam, the largest orthodox tea producing district was purposively selected for this study. Ilam, Suryodayaand, Deumai Municipalities and Phakphokthum Rural Municipality were selected purposively, and the selection of the survey area was mainly based on considerations that where, the organic certification has been applied. And all the certified orthodox tea growers of Ilam district were located only in above mention area. Data were collected from total of 160 households (80 HHs from certified growers and 80HHs from non-certified growers). Primary data were collected through interview schedule with semi structured questionnaire, focus group discussions (FGDs), key informants interviews (KII), direct field observations and secondary data were collected from the previous study conducted by different agencies. Analysis was done by using Statistical Package for Social Science (SPSS, version 20.0) and STATA (version 12.0 software.

Logit model

Logit model was used for assessing adoption behavior of certification in study area. Mathematical form of Logit model

$$Certification_i(Yes=1) = \delta_0 + \gamma \sum X_{ji} + \varepsilon_i \quad ....(1)$$

Where,

$Certification_i$= Adoption of organic certification in study area (Yes=1, 0=Otherwise).

X_{ji}= set of explanatory variables like age, gender, education, economically active household members, migration in Logit model.

ε_i = Error term.

Income regression model

The income regression model can be an appropriate statistical tool in determining influence of certification decision on tea revenue.

$$\ln Y_i = \beta_0 + \beta_1 Certification_i + \varphi \sum X_{ki} + \mu_0 \quad ....(2)$$

Where,

lnY_i= Annual household income from tea sub-sector (NRs. in natural log) in Income Regression Function.

$Certification_i$= Adoption of organic certification in study area (Yes=1, 0=Otherwise).

X_{ki}= set of explanatory variables in Income Regression Function.

μ_i = Error term.

Results and Discussion

Land availability and average area of tea plantation

Average cultivated land of respondents was 1.05ha among which certified farmers reported 1.18ha of land whereas among non-certified growers it was 0.92ha. Total cultivated land was found statistically significant among certified and non-certified orthodox tea growers. The total tea production area was found 0.64ha among the certified growers and 0.62ha among the non-certified growers. The land features in the study area is presented in Table 1.

Table 1: Land holding and land features of the respondents in the study area.

Land (hacter)	Total Average (n=160)	Certified Growers (n=80)	Non-certified Growers(n=80)	Mean Difference	t Value
Total owned land	1.89	2.07	1.7	0.36	1.58
Total cultivated land	1.05	1.18	0.92	0.26**	2.16
Total upland	0.88	1.02	0.74	0.27***	2.45
Total lowland	0.15	0.16	0.13	0.03*	1.72
Tea production area	12.63	0.64	0.62	0.028	0.383

Notes: Figures in parentheses indicate percent. ***, ** and * indicate significant at 1%, 5% and 10% levels, respectively.

Economics of orthodox tea production

The average annual productivity of the orthodox tea was found 5637.50 kg/ha. The average productivity of non-certified tea was 7791.38kg/ha whereas it was 3483.41kg/ha for certified orthodox tea. Average cost of production of certified green tea leaves was found NRs. 50.78/kg while it was only NRs. 32.51/kg for noncertified green tea leaves production. Similarly, the finding showed the average return per kg of green

tea leaves among the certified growers was NRs. 70.74 whereas it was only NRs. 41.87 for the non-certified growers, which was statistically significant. The study revealed that benefit cost ratio (B/C ratio) of certified orthodox tea was 1.46 while it was 1.58 for non-certified orthodox tea, which was statistically non-significant. Dhakal & Dahal [6] also concluded that conventional tea productivity is higher than organic tea productivity but had no significant differences in profits [7].

According to Adhikari, Regmi, Gautam, Thapa, and Joshi the production cost of certified and non-certified green tea leaves was NRs. 35.79/ kg and NRs. 25.79/kg, respectively. The premium price of green tea leaves was higher in certified tea (NRs. 60/kg) than non- certified tea leaves (NRs. 40/kg).

The marketing margin was higher in certified tea leaf (NRs. 24.21/ kg) than non- certified (NRs. 14.21/ kg) [6]. The detail economics of production of certified and non-certified orthodox tea has been shown in Table 2.

Table 2: Economics of production of orthodox tea in study area.

Variables	Total Average (n=160)	Certified Orthodox Tea (n=80)	Non-certified Orthodox Tea (n=80)	Mean Difference	t Value
Average productivity(kg/ha)	5637.5	3483.41	7791.78	-4308.37***	-6.64
Costof production per kg	41.64	50.78	32.51	18.26***	9.71
Return per kg	56.3	70.74	41.87	28.87***	11.64
B/C ratio	1.52	1.46	1.58	-0.12	-0.306
Gross margin (per kg)		3827.74	5935.95		

Note: *** indicates significant at 1% level.

Household income source

Tea sector was the major source of income (31.98%) for the farmers in the study area. Apart from this, livestock sector and remittance played major role in livelihood in study area. Share of agricultural enterprise in total household income was found 11.91% in an average, whereas tea contributed 31.98% of total income of the households in the study area. Contribution of tea sector was seen more in non-certified grower's annual household income (35.49%) than in certified grower's annual household income (28.48%). Share of different enterprises to annual household's income as presented in Table 3.

Table 3: Share of different enterprises to household income in study area.

Annual HH Income (%)	Total (n=160)	Certified Growers (n=80)	Non-certified Growers (n=80)	Mean Difference	t Value
Tea sub-sector	31.98	28.48	35.49	-7	-1.88
Agriculture (except tea)	11.91	13.87	9.95	3.92**	1.97
Livestock sector	20.42	23.55	17.29	6.26***	2.39
Wage	4.31	5.61	3.01	2.59	1.29
Government service	4.065	1.06	7.07	-6.00***	2.79
Remittance	18.43	21.32	15.53	5.78	1.29
Own business	8.46	5.56	11.35	-5.79	-1.89
Other	0.39	0.51	0.271	0.23	0.54

Note: *** and ** indicate significant at 1% and 5% level, respectively.

Factors affecting certification

To run the Logit model and to know the factors affecting certification, all the important variables were categorized into binary responses. The extent to which the Logit regression analysis model's independent variables used in the prediction correctly predicted the dependent variable. The wald test (LR chi Square) for the model indicated that, the model had good explanatory power at the 1% level. The pseudo R^2 was 33%. For the interpretation of the model, marginal effects were driven from the regression coefficients, calculated from the partial derivatives as a marginal probability. The interpretation of factors affecting certification is shown in Table 4.

Table 4: Factors influencing the certification process of orthodox tea in study area.

Variable	Coefficients	P>|z|	Standard error	dy/dx	S.E.
Economic active member	-0.405***	0.009	0.15	-0.10***	0.03
Livestock holding Unit LSU[1]	0.27	0.096	0.16	0.068	0.04
Ethnicity	-1.96 ***	0	0.46	-0.45***	0.09
Education	0.303	0.608	0.59	0.075	0.15
Gender of household head#	-0.041	0.956	0.75	-0.01	0.18

[1]LSU = 1(cow/buffalo+0.7(calf)+0.1(goat)+0.007(poultry)+0.02(pig)

Age of household head	0.015	0.428	0.01	0.003	0
Credit access#	1.825***	0	0.48	0.426***	0.09
Training received#	0.628	0.425	0.78	0.154	0.18
Total cultivated land	0.046***	0.007	0.01	0.011***	0
Migrated member	0.203	0.712	0.55	0.05	0.13
Tea share in income	-0.017	0.121	0.01	-0.004	0.002
Constant	-1.1	0.477	1.54		
Number of observations			=160		
Log likelihood			-73.43		
LR chi2 (11)			=74.93***		
(Probability > chi2			=0.000		
Pseudo R2			=0.337		

Notes: *** and* indicate significance at 1% and 10% levels, respectively. dy/dx indicates marginal change in probability (marginal effects after Logit). # indicates dummy variable (1=yes).

Logit model showed four variables were statistically significant for the certification process at 1% level of which two variables economic active members and ethnicity were negatively significant and access to credit, total cultivated land was positively significant. Though statistically non-significant, five other variables; livestock holding (LSU), education, age, migration, training received associated positively with the certification while gender of the household head, tea share in income were associated negatively.

The study revealed that the number of economically active family members was negatively and statistically significant at 1% level. If economic active member increases by 1%, the probability of certification decreases by 10%. Higher productivity of non-certified orthodox tea and the engagement of economically active member in other occupation rather than the agriculture might be the reason behind the declination in certification.

Education and training were positively associated with the certification. If HH head was literate the probability of certification increased by about 7.5% as compared to illiterate HH head. Lawal & Oluyole [8] that extension service had positive and highly significant association technology adoption [8].

Livestock holding was positively association with certification. If livestock holding increased by one unit the probability of adoption of tea certification increased by 6.8%. As the chemical fertilizer is restricted in certified tea production system, only organic manure can used, this might be fact that increase in livestock holding cause increase in certification process.

Access to credit had positively and highly statistically significant impact on certification decision in study area, if farmers had easy access to credit from local cooperatives, micro finance institution and banks, the probability of adoption of tea certification increased by 42.6% than farmers did not have credit access.

Total cultivated land in households had significant and positive impact on certification at 1% level. If cultivated land increased by unit the probability of adoption of tea certification increased by 1.15%.

Impact of certification on annual tea income

To identify the factor determining the annual tea income, income regression model was used, and the estimated results are shown in the Table 5.

Table 5: Regression estimates for determinants of income from tea (NRs. in natural logarithms).

Variables	Coefficients	Standard Error	T	P
Economic active members in number	-0.042	0.03	-1.07	0.286
Certification *Production	0.0001	0	2.42	0.017
Age of HH head	0.0008	0	0.19	0.849
Gender of HH head (Dummy)	0.168	0.17	0.98	0.33
Ethnic group (Dummy)	-0.203	0.1	-1.92	0.057
Education (Dummy)	0.267**	0.12	2.09	0.039
Household size	0.066	0.03	1.81	0.072
Livestock holding (LSU)	-0.085**	0.03	-2.34	0.021
Certification adopted (Dummy)	-0.539***	0.14	-3.6	0
Log tea land (hacter in log)	0.865***	0.07	11.07	0

Migrated member (Dummy)	-0.102	0.1	-0.98	0.329
Access to credit	0.075	0.1	0.71	0.476
Constant	9.52***	0.33	28.67	0
F (12,147)		= 21.54***		
Probability> F		=0.000		
R^2		=0.63		
Adjusted R2		=0.6		
Root MSE		=0.55		
VIF		= 1.4		

Note: *** and** indicate significance at 1% and 5% levels, respectively.

The value of coefficient of multiple determinations (R^2) is 63%. It indicates the variation in the annual household income from orthodox tea sector is explained by the independent variables included in the Ordinary Least Square (OLS) regression model. In addition-statistic (21.54) confirms the stability of the overall regression equation and joint significant at 1% level (P=0.000) in explaining HHs tea income. VIF is 1.44 and none of the variables has value higher than 1.9 it means there is no multicollinearity between independent variables included in the model. Error terms are also randomly distributed that has been checked by plotting them against predicted value of the dependent variable.

The model revealed that, certification of orthodox tea is negative and highly significant with household income from orthodox tea subsector. Similarly, tea cultivated land (Log tea land) hacter in log, is found positively significant at 1% level to determine household income from tea sector. While livestock holding (LSU) was negatively significant at 5% level to determine household income from tea sector and the explanatory variable i.e. education was positively and statistically significant at 5% level. Other independent variables in model like age of HH head, gender of HH head, HH size, and access to credits were positive but statistically non-significant in the model. Similarly, independent variables like number of economically active member, ethnicity and migrate member were negative but statistically non-significant in the model.

Studies by Parrilli [9] in Mexico and Tiyapongpattana [10] in Thailand showed that farmgate prices paid in Fair-trade certified production systems were not necessarily higher than those in conventional production systems. It might be reasoning that certification had negative impact on tea income. Giovannucci & Potts [11] showed that effectiveness and impact of certification on social, economic, and environmental performance of small holder producers depend highly on the local setting which determines the implementation, enforcement, and monitoring of certification schemes [11].

Conclusion

Tea being an industrial crop can be a suitable enterprise for addressing poverty, protecting environment and providing employment to the rural masses of the hilly areas of the country. As the orthodox tea has light color, unique aroma and subtle, slightly fruity flavor, it is in high demand among overseas consumers. A low and negligible impact of certification on growers livelihood due to low productivity, low selling price and low bargaining power of farmers, problem of local transportation, shortage of labor, lack of national level norms and standard for certification scheme, poor extension activities to encourage growers to adopt certification are major reason behinds the reluctance of farmers to adopt the certification in production of orthodox tea. Technical and financial supports to growers to increase the productivity of certified orthodox tea, institutional coordination, strengthening of national brand, effective extension service to encouragement of farmers and efficient development of marketing channel is necessary to promote the adoption of certification in production of orthodox tea.

Based on the study, followings suggestions can be made for policy makers:
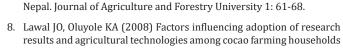
a) Tea cultivation is depended on monsoon rains serious attention must be taken to improve the irrigation facilities.

b) Focused on expansion of certified organic tea cultivation.

c) Implementation of national level norms, standard and certification scheme.

d) Establishment of organic fertilizer industry in production hub.

e) Transportation major problem - provide transportation facilities by building sub agricultural tracks.

f) Monopoly of processor in price determination - government should establish minimum support price to the profitable level.

g) Need to bring all the chain actors in same platform for the sharing and discussion of problem and opportunity - monthly or annual meeting arrangement.

Acknowledgement

References

1. Ferruzzi MG (2010) The influence of beverage composition on delivery of phenolic compounds from coffee and tea. Physiol Behav 100(1): 33-41.

2. Rana A (2007) Orthodox tea in Nepal: Upgrading with Value Chain Approach. Deutshe Gesellschaft for technische zuamenarbeit (GTZ).

3. Thapa YB (2005) Commodity case study tea. In: Karkee MK, Sharma RP (Eds.), Implications of the WTO Memberships on Nepali Agriculture. Food and Agriculture Organization of the United Nations, Kathmandu, Nepal.

4. NTCDB (2018).

5. NEAT (2011) Value Chain/Market Analysis of the Orthodox Tea Subsector in Nepal.

6. Dhakal SC, Dahal KR (2016) The Relative Efficiency of Organic Farming in Nepal. South Asian Network for Development and Environmental Economics (SANDEE).

7. Adhikari KB, Regmi PP, Gautam DM, Thapa RB, Joshi GR (2017) Value chain analysis of orthodox tea: evidence from Ilam district of Nepal. Journal of Agriculture and Forestry University 1: 61-68.

8. Lawal JO, Oluyole KA (2008) Factors influencing adoption of research results and agricultural technologies among cocao farming households in Oyo state, Nigeria. International Journal of sustainable Crop Production 3(5): 10-12.

9. Parrilli MD (2000) Subsector analysis in the Mexican craftwork: the role of Fair Trade and Xochiquetzal in Tonalá and Chapala, Jalisco, and Olinalá, Guerrero. Culemborg, The Netherlands, Fair Trade Assistance.

10. Tiyapongpattana TA (2001) Fair Trade Effects Studies 2001-Thailand. Culemborg, The Netherlands, Fair Trade Assistance.

11. Giovannucci D, Potts J, Killian B, Wunderlich C, Soto G, et al. (2008) Seeking sustainability: COSA preliminary analysis of sustainability initiatives in the coffee sector. Committee on Sustainability Assessment.