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Perceived Impact Of Tea Farming On Livelihoods Of Smallholder Farmers In Panchagarh District

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Abstract

The main objective of the study was to assess the perceived impact of tea farming on livelihoods of the smallholder tea growers. The research was conducted in the Tetulia upazila under Panchagarh district. A total of 550 farmers constituted the population of the study, and 118 small tea growers were selected as samples of the study following simple random sampling techniques. An interview schedule was used for data collection, and data was collected from 28 August to 12 October 2023. Perceived impact on livelihood of the small tea growers were assessed based on a five-point Likert scale. In contrast, both Pearson's product-moment correlation coefficient (r) and multiple linear regressions were performed to determine the relationships, influence and contribution of the selected characteristics to perceived impact of tea farming on livelihood of smallholder farmers. Present status explored that bought leaf factories are the major buyer of leaves and small-scale farmers were not getting the desired price of their tea leaves. The price fluctuation has happened over time in recent years and 20 to 40 percent deduction of the weight by the factories due to the long and large leaves. More than four-fifths of the tea growers cut raw leaves with a sharp knife instead of plucking leaves by hand. Most tea growers use pickup trucks to transport an excessive amount of raw leaves due to the high cost of labor and transportation which also degrades the quality of the tea. So, a significant proportion of the small tea growers who rely solely on income from tea farming opined that it is not profitable. Therefore, an overwhelming majority of tea growers are moderately satisfied by cultivating tea. Farmers have lost interest in cultivating tea due to the determining the price of raw leaves as desired by the factory owners and giving deductions on the leaves supplied by farmers and non-availability of low-cost agricultural credit and subsidized fertilizers and pesticides among small tea farmers. The bought leaf factories owners opined that unplanned tea farming by small growers supplied low quality and irregular raw leaves, impeding the production of good quality tea and causing a decline in tea auction market prices. The results of the study showed that tea farming had a medium perceived impact on livelihood of the 67.8 percent farmers. The selected characteristics of the farmers such as education status, farm size, tea cultivating area, income from tea farming, innovativeness, knowledge on tea farming, and attitude towards selling price of tea leaves have significant and positive effect on perceived impact of tea farming on livelihood of the small holder tea growers. Multiple regression analysis revealed that the whole model explained 63.9 percent of the total variation in the perceived impact of tea farming on livelihood of the small holder tea growers. Education status, innovativeness, knowledge on tea farming, and attitude towards selling price of tea leaves showed significant positive contributions to the perceived impact of tea farming.

Key Words: *Livelihood, Smallholder tea growers, Percieved impact, Tea farmers, Panchagarh district*

Introduction

The evergreen Camellia sinensis plant, a member of the Theaceae family, yields the leaves used to create the beloved beverage, tea (Arancon et al., 2007). Tea, the world's second most consumed beverage after water which is produced by the infusion of Camellia sinensis leaves. The world's total tea production is reported to increase from 2.9 million tons in 1994 to 6.1 million metric tons in 2019 (Ismail et al., 2020). The annual consumption of tea is assessed to be almost 273 billion liters and is anticipated to rise to 297 billion liters by 2021 (Ismail et al. 2020). Globally tea is one of the economic factors for many countries due to its large-scale plantation, production, marketing, and consumption (Hajiboland, 2017). It is the third commodity after petroleum and edible oil on which our billions of expenditures have been spent annually. It is a labor-intensive crop and produces employment and income generating possibilities and indirectly participates in economic development (Rehman et al., 2012). The main tea producing countries are China, India, Kenya, Sri Lanka, Vietnam, Argentina, and Turkey. In Bangladesh, tea stands as a significant cash crop and exportable commodity. The country's tea legacy dates back to 1840, with

the establishment of the first tea garden in Chittagong. Presently, tea cultivation flourishes in three ecologically diverse regions: the Surma valley in greater Sylhet, the Halda valley in Chittagong, and the Karatoa valley in Panchagarh. Bangladesh boasts 162 tea estates, spanning roughly 60,179 hectares of tea plantation, producing about 67.38 million kilograms of finished tea annually, with an average yield of approximately 1270 kilograms per hectare. Impressively, the tea industry contributes 0.11 percent to the nation's GDP (Raliman et al. 2020; Ahmad and Hossain 2013).

The Bangladesh Tea Research Institute (BTRI) has played a pivotal role in this success, introducing high-yield and quality clones along with hybrid seed stocks of biclonal and polyclonal origin (Alam, 2002). Various improvements, from revised fertilizer policies for mature and immature tea to optimized integrated pest control methods, have further enhanced tea production. The COVID-19 pandemic has not deterred the growth of tea production, particularly in Panchagarh and northern districts. The favorable climate and soil conditions in Panchagarh spurred its transformation into a key tea cultivation area in the late 1990s, with a significant increase in production. In 2020, Panchagarh alone produced over 10.30 million kilograms of tea, worth Tk 175 crore, marking a 7.11 lakh kg increase from the previous year (Daily Star, 2021).

This growth has not only met domestic demand but also expanded to international markets. The economic transformation has driven many farmers to switch from traditional crops to tea cultivation, fostering the emergence of 6,523 tea producers on 8,642 acres of land. Panchagarh is now home to 1,007 registered tea farmers and 10 large-scale tea estates, solidifying its status as a thriving tea cultivation hub (Dhaka Tribune 2021; Business Post 2022). Recently, primary producers have taken a significant financial hit as a result of the drop in price of raw tea leaf in the Tetulia Upazila of Panchagarh. However, tea farmers are not obtaining a fair price while the season is in progress. Despite the fact that there are vast gardens full of tea leaf, the price is quite low. Tea farmers are losing money because they are not receiving a fair price for their product. The owners of locally produced tea manufacturers were said to be members of a syndicate that was operating behind the tea price drop, according to allegations made by marginal producers. Over the course of the past few years, growers have been responding to market pressure to drive up tea leaf prices. In addition to that, they repeatedly formed chains of people. However, it failed to arouse any feeling of authority. Suddenly, the proprietors of tea factories have begun repressing their employees in the same manner as the Neelkars. The price of a kilogram of tea leaves has dropped to 11 taka. However, factories often subtract between 15 and 20 percent. This amount does not even come close to covering pay, much alone the cost of pesticides. The cost of producing one kilogram of tea leaves is around fourteen taka that is why farmers have to account for waste (Daily Star, 2022). It is of utmost need to research the linkages between socio-economic condition of smallholder tea growers, their tea farming status, and their livelihood condition. However, the purpose of this study is to provide answers of the following research questions:

i. What are the selected characteristics of the smallholder tea farmers?
ii. Is there any impact of tea farming on improving the livelihood status of smallholder farmers?
iii. What are the influences of farmers' selected characteristics on the perceived impact of tea farming on livelihood of smallholder farmers?

The promotion of tea cultivation as a nonconventional kind of agriculture is giving farmers rich returns in addition to offering enormous work opportunities, which is elevating the quality of life for thousands of people in five northern districts. Tea planting on plain lands is quickly developing in the "Kartoa Valley" ecological zone, which consists of five northern districts, according to the data of the Bangladesh Tea Board (BTB) at its Panchagarh Regional Office. This is transforming the rural economy. "Over 30,000 individuals, the most of whom are women are leading better lives in the Panchagarh, Thakurgaon, Dinajpur, Nilphamari, and Lalmonirhat districts of the valley." he stated. "These people are receiving higher salaries from farm-activities and picking tea leaves." The "Karton Valley" had an all-time record output of 14.54 million as of processed tea in 2021 as a consequence of increased tea growing This was an increase of 424 million kgs over the previous year's production of 10.30 million kgs of processed tea in the year 2020. According to Bangladesh Tea Board (BTB) authority, "Owners of nine registered and 21 unregistered tea estates and 8.067 smallholders planted tea on 11.434 acres of land in 2021." which is an increase of 1,264 acres compared to the 10.170 acres of land used for tea cultivation in 2020. When compared to the production of 51.28 million kgs of green tea leaves in the valley in 2020, the mountain region's output of green tea leaves increased to 73.57 million kgs in 2021 as a result of successful tea cultivation (Dhaka Tribune, 2021). Twenty-two businesses located in Panchagarh. Thakurgaon, and Lalmonirhat were responsible for the processing of 73.57 million kilograms (kg) of green tea leaves, which resulted in the production of 14.54 million kilograms (kg) of processed tea. This amount represented 15 percent of the total national production of 96.506 million kilograms (kg) in 2021 (Business Post, 2022).

The present study addresses the following specific objectives to:

i. determine and describe the selected characteristics of the smallholder tea growers;
ii. assess the perceived impact of tea farming on livelihoods of the smallholder tea growers; and
iii. explore the influence of the selected characteristics of the tea farmers on the perceived impact of tea farming on livelihood of smallholder farmers.

Materials and Methods

Study area

The study was conducted in northern Bangladesh, especially Tetulia Upazila under Panchagarh district of Bangladesh. Tetulia has an area of 189.12 square kilometers and is located between latitudes 26°24' and 26°38' north and longitudes between 88°21' and 88°33' east. This upazila is bounded on the north, south, and west by West Bengal, India, and on the east by Panchagarh Sadar upazila.

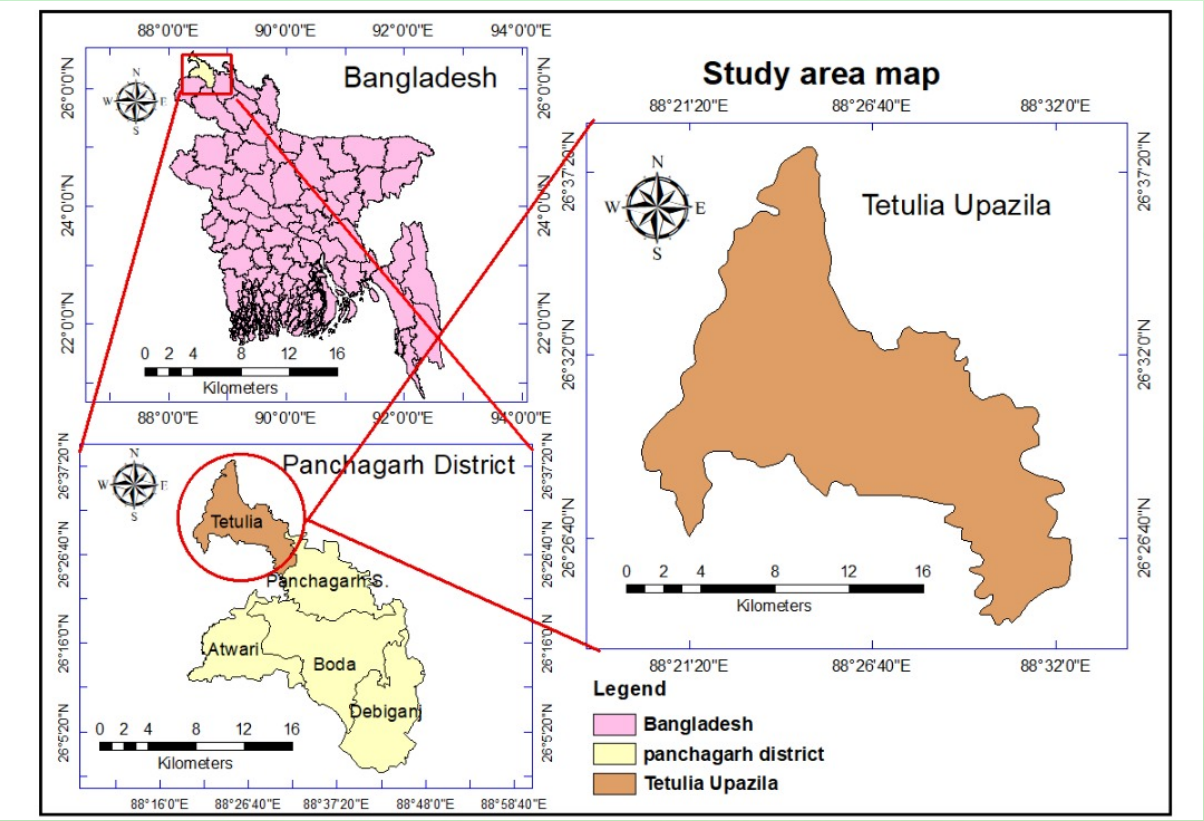

Figure 1. Map of Bangladesh and Panchagarh district showing the study area

Population and Sample

A total 550 small tea growers list was collected from Bangladesh Tea Board (BTB) Panchagarh Office, which constituted the population of this study. To make a respected sample from the population the following formula was used as developed by Kothari (2004).

$$n = \frac{Z^2PQN}{(N-1)\,e^2 + Z^2PQ}$$

Where,
n= Sample size
Z=the value of the standard normal variable at the chosen (95%) confidence level (1.96)
P= Probability assume (0.5)
Q= Remaining from probability (1-P)
N= Total population
e= the level of precision (8%)
By using this formula, 118 smallholder tea growers were selected as a sample of the study by following random sampling technique from the study area. Beside this, a reserved list of 20 farmers was prepared who were supposed to be interviewed only when a respondent in the original sample list was unavailable during data collection.

Research instrument and data collection

In order to collect valid and reliable information an interview schedule was prepared using both open and closed forms of questions to collect information. Simple, direct questions, statements and scales were included in the schedule to obtain information for independent and dependent variables. For Validity of the instrument pre-tested

with 20 respondents. Prior to completing the interview schedule, required adjustments and amendments were made based on the pre-test. The interviews were individually conducted at their respective residences and tea field of the respondents from 28 Aguest to 12 October 2023.

Variables of the Study

Measurement of independent variables

The independent variables of the study were focused on the smallholder tea farmers` socio-demographic profile of the smallholder tea growers and status of tea farming. The variables were as follows:

1. Age
2. Education status
3. Tea farming experience
4. Farm size
5. Recent tea cultivating area
6. Income from tea farming
7. Innovativeness
8. Extension contact
9. Knowledge on tea farming
10. Attitude towards selling price of tea leaves

Measurement of dependent variable

The dependent variable of this study was respondents` perceived the impact of tea farming on the livelihood of the smallholder tea growers. The variable was measured using a Likert scale (Likert 1932). The respondent was asked to express his/her opinion on 12 statements concerning tea farming, which were collected based on a review of the literature. The perceived impact of tea farming was measured by analyzing the perception index score. The ratings of the responses given by the respondents was measured following a 5-point Likert scale such as strongly agree, agree, no opinion, disagree, and strongly disagree, and the corresponding score of 5,4,3,2, and 1 was given for each of response, respectively. Thus, the Perceived impact of tea farming on livelihoods of Smallholder farmers could range from 0 to 60; while 0 indicating no Perceived impact of tea farming changed the livelihoods of Smallholder farmers and 60 indicating high perceived impact of tea farming the livelihoods of Smallholder farmers.

Data analysis

Different descriptive statistics like frequency, percentage, mean, standard deviation, and inferential statistics such as correlation, multiple linear regression, were employed. The Statistical Packages for the Social Sciences (SPSS) (version 25) was used to analyse the data. Results were presented in tables and graphs For clarity of understanding.

Results and Discussion

Characteristics profile of the smallholder tea farmers

The selected characteristics of smallholder tea growers included their age, education status, tea farming experience, farm size, tea cultivating area, income from tea farming, innovativeness, knowledge on tea farming and attitude towards selling price of tea leaves were presented in the Table 1. The age of the respondents ranged from 20 to 71 years, average being 39.79 years with a standard deviation of 11.61. Highest proportion (43.2 percent) of the respondents found in the young aged category compared to 33.1 percent middle and 23.7 percent old aged category. From the findings of the study young and middle aged tea growers constituted the major part. Because young age people are more amenable to new technologies such as cultivation of tea in the pain land, innovative, energetic, and risk taker than older on. Existing studies emphasizing the role of youth in agricultural transformation and are more likely to adopt agricultural innovations (Mahama et al., 2024, Harizanova-Bartos et al., 2019). The educational score of the tea farmers ranged from 0.5 to 18 with an average of 8.89 and standard deviation of 3.88. Results indicated that the highest proportion (45.8 percent) of the respondents had secondary level of education compared to 23.7 percent of them having higher secondary education, 9.3 percent of them having above secondary level education, 12.7 percent having primary level education and only 8.5 percent of the tea farmers could sign only. Thus, the majority (69.50 percent) of the tea farmers had education ranging from secondary to higher secondary level. The findings indicate the literacy rate of the tea growers is higher than the national average literacy of 55.7 percent (BBS, 2018). It can be assumed that the educational qualification of the tea growers may be higher than their neighbors'. Educated farmers are more likely to adopt modern farming techniques and management strategies (Worku, 2019). Higher education levels are also associated with an increased likelihood of embracing precision agriculture and sustainable farming practices (Hermans et al., 2021).

Additionally, research suggests that tertiary education contributes significantly to improving agricultural efficiency, as educated farmers are better equipped to comprehend and implement new agricultural technologies (Andrianarison et al., 2021). This supports the assumption that the educational qualification of tea growers provides them with the necessary skills for effective tea farming. Studies have also shown that farmers with access to formal education are more open to adopting innovations, which can lead to higher yields and better economic outcomes (Verma, 2024).

Table 1. Selected characteristics of the smallholder farmers (N=118)

	Scoring method	Range Observed (Possible)	Categories	Respondents No.	Respondents %	Mean	SD
Age	No. of years	20-71 (Unknown)	Young aged (<35) Middle aged (36-50) Old aged (>50)	51 39 28	43.2 33.1 23.7	39.79	11.61
Education status	Schooling year	0.5-18.0 (Unknown)	Can sign only (0.5) Primary (1-5) Secondary (6-10) Higher secondary (11-12) Above higher secondary (>12)	10 15 54 28 11	8.5 12.7 45.8 23.7 9.3	8.89	3.88
Tea farming experience	No. of years	2-14 (Unknown)	Less experienced (up to 6) Medium experienced (7-11) Highly experienced (≥12)	25 71 22	21.2 60.2 18.6	8.56	2.68
Farm size	Hectare	0.13-2.21 (Unknown)	Marginal (0.02-0.2 ha.) Small (0.2-1 ha.) Medium (1-3 ha.)	2 71 45	1.7 60.2 38.1	0.89	0.53
Tea cultivating area	Hectare	0.2-2.0 (Unknown)	Small (0.2-1 ha.) Medium (1-3 ha.)	71 47	60.2 39.8	0.90	0.50
Income from tea farming	('000'Tk.)	20-750 (Unknown)	Low income (up to 78) Medium income (79-471) High income (>471)	24 75 19	20.3 63.6 16.1	274.37	196.61
Innovativeness	Score	0-30 (Unknown)	Less innovative (up to 11) Moderately innovative (12-22) Highly innovative (>22)	77 32 9	65.3 27.1 7.6	9.06	6.62
Knowledge of tea farming	Score	6-19 (0 to 20)	Poor knowledge (up to 11) Fair knowledge (12-17) Good knowledge (>17)	13 90 15	11.0 76.3 12.7	14.31	3.11
Attitude of tea farmers towards selling price of tea leaves	Score	6-19 (0 to 20)	Poor knowledge (up to 11) Fair knowledge (12-17) Good knowledge (>17)	13 90 15	11.0 76.3 12.7	14.31	3.11

SD= Standard deviation

Thus, the findings from this study align with broader agricultural research, indicating that a higher education level significantly influences farmers' ability to adopt advanced techniques and improve productivity (Baldock et al., 2022). Tea farmers with at least a secondary education level are well positioned to engage in team farming enterprises effectively and enhance their livelihoods. Tea farming experience of the respondents ranged from 2 to 14 years. The mean tea farming experience is 8.56 years with a standard deviation of 2.68 years. Analyzed data demonstrated in Table 1 indicate that the majority (60.2 percent) of tea farmers had medium experienced of tea farming while 21.2 percent had jointly less experienced and only 18.6 percent highly experienced of tea farming. It means that the majority (78.8%) of the tea farmers had farming experience of medium to high experience of tea farming. The farm size of the respondents in the study area ranged from 0.13 to 2.21 hectares. The mean of farm size was 0.89 hectares with a standard deviation of 0.53 hectares. Results showed that majority of the respondents (60.2 percent) had small farms while 38.1 percent had medium farm size, and only 1.7 percent was marginal. The findings revealed that almost all (98.3 percent) of the respondents had small to medium farm size. In the context of the study area the respondents had farm sizes of up to 3 hectares, which is not so much less than we think. However, there are no landless respondents found in the study area. Studies indicate that larger farm sizes are associated with higher yields and greater economic returns due to economies of scale (Gessesse & He, 2021). However, smallholder farmers can still achieve high productivity through efficient land use, modern agronomic practices, and cooperative farming models (Ateka et al., 2018).

Additionally, research suggests that farm size influences household poverty levels, with small farms often yielding lower incomes, thus necessitating supplementary income sources (Rotich et al., 2017). In Kenya, smallholder tea farmers with diversified crop production reported higher profitability compared to those solely dependent on tea farming (Kanyua et al., 2015). Furthermore, land tenure security and access to land certification have been identified as critical factors in improving farm productivity. Secure land tenure allows farmers to make long-term investments in their tea farms, thereby enhancing production efficiency (Gessesse & He, 2021). Policies that support smallholder land consolidation, credit access, and technical training can significantly contribute to the economic viability of tea farming (Munishi et al., 2017). Overall, the study's findings align with existing literature emphasizing the importance of efficient land management, innovative farming techniques, and supportive policies to enhance smallholder tea farming sustainability. The range of recent tea cultivation areas from 0.2 to 2.0 hectares, mean was 0.90 hectares and standard deviation of 0.50. majority of the respondents (60.2 percent) had small recent

tea cultivated areas and 39.8 percent had medium recent tea cultivated areas. It means that a significant portion of tea growers may face lower incomes and potentially reduced livelihood stability due to limited land for cultivation, while 39.8 percent with medium sized areas may have a comparatively more secure economic base. Research shows that increasing farm size can significantly enhance tea yield and economic stability (Gessesse & He, 2021). Farmers with smaller tea farms may benefit from land consolidation and cooperative farming models to improve efficiency and profitability (Munishi et al., 2017). Additionally, the adoption of organic tea cultivation has been shown to improve the economic viability of smallholder farmers by increasing market value and reducing input costs (Doanh et al., 2018). Supporting smallholder farmers with better market access, extension services, and sustainable farming methods can enhance productivity and long-term economic sustainability (Ateka et al., 2018). Income from tea farming is the total annual money generated from cultivating and selling tea leaves. Income of the respondents from tea farming ranged from Tk. 20,000 to Tk.750, 000 with the mean of Tk. 274,370 and standard deviation Tk. 196,610. Findings showns that 63.6 percent of the respondents belonged to the medium of income followed by 16.1 percent in high and 20.3 percent in low income group from tea farming. Thus, the overwhelming majority (83.9 percent) of tea farmers had low to medium income from tea farming. This suggests that the livelihoods of many tea growers are moderately impacted by their income from tea farming, which might not provide a high standard of living or economic security. Income disparities among tea farmers are influenced by farm size, farming practices, and access to markets. Studies indicate that farmers with diversified cash crop production tend to earn more than those who rely solely on tea farming (Kanyua et al., 2015). Additionally, research suggests that contract farming and sustainability certification can enhance income by providing stable prices and premium market opportunities (Nguyen, 2020). In Tanzania, studies have shown that smallholder tea farmers with access to credit, extension services, and cooperative structures experience improved income stability (Dogeje & Ngaruko, 2023). Furthermore, improving infrastructure and market linkages can significantly boost smallholder tea farmers' earnings and reduce poverty levels (Rotich et al., 2017). Overall, these findings suggest that while tea farming provides a primary source of income for smallholder farmers, additional support in the form of cooperative farming, credit access, and sustainable practices is necessary to enhance economic security and long term viability.

The innovativeness scores of the respondents ranged from 0 to 30 with average of 9.06 and standard deviation were 6.62. The computed data indicated that 65.3 percent of the respondents had less innovativeness compared with 27.1 percent had moderately, and only 7.6 percent had highly innovativeness. The findings of the study revealed that more than half (65.3 percent) of the respondents had less innovativeness on modern agricultural technology. This means that the majority of the tea farmers had less innovativeness towards the improved farming practices in terms of duration of practicing improved farming on tea production. Knowledge on tea farming of the tea farmers ranged from 6 to 19 against the possible range of 0 to 20. The mean and standard deviation were 14.31 and 3.11 respectively. It can be clearly seen from the findings that an overwhelming majority (76.3 percent) of the respondents possessed fair knowledge on tea production, followed by 11.0 percent with less and 12.7 percent having good level of knowledge of tea farming. Thus, we can conclude that 87.3 percent of the tea farmers had low to fair knowledge on tea farming and highlighting the potential need for educational and training programs in tea farming. When it comes to selling price of tea leaves, attitude defines how they approach the challenges and opportunities associated with the fluctuating prices of their tea leaves. Considering the drop of raw leaf, the attitude of the respondents was measured. Attitude scores of the respondents towards selling price of tea leaves could theoretically range from 0 to 100. However, their observed scores ranged from 30 to 81 with an average of 50.65, and standard deviation of 7.64. It was found that among the respondents' 50.0 percent belong to moderately favorable attitude category while 24.6 percent had moderately favorable attitude, 15.3 percent had highly favorable attitude, 8.5 percent had highly unfavorable attitude and only 1.7 percent had neutral attitude towards selling price of tea leaves. These findings suggest that most farmers are neither strongly optimistic nor completely dissatisfied with tea leaf prices but maintain a cautiously optimistic stance. Several factors contribute to this moderate satisfaction level. The fluctuation in raw tea leaf prices at different bought-leaf factories, potential collusion between buyers and sellers, and increasing costs of tea cultivation may all influence farmers' attitudes. Research has shown that tea smallholders often perceive pricing structures as unfair due to external control by factory owners and market intermediaries (Kakoty, 2021). Additionally, studies in Kenya have demonstrated that price volatility in the tea sector creates uncertainty for smallholder farmers, impacting their willingness to expand production and invest in quality improvement measures (Kiplimo et al., 2015). Moreover, tea pricing decisions are influenced by factors beyond the farmers' control, including agro-climatic conditions, plucking standards, and the cost of inputs (Kanyua et al., 2015). In the case of Bangladesh, farmers in Panchagarh have expressed disillusionment due to not receiving the expected fair prices for their tea leaves. The initial phase of tea farming was characterized by fewer cultivars and higher pricing, but as the number of tea farmers increased, the market became more competitive, leading to lower prices and reduced profit margins. This aligns with global trends, where increased supply often drives prices down, especially in commodity markets dominated by large processing units (Mahindapala, 2020).

To improve pricing satisfaction among tea smallholders, researchers suggest the adoption of collective marketing strategies, participation in cooperatives, and the establishment of price stabilization mechanisms (Trimo et al., 2018). Moreover, branding and certification of specialty tea can enhance the market value of tea leaves, enabling farmers to receive premium prices (Raj, 2021).

Extension contact

Extension contacts measure the level of interaction between tea farmers and tea extension workers, and it is a very effective and powerful source of receiving information about various new and modem technologies.

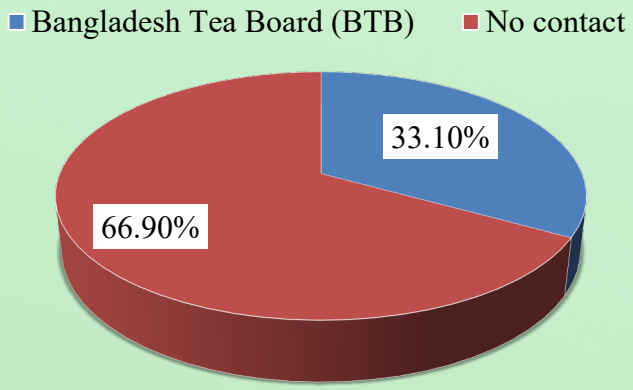

Figure 2. Distribution of the smallholder tea growers based on their extension contact

Graphical data in Figure 2 indicated that Majority (66.9 percent) of the tea farmers have no contact with extension compared to 33.1 percent of them having Bangladesh tea board (BTB) extension contact. It may be remarked that many tea farmers lack access to extension services, but those who access to extension contact like Bangladesh Tea Board (BTB) gain valuable insights into new agricultural technologies. This information can enhance their tea cultivation, leading to higher crop yields which can influence their livelihoods. Furthermore, studies in Sri Lanka have highlighted the importance of public-private partnership (PPP) extension models in bridging the gap between government-led and private-sector advisory services. These models have been shown to improve trust, technical knowledge sharing, and farmer participation in sustainable tea production (Amarathunga & Jayasinghe, 2024). Similarly, research on extension services in Indonesia has found that smallholder farmers who engage with agricultural extension programs tend to adopt better farm management strategies, leading to increased efficiency and income (Kosim et al., 2021).

Despite these benefits, challenges remain in ensuring widespread access to extension services. Research suggests that privatized extension models often face governance and accountability issues, which can limit their effectiveness for smallholder tea farmers (Mbeche et al., 2021). Thus, policymakers and agricultural agencies should focus on expanding extension outreach, improving farmer education programs, and integrating technology based advisory services to ensure that all smallholder tea growers can access essential agricultural information.

Perceived Impact of Tea Farming on Livelihoods of Smallholder Tea Growers

The perceived impact of tea farming on livelihoods of Smallholder tea growers was determined was assessed in three ways:

a) By assessing the overall perceived impact of tea farming on livelihood of smallholder tea growers, (b) by assessing dimension wise perceived impact of tea farming on livelihood of small tea growers, (c) by assessing the statement-wise perceived impact of tea farming.

The results are as follows:

Overall perceived impact of tea farming on livelihoods of smallholder tea growers

The observed overall perceived impact of tea farming scores ranged from 31 to 49 against the possible range of 12 to 60 with a mean of 39.75 and standard deviation of 4.62. Based on Their 'Perceived impact of tea' scores the respondents were classified into three categories such as 'Low perceived impact' (up to 35), 'Medium perceived impact' (36-45), and 'High perceived impact' (above 45) as shown in Table 2.

Table 2. Distribution of the smallholder tea growers based on their perceived impact on livelihood

Range		Categories (in score)	Frequency	Percent	Mean	SD
Possible	Observed					
12-60	31-49	Low perceived impact (up to 35)	24	20.3	39.75	4.62
		Medium perceived impact (36-45)	80	67.8		
		High perceived impact (above 45)	14	11.9		
		Total	118	100.0		

The results of Table 2 show that highest proportion (67.8 percent) of respondents believed that tea farming had a medium perceived impact on their livelihoods. A smaller proportion (20.3 percent) perceived a low perceived impact and while only 11.9 percent perceived a high perceived impact of Tea farming. This indicates that a very large majority (88.1 percent) of the respondents fell within the low to medium perceived impact category, suggesting that the overall perceived impact of tea farming on their livelihoods was not very high.

Dimension wise perceived impact on livelihood of small tea growers

To measure the perceived impact of tea farming on livelihoods, five dimensions of livelihood were considered, as shown in Figure 3. The ranking of perceived impact of tea farming on livelihoods based on their Perceived Impact Indices (PIIs) was presented through a graphical representation in the form of a spider diagram representing the five dimensions.

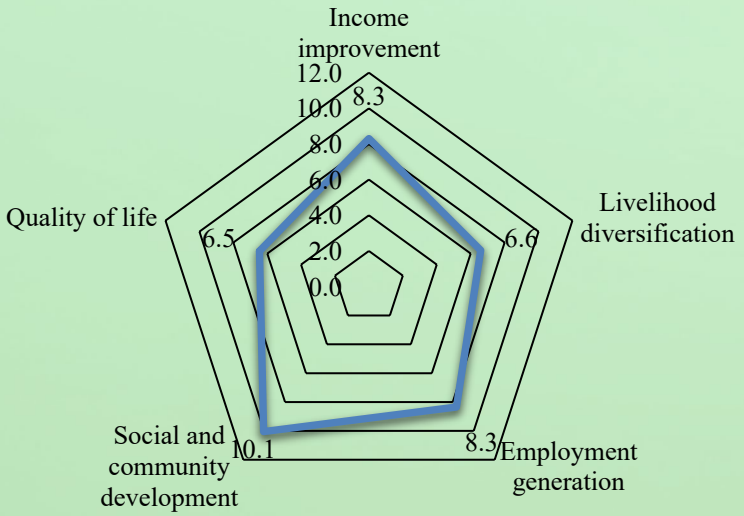

Figure 3. Dimension wise perceived impact on livelihood of small tea growers

Result of Figure 15 shows that among five dimensions of tea farmer's livelihood, Social and community development (PIIs=10.1) was mostly perceived impact by tea farming, followed by employment generation (PIIs=8.3) and income improvement (PIIs=8.3) were the second most. Livelihood diversification (PIIs=6.6) was the third and Quality life was the least perceived impact among all the five dimensions of tea farmer's livelihood.

Statement-wise perceived impact of tea farming

Twelve statements related to livelihoods of smallholder tea farmers were considered for measurement perceived impact of Tea farming. The ranking of the statements was done based on their Statement-wise Perceived Impact on Livelihood Index (PILI) and they are presented in Table 3. For having better understanding regarding perceived impact of Tea farming on livelihoods of Smallholder tea farmers, it was necessary to have an idea about the comparative statements in 12 selected statements. For this purpose, Statement-wise Perceived Impact on Livelihood Index (PILI) was computed.

The computed indices score of the 12 statements ranged from 288 to 521 against a possible range of 0 to 590. The rank order according to their Statement-wise Perceived Impact on Livelihood Index (PILI) is shown in Table 3.

Result in Table 11 indicate that 'tea farming has provided employment for local communities in the tea sector' (PILI=521) was the most perceived impact due to Tea farming. 'Tea farming has created job opportunities for me and other members of my household' (PILI=464) was found to have the second most perceived impact due to Tea farming. 'Tea farming has opened opportunities for additional livelihood activities' (PILI=424) emerged as the third most perceived impact due to Tea farming. 'Tea farming has significantly increased my household income' (PILI=288) was the least perceived impact due to Tea farming among the 12 selected statements.

Influencing variables to perceived impact of tea farming on livelihoods of smallholder farmers

Correlation Analysis

This section deals with the findings of the relationships between the selected characteristics of tea farmers and the perceived impact of tea farming on livelihood of smallholder farmers. The selected characteristics of the tea farmers are age, educational status, tea farming experience, farm size, tea cultivating area, income from tea farming, innovativeness, extension contact, knowledge on tea farming and attitude towards selling price of tea

leaves. The dependent variable was perceived impact of tea farming on livelihood of smallholder farmers. Pearson's Product Moment Correlation co-efficient (r) was used to determine the relationships between the selected characteristics of the farmers and the perceived impact of tea farming on the livelihood of smallholder farmers. At highest five percent (0.05) level of significance was used as the basis for rejection of a null hypothesis. The correlation analysis (Table 4) shows that eight out of ten variables are significantly positive related to the perceived impact of tea farming on the livelihood of smallholder farmers namely ,educational status, farm size, tea cultivating area, income from tea farming, innovativeness, extension contact, knowledge on tea farming and attitude towards selling price of tea leaves. In contrast, only age and tea farming experience had no significant relationship with the perceived impact of tea farming on the livelihood of smallholder farmers at five percent level of significance.

Table 3. Rank order of the livelihood options based on perceived impact on livelihood index value

Sl. No.	Statements	Level of agreement					*PILI	**RO
		SA	A	UD	DA	SDA		
(A) Income improvement:								
1.	Tea farming has significantly increased my household income	24	29	55	9	1	288	12th
2.	Tea farming has provided me with a stable source of income	1	24	65	28	0	356	9th
3.	Tea farming has helped me meet my financial needs and expenses	1	42	50	24	1	336	11th
(B) Livelihood diversification:								
4.	Tea farming has allowed me to diversify my income sources	18	20	30	44	6	354	10th
5.	Tea farming has opened up opportunities for additional livelihood activities	3	13	19	77	6	424	3rd
(C) Employment generation:								
6.	Tea farming has created job opportunities for me and other members of my household	0	16	5	68	29	464	2nd
7.	Tea farming has provided employment for local communities in the tea sector	0	0	8	53	57	521	1st
(D) Social and community development:								
8.	Tea farming has improved the social status and recognition of tea growers in the community	2	23	12	74	7	415	4th
9.	Tea farming has fostered a sense of community among tea growers	4	19	11	83	1	412	5th
10.	Tea farming has led to the development of social infrastructure and services in the area	15	23	24	54	2	359	8th
(E) Quality of life:								
11.	Tea farming has improved the living standards of small holder tea growers	4	38	26	45	5	363	7th
12.	Tea farming has provided better access to education, healthcare, and other essential services	9	22	31	49	7	377	6th

*Perceived Impact on Livelihood Index; **Rank Order

Table 4. Relationships between the dependent and independent variable

Dependent Variable	Independent variables	Calculated 'r' value at 116 df.	Tabulated 'r' value at 116 df.	
			0.05% Level	0.01% Level
Perceived impact of tea farming on livelihoods of smallholder farmers	Age (X_1)	0.157	±0.183	±0.239
	Education status (X_2)	0.317**		
	Tea farming experience (X_3)	0.113		
	Farm size (X_4)	0.200*		
	Tea cultivating area (X_5)	0.185*		
	Income from tea farming (X_6)	0.232*		
	Innovativeness (X_7)	0.701**		
	Extension Contact (X_8)	0.206*		
	Knowledge on tea farming (X_9)	0.524**		
	Attitude towards selling price of tea leaves (X_{10})	0.296**		

*Correlation is significant at the 0.05 level and ** Correlation is significant at the 0.01 level

Multiple linear regression analysis

Multiple regression analysis (enter methods) was run to determine the influence of explanatory variables on Perceived impact of tea farming on livelihoods of smallholder farmers. Out of ten independent variables, eight were included in multiple regression analysis due to their significant values in correlation analysis (Table 4). The coefficient of determination (R2) indicates that all the independent variables explain 66.3 percent of the variance in the perceived impact of tea farming on smallholder farmers' livelihoods. The adjusted R2, calculated by only including the significant independent variables, reveals that 63.9 percent of the dependent variable's variation is attributable to these independent variables. Of them only four variables namely education status, innovativeness, knowledge on tea farming and attitude towards selling price of tea leaves had positive significant contribution to the perceived impact of tea farming on the livelihood of smallholder farmers. The contributions of the remaining selected characteristics were insignificant.

Table 5. Contribution of selected characteristics to the perceived impact of tea farming on the livelihood of smallholder farmers

Selected characteristics of the respondents	Unstandardized Coefficients		Standardized Coefficients	% Contribution	*t*-value
	β	SD	β		
(Constant)	23.410	1.966			11.906
Education status (X_2)	0.137	0.071	0.115		1.930*
Farm size (X_4)	0.106	0.697	0.012		0.152
Tea cultivation area (X_5)	-0.364	0.712	-0.039		-0.512
Income from tea (X_6)	0.001	0.001	0.038	63.9	0.605
Innovativeness (X_7)	0.408	0.042	0.585		9.679**
Extension contact (X_8)	0.037	0.347	0.006		0.108
Knowledge on tea farming (X_9)	0.472	0.091	0.318		5.186**
Attitude towards selling price of tea leaves (X_{10})	0.091	0.036	0.151		2.537**

* Significant at 5% level of significance and ** Significant at 1% level of significance; R^2=0.663; Adjusted R^2=0.639; F change= 26.86; SD= Standard deviation

In this connection however, the researcher rejected the null hypothesis concerned and concluded that each of the factors had a significant effect on the perceived impact of tea farming on smallholder farmers' livelihoods. In other words, the extent of perceived impact of tea farming on livelihood by the smallholder tea growers was influenced by those four factors. Innovativeness has the strongest positive impact, showing that farmers who adopt new techniques, value addition, and modern farming practices perceive greater benefits. This aligns with studies highlighting that innovative farmers achieve higher productivity and profitability (Nyokabi et al., 2024). Similarly, knowledge on tea farming is another major contributor, as better informed farmers can optimize their farming practices, leading to improved yields and income (Maina et al., 2012).

The attitude towards selling price of tea leaves also plays a crucial role, indicating that farmers who view tea prices favorably perceive more benefits from tea farming. This suggests that market confidence and price stability enhance farmer satisfaction and investment in tea production. Additionally, education status significantly impacts perception, as educated farmers tend to make informed decisions, adopt improved practices, and access better markets, leading to enhanced livelihood benefits.

Conclusions

Based on the major findings of the study and their logical interpretation the following conclusions were drawn:

- The selected characteristics of the smallholder tea growers reveals that majority of the respondents were young to middle aged having eleven years of experience with small tea cultivation area and very poor extension contact with Bangladesh tea board officials. The small growers have fair knowledge but due to not receiving any training they were unable to use their knowledge which leads them less innovative practices in tea farming.
- Tea farming had a medium perceived impact on the livelihood of the small tea growers which is mostly impacted in social and community development compared to other four dimensions of livelihood because tea is cultivated commercially in this area by other different tea state and small tea garden producers. Therefore, it might be concluded that though their livelihood was not expectedly impacted by tea farming but impacted in other considered dimensions of livelihood.
- Both the correlation and regression analyses showed that education status, innovativeness, knowledge on tea farming, and attitude towards the selling price of tea leaves had significantly influenced the perceived impact of tea farming on the livelihoods of smallholder farmers. These factors positively contribute to the economic stability and overall well-being of the tea farmers. Specifically, innovativeness showed the strongest positive

relationship (r = 0.701**), while education, knowledge, and attitude towards the selling price of tea leaves also have substantial positive impacts. Conversely, age and tea farming experience do not significantly affect the perceived impact. The results underscore the importance of fostering education, promoting innovative practices, enhancing knowledge dissemination, and empowering farmers in market negotiations to improve their livelihoods.

Recommendations

Based on the above conclusions and experience of the present study the following recommendations were made:

Recommendations for policy implications

- The findings of the study indicated that an overwhelming majority (82.5 percent) of the respondents have not received any training in tea farming. Therefore, Bangladesh Tea Board (BTB) may establish institutional tea training center for enhancing the tea farmers' competence and provide low-cost agricultural credit with subsidized fertilizers and pesticides among small tea farmers.
- Working along with both the Bangladesh Tea Board (BTB) and the Department of Agricultural Extension (DAE) to diagnose crops and tea fields and choose commercial tea-growing places for better quality tea instead of scattered cultivation in homestead area.
- The ministry of commerce needs to realize and take necessary measures for capacity building of Panchagarh BTB office for providing better services to the tea producers. The Ministry of commerce also may provide more rural inclusive financing and widening alternative use of tea leaves for tea growers.

Recommendations for further study

A piece of study cannot provide all information for proper understanding of the perceived impact of tea farming on the livelihood of smallholder farmers. It was felt that much investigation is needed for clear understanding of the perceived impact of tea farming on livelihood of smallholder farmers. Hence, the following suggestion might be helpful for further research:

- The study was conducted on perceived impact of tea farming on livelihood of smallholder farmers in Tetulia upazila under Panchagarah district of northern Bangladesh. The findings of this study should be verified by similar research in other parts of the country.
- This study investigated the relationship of ten selected characteristics of the tea farmers with the perceived impact of tea farming on the livelihood of smallholder farmers. Therefore, further research could be conducted to assess the relationships of other characteristics of the smallholder tea farmers with the same.
- Age and tea farming experience of the tea growers had no relationship with their perceived impact of tea farming on livelihood of smallholder farmers. As a result, further verification is necessary in this regard.

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