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ANALYSIS OF THE ECONOMIC EFFICIENCY AND INFLUENCING FACTORS OF SHAN TUYET TEA PRODUCTION AMONG FARMING HOUSEHOLDS IN YEN BINH COMMUNE, THAI NGUYEN PROVINCE

ANÁLISE DA EFICIÊNCIA ECONÔMICA E DOS FATORES QUE INFLUENCIAM A PRODUÇÃO DE CHÁ SHAN TUYET ENTRE FAMÍLIAS AGRICULTORAS NA COMUNA DE YEN BINH, PROVÍNCIA DE THAI NGUYEN

Le Phuong Nam
Vietnam National University of Agriculture, Vietnam, Vietnam
lephuongnam87@gmail.com

Nguyen Manh Hieu
Vietnam National University of Agriculture, Vietnam, Vietnam
hieunguyenmanh90@gmail.com

Ha Quang Hien
Nanjing Agricultural University, China, China
hien.ha4w@gmail.com

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Corresponding author:
hieunguyenmanh90@gmail.com

Abstract

Shan Tuyet tea is an important crop in Yen Binh Commune, Thai Nguyen Province (formerly Yen Cu Commune, Cho Moi District, Bac Kan Province). It plays a key role in helping local people increase their income. However, tea production still faces several challenges, such as low yield, small farming scale, limited use of machinery, and unstable markets. This study surveyed 45 farming households in two villages, dividing them into three groups by production scale (small, medium, and large). The research applied descriptive and comparative statistics, annual cost-benefit accounting, and multiple regression analysis. Results show that tea production has improved thanks to government support and the development of cooperatives. Still, there are clear differences between household groups. Larger-scale households achieved better yields and higher economic results because they had more land, invested more labor, and worked closely with cooperatives. The regression model found three factors that clearly increased tea yield: joining a cooperative, having more land, and using more labor. In contrast, education level and farming experience did not show significant effects. Based on the findings, the

study proposes four main solutions to improve tea production: invest in equipment suitable for each group; enhance technical training and support; strengthen links between producers and buyers; and expand the market for Shan Tuyet tea in Yen Binh.

Keywords: Shan Tuyet tea. economic efficiency. production linkage.

Resumo

O chá Shan Tuyet é uma cultura importante na comuna de Yen Binh, província de Thai Nguyen (anteriormente comuna de Yen Cu, distrito de Cho Moi, província de Bac Kan). Ele desempenha um papel essencial ao ajudar a população local a aumentar sua renda. No entanto, a produção de chá ainda enfrenta vários desafios, como baixa produtividade, pequena escala de cultivo, uso limitado de maquinário e mercados instáveis. Este estudo pesquisou 45 famílias agricultoras em duas aldeias, dividindo-as em três grupos de acordo com a escala de produção (pequena, média e grande). A pesquisa aplicou estatísticas descritivas e comparativas, contabilização anual de custos e benefícios e análise de regressão múltipla. Os resultados mostram que a produção de chá melhorou graças ao apoio do governo e ao desenvolvimento de cooperativas. Ainda assim, há diferenças claras entre os grupos familiares. As famílias de maior escala obtiveram melhores rendimentos e resultados econômicos mais altos porque possuíam mais terras, investiram mais trabalho e mantiveram uma relação mais próxima com as cooperativas. O modelo de regressão identificou três fatores que aumentaram significativamente a produtividade do chá: participação em cooperativas, maior área de terra e maior uso de mão de obra. Em contrapartida, o nível educacional e a experiência agrícola não apresentaram efeitos significativos. Com base nas conclusões, o estudo propõe quatro soluções principais para melhorar a produção de chá: investir em equipamentos adequados para cada grupo; aprimorar o treinamento técnico e o suporte; fortalecer os vínculos entre produtores e compradores; e expandir o mercado do chá Shan Tuyet em Yen Binh.

Palavras-chave: chá Shan Tuyet. eficiência econômica. articulação produtiva.

1. INTRODUCTION

Shan Tuyet tea is a specialty tea variety that grows naturally at altitudes above 800 meters, characterized by low planting density and organic cultivation practices without the use of chemicals (Nguyen Thi Kieu Oanh et al., 2022). In Yen Cu commune, formerly part of Bac Kan province, where the soil and climatic conditions are typical of highland areas, Shan Tuyet tea has long been a sustainable livelihood, contributing to income improvement and poverty reduction for local farmers. This is achieved through the laboration between households and cooperatives in tea cultivation, processing, and brand development (HaThanh, 2024; Tam Ngoc, 2024). In recent years, the former Bac Kan province has actively implemented technical support programs, tea variety improvement initiatives, and organic-oriented cultivation models. At the same time, local authorities have promoted the establishment of cooperatives and the development of tea brands under the OCOP program. As a result, cooperatives such as Ban Chao Shan Tuyet Tea Cooperative and Ban Moc Agricultural Cooperative, both located in the former Cho Moi district, have achieved OCOP certifications of three to four stars. These achievements have helped increase product value and enhance market competitiveness (Bich Ngoc, 2024).

However, the economic efficiency of Shan Tuyet tea production among farmers in the former Yen Cu commune remains limited. The average yield is only about one ton of fresh buds per hectare per year, while market demand is unstable and selling prices remain low (UBND xa Yen Cu [Yen Cu Commune People's Committee], 2023). Due to the limited economic attractiveness of Shan Tuyet tea cultivation, many households lack the incentive to expand cultivation areas or invest in quality improvement. Moreover, the variation in economic efficiency across different farm-size groups has not been systematically analyzed, creating challenges for designing appropriate policy interventions. These realities underscore the necessity of conducting a comprehensive empirical study to evaluate the economic efficiency and determinants of Shan Tuyet tea production among farming households in the former Yen Cu commune. The findings of this study are expected to provide evidence-based insights to support the formulation of practical policy recommendations aimed at improving the economic performance and sustainability of Shan Tuyet tea production in the locality in the coming years.

2. LITERATURE REVIEW

In agricultural research in Vietnam, the economic efficiency of crop production is commonly approached from a financial perspective, which evaluates the profitability of production activities based on annual accounting indicators such as Gross Output (GO), Intermediate Cost (IC), Value Added (VA), and Mixed Income (MI). This approach effectively reflects the extent to which input resources are efficiently utilized to generate output value and profit. It is particularly suitable for smallholder farming conditions and has been widely applied in empirical studies. According to Bui Thi Minh Ha et al. (2018), the economic efficiency of tea production among farming households in Thai Nguyen province was assessed using financial indicators such as GO, IC, VA, and MI. Their findings revealed that household income is closely associated with productivity, production scale, and the organization of product marketing. Tran Thi Quy Chinh et al. (2020) confirmed that the financial efficiency of tea production can reach a profit-to-cost ratio of up to 48.97%, influenced by factors such as cultivated area, cultivation techniques, and access to credit. Similarly, (Nguyen Van Chung and Hoang Dung Ha, 2024) indicated that market constraints, production organization, and consumption capacity are the main factors limiting the economic efficiency of Truoi tea production in Thua Thien Hue province. Beyond the household level, studies on traditional tea craft villages in Thai Nguyen also demonstrate that the financial performance of tea production can be effectively measured through indicators such as output value per hectare, yield per hectare, and income per laborer (Dong Duy Khanh et al., 2023). Therefore, the application of a financial indicator system to evaluate economic efficiency in crop production not only reflects the profitability of farming activities but also serves as an important basis for policy formulation aimed at supporting and developing agricultural crops.

Tea production among farming households is influenced by a combination of production, organizational, and policy-related factors. First, government support policies and public services—including agricultural extension, technical training, and rural credit—have a direct impact on productivity and production outcomes (Nguyen Bich Hong and Mitsuyasu Yabe, 2015; Tran Thi Quy Chinh et al., 2020). A study in Ha Giang province also emphasized the role of contract farming arrangements and extension services in farmers' decisions to adopt organic production practices (To The Nguyen and Nguyen Tuan Anh, 2019). Second, input and output prices play a critical role in determining the profitability of household tea production. Chen Yihui and Li Minjie (2019) noted that price volatility, especially in markets dominated by private traders, is a major factor reducing both the efficiency and

stability of tea production. Third, participation in cooperatives is closely associated with technical efficiency and market access, as cooperatives provide better opportunities for processing services, market linkages, and collective bargaining (Josiah M.Ateka et al., 2018). In contrast, factors such as the education level and years of farming experience of household heads have shown weak or insignificant statistical effects in several studies, since most farmers continue to rely on traditional practices with limited exposure to modern technologies (Nguyen Van Chung and Hoang Dung Ha, 2024). From an internal perspective, cultivated area and labor scale are both positively correlated with production outcomes, helping farmers to reduce unit costs and optimize resource utilization in tea cultivation (Nguyen Bich Hong and Mitsuyasu Yabe, 2015).

A number of studies, both domestic and international, have analyzed technical and financial efficiency in tea production; however, certain research gaps remain regarding the analysis of economic efficiency and its determinants. First, most previous studies have primarily reflected average production outcomes, without fully clarifying the differences in economic efficiency across production scales. Although studies by Le Cuong (2024), Nguyen Nhu Trang (2019) and Tran Thi Quy Chinh et al. (2024) have mentioned disparities in production performance among different household groups—classified by social characteristics or the degree of market linkage—they have not provided an in-depth analysis of economic efficiency variations based on cultivated area. This represents an important basis for designing tailored policy interventions for different household groups. In addition, most previous studies have focused on large-scale tea-producing regions involving hundreds of households (Nguyen Bich Hong and Mitsuyasu Yabe, 2015; Nguyen Van Huong et al., 2021), whereas Shan Tuyet tea represents a specialty crop that is cultivated in small, scattered plots in mountainous areas. Therefore, it is essential to conduct a more detailed analysis of economic efficiency by production scale and the factors influencing tea production, aspects that have not yet been sufficiently emphasized in existing research.

3. RESEARCH METHODOLOGY

3.1. Data collection

Secondary data were collected from official and reliable sources, including: (i) annual socio-economic reports of the commune and district; (ii) tea production data on Shan Tuyet tea provided by the former Yen Cu Commune People's Committee and the Division of Agriculture and Rural Development of the former Cho Moi district; and (iii) related studies and publications on the development of Shan Tuyet tea obtained from local information portals and academic journals.

Primary data were collected in March 2025 through direct household surveys of Shan Tuyet tea producers in Thai Lao and Ban Chao villages. These two villages account for more than 80% of the total tea cultivation area in the former Yen Cu commune (Ha Thanh, 2017), making them representative locations for the study. The minimum sample size was determined using Taro Yamane (1967) formula for sample selection: $n = \mathrm{N}/(1+ \mathrm{N}.e^2)$, here $N = 71$ represents the total number of tea-producing households, and the margin of error $e = 10\%$. Based on this calculation, the study surveyed 45 Shan Tuyet tea–growing households across the two villages, covering a total area of 45.2 hectares, equivalent to 87.6% of the commune's total tea cultivation area. This sample size is sufficiently large to ensure representativeness for analysis by production scale. Specifically, households were classified into three groups according to production scale: Small-scale group (SSG): 18 households with tea cultivation areas of 0.7 ha/household; Medium-scale group (MSG): 16 households with areas between >0.7 ha and 1.5 ha/household; Large-scale group (LSG): 11 households with areas 1.5 ha/household. This classification by cultivated area enables a comparative analysis of production conditions, productivity, and economic efficiency among household groups. In addition to the household survey, in-depth interviews were conducted with five local officials and technical staff from the commune and district levels to gather supplementary information on supporting policies, challenges, and constraints related to Shan Tuyet tea production in the study area.

3.2. Data analysis method

The descriptive statistical method was employed to synthesize and analyze the fundamental characteristics of Shan Tuyet tea production among local households. The analytical indicators included: cultivated area, yield of fresh and dried

tea buds, total harvested output, average selling price, total production cost (including materials, labor, and depreciation), total revenue, processing methods, and marketing channels.

The comparative analysis method was applied to assess the differences among household groups categorized by cultivation scale (small, medium, and large). This method enables the comparison and evaluation of variations among groups across indicators such as cultivated area, yield, output, cost, revenue, mixed income, and other economic efficiency measures.

The annual economic accounting method was utilized to evaluate the economic efficiency of Shan Tuyet tea production. This approach calculates key indicators such as Gross Output (GO), Intermediate Cost (IC), Value Added (VA), and Mixed Income (MI) per unit of cultivated area. It is particularly suitable for small-scale farming conditions typical of local households, as it allows for accurate estimation of input use, output value, and income. This accounting approach has been applied in previous studies by Bui Thi Minh Ha et al. (2018), Tran Thi Quy Chinh et al. (2020) and Nguyen Ha Quyen Anh et al. (2023) in evaluating the economic efficiency of tea and orange production in the northern mountainous provinces of Vietnam.

In addition, to quantify the assessment of factors influencing Shan Tuyet tea production, the study employed a five-point Likert scale following Ankur Joshi et al. (2015); Nancy Burns and Susan K. Grove (2005), including: Level 1 – Poor, Level 2 – Weak, Level 3 – Average, Level 4 – Good, and Level 5 – Very good. The Likert-scale questions were designed around three main groups of factors: (i) supporting policies from local authorities, (ii) infrastructure conditions for production, and (iii) market accessibility. The use of this scale allows a quantitative reflection of producers' perceptions and evaluations toward each influencing factor.

Moreover, the study employed a multiple regression model, a method widely used in previous research to analyze determinants of tea production outcomes (Bac Van Ho et al., 2019; Hoa Nguyen Ngoc and Nguyen Thi Phuong Hao, 2025; Yoshihisa Saigenji and Manfred Zeller, 2009). In this study, the model was utilized to examine the relationship between Shan Tuyet tea yield (measured in quintals per hectare – t/ha) as the dependent variable and the household-specific production factors as independent variables. The evaluation of influencing factors was structured around three major components: (i) Production organization, represented by the level of production linkage (through participation in cooperatives); (ii) Demographic characteristics, including years of education and years of experience in tea production; and (iii) Production scale, measured by cultivated area and labor input. This analy-

tical approach aims to clarify the combined effects and mechanisms through which these factors influence the overall production efficiency of Shan Tuyet tea farming households.

4. RESULTS AND DISCUSSION

4.1. Analysis of Economic Efficiency in Shan Tuyet Tea Production

4.1.1. Demographic Characteristics of Surveyed Households

Table 1 shows that the total area under Shan Tuyet tea cultivation in the former Yen Cu Commune reached 62.40 hectares in 2024, with the majority of the area concentrated in Thai Lao and Ban Chao hamlets. These two hamlets accounted for 82.7% of the commune's total Shan Tuyet tea area, underscoring their role as key production zones, favored by advantageous altitude and climatic conditions. In contrast, the remaining hamlets had relatively small tea-growing areas, ranging from 0.8 to 2.0 hectares per hamlet, mainly serving household consumption needs. Their production output and quality were comparatively lower due to less favorable soil and climate conditions.

Table 1. Area of Shan Tuyet Tea Cultivation in the Former Yen Cu Commune, 2024.

STT	Hamlets	Total Area (ha)
1	Thai Lao	26.60
2	Ban Chao	25.00
3	Ban Tam	1.50
4	Phieng Duong	1.00
5	Na Hin	1.00
6	Na Rien	1.50
7	Na Hoang	1.00
8	Ban Ria	2.00
9	Ban Chang	2.00
10	Others	0.80
Total		**62,40**

Source: Yen Cu Commune Statistics Board, 2025.

The data in Table 2 reveal that the demographic characteristics of Shan Tuyet tea-producing households in the former Yen Cu Commune reflect typical features of mountainous rural areas. The majority of household heads are male (84.4%), with an average age of approximately 48.3 years, indicating a predominantly middle-aged labor force experienced in tea cultivation. In terms of education level, the largest proportion of household heads completed lower secondary school (40%), followed by those with upper secondary education (17.78%). This structure suggests that farmers' capacity to access and apply technological innovations remains limited, posing a challenge to the sustainable development of Shan Tuyet tea production in the locality.

Table 2. Demographic Characteristics of Shan Tuyet Tea-Producing Households by Farm Size in the former Yen Cu Commune

Indicator	Small Scale (n=18)		Medium Scale (n=16)		Large Scale (n=11)		Overall (n=45)	
	Quantity	Share (%)	Quantity	Share (%)	Quantity	Share (%)	Quantity	Share (%)
1. Total households	18	100.00	16	100.00	11	100.00	45	100.00
2. Gender of household head								
Male	14	77.78	13	81.25	11	100.00	38	84.44
Female	4	22.22	3	18.75	0	0.00	7	15.56
3. Average age of household head	47.17		48.69		49.55		48.29	
4. Education level								
No formal education	3	16.67	2	12.50	1	9.09	6	13.33
Primary school	5	27.78	5	31.25	3	27.27	13	28.89
Lower secondary school	5	27.78	8	50.00	5	45.45	18	40.00
Upper secondary school	5	27.78	1	6.25	2	18.18	8	17.78

Source: Field survey, 2025.

Regarding the tea cultivation area of surveyed Shan Tuyet tea households in the former Yen Cu Commune, production remains small-scale and fragmented, with an average cultivation area of only about 1.0 hectare per household. The differences among groups are quite pronounced — households in the large-scale group cultivate an average of 1.75 hectares per household, significantly higher than the other two groups. The current production scale is insufficient to establish a specialized tea-growing zone, underscoring the urgent need to expand cultivated area and reorganize production. Compared with the study by Ho Ngoc Ninh et al. (2022) conducted in the former Bac Yen District, Son La Province, the demographic characteristics of Shan Tuyet tea growers in the former Yen Cu Commune are fairly similar — household heads are predominantly middle-aged laborers, possess lower secondary education, and maintain an average tea cultivation area of around 1.0 hectare per household.

4.1.2. Production Costs of Shan Tuyet Tea

In Shan Tuyet tea cultivation in the former Yen Cu Commune, the level of mechanization remains limited, particularly during the establishment stage of tea plantations. According to Table 3, the average input cost per hectare per year for Shan Tuyet tea during this stage shows no significant difference among the small-scale, medium-scale, and large-scale household groups, ranging approximately from 27.6 to 27.7 million VND per hectare. However, the most notable difference lies in the amount of family labor invested annually: small-scale households use the highest amount of labor (94.56 labor-days/ha), followed by medium-scale households with 89.06 labor-days/ha, and large-scale households with 86.18 labor-days/ha. This variation in labor input among household groups is primarily attributed to differences in resources and production organization. Large-scale households tend to share tools and exchange labor, which helps accelerate production progress and reduce labor costs. In contrast, small-scale households often face labor shortages and must allocate time across multiple livelihood activities, resulting in higher total labor input devoted to Shan Tuyet tea cultivation.

Table 3. Average Cultivation Costs per Hectare of Shan Tuyet Tea During the Establishment Period in the Former Yen Cu Commune, 2024

Indicator	Small scale (n=18)		Medium Scale (n=16)		Large Scale (n=11)		Average (n=45)	
	Quantity	Share (%)	Quantity	Share (%)	Quantity	Share (%)	Quantity	Share (%)
1. Material costs (million VND), including:	**27.63**	**100**	**27.71**	**100**	**27.65**	**100**	**27.67**	**100**
Seedlings	10.00	36.19	10.00	36.09	10.00	36.17	10.00	36.14
Phosphate fertilizer	2.25	8.14	2.25	8.12	2.25	8.14	2.25	8.13
Nitrogen fertilizer	3.60	13.03	3.60	12.99	3.60	13.02	3.60	13.01
Potassium fertilizer	0.78	2.82	0.78	2.81	0.78	2.82	0.78	2.82
Organic fertilizer	8.00	28.95	8.00	28.87	8.00	28.93	8.00	28.91
Transportation and loading	2.50	9.05	2.50	9.02	2.50	9.04	2.50	9.04
Tools and equipment	0.33	1.19	0.30	1.08	0.23	0.83	0.29	1.05
Others	0.17	0.61	0.29	1.05	0.30	1.08	0.24	0.87
2. Family labor (labor days)	**94.56**		**89.06**		**86.18**		**90.56**	

Source: Field survey, 2025.

Table 4 shows that the average total production cost for cultivating 1 hectare of Shan Tuyet tea per year during the business production period varies significantly among household groups, ranging from 8.17 million VND/ha/year in the small-scale households group to 13.33 million VND/ha/year in the large-scale households group, mainly due to differences in hired labor costs and fixed asset depreciation. The large-scale households group incurs higher costs, reflecting its larger produc-

tion scale, higher mechanization, and greater specialization, whereas the small-scale households group primarily relies on family labor, operates on a smaller scale, and achieves lower efficiency. The difference in labor costs is also evident in the distribution of labor across production stages: family labor is mainly concentrated in harvesting activities (accounting for 66.8–70.4% of total labor days per hectare per year). Meanwhile, the large-scale households group allocates a higher proportion of labor to crop care, indicating a greater investment in technical practices and intensive production processes.

Table 4. Average Production Costs per Hectare of Shan Tuyet Tea During the Business Period in the Former Yen Cu Commune, 2024

Indicator	Small Scale (n=18)	Medium Scale (n=16)	Large Scale (n=11)	Average (n=45)
1. Intermediate costs IC	**3.38**	**2.98**	**2.90**	**3.12**
Material costs	2.28	1.62	1.21	1.78
Transportation	0.70	0.72	0.50	0.66
Processing and packaging	0.40	0.64	1.19	0.68
2. Field depreciation	**2.02**	**1.98**	**1.95**	**1.99**
3. Fixed asset depreciation	**0.81**	**0.89**	**1.80**	**1.06**
4. Hired labor	**1.96**	**3.71**	**6.68**	**3.73**
Total production cost	**8.17**	**9.56**	**13.33**	**9.90**

Unit: million VND/ha

Source: Survey data, 2025.

Compared with the study by Ho Ngoc Ninh et al. (2022), the cultivation cost per hectare of Shan Tuyet tea during the establishment period in the former Yen Cu Commune is significantly lower (27.6–27.7 million VND/ha) than the 36.2 million VND/ha reported in the former Bac Yen District. This discrepancy is primarily attributed to the extensive cultivation practices and the low level of mechanization in Yen Cu. These differences reflect variations in the degree of intensification, investment structure, and particularly in the use of fertilizers and plant protection chemicals.

4.1.3. Productivity, Output, and Consumption Situation of Shan Tuyet Tea

Table 5 illustrates a significant disparity in yield and selling prices of *Shan Tuyet* tea among different household groups in the former Yen Cu Commune. In 2024, the large-scale group achieved the highest productivity, with 11.16 quintals/ha of fresh tea buds and 2.51 quintals/ha of dried tea. The average selling price of dried tea reached 27.58 million VND per quintal, which is more than 11 times higher than that of fresh tea (2.46 million VND per quintal). This indicates that processing fresh tea into dried tea generates significantly greater economic value. The dif-

ferences among groups are mainly attributed to factors such as cultivation area, investment level, participation in cooperatives, and capacity to apply technical advances in production.

Table 5. Productivity, Output, and Selling Prices of Shan Tuyet Tea by Group in the Former Yen Cu Commune, 2024

Indicator	Unit	Small Scale (n=18)	Medium Scale (n=16)	Large Scale (n=11)	Average (n=45)
1. Average productivity					
Fresh tea buds	Quintal/ha	9.56	10.87	11.16	10.42
Dried tea	Quintal/ha	1.54	2.28	2.51	2.17
2. Average selling price					
Fresh tea buds	Million VND/quintal	2.12	2.85	—	2.46
Dried tea	Million VND/quintal	27.17	27.44	28.46	27.58

Source: Survey data, 2025.

Table 6 shows a clear differentiation in the processing methods of *Shan Tuyet* tea among household groups in the former Yen Cu Commune. The rate of processing through cooperatives increases proportionally with production scale — from 33.33% in the small-scale group, 56.25% in the medium-scale group, to 90.91% in the large-scale group. This reflects the higher level of linkage and better access to centralized processing services among larger producers. Conversely, the proportion of fresh tea bud sales is higher among small-scale group (61.11%) and medium-scale group (43.75%), indicating that these groups mainly opt for quick, low-value sales due to limited resources and processing capacity. Home-based and outsourced processing methods are minimal, occurring only sporadically in large scale and small scale groups. These findings underline the pivotal role of cooperatives in enhancing the value of *Shan Tuyet* tea products in the locality.

Table 6. Processing Methods of Shan Tuyet Tea Among Surveyed Households

Indicator	Small Scale (n=18)		Medium Scale (n=16)		Large Scale (n=11)		Overall (n=45)	
	No. of households	Share (%)	No. of households	Share (%)	No. of households	Share (%)	No. of households	Share (%)
Home processing	0	0.00	0	0.00	1	9.09	1	2.22
Hired processing	1	5.56	0	0.00	0	0.00	1	2.22
Processing through cooperative	6	33.33	9	56.25	10	90.91	25	55.56
Selling fresh tea buds	11	61.11	7	43.75	0	0.00	18	40.00

Source: Survey data, 2025.

Table 7 reveals significant differences in the marketing channels for *Shan Tuyet* tea among the household groups in the former Yen Cu Commune. The small-scale group primarily sells fresh tea buds to enterprises and private traders, accounting for 66.76% of total fresh tea output; meanwhile, 73.17% of its processed dry tea is marketed through cooperatives. The medium-scale group demonstrates a higher level of linkage with cooperatives, with 63.22% of fresh tea and 81.68% of dry tea sold through this channel. Notably, the large-scale group does not sell fresh tea buds, focusing entirely on dry tea products. Of this amount, 59.14% is distributed through cooperatives, while the remainder is sold directly to enterprises, private traders, or end consumers. These results reflect a greater degree of market proactiveness and diversification in marketing channels among large-scale producers, highlighting the progressive shift toward value-added, market-oriented production in the *Shan Tuyet* tea sector.

Table 7. Consumption Channels of Shan Tuyet Tea Among Households in the Former Yen Cu Commune

Consumption Channel	Small Scale (n=18)				Medium Scale (n=16)				Large Scale (n=11)	
	Fresh Tea Buds		Dried Tea		Fresh Tea Buds		Dried Tea		Dried Tea	
	Quantity (quintals)	Share (%)	Quantity (quintals)	Share (%)	Quantity (quintals)	Share (%)	Quantity (quintals)	Share (%)	Quantity (quintals)	Share (%)
Cooperatives	20.46	32.22	3.90	73.17	45.90	63.22	16.99	81.68	28.53	59.14
Enterprises/ Private Traders	42.39	66.76	0.77	14.45	25.78	35.51	1.58	7.60	13.53	28.05
Direct Consumers	0.00	0.00	0.41	7.69	0.00	0.00	1.51	7.26	5.21	10.80
Household Consumption	0.65	1.02	0.25	4.69	0.92	1.27	0.71	3.41	0.98	2.03
Total	**63.50**	**100**	**5.33**	**100**	**72.60**	**100**	**20.80**	**100**	**48.25**	**100**

Source: Survey data, 2025.

According to the study by Ho Ngoc Ninh et al. (2022), the yield of *Shan Tuyet* tea in the former Yen Cu Commune (10.42 quintals/ha) remains lower than the over 12 quintals/ha recorded in the former Bac Yen District. Similarly, the findings of Tuong Tran et al. (2016) indicate that the average annual output of dried tea among organic producers in the former Yen Bai and Ha Giang provinces reached approximately 22.5 quintals/household, while conventional producers achieved up to 56 quintals/household. In comparison, the large-scale households in Yen Cu produced only 21.3 quintals/household of dried tea on average—roughly equivalent to organic production levels—implying that production efficiency remains modest. In terms of marketing, small-scale producers in Yen Cu mainly sell fresh tea buds, whereas large-scale producers exhibit a higher proportion of dried tea sales, largely

thanks to their linkages with cooperatives. This underscores the crucial role of cooperatives and local primary processing in enhancing product value.

4.1.4. Production and Economic Efficiency of Shan Tuyet Tea

Table 8 clearly illustrates a positive relationship between production scale and economic efficiency in *Shan Tuyet* tea cultivation in the former Yen Cu Commune. In 2024, the values of Gross Output (GO), Value Added (VA), and Mixed Income (MI) all increased in line with production scale. Specifically, the large-scale group achieved an average GO of 71.35 million VND/ha, which is 2.5 times higher than small-scale households and 1.6 times higher than medium-scale households. Similarly, the VA of large-scale households reached 68.45 million VND/ha, and MI reached 58.12 million VND/ha, both markedly higher than the smaller groups.

Notably, the efficiency of intermediate cost utilization was outstanding in the large-scale households group, with GO/IC = 24.58, VA/IC = 23.58, and MI/IC = 20.02, nearly three times greater than those of small-scale households. This indicates that each unit of input cost among large-scale households generated significantly higher output value—reflecting superior production management, optimized use of materials, labor, and inputs, and greater operational efficiency.

Regarding family labor productivity, the large-scale households group again led the way with GO/L = 600 thousand VND/day, compared with 470 thousand VND/day for medium-scale households and only 370 thousand VND/day for small-scale households. Similarly, VA/L and MI/L were substantially higher for large-scale households, reaffirming its higher degree of labor specialization and more effective production organization.

The disparity arises from several contributing factors. First, the large-scale households have better access to capital, technology, and production support services, particularly through cooperatives and local assistance programs. Second, their larger cultivated area allows for more efficient allocation of fixed costs, enabling them to benefit from economies of scale. Third, the large-scale households group possesses the capacity to invest in modern machinery and equipment, which helps reduce intermediate costs and enhance labor productivity. Fourth, their market access capability is superior, with stronger linkages to enterprises, cooperatives, and traders, providing greater stability and flexibility in product sales. Conversely, the small-scale households operate on limited land areas, face capital and labor shortages, and thus exhibit low cost efficiency and poor labor productivity. Their production remains fragmented, manual, and largely dependent on family labor, with minimal mechanization and weak market integration.

Table 8. Results and Efficiency of Shan Tuyet Tea Production in 2024, Former Yen Cu Commune

Indicator	Unit	Small Scale	Medium Scale	Large Scale	Average
I. Production Results					
1. Gross Output (GO)	Million VND/ha	28.66	44.80	71.35	44.83
2. Intermediate Cost (IC)	Million VND/ha	3.38	2.98	2.90	3.12
3. Value Added (VA)	Million VND/ha	25.28	41.82	68.45	41.71
4. Mixed Income (MI)	Million VND/ha	20.49	35.24	58.12	34.93
5. Family Labor (L)	Labor-days	77.00	95.50	119.45	93.96
II. Efficiency Indicators					
1. GO/IC	Times	8.48	15.05	24.58	14.37
2. VA/IC	Times	7.48	14.05	23.58	13.37
3. MI/IC	Times	6.06	11.84	20.02	12.87
4. GO/L	Million VND/labor-day	0.37	0.47	0.60	0.48
5. VA/L	Million VND/labor-day	0.33	0.44	0.57	0.44
6. MI/L	Million VND/labor-day	0.27	0.37	0.49	0.37

Source: Survey data, 2025.

Compared with the study by Ho Ngoc Ninh et al. (2022) in the former Bac Yen District (Son La Province), the economic efficiency of Shan Tuyet tea production in the former Yen Cu Commune is considerably higher. While the mixed income of tea-growing households in Bac Yen was approximately 19.1 million VND/ha/year, that of Yen Cu households reached around 34.93 million VND/ha/year. This indicates that differences in cultivation methods and product structure have contributed to improved economic performance in Yen Cu, despite its lower yield. Similarly, according to Tuong Tran et al. (2016), households participating in organic Shan tea value chains in the former provinces of Yen Bai and Ha Giang achieved higher output and revenue, owing to the application of sustainable farming techniques and stable marketing linkages. In addition, the research by (Nguyen Van Chung and Hoang Dung Ha, 2024) in Thua Thien Hue Province revealed that the Truoi tea model, although having low production costs, exhibited limited economic efficiency, with an average income of only 15.3 million VND/ha/year, mainly due to the lack of value chain linkages and dependence on private traders. A comparison among these studies clearly highlights the crucial role of investment level, production linkage models, and processing capacity in enhancing the economic efficiency of Shan Tuyet tea production in the former Yen Cu Commune.

4.2. Analysis of Factors Influencing Shan Tuyet Tea Production

4.2.1. Government and Local Policies for Shan Tuyet Tea Production

Table 9 indicates that Shan Tuyet tea–producing households in the former Yen Cu Commune highly appreciated agricultural extension and technical support policies, with an average score of 4.4/5, reflecting the suitability and accessibility of training programs. In contrast, the policy on product consumption support received the lowest rating (1.78/5) due to the lack of contract farming mechanisms and market linkages, which caused marketing difficulties and limited production expansion. Regarding machinery support (3.71/5), the lower-than-expected effectiveness stems from the fact that most support resources were concentrated on cooperatives, while small and medium-sized households had limited access. These results suggest that priority should be given to improving market access, expanding equipment support for smallholders, and maintaining the effectiveness of agricultural extension programs.

Table 9. Farmers Satisfaction with Policies Supporting Shan Tuyet Tea Production

Criteria	Percentage (%) (n = 45)					Average Score
	Poor	Weak	Average	Fair	Good	
Policy on agricultural extension and technical support	0.00	0.00	11.11	37.78	51.11	4.40
Policy on product marketing and consumption support	31.11	60.00	8.89	0.00	0.00	1.78
Policy on machinery and equipment investment support	0.00	13.33	28.89	31.11	26.67	3.71

Source: Survey data, 2025.

4.2.2. Market and Price Conditions in Shan Tuyet Tea Production

Table 10 reveals a clear contrast between the stability of input and output prices in Shan Tuyet tea production in Yen Cu. Input prices were evaluated as relatively stable, with an average score of 4.49/5, thanks to material support programs and a steady supply of inputs from local sources and cooperatives. In contrast, the stability of output prices was much lower (average score 2.67/5), with over 86% of households rating them as only "average" or "weak." This instability stems from the heavy dependence on middlemen, the absence of contract farming arrangements, and the lack of a recognized local tea brand. The main reason lies in the high propor-

tion of fresh tea leaf sales (40% of households), while the current market primarily favors processed dry tea products. This price instability not only reduces household income but also leads many producers to cut back on investment or even reduce their tea-growing area. This situation highlights an urgent need to develop stable marketing channels, strengthen local brand building, and promote stronger linkages between producers, cooperatives, and purchasing enterprises.

Table 10. Farmers Assessment of Input and Output Price Stability for Shan Tuyet Tea Production in the Former Yen Cu Commune

Criteria	Percentage (%) (n = 45)					Average Score
	Poor	Weak	Average	Fair	Good	
Stability of input prices	0.00	0.00	15.56	20.00	64.44	4.49
Stability of product output prices	6.67	35.56	44.44	11.11	2.22	2.67

Source: Survey data, 2025.

4.2.3. Other Factors Affecting Shan Tuyet Tea Productivity

Table 11 shows that the regression model demonstrates a high level of goodness of fit, with an R-squared value of 72.3%, indicating that the independent variables in the model explain 72.3% of the variation in Shan Tuyet tea productivity among surveyed households in former Yen Cu Commune. The calculated F-test value confirms that the model is statistically significant at the 1% level, thereby validating the overall reliability and explanatory power of the model.

Table 11. Estimated Model Results of Factors Affecting Shan Tuyet Tea Productivity among Households in the Former Yen Cu Commune

Model Statistics			
R	: 0.8503	Calculated F-value : 20.3682	
R-squared	: 0.7231	Significance level : 6.00E-10	
Adjusted R-squared	: 0.6876		
Standard error	: 1.1125		
Variable	**Coefficient**	**Standard Error**	**P-value**
Cooperative participation	0.7933**	0.3837	0.0454
Years of Schooling	0.0053ns	0.2370	0.9821
Years of Tea Production	-0.3869ns	0.2317	0.1029
Cultivated Area	1.9074***	0.4597	0.0002
Labor (Workdays)	0.0232**	0.0098	0.0223
Constant	6.6243	0.7749	0.0000

Note: ***, **, * and ns correspond to statistical significance levels of 1%, 5%, 10%, and non-significant, respectively. [flushleft]
Source: Survey data, 2025.

When examining individual factors, *ceteris paribus* (holding other variables constant), the "Cooperative participation" variable has a coefficient of 0.7933, sta-

tistically significant at the 5% level, indicating that households participating in cooperatives achieve, on average, 0.79 quintal/ha higher productivity of Shan Tuyet tea than non-participating households. This result is reasonable, reflecting the positive role of cooperatives in providing technical guidance, machinery, and marketing support for product sales.

The "Cultivated area" variable has a coefficient of 1.9074 and is statistically significant at the 1% level, implying that for each additional hectare of tea area, productivity increases by approximately 1.91 quintal/ha on average. This confirms the scale effect in tea production—larger farms tend to have greater incentives and better capacity for investment and management. The "Labor" variable, with a coefficient of 0.0232, is statistically significant at the 5% level, indicating that each additional labor day contributes to an increase of around 0.023 quintal/ha in productivity. This result highlights the direct relationship between labor investment and yield, especially in the context of Shan Tuyet tea cultivation, which still relies heavily on manual work. The remaining two variables—education level of household head and years of experience in Shan Tuyet tea production—are statistically insignificant. This can be attributed to the generally low educational attainment of household heads, while production experience, though extensive, is mainly traditional and not yet associated with the adoption of technical innovations.

The regression results in former Yen Cu Commune reveal that Shan Tuyet tea productivity is significantly influenced by cultivated area, labor, and cooperative participation. These findings are consistent with previous studies such as Nguyen Bich Hong and Mitsuyasu Yabe (2015) in Thai Nguyen, Ho Ngoc Ninh et al. (2022) in Bac Yen (Son La), (Nguyen Van Chung and Hoang Dung Ha, 2024) in Thua Thien Hue, Bac Van Ho et al. (2019) in Northern provinces—all of which emphasized the roles of production scale, technical services, and market linkages. Similarly, studies by Do Van Dai and Nguyen Thi Thanh Huyen (2021) in Dai Tu District (Thai Nguyen), Nguyen Thi Trang Thanh (2016) in Nghe An, Tran Quang Huy (2010); Yoshihisa Saigenji and Manfred Zeller (2009) also demonstrated that productivity and household income improve with technical support, contract farming, and expanded cooperation. In line with these Hoa Nguyen Ngoc and Nguyen Thi Phuong Hao (2025) found that labor input and educational attainment significantly affect tea farmers' income. Taken together, these results reinforce the conclusion that to enhance economic efficiency in Shan Tuyet tea production in former Yen Cu Commune, it is essential to simultaneously strengthen household capacities and promote linkages and technical transfer within the tea value chain.

4.3. Solutions to Enhance the Production Efficiency of Shan Tuyet Tea

4.3.1. Strengthening Investment in Equipment for Shan Tuyet Tea Production

Research results indicate that the proportion of households owning machinery and specialized equipment for Shan Tuyet tea production in the former Yen Cu Commune remains very low. Most households still rely on equipment originally used for other crops, while access to financial resources for investing in agricultural machinery remains limited. To address this issue, it is necessary to strengthen communication on the importance of mechanization in improving productivity and product quality, and to widely disseminate government support policies for agricultural equipment investment. At the same time, training sessions should be organized to guide the use of modern machinery, demonstration activities should be conducted at the local level, and preferential credit access should be facilitated to help farmers invest in suitable equipment. When selecting equipment, attention should be given to compatibility with household production scale, avoiding overly modern machinery that could pose difficulties in operation and maintenance.

4.3.2. Training and Technology Transfer for Tea Producers

Practical production experience in the locality shows that farmers' cultivation skills remain low, and their awareness of safe and sustainable tea production is still limited. To improve this, it is necessary to expand training programs on tea production techniques following VietGAP and organic standards; establish technical demonstration models in key villages; and enhance the capacity of agricultural extension officers and commune-level agricultural staff. Strengthening communication and disseminating scientific and technical knowledge, including procedures for tea care, harvesting, preservation, and processing, will help improve product quality and labor productivity among local producers.

4.3.3. Promoting Production and Marketing Linkages through Cooperatives

The study shows that households not participating in cooperatives often face difficulties in marketing, are subject to price manipulation, and experience unstable markets, which reduce their production motivation. Therefore, it is crucial to encourage households to join cooperatives or production groups through broad com-

munication about the benefits of production–consumption linkages. In parallel, it is necessary to promote the development of the "Four-Party Linkage Model" (State – Scientists – Enterprises – Farmers), forming a closed ecosystem from production and processing to consumption. Support should be provided to cooperatives in trade promotion, building the Shan Tuyet tea brand, organizing fairs, and promoting products on digital platforms and e-commerce sites. Controlling the purchasing system, preventing price suppression and informal collection practices, is also an important solution to protect the interests of producers.

4.3.4. Expanding Market Outlets for Shan Tuyet Tea Products

Survey results show that price instability in the output market is one of the main reasons reducing farmers' motivation to invest and expand production. To address this, it is necessary to establish stable market connections by strengthening the roles of cooperatives, contract enterprises, and long-term production agreements. At the same time, trade promotion and local brand marketing should be intensified, encouraging participation in agricultural fairs and expanding sales channels to out-of-province and export markets. In addition, the application of digital technologies and e-commerce in product marketing and distribution should be emphasized to diversify distribution channels and improve market accessibility for Shan Tuyet tea products.

5. CONCLUSION

The study clarified the positive transformations in Shan Tuyet tea production in the former Yen Cu Commune (now Yen Binh Commune), with a total cultivation area exceeding 60 hectares. The average yield of fresh tea buds reached 10.42 quintals per hectare, in which the large scale group achieved the highest dry tea yield (2.51 quintals/ha). The production efficiency is demonstrated through several key indicators:The mixed income reached 58.12 million VND/ha for the large scale group, which is 2.8 times higher than that of the small scale group; The input cost efficiency (MI/IC) was 20.02 times; and the labor productivity (MI/L) reached 0.49 million VND per labor day. The economic efficiency differentiation among tea producers according to farm size is quite significant, reflecting the influence of several key factors, such as participation in cooperatives, tea cultivation area, and labor input. Meanwhile, educational level and production experience have not yet shown a significant impact.

Regarding the policy environment, farmers highly appreciated agricultural extension programs, but considered that policies on product marketing and machinery support still fell short of expectations—particularly for small- and medium-scale households. The instability of output markets and price fluctuations remain major causes reducing production motivation. On this basis, the study proposes four main groups of solutions: (i) Enhancing investment in equipment suited to household production scale; (ii) Strengthening technology transfer and improving cultivation techniques; (iii) Promoting production–consumption linkages through cooperatives and contract enterprises; and (iv) Improving market stability and expanding market access. The synchronous implementation of these solutions will form an important foundation for enhancing economic efficiency in Shan Tuyet tea production, increasing household income, and promoting the sustainable development of Shan Tuyet tea in Yen Binh Commune in the coming years.

References

Ankur Joshi, Saket Kale, Satish Chandel, & D Kumar Pal. (2015). Likert scale: Explored and explained. *British Journal of Applied Science and Technology*, *7*(4), 396. https://doi.org/10.9734/BJAST/2015/14975

Bac Van Ho, Teruaki Nanseki, & Yosuke Chomei. (2019). Profit efficiency of tea farmers: Case study of safe and conventional farms in Northern Vietnam. *Environment, Development and Sustainability*, *21*(4), 1695–1713. https://doi.org/10.1007/s10668-017-0073-z

Bich Ngoc. (2024). Phat trien san pham OCOP tu nong nghiep sach [Developing OCOP products from clean agriculture]. Retrieved April 16, 2024, from https://baobackan.vn/phat-trien-san-pham-ocop-tu-nong-nghiep-sach-post62627.html

Bui Thi Minh Ha, Nguyen Huu Tho, & Le Thi Hoa Sen. (2018). Phan tich hieu qua kinh te cay che cua nong ho tinh Thai Nguyen [Analysis of the economic efficiency of household tea production in Thai Nguyen province]. *Vietnam Journal of Agricultural Science*, *12*(3), 21–25. https://sti.vista.gov.vn/publication/view/phan-tich-hieu-qua-kinh-te-cay-che-cua-nong-ho-tinh-thai-nguyen-6ac0ef09864cc364ff809eeda94f9f64-285390.html

Chen Yihui, & Li Minjie. (2019). Evaluation of influencing factors on tea production based on random forest regression and mean impact value. *Agricultural Economics (Zemdlská ekonomika)*, *65*(7), 340–347. https://doi.org/10.17221/399/2018-agricecon

Do Van Dai, & Nguyen Thi Thanh Huyen. (2021). Thuc trang lien ket trong san xuat va tieu thu che tai huyen Dai Tu, tinh Thai Nguyen [The current situation of linkages in tea production and consumption in Dai Tu district, Thai Nguyen province]. *Tp chí Kinh t Châu Á - Thái Bình Dng [AsiaPacific Economic Review]*, *588*(588), 31–33. https://sti.vista.gov.vn/publication/view/thuc-trang-lien-ket-trong-san-xuat-va-tieu-thu-che-tai-huyen-dai-tu-tinh-thai-nguyen-087c83f47f8c0ee887bc96f4205804ea-328622.html

Dong Duy Khanh, Duong Quynh Phuong, Nguyen Xuan Truong, & Nguyen Hong Ly. (2023). Phat trien lang nghe che truyen thong tinh Thai Nguyen: Thuc tien tai mot so lang nghe o vung que Tan Cuong, Trai Cai va La Bang [Developing traditional tea craft villages in Thai Nguyen province: Practices from Tan Cuong, Trai Cai, and La Bang tea areas]. *TNU Journal of Science and Technology*, *228*(08), 109–117. https://doi.org/10.34238/tnu-jst.7169

Ha Thanh. (2017). Khoi phuc dien tich che Shan tuyet o Cho Moi [Restoring

Shan Tuyet tea cultivation area in Cho Moi district]. Retrieved May 10, 2017, from https://baobackan.vn/khoi-phuc-dien-tich-che-shan-tuyet-o-cho-moi-post35358.html

Ha Thanh. (2024). Che Shan tuyet, sinh ke cho ba con vung cao o Cho Moi [Shan Tuyet tea: A livelihood for highland residents in Cho Moi district]. Retrieved August 22, 2024, from https://baobackan.vn/che-shan-tuyet-sinh-ke-cho-ba-con-vung-cao-o-cho-moi-post65329.html

Ho Ngoc Ninh, Truong Ngoc Tin, Lai Phuong Thao, & Mua A Chinh. (2022). Phat trien san xuat che Shan tuyet: Truong hop nghien cuu tai huyen Bac Yen, tinh Son La [Developing Shan Tuyet tea production: A case study in Bac Yen district, Son La province]. *Tp chí Khoa hc Nông nghip Vit Nam [Vietnam Journal of Agricultural Science]*, *20*(11), 1528–1539. https://tapchi.vnua.edu.vn/wp-content/uploads/2022/12/tap-chi-so-11.10.pdf

Hoa Nguyen Ngoc, & Nguyen Thi Phuong Hao. (2025). Factors affecting the income of tea farming households in Dong Hy District, Thai Nguyen Province. *International Journal of Advanced Multidisciplinary Research and Studies*, *5*(1), 605–609. https://www.multiresearchjournal.com/admin/uploads/archives/archive-1738220108.pdf

Josiah M. Ateka, Perez A. Onono, & Martin Etyang. (2018). Technical efficiency and its determinants in smallholder tea production: Evidence from Nyamira and Bomet counties in Kenya. *Global Journal of Science Frontier Research: Agriculture and Veterinary*, *18*(3), 1–11. https://ir-library.ku.ac.ke/handle/123456789/19461

Le Cuong. (2024). *Analysis of smallholder agricultural production systems in upland areas of Vietnam: Technical efficiency in rice, cashew and tea production and farmer preferences for incentives supporting sawlog timber production* [Doctoral dissertation, The University of Western Australia]. https://doi.org/10.26182/qk0j-4m26

Nancy Burns, & Susan K. Grove. (2005). *The practice of nursing research: Conduct, critique and utilization.* Elsevier/Saunders.

Nguyen Bich Hong, & Mitsuyasu Yabe. (2015). Resource use efficiency of tea production in Vietnam: Using Translog SFA model. *Journal of Agricultural Science*, *7*(9). https://doi.org/10.5539/jas.v7n9p160

Nguyen Ha Quyen Anh, Nguyen Thi Phuong Dung, Hoang Anh Tuan, Nguyen Thi Phuong Chi, & Do Hai Yen. (2023). Economic efficiency analysis of organic farming models in Tuyen Quang province. *Tp chí Khoa hc i hc Tân Trào (Tan Trao University Journal of Science)*, *9*(2). https://doi.org/10.51453/2354-1431/20

23/932

Nguyen Nhu Trang. (2019). Determinants of linking gaps tea production: Case study of tea production households in Northern Midland and Mountainous Region, Vietnam. *Journal of Business Management and Economic Research*, *3*(3), 34–45. https://doi.org/10.29226/TR1001.2019.111

Nguyen Thi Kieu Oanh, Nguyen Phuong Linh, Le Hoang Long, & Le Huyen Thao. (2022). Discriminative chemical profiles of Shan Tuyet tea (Camellia sinensis var. Shan) and Sinensis tea (Camellia sinensis var. sinensis) collected in Ta Xua, Son La, Vietnam and their correlation with antioxidant activity. *Natural Product Communications*, *17*(9), 1934578X221128410. https://doi.org/10.1177/1934578x221128410

Nguyen Thi Trang Thanh. (2016). Mot so van de trong san xuat, che bien va tieu thu che o Nghe An [Several issues in tea production, processing, and consumption in Nghe An province]. *Khoa hc và Công ngh Ngh An [Nghe An Journal of Science and Technology]*, *5*, 43–46, 49. https://sti.vista.gov.vn/publication/view/mot-so-van-de-trong-san-xuat-che-bien-va-tieu-thu-che-o-nghe-an-e69ebc38ea619fd9f9709057fa24ad2c-243864.html

Nguyen Van Chung, & Hoang Dung Ha. (2024). Nhung rao can trong hoat dong san xuat va tieu thu che Truoi cua nong ho tai tinh Thua Thien Hue [Barriers to tea production and consumption activities of smallholder farmers in Thua Thien Hue province]. *Tp chí Khoa hc Nông nghip Vit Nam [Vietnam Journal of Agricultural Science]*, *22*(6), 811–820. https://sti.vista.gov.vn/publication/view/nhung-rao-can-trong-hoat-dong-san-xuat-va-tieu-thu-che-truoi-cua-nong-ho-tai-tinh-thua-thien-hue-21cf18d77e7a94b6a487672da0d3d71d-379372.html

Nguyen Van Huong, Hoang Van Hung, Nguyen Van Song, & Thai Van Ha. (2021). Technical efficiency of smallholder tea production: A case study in Viet Nam. *Academy of Strategic Management Journal*, *20*(Special Issue 6). https://www.abacademies.org/articles/technical-efficiency-of-smallholder-tea-production-a-case-study-in-viet-nam-12523.html

Tam Ngoc. (2024). Che Shan tuyet sinh ke ben vung cho nguoi dan vung cao huyen Cho Moi [Shan Tuyet tea a sustainable livelihood for highland residents in Cho Moi district]. Retrieved August 8, 2024, from https://kinhtedouong.vn/che-shan-tuyet-sinh-ke-ben-vung-cho-nguoi-dan-vung-cao-huyen-cho-moi-102166.html

Taro Yamane. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.

To The Nguyen, & Nguyen Tuan Anh. (2019). Efficiency and adoption of organic tea production: Evidence from Vi Xuyen district, Ha Giang province, Vietnam. *Asia-Pacific Journal of Regional Science*, *3*(1), 201–217. https://doi.org/10.1007/s41685-018-0092-2

Tran Quang Huy. (2010). Anh huong cua cac yeu to san xuat den quan he hop tac trong san xuat tieu thu che [Effects of production factors on cooperative relationships in tea production and consumption]. *Tp chí Nghiên cu Kinh t [Journal of Economic Studies]*, *4*, 58–62. https://sti.vista.gov.vn/publication/view/anh-huong-cua-cac-yeu-to-san-xuat-den-quan-he-hop-tac-trong-san-xuat-tieu-thu-che-a1d4a8c493b765b24abfad36951f3a91-179332.html

Tran Thi Quy Chinh, Tran Cuong, & Jiancheng Chen. (2020). Factors affecting tea-growing households financial efficiency: A case study from Thai Nguyen province. *Open Access Library Journal*, *7*, e6969. https://doi.org/10.4236/oalib.1106969

Tran Thi Quy Chinh, Vu Dinh Khoa, Nguyen Thi Mai Anh, Vu Thi Hien, & Tran Cuong. (2024). Tea production efficiency in Thai Nguyen province, Vietnam: A case study between the poor household and non-poor household. In *Proceedings of the 4th International Conference on Research in Management and Technovation*, Singapore.

Tuong Tran, Giacomo Branca, Aslihan Arslan, & Trinh Van Mai. (2016). Value chain analysis of climate-smart Shan tea production in the Northern Mountainous Region of Vietnam. *Rivista di Economia Agraria*, *LXXI*(1, Supplemento). https://oajournals.fupress.net/index.php/rea/article/view/9861

UBND xa Yen Cu [Yen Cu Commune Peoples Committee]. (2023). *Bao cao tinh hinh kinh te xa hoi xa Yen Cu nam 2023, 2024 [Report on the socio-economic situation of Yen Cu commune in 2023 and 2024].*

Yoshihisa Saigenji, & Manfred Zeller. (2009). Effect of contract farming on productivity and income of smallholders: The case of tea production in Northwestern Vietnam. *Quarterly Journal of International Agriculture*, *48*(4), 333–350. https://ageconsearch.umn.edu/record/51681/