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**A Comparative Analysis of Profitability:
Certified Organic vs. Non-Certified
Organic Tea Farming Systems in Phongsaly
District, Lao PDR.**

**A thesis presented in partial fulfilment of the requirements
for the degree of**

Master of Agribusiness

in

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Abstract

Demand for organic tea is rising in both domestic and international markets, emphasising the need for sustainable, certified organic farming practices to meet environmental goals and capture higher prices. The shift toward certified organic farming aligns with regional efforts to meet global demand backed by standards, creating new opportunities for smallholder producers. With limited land availability, improving productivity and profitability on current tea farms is the most feasible approach. This study examines factors affecting profitability for certified organic (CO) and non-certified organic (NCO) tea producers, and factors influencing producers' decisions to participate in CO farming system in Phongsaly district, Phongsaly province, Lao PDR. The study used a survey technique complemented by an interview technique for in-depth data collection. Data were collected through a structured questionnaire survey of 304 tea producers (122 CO and 182 NCO producers) and a semi-structured questionnaire for face-to-face interviews with eight key informants representing producer organisations, tea processors, and government officials. Multiple linear regression was used to identify factors affecting profitability in CO and NCO farming systems, while binary logistic regression analysed factors influencing CO participation decisions. The multiple linear regression demonstrated that farm size, production costs, extension support, and financial support significantly affected profitability, whereas education, farming experience, and labour availability were not that significant. Binary logistic regression revealed that farm size, market support, and financial support were the most substantial positive factors in CO participation, with smartphone ownership as a negative factor. Although age, education, tea farming experience, and extension support positively influenced CO adoption, they were not statistically significant. To enhance profitability and encourage certified organic adoption, the study recommends equipping tea producers with targeted training and cost-analysis tools through effective extension services and market and financial support.

Key words: Certified organic farming system, non-certified organic farming system, smallholder producers, tea, organic markets, Laos.

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Abbreviations

CO	Certified organic
COF	Certified organic farming
COP	Certified organic producers
NCO	Non-certified organic
NCOP	Non-certified organic producers
POs	Producer organisations
MAF	Ministry of Agriculture and Forestry

Chapter 1: Introduction

1.1. Research background

In recent years, the agricultural sector in Laos and worldwide has increasingly shifted toward sustainable and organic practices, driven by environmental concerns and the potential for higher market prices. This trend is particularly visible in Laos's tea-growing Phongsaly District, where the high-altitude, mountainous terrain provides ideal conditions for producing high-quality tea with unique flavours (Smith, 2010). These natural features make Phongsaly an ideal area to study the economic and social factors that impact profitability and decisions around organic certification. The shift toward certified organic farming (COF) reflects a wider effort to meet international market standards, where the demand for sustainably grown, premium products has opened new market opportunities for smallholder producers (Bolwig et al., 2009; Earth Systems, 2016; Panyakul, 2012).

Research on organic certification indicates that transitioning to certified organic practices can enhance profitability for producers, as they benefit from premium prices and reduced input costs over time, though initial certification expenses, such as fees and administrative requirements, can be a barrier for small-scale producers (McBride & Greene, 2009). However, the economic benefits of certification are often complemented by social and institutional support structures, such as training and extension services, which play a crucial role in the successful adoption of organic methods (Nemes, 2009). In the context of Phongsaly district, where smallholder producers dominate the tea sector, producer organisations are instrumental in delivering these support services, bridging gaps in knowledge, and facilitating access to certification resources (Keovilignavong et al., 2023).

This study aims to expand on the existing research about organic farming in developing countries by focusing on what influences profitability and decisions to participate in organic farming systems among tea producers in Laos. This research seeks to uncover insights into the economic, social, and institutional factors that shape the tea sector in Phongsaly district. Understanding these influences is important not only for evaluating how sustainable and profitable organic practices can be but also for guiding policies that strengthen Laos's tea

industry and make it more competitive globally. This study will therefore provide a clearer understanding of the conditions that allow certified organic farming to succeed, increase producers' engagements, and offer practical insights for those involved in agricultural development and policy in Laos.

1.2. An overview of Lao PDR

The Lao People's Democratic Republic (Lao PDR), commonly known as Laos, is a landlocked nation situated in Southeast Asia. It shares its borders with China to the north, Vietnam to the east, Cambodia to the southeast, Thailand to the west, and Myanmar (Burma) to the northwest (Sa-angchai et al., 2016). Laos spans about 236,800 square kilometres and most of its land is mountainous, with around 80% covered by rugged mountains, plateaus, and dense forests. Since Laos is a landlocked country, it depends on roads for its transportation and trade. Laos experiences a tropical monsoon climate with a wet season from May to October and a dry season from November to April. Average temperatures range between 25°C and 27°C but can vary with altitude. The wet season often brings heavy rain, especially in lowland areas and along the Mekong River, causing seasonal flooding, while the dry season is cooler, particularly in the northern highlands (Profile, 2010). As of 2023, the population of Laos is around 7.16 million and a GDP of USD 18.174 billion in 2019, with a low density of about 32 people per square kilometre (The World Bank Data, 2022).

Laos is rich in natural resources like copper, gold, tin, and extensive forest resources. The country is also known for its biodiversity, with large areas of untouched forests that support various plant and animal species (Prosperity, 2003). In 2010, forests cover about 40% of the land and are crucial for the rural economy, providing timber, non-timber products, and opportunities for ecological tourism (Kim & Alounsavath, 2015). The economy has swiftly expanded in the last twenty years, mainly due to investments in mining, hydropower, and the services industry (Alexander et al., 2017). Laos expanded its infrastructure, particularly in hydropower, to meet domestic energy needs and export electricity to neighbouring countries. However, building hydropower dams has raised concerns about their effects on river ecosystems and communities depending on the Mekong River (Matthews, 2012). Additionally, Laos faces environmental challenges such as deforestation, soil erosion, and climate change.

Deforestation has increased due to logging, shifting cultivation, and infrastructure development (Profile, 2010).

1.3. The agriculture sector of Lao PDR

The total surface area of Laos covers 236,800 square kilometres, of which agricultural land covers 10.6% in 2018 (Central Intelligence Agency, 2023). The agricultural sector makes a significant contribution to the country's economic development by providing jobs for over 61% of the workforce as of 2020 (O'Neill, 2023). Additionally, the sector significantly contributed to the country's development at 25% of the GDP in 2015 (Alexander et al., 2017). Small-scale farming is mostly for self-sufficiency, and products such as fruits, vegetables, meat, and seafood are provided to local markets (Onphanhdala, 2022). Apart from main crops such as rice, coffee, maize, and vegetables, tea (Figure 1 and 2) has also been recognised as an essential agricultural product in the Lao National Socio-Economic Development Plan 2016-2020 and the Agriculture Development Strategy up to 2025 and the Vision for 2030 (Earth Systems, 2016). Particularly in northern Laos, the agricultural sector's economy has significantly changed due to increased trade with China (Smith, 2010). This trade has shifted subsistence agriculture towards high-value commercial agriculture, increasing smallholder producers' income (Onphanhdala, 2022).

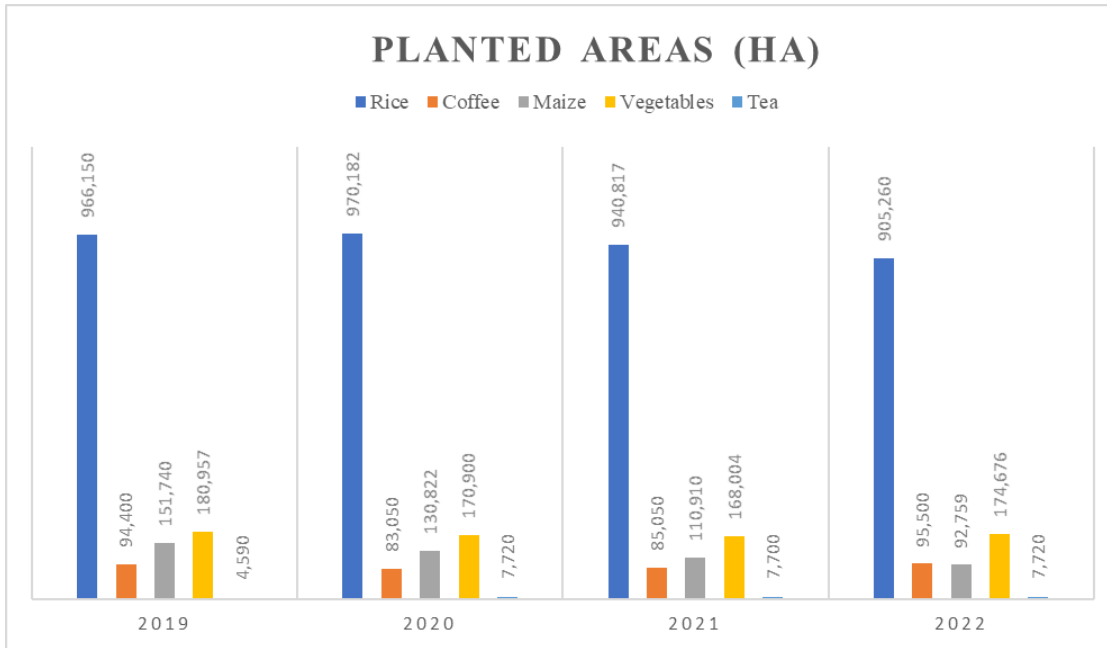


Figure 1: The total planted areas of five major agriculture commodities in Laos (2019-2022). Source of information: Statistical Yearbook from 2019-2022 by Lao Statistics Bureau and Department of Agriculture (DoA), Ministry of Agriculture and Forestry (MAF).

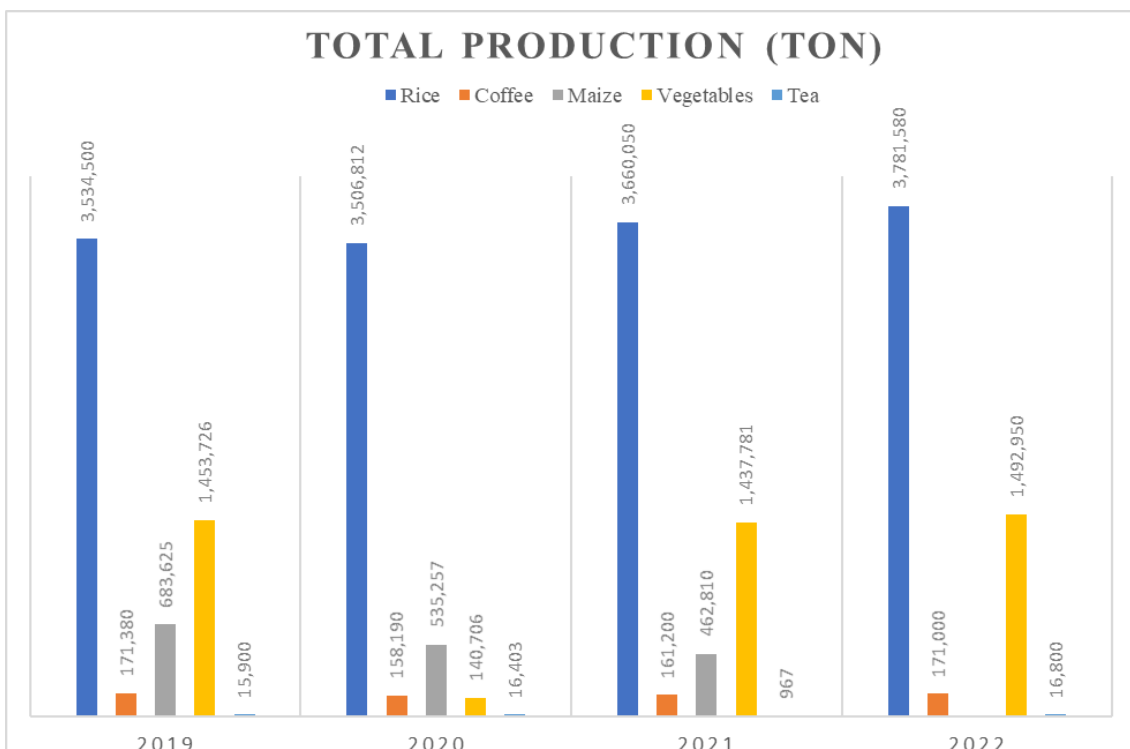


Figure 2: The total production of five major agriculture commodities in Laos (2019-2022). Source of information: Statistical Yearbook from 2019-2022 by Lao Statistics Bureau and DoA, MAF.

1.4. Organic agriculture in Lao PDR

In the early 2000s, the government of Laos launched 'Clean Agriculture' as a national strategy for sustainable agricultural development. This policy highlights organic farming, noted for its advantages such as safe food production, enhanced farmer incomes, and natural resource conservation (Keochansy et al., 2024). Organic farming practices have been integrated into the Strategy for Agricultural Development for 2011-2020, as well as the Lao National Socio-economic Development Plans spanning from 2006-2010 and 2011-2015 (De Ligne, 2015). Organic farming holds considerable promise in Laos, as it aligns well with the existing traditional farming practices that rely on indigenous knowledge and natural resources (Keochansy et al., 2024). Furthermore, the Ministry of Agriculture and Forestry (MAF) recognises organic farming as part of "new agriculture," emphasising its role in establishing valuable and specialised product connections from producers to consumers. This approach not only fosters improved environmental and social outcomes but also supports economically disadvantaged farmers by strengthening their local knowledge and innovation. According to recent studies, such farming practices contribute to poverty reduction and are in line with the Millennium Development Goals (MDGs) (Panyakul, 2012).

1.5. Tea development sector in Lao PDR

1.5.1. The initial development of Lao tea sector

Tea (*Camelia sinensis*), a globally popular beverage known for its health benefits, ranks second only to water in popularity. Its origin dates back to 2,737 BC, during the reign of the Chinese emperor "Shen Nung," when it was initially used for medicinal purposes in China (Hasanuzzaman, 2019). The plant was initially found in northeast India, northern Myanmar, Tibet, and southwest China (Heiss & Heiss, 2007). In Laos, Tea was seen as a variety of Wild tea during "the Lao Lan Xang Kingdom" (The Laotian Kingdom) era in the 14th century or from 1354 to 1707 (Ole S. Pedersen et al., 2016). Then, in the 1990s, it was widely recognised and promoted as a commercial crop with different varieties to rural producers in many of Laos's southern and northern mountainous provinces (Ole S. Pedersen et al., 2016).

In 2022, Laos experienced substantial growth in its tea production sector, with roughly 7,720 hectares of land used for tea farming, which increased from 7,700 hectares in 2021. However, its total dried tea output declined significantly from 82,479 tons in 2021 to 68,435 tons in 2022 because of the COVID-19 pandemic (Lao Statistic Bureau, 2023). Tea is mainly produced in northern Laos, with approximately 85% of the total production in Phongsaly province (Earth Systems, 2016). It has been processed primarily into black tea, green tea, white tea, and "Mao-cha" (a type of rough tea used for the production of Pu'er tea), which accounts for 85% of tea production by small and medium-scale processors at household and factory levels (Boupha et al., 2010; Smith, 2010). Mao-cha tea is exported to Yunnan, China, to be further processed into Pu-erh tea cakes¹. In Laos, this practice originated in Phongsaly Province and gradually expanded southwards due to the evolving Pu-erh market (Boupha et al., 2010). The demand for Lao tea increases gradually in regional and international markets such as China, Russia, France, Germany, East Asia, Southeast Asia, and the USA. The increase in demand is influenced by some Chinese tea traders who promote the source of Lao teas to customers who seek organic and chemical-free tea. They also have a strong reputation in the premium Chinese tea markets (Earth Systems, 2016).

1.5.2. Tea varieties in Lao PDR

Tea in Laos is categorised into three primary types: wild forest tea (Figure 1 – (A)), ancient tea (Figure 1 – (B)), and commercially cultivated tea (Figure 1 – (C)) (Earth Systems, 2016). The wild forest tea is the aged tea trees that grow naturally in forests. The category of this tea encompasses various types of *Camellia* species and varieties such as *Camellia sinensis* var. *assamica* and *Camellia taliensis*. The ancient tea is *Camellia sinensis* var. *assamica*., derived from the tea leaves cultivated in tea gardens for over 100 years. Commercially grown ancient tea is produced within organised tea gardens or plantations, usually maintained by individual households. (CARE, 2011a). The commercially cultivated tea generally involves *Camellia sinensis* var. *sinensis*. And *Camellia sinensis* var. *assamica*. It is planted within villages, managed and harvested either communally or individually by households (Earth Systems, 2016). The tea plants in the northern provinces, especially the wild and ancient tea, are

¹ It is produced through fermentation and compression processes to form a cake shape. It can be stored longer than other tea types to increase its value. Tea Sector Challenges and Opportunities, Background Paper (CARE, 2011).

classified as high-value tea by Chinese traders and have been supplied to domestic and Chinese markets (Smith, 2010). Therefore, the local government has been advocating for the cultivation of this crop as a sustainable alternative to opium production and slash-and-burn farming in mountainous regions (Earth Systems, 2016; Wilson, 2014b).

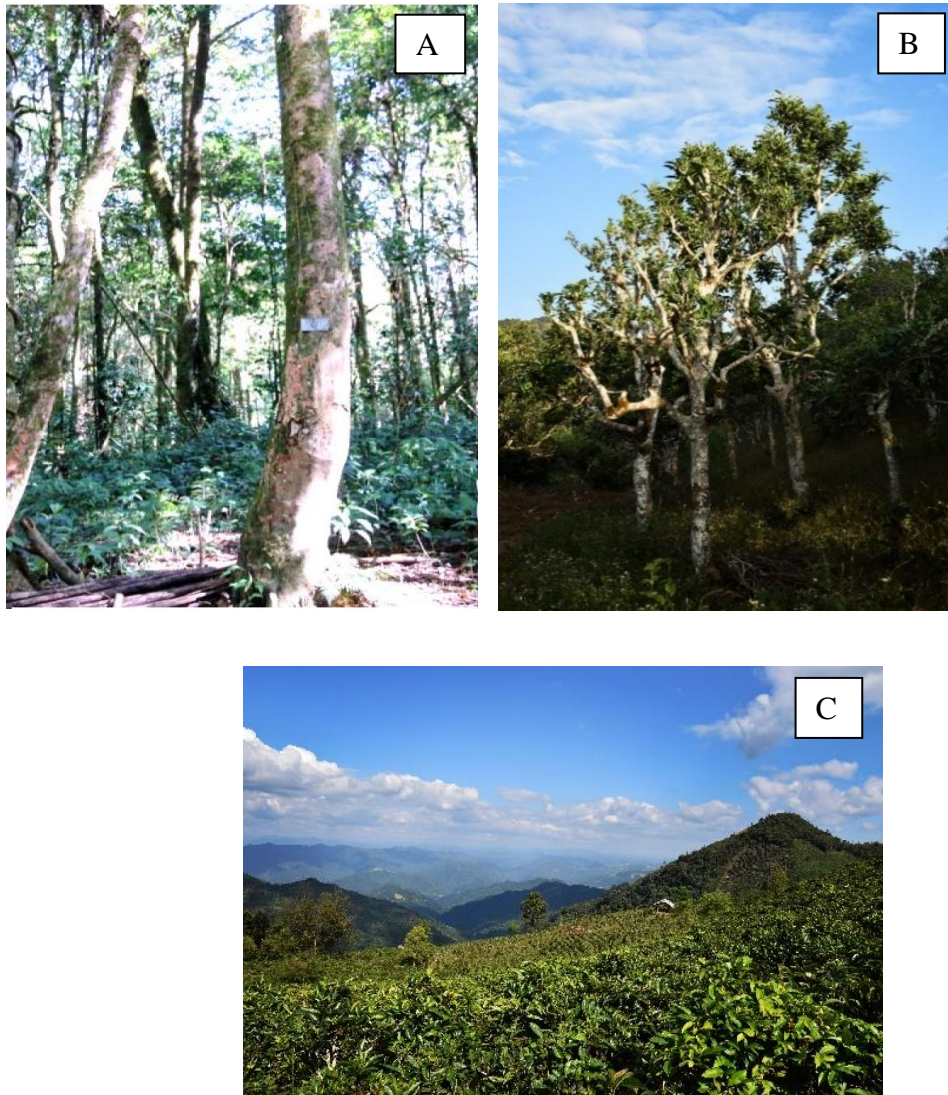


Figure 3: Tea types in Laos

(A) Large wild forest tea in Phou San Conservation Forest, Xiengkhouang province, Laos. Source of information: Agro-biodiversity Project (2016).

(B) Ancient tea tress that are more than 100 years old, in Komaen village, Phongsaly district and province, Laos. Source of information: BioTrade project (2023), HELVETAS Laos.

(C) Commercial cultivated tea trees that are more than 20 years old, in Nongkinnali village, Phongsaly district and province, Laos. Source of information: BioTrade project (2023), HELVETAS Laos.

1.6. Market trends for Lao organic teas

In general, Lao tea has opportunities to capture the trend of growing links with China's tea markets, a high-value niche market for organic wild forest and ancient tea (Khamhoung & Van Gansberghe, 2016). While the global demand for organic tea is increasing, some Chinese tea processors and exporters believe that organic certification is unnecessary for their domestic and export markets (Wilson, 2014b). Therefore, most Lao tea products are sold without organic certification, with approximately 90% exported to Yunnan Province in China (primarily in the processed form of Mao Cha) through border trade (Earth Systems, 2016). However, organic certification is seen as an important strategy for enhancing the value and market potential of the products for Chinese tea exports, which mainly target Western or domestic markets (Wilson, 2014b). The tea produced from the wild and ancient tea found in high-altitude areas of Laos is of exceptional quality. Smallholder producers can substantially profit if they sell them in Mao Cha in Chinese markets (Smith, 2010).

1.7. Research rationale

The agricultural sector of Laos plays a crucial role in improving livelihoods and food security, particularly for smallholder producers in rural areas (Bourdet, 1995). Tea farming is a significant part of this agricultural landscape, especially in northern Laos (Wilson, 2014a). However, the country faces several challenges in optimising farming outcomes, including limited infrastructure, insufficient access to modern agricultural techniques, and fluctuating market demands (Keovilignavong et al., 2023; Smith, 2010). Promoting certified organic farming schemes in Laos has gained attention as a potential strategy to enhance market access and improve the sustainability of cash crop production (Makino & Inthlangsee, 2023). By adopting organic methods, Lao producers could tap into the export markets that demand certified organic products, potentially increasing their income and ensuring more stable economic growth (Makino & Inthlangsee, 2023; Panyakul, 2012). The certified organic farming also aligns with global trends towards healthier and environmentally friendly

agricultural practices (Makino & Inthalangsee, 2023). Thus, promoting organic farming is an economic opportunity to support sustainable agricultural development (Saysana, 2011). However, smallholder producers face significant challenges in the costs and complexity of compliance with organic standard and certification requirements. These obstacles can make it difficult for small-scale producers to adopt organic farming practices widely (Gunaratne, 2015).

Tea farming systems in Laos can be characterised as following:

- Non-certified organic farming practices refer to traditional farming methods that do not use chemical inputs and are often considered organic by default. These practices typically involve intensive labour in production. However, in some areas, chemical inputs are still applied.
- Organic and Fairtrade Certified farming is found in some northern and southern Laos regions (involves the intensive agricultural practices to meet national and international standard requirements).

Commercial cultivated tea (Figure 3, (C)) is selected for the study area. It is commonly grown in Phongsaly district and other districts such as Houn, Beng Sanamsai, Peak, and Bountai. The tea spans 1,400 hectares in Phongsaly province, representing nearly half of the total commercially cultivated tea areas in northern Laos. Both hand and factory processing are used for green and black teas, but hand-processing is less feasible for large volumes (CARE, 2011b). Tea cultivated in well-organized plantation areas is typically maintained through pruning and management practices to simplify harvesting and enhance productivity (Earth Systems, 2016).

Despite the potential of organic farming, the economic benefits of certified organic farming compared to non-certified organic tea farming in Laos are still questionable. While certified organic farming promises higher market prices and environmental benefits, it also involves higher initial costs and more labour-intensive practices (Durham & Mizik, 2021; Poyearleng et al., 2019). Conversely, non-certified organic farming may offer more immediate returns but at the potential cost of long-term production and environmental degradation (Deka & Goswami, 2021). Therefore, research compares these two farming systems regarding yield, profitability, key factors affecting profitability, and factors influencing producers' decisions to participate in certified-organic farming systems. This research is critical for policymakers and

producers to make informed decisions that balance economic feasibility with sustainable production. The findings can guide policy development to support sustainable practices while ensuring economic benefits for smallholder producers. Moreover, this research can aid producers in selecting the most suitable farming methods based on their specific circumstances, ultimately promoting more sustainable agricultural practices and contributing to long-term livelihood improvement and environmental health.

1.8. Research objectives

- To examine factors affecting the profitability of certified organic and non-certified organic producers of commercial cultivated tea.
- To identify factors influencing producers' decisions to participate in certified-organic farming system.

Chapter 2: Literature Review

This chapter reviews the literature regarding certified organic and non-certified organic farming systems, and relevant studies on profitability and decisions of producers to participate in the certified organic farming system. It is structured into seven sections. The first section focuses on certified and non-certified organic farming systems in developing countries. The second section explores the importance of Lao Tea sector in Lao economic development. The third section describes economic comparisons between certified and non-certified organic farming systems. This section describes the comparisons of economic benefits, production costs and prices of both farming systems. The fourth part elaborates on standard and certification requirements for certified organic farming system. The fifth section explores factors affecting the profitability of certified- and non-certified organic farming systems. The sixth section provides the factors affecting producers' decisions to participate in certified-organic farming system. Lastly, the seven section reviews the overview of producer organisations in developing countries.

2.1. Certified and noncertified-organic agriculture in developing countries

Organic agriculture (OA) is practiced globally and is often viewed as a development strategy that promotes environmentally sustainable practices and improves socio-economic conditions (Ume & Bahta, 2024). Although this farming method is practiced worldwide, its definitions and requirements differ by country. In the U.S., the USDA's National Organic Program (NOP) defines organic farming as a system that emphasises biodiversity and minimal external inputs, focusing on natural methods to enhance soil health, sustainability, and reduce environmental impacts (Fess & Benedito, 2018). Sumberg & Giller (2022) described organic agriculture as a cultivation system that deliberately avoids or prohibits applying synthetic chemical inputs (fertilizers, pesticides) and growth-enhancing substances. OA has been seen as an effective development strategy for achieving Millennium Development Goals in developing countries, largely due to its low capital requirements (Setboonsarng & Gregorio, 2017).

According to the annual handbook report of International Foundation for Organic (IFOAM), the number of certified organic producers and the area under organic management have risen notably. Latin America has emerged as a leading region, with nearly 6 million hectares, accounting for 24% of the world's certified organic land. Countries like Argentina, Brazil, and Uruguay rank among the top ten globally in certified organic land, while Asia and Africa have comparatively less. However, there has been rapid growth in certified organic land in the southern hemisphere over the past three years (Parrott et al., 2006). Certified organic agriculture is not just an alteration of non-certified organic methods but a thorough restructuring of farming systems, emphasising sustainability and environmental preservation (Lema, 2013). Organic certification increases the value of agricultural products and grants access to profitable markets by leveraging potential resources that poor producers already managed, like chemical-free land and traditional farming knowledge. Producer groups and cooperatives are often established to reduce certification costs through economies of scale and enhance knowledge sharing regarding the market access, cultivation and marketing techniques, with the support from governments or NGOs (De Ligne, 2015).

The term "non-certified organic agriculture" (NCO) or "conventional agriculture" was commonly used to describe the prevalent farming practices during the 1950s and 1960s, signifying the standard agricultural methods used at the time. In the 1970s and 1980s, it became a term more frequently used to distinguish and describe farming methods in contrast to organic practices (Sumberg & Giller, 2022). NCO in developing nations can be classified into two main types: those that require high or low levels of inputs for commercial production and those geared towards subsistence farming (Seufert et al., 2012). These agricultural methods are crucial for providing food and generating income, especially for poor and rural households. Nevertheless, their effectiveness and robustness are under growing threat due to the evolving climate, adversely affecting their yield and resilience (Trentinaglia et al., 2023). NCO practices incorporate various techniques and yield different results, mirroring the varied environmental, economic, and cultural settings. Critics have argued that this form of agriculture tends to oversimplify the complexity of farming systems and ongoing discussions about the evolution of agricultural practices, leading to a more uniform perspective on agriculture (Sumberg & Giller, 2022).

2.2. Importance of Lao Tea in Lao economic development

Tea sector is becoming an increasingly vital part of the Lao economy, especially in the northern mountainous regions, where it serves as a key source of income for smallholder producers and ethnic minority groups. The sector involves around 8,500 households and encompasses about 12,000 hectares of tea resources, with approximately 85% of its production occurring in the northern provinces (Earth Systems, 2016). In the northern provinces such as Phongsaly, Oudomxay, and Xiengkhuang, tea is cultivated at high altitudes, making it well-suited for areas where other agricultural activities are constrained by challenging landscape and climatic conditions (Wilson, 2014a). In 2015, the harvested area reached 3,400 hectares, yielding over 6,100 tonnes of fresh leaves. The sector also generated substantial export revenue, with an estimated value of \$10,000 USD per tonne for tea exported from Lao PDR in 2014 (Earth Systems, 2016). According to the National Agriculture and Forestry Research Institute (NAFRI), the production area for tea covered around 5,430 hectares and 8,055 tons of tea leaves were harvested in 2019 (Wilson, 2014a).

2.3. Economic comparisons between certified- and non-certified organic farming systems

2.3.1. Economic benefits

Shrestha, G., & Bhattarai, K. (2014) conducted an economic evaluation of commercial organic versus conventional vegetable farming in the Kathmandu Valley. Their research revealed that organic farming was more economically beneficial than conventional methods, yielding higher net returns per hectare. They concluded that organic farming is a feasible substitute for conventional practices in the Kathmandu Valley. However, it is noteworthy that organic farms generally had lower yields, especially in areas such as fruit, vegetable, and livestock production (Shrestha et al., 2014). Despite these lower yields, organic farming could provide substantial environmental advantages at the local level (Durham & Mizik, 2021).

According to Lema (2013), the study on comparison of economic efficiency of organic and conventional farming systems in Tanzania showed that coffee had the highest total physical costs among all crops, with organic coffee at 57% and conventional coffee at 53%. These high

costs were primarily due to the use of expensive farm inputs purchased from stockists, unlike crops such as bananas, beans, and maize, which were sourced within farms. Most small-scale coffee producers (91%) converted to organic farming by default, drawn by the lower production costs and the premium prices for certified organic coffee. However, organic coffee farms showed lower profit per acre than conventional farms, with conventional farms yielding 65% higher gross profits due to higher yields and the lack of higher prices for other certified organic crops like bananas, maize, and beans.

Zhen et al., (2023) conducted a study comparing economic benefits of organic and conventional tea farming in China, finding that while both systems offer profitability, organic tea farms generally reported lower yields but gained from reduced input costs and environmental benefits. Organic tea farms achieved a total revenue of \$18.7 thousand per hectare per year and a profit of \$13.7 thousand, outperforming conventional tea farms and organic-conversion tea farms. Conventional tea farms had lower profits, with revenues of \$11.8 thousand per hectare and profits around \$7.23 thousand. Organic-conversion farms demonstrated comparable profits to conventional farms, aided by strategies like reduced input costs and manual harvesting (Zhen et al., 2023).

2.3.2. Production costs

Although the overall production costs were roughly the same for both systems, the nature of these costs varies. In organic systems, labour expenses were approximately 7% greater, but this increase was balanced by the cost reductions from avoiding synthetic inputs such as fertilizers and pesticides in organic agriculture. Organic farming required about 35% more labour than inorganic farming, primarily due to a greater variety of crops and the use of mechanical pest control methods. This increased labour demand persists consistently throughout the growing season (Fess & Benedito, 2018). While labour expenses were usually greater in organic farming, the costs for inputs were typically lower. When this was combined with the higher selling prices of organic products, it could lead to a reduction in financial risks for producers (Shennan et al., 2017). Durham, T. C., & Mizik, T. (2021) stated that organic farming generally outperformed inorganic systems economically due to their lower production costs and higher market prices. Similarly, a study of organic and conventional wheat farming in Pakistan showed that organic wheat producers were marginally more profit-efficient than conventional ones, with profit efficiencies of 0.915 and 0.911, respectively. While organic farming benefited

from reduced input costs (Rs. 4,494/acre versus Rs. 7,220.6/acre for conventional farming), it faced higher labour costs due to its labour-intensive processes. Despite yielding less (1,568.8 kg/acre for organic wheat compared to 1,650 kg/acre for conventional wheat), organic farming generated greater profit per acre (Rs. 24,872.5 versus Rs. 23,712) (Yasin et al., 2014).

Bachwenkizi (2009) analysed the economics of smallholder organic coffee producers in Muleba, Tanzania, and the results of farm budget analysis showed that organic coffee had nearly double the variable costs of conventional coffee, making it less profitable. However, the profit difference between organic and conventional hulled coffee was not statistically significant ($p > 0.05$). Producers tended to overlook production and marketing costs for organic coffee, as family labour handled most activities. Additionally, the lack of record-keeping on production costs made it challenging for farmers to assess whether they were making a profit or loss (Bachwenkizi, 2009).

2.3.3. Prices of certified and non-certified organic products

Organic products often have higher market prices, leading to greater profitability despite their lower yields (Fess & Benedito, 2018). The premium price for these products can be significant, sometimes up to 140%, which results in organic corn being 25% more profitable than conventional corn over a decade (Durham & Mizik, 2021). This premium price results in increased cash earnings and a shorter period to initially generate more income than expenses in organic farming systems (Fess & Benedito, 2018). While inorganic products typically priced lower than organic ones, can compensate for this with higher yields. The extent of this compensation varies based on crop types and geographic locations (Durham & Mizik, 2021). Consumers in these regions are increasingly willing to pay higher prices for certified-organic products, as they are considered to be of superior quality, safer, and more environmentally responsible than inorganic options (Willer et al., 2021). Studies from Great Britain and Germany reveal that higher prices for organic products significantly contribute to farm profits, accounting for 40-73% of profits for crop farms. The influence of market conditions and organic pricing often exceeds that of government financial support. In developing countries, where such support is limited, organic farming is mainly driven by demand in more developed regions (Lema, 2013).

2.4. Standard and certification requirements

CO agricultural systems often become more profitable due to premium pricing, but it can still be more profitable than NCO farming even without these premiums. As CO agriculture scales up, the need for premiums decreases because costs related to postharvest handling and certification are lower for larger quantities (Lema, 2013). Organic certification schemes facilitate knowledge exchange and support farmers shifting to organic farming globally. However, high certification costs are a significant barrier for small producers. (Shennan et al., 2017). The cost of certification can vary based on inspection fees, type of certification (individual or group), farm size, location, production volume, and the product. In developing countries, a significant challenge for organic farming is the high certification cost, particularly for small farms and remote areas, due to expensive inspection fees. The substantial fees for certification and training, especially with foreign inspectors traveling long distances, create a considerable obstacle for small producers entering the organic market (Lema, 2013).

Research funded by the Asian Development Bank Institute has demonstrated the beneficial effects of organic farming methods on environmental sustainability, biodiversity, income levels, and health, particularly for women farmers in selected Asian countries (Setboonsarng & Gregorio, 2017). However, the financial feasibility of organic agriculture in developing countries is still debatable. These countries encounter obstacles, including strict certification requirements. Furthermore, they face difficulties in entering global markets, attributed to intricate regulatory and certification procedures (Abebe et al., 2022; Halberg et al., 2006). The transition phase to organic certification is often the most economically challenging for producers, mainly due to lower yields without premium prices and overlooked costs such as certification fees and the time spent in developing market connections (Fess & Benedito, 2018).

2.5. Relevant studies on factors affecting the profitability of certified and non-certified organic farming systems.

Ndungu et al. (2013) studied on A study on organic vegetable farming profitability in Kenya's Kiambu and Kajiado counties highlighted key factors affecting profitability. Results showed

that smaller farms are generally more profitable in organic systems, attributed to lower costs and more efficient resource management. The study found that total farm size had a negative coefficient of -2.27, meaning that profitability decreases as farm size grows. This decline is likely due to the added complexity and higher labour costs involved in managing larger organic farms, which can reduce the financial advantages of organic practices (Ndungu et al., 2013). In contrast, the study of Lema (2013) in Tanzania found that farm size significantly influenced profit in both organic and conventional coffee farming systems. The coefficient for farm size was 0.62 for conventional farms and 0.60 for organic farms, both significant at the 0.01 level. This means that a 1% increase in land area resulted in a 0.62% profit increase for conventional farms and a 0.60% increase for organic farms, indicating a positive relationship between farm size and the profitability of both farming systems (Lema, 2013).

OM (2023) studied on the profitability of intercropped tea farms and identified the factors influencing the profitability of tea intercropping systems in Taraba State, Nigeria, revealed that labour costs were one of the key factors influencing the profit levels of the tea intercropping system. This factor associated with pruning, fertilizer application, and watering, along with material costs like those for the cutlass (-1.89, significant at 10%) and other unspecified materials (-1.97, significant at 1%), had a negative relationship with profit. This negative association suggests that as expenditures on these activities decrease, the revenue generated increases (OM, 2023).

In terms of extension support, Lema revealed that this factor positively and significantly affects the profitability of both organic and conventional coffee farming systems. The coefficient for extension services is 0.12 for conventional coffee farms and 0.25 for organic coffee farms, with both values significant at the 0.01 level. This suggests that access to extension services boosts profitability by 0.12% in conventional farms and by 0.25% in organic farms. The higher coefficient in organic farming indicates that extension support may provide greater benefits for organic farmers, likely due to the complexity of organic farming practices and the need for specialised guidance. The study also revealed that financial support negatively impacted profitability in organic farms, with a coefficient of -0.11, significant at the 5% level, suggesting that farmers might not have effectively utilised credit for increase profit efficiency. In contrast, for conventional coffee farming, the coefficient for financial support was 0.01, indicating a positive but minimal influence on profit.

Xaba and Masuku (2013) examined the factors affecting vegetable production and profitability among smallholder farmers in Swaziland to identify the key determinants of productivity and profitability in vegetable farming. The study aimed to support improvements in income and efficiency for smallholder farmers in the area. The results showed that distance to market had a negative effect on productivity and profitability for vegetable producers. For every additional kilometre from the market, profitability declined due to higher transportation costs, potential for spoilage, and time delays. This impact is demonstrated by a coefficient of -0.201 for baby corn production, suggesting that closer proximity to the market enhances production and profitability by minimising these logistical challenges (Xaba & Masuku, 2013).

2.6. Relevant studies on factors Influencing producers' decision to participate in COF

Lee et al. (2016) and Khoy et al. (2016) both highlighted the importance of education in adopting sustainable farming practices. Lee et al. found that in Gangwon Province, South Korea, education significantly increased the likelihood of producers adopting environmentally friendly farming, with subsidies boosting the probability by 5.20 times compared to conventional methods (Lee et al., 2016). Khoy et al.'s study in Southern Cambodia similarly revealed that producers with higher education levels were more inclined to adopt organic rice farming practices. Both studies emphasised that education plays a critical role in influencing producers' decisions to transition to more sustainable agricultural methods (Khoy et al., 2016).

Xie et al. (2015) who studied the adoption of organic farming in Jiangsu province, China identified several key factors influencing producers' willingness to transition. The results of binary logistic regression showed that age, labour availability, anticipated income, and environmental benefits significantly affect producers' decisions to adopt organic farming. Older producers are likely to choose organic farming, with age showing a positive impact at the 5% significance level (Xie et al., 2015). Similarly, Khoy et al., (2016) revealed that older producers are more inclined to adopt organic practices. In contrast, Mrinila's study on factors influencing the adoption of organic farming in Nepal revealed that with each additional year of age, the likelihood of choosing organic farming decreases by 0.62%, while the probability of opting for inorganic farming increases by 1.13% (Mrinila et al., 2015). Sufficient labour availability also has a positive effect on this decision (significant at 5%), which aligns with the

labour-intensive requirements of organic farming. Furthermore, the expectation of higher income from organic practices strongly promotes adoption (significant at 1%), along with the perceived environmental advantages (significant at 10%) (Xie et al., 2015).

According to Karki (2011), a study on factors influencing a convention to organic tea farming in Nepal showed that tea producers with larger farms are more inclined to adopt organic farming. This was because their greater capital and ability to manage the risks and costs of certification (Karki et al., 2011). In Colombia, coffee producers with larger farms are more likely to adopt organic farming, as these farms generally have more plots and greater total area than conventional ones, which are typically under 5 hectares. Larger farms can better manage the financial costs and risks associated with organic certification (Bravo-Monroy et al., 2016). In contrast, Lee et al. (2016) found that farm size negatively impacted adoption, with smaller farms being more inclined to implement environmentally friendly practices due to the higher costs and risks associated with transitioning on larger farms.

Bui & Nguyen (2021) found that market support, such as access to marketing services, significantly influenced farmers' adoption of organic practices. A coefficient of 1.322 indicated that better market access greatly increased the likelihood of adoption by reducing price risks and ensuring sales through fixed-price contracts, which provided a stable income despite initial conversion costs (Bui & Nguyen, 2021). Similarly, a study on organic apple farming in China found that market support, including access to marketing services, played a key role in adopting organic practices. Organic certification and online market access led to a price increase of CNY 1.88 per half kilogram for certified apples sold online. This suggests that online market access reduces transaction costs, improves price transparency, and provides stable, higher prices, thereby encouraging organic adoption through economic benefits and reduced financial risks (Zhang et al., 2024).

The study by Bui and Nguyen (2021) found that financial support was crucial in encouraging producers to switch from conventional to organic practices. Access to credit had a positive impact on adoption, indicating that producers with better financial resources were more likely to go organic. This support helped cover initial costs and manage lower yields in the early stages. The study also found that access to extension services and participation in contract farming increased the likelihood of adopting organic practices by 63% and 71%, respectively, highlighting the importance of external support and market connections in motivating

producers to make the shift. Lee et al., (2016) also examined a financial analysis to evaluate the annual costs and net returns of conventional, partially converted, and environmentally friendly farming. The study indicated that financial subsidies played a crucial role in encouraging producers to adopt the environmentally friendly farming practices, with the subsidies increasing the likelihood by 5.20 times compared to conventional methods.

Distance to markets is one of the key factors affecting producers' decisions to adopt organic farming. Regarding Wollni & Anderson (2014), their study on organic farming adoption in Honduras found that distance to market centres negatively affected the adoption of organic farming, with a statistically significant impact at the 10% level. Producers residing in remote areas with poor market access were less likely to adopt organic practices (Wollni & Andersson, 2014). Similarly, the study of Jena et al., (2017) showed that increased distance from the market negatively impacts producers' decisions to pursue organic certification. The marginal effect for "distance to market" revealed a significant negative association (-0.006, $p < 0.05$) with the likelihood of adopting organic certification. This implied that the farther producers were from the market, the less likely they were to choose organic certification due to added logistical and cost-related difficulties (Jena et al., 2017). Conversely, Karki et al. (2011) found that Nepali tea producers who were farther from market centres were more likely to adopt organic farming, possibly due to reduced dependency on external inputs such as pesticides and fertilizers.

Donkoh et al. (2019) argued that rice producers in Ghana with mobile phones were less likely to adopt practices like harrowing and line planting. This negative correlation suggests that mobile phones may not effectively deliver the practical, hands-on knowledge required for these techniques, which often require visual demonstrations and field experience (Donkoh et al., 2019). In contrast, Nonvide (2021) conducted a study on the adoption of agricultural technology among rice producers in Benin and found that mobile phone ownership was a key factor, with phone-owning producers being 14.4% more likely to adopt new technologies. Mobile phones provide essential information on technology, pricing, and markets, which supports better decision-making and highlights the importance of digital tools in promoting technology adoption among rural producers (Nonvide, 2021).

2.7. Producer organisations in developing countries

Producer organisations are defined in various forms based on their membership scale and the services they offer. Its definitions are classified into four categories: 1) producer groups and pre-cooperatives (informal farmer associations), 2) producers' associations, federations, and unions, 3) Agricultural cooperatives (organisations owned and managed by independent farmers), and 4) "Agricultural chambers with a general assembly elected by farmers" (Stockbridge et al., 2003). Producer organisations are typically defined as voluntary associations, groups, or organisations of farmers or agricultural producers collaborating to achieve common objectives, such as improving production techniques, accessing credit, or marketing their products collectively (Markelova et al., 2009). These organisations can take various forms, including agricultural cooperatives, self-support groups, and farmer companies (Fernando et al., 2021). Key characteristics often associate with producer organisations include democratic governance, member ownership, and a focus on the equitable distribution of benefits among members (Stockbridge et al., 2003). Organisations of producers, such as cooperatives and agricultural collectives, are believed to assist smallholder producers in expanding their businesses to reduce expenses, improve their bargaining power, and offer greater chances to gain market knowledge and access to advanced technologies (Markelova et al., 2009).

While these organisations vary in size and scope, their fundamental purpose is to empower farmers or members by providing them with a collective voice, strengthening farmer networks, and facilitating their participation in value chains and high-value markets (Ma. Lucila A. Lapar et al., 2006). According to Stockbridge (2003), the primary objective in supporting producer organisations is to improve "livelihood opportunities and security." The different forms of producer organisations, such as producer groups, cooperatives, and clubs, enhance negotiation capabilities within the value chain and give access to crucial resources such as knowledge, funds, and vital connections (Ma. Lucila A. Lapar et al., 2006). Producer organisations benefit smallholder producers to participate in markets effectively (Helen Markelova et al., 2008). These organisations have been shown to provide smallholder farmers with improved access to markets, fairer pricing mechanisms, and increased bargaining power. This, in turn, can lead to enhanced income generation and poverty reduction (Maspaitella, 2015).

2.8. Theoretical framework

The theoretical framework of this research is based on the perspective of economic decision-making, particularly focusing on the adoption of organic farming practices. This framework is highly relevant in the context of smallholder tea producers in Lao PDR. The core theoretical foundation is the Theory of Profit Maximization, which assumes that producers aim to maximize their income despite limited access to resources such as land, labor, and capital. This theory is applied to examine how key variables—such as farm inputs (e.g., farm size, labor availability, and production costs)—directly influence profit margins (Lema, 2013; Zhen et al., 2023). Additionally, institutional support plays a critical role in facilitating access to essential services such as agricultural extension, market linkages, credit, and certification, typically provided through producer organisations and related institutions. Equally important are producer-specific factors, such as educational level and farming experience, which impact their capacity to adopt effective farming practices and make informed decisions. By comparing these factors between certified organic (CO) and non-certified organic (NCO) systems, the framework highlights the differing dynamics that shape profitability in tea farming.

Chapter 3: Method of analysis

This chapter describes the research methods applied in this study to examine CO and NCO farming systems, providing a detailed exploration of the processes and approaches undertaken. The chapter is structured into seven main sections. The first section offers an in-depth description of the research method. Following this, the second section discusses the selection of research areas, elaborating on the criteria and rationale for choosing specific locations for the study. The third section delves into the sampling technique employed, explaining how participants were selected and the strategies used to ensure a representative sample. The fourth section outlines the technique for determining sample sizes for the study. The fifth section describes the questionnaire development process, highlighting the steps taken to design effective instruments. The sixth section is dedicated to data collection techniques and processes, providing a comprehensive overview of how data was gathered, including the tools and methodologies used. Finally, the seventh section presents a detailed description of the data analysis methods used in this study, offering insights into the analytical techniques and tools used, including how the collected data was interpreted and the statistical techniques applied to draw meaningful conclusions.

3.1. Research Method

To comprehensively examine the targeted research phenomena and the complexities of the tea sector in the target area, the study applies the quantitative method, focusing on a survey technique complemented by an interview technique for in-depth data collection. Using this method offers the research way to tackle complicated research questions and gain a complete understanding of intricate research issues (Cresswell, 2014; Harris & Brown, 2019). Several studies have also applied this method with the interview technique in similar contexts related to the economic efficiency of CO and NCO farming systems, livestock consumption, and other areas (Grotti, 2015; Synt, 2023). The study focuses on collecting demographics, farm characteristics, market aspects, and institutional support to CO and NCO tea producers.

The interview was used to collect qualitative data to understand the roles of producer organisations in facilitating access to organic markets, as well as broader dynamics within the tea sector in Laos. Data were collected through semi-structured interviews with key producer

leaders in the selected producer organisations, tea factories, and other relevant stakeholders. Further data were extracted from relevant reports, academic papers, and other publications. The data gathered through these interviews were thematically analysed to identify potentials, challenges and strategies employed by producer organisations in supporting organic tea producers. This qualitative analysis provided context and depth to complement the quantitative findings, helping to interpret the statistical results more meaningfully. It also allowed the research to explore underlying motivations, institutional relationships and functions. These findings contributed to the discussion section of the study, shed light on the role of producer organisations and relevant policy considerations.

3.2. Studying area selection

There are two compelling reasons that guide the logical selection of research areas in the Phongsaly district. Firstly, the district is one of the seven districts of Phongsaly province (Figure 2), which is located in the most northern region of Laos with 99.9% high mountainous landscapes and an average elevation of 1,183.5 meters above sea level, making this suitable for tea production (CPTDS, 2018). Also, the area stands out as the most significant tea production area within its province and nationally in Laos (CPTDS, 2018; Lao Statistics Bureau, 2021). This led the district has substantial volume of tea production, making it a critical contributor to the country's tea industry. Secondly, a policy on promoting producer organisations and the adoption of certified organic farming systems under the “Phongsaly Tea Development Strategy by 2025” led local producers to have various choices of farming practices and market access (CPTDS, 2018).

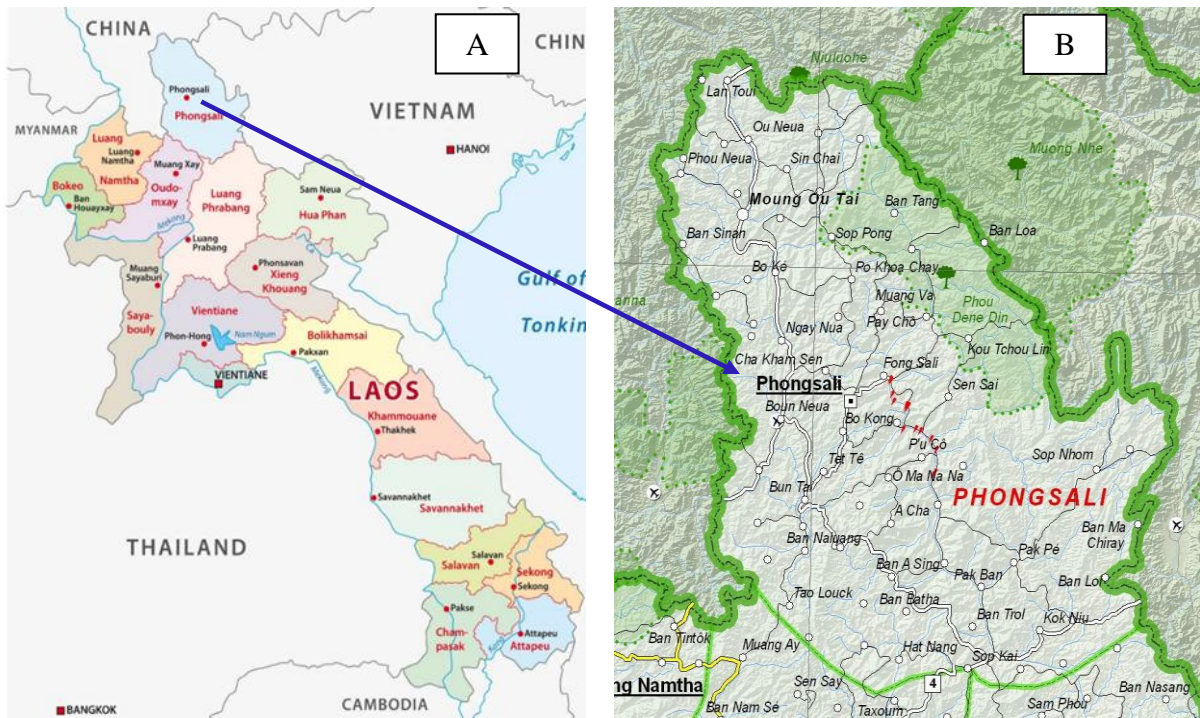


Figure 4: The map of Phongsaly district and Phongsaly province, Laos.

(A) The map of Phongsaly province, Laos.

Source of information: <https://www.mappr.co/counties/laos-provinces/>

(B) The map of Phongsaly district, Laos.

Source of information: https://en.wikipedia.org/wiki/Phongsaly_province

3.3. Sampling technique

The sources of research information from the local government office (Agriculture and Forestry office of Phongsaly Province, 2019) indicate that the target district consists of 18 villages where tea is produced. These villages are classified into three zones: 1) CO tea farms with commercial tea variety plantations; 2) NCO tea farms with commercial tea varieties; and 3) CO and NCO tea farms with both commercial and ancient tea varieties. Referring to this secondary source of information, the cluster sampling technique was used to cope with these conditions. This technique involves dividing a large area into smaller areas and randomly choosing a few for a survey (Taherdoost, 2016). Among the three zones, only the third zone consists of both CO and NCO producers who grow the same tea variety—commercial tea. These conditions align with the study’s objectives of examining CO and NCO farming systems with commercial tea varieties. Therefore, this zone was selected for the study.

3.4. Sample size determination

Regarding the Taro Yamane Formula (Yamane, 1973), when both the population size and the proportion are known, the sample size can be determined by this formula to ensure enhanced accuracy (Chaokromthong & Sintao, 2021). The Yamane Formula:

$$n = \frac{N}{1 + Ne^2}$$

Where:

- n = sample size
- N = population size
- e = error (0.05) reliability level 95%

Based on data from the Provincial Agriculture and Forestry Office (2019), the estimated number of tea producers in Phongsaly District, Phongsaly Province, is 1,184 in 18 villages. Following this method, the calculated sample size was 299 households. However, 304 respondents (Table 2) were interviewed to ensure the accuracy and sufficiency of the data.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{1,184}{1 + 1,184 (0.05)^2} = 298.9898 = 299$$

The research interviewed eight key informants: 6 farmer leaders from certified organic producer organizations, 1 tea factory, and 1 local government staff member from the Provincial Agriculture and Forestry office (Table 1).

Table 1: Total samples of key informants involved in the interviewed data collection

Key informants	Responsibility	Interviewed data (no. of informants)	Name of village/location
Producer leaders from CO producer organisations	General management	6	1) Chaphou 2) Bokong 3) Phongxek
Tea factories/processors	General manager of the factory	1	Chaphou
The local government (Provincial)	The head of the Crop Section, Provincial Agriculture and Forestry Office of Phongsaly Province	1	Phongsaly Province
Total		8	

Table 2: Total samples of producers involved in the research

Sample groups	Description	Survey data (no. of respondents)	Name of village
Certified organic producers (COP)	<ul style="list-style-type: none"> - The members of tea producer organisations in Phongsaly district. - Apply for the CO farming system (either international or local). - Produce fresh and dried teas (made from commercially cultivated tea varieties) and supply to CO and NCO markets. 	122	<ul style="list-style-type: none"> 1) Chaphou 2) Bokong 3) Phongxek
Non-certified organic producers (NCOP)	<ul style="list-style-type: none"> - Non-certified organic producers in Phongsaly district. - Produce fresh and dried teas (made from commercially cultivated varieties) and supply to local factories (NCO markets). 	182	<ul style="list-style-type: none"> 1) Mongchao 2) Phousoum 3) Namleng
Total		304	Six villages

3.5. Questionnaire

In social science research, different questionnaires are used for various purposes. These include structured, semi-structured, and unstructured questionnaires (Bowling, 2005). In this study, both semi-structured and structured questionnaires are utilised. These types are selected because structured questionnaires are well-suited to collect explicit and measurable data for a survey approach (Cheung, 2021). On the other hand, semi-structured questionnaires are more flexible and help understand people's perspectives and experiences in detail (Bowling, 2005). Both types can contribute to collecting a wide range of information, from specific data to in-depth insights.

The semi-structured questionnaire contains open-ended interview questions to gather in-depth data (Bowling, 2005). This technique allows the researchers to gather initial background details about the producer organisations in a pre-testing step, enabling adjustments and improvements to survey questionnaires. The open-ended questions were formulated and organised in line with the research goals and existing literature (Fernando, 2021; Hidayati, 2023; Tray et al., 2021). The questionnaire (Appendix 2) was developed separately for three respondent groups: the leaders of producer organisations, the tea factory, and local government officials (at the provincial level). The questionnaire was organized into five sections: (I) General background about the producer organisation's manager, (II) The roles of the producer organisation in coordination with members and other stakeholders, (III) Producer organisation activities and services, (IV) Producer organisation's management, and lastly, (V) Challenges and future strategies of the producer cooperative.

The survey data from individual producers, both CO and NCO, were gathered by using a structured questionnaire (Appendix 1), which included structured closed questions. The closed questions were structured to allow respondents to choose from single or multiple options or provide a specific numerical response (Cheung, 2021). The development of this questionnaire involved a four-step process: (1) an initial review of relevant literature and consultations with academic supervisors and critical stakeholders, (2) the creation and refinement of the questionnaire draft, (3) conducting a preliminary test of the questionnaire, and (4) the finalisation of the questionnaire.

The initial versions of the survey questionnaires were formulated using insights from earlier research concerning the integration of the producers into both CO and NCO farming systems and other relevant studies (De Ligne, 2015; Hariyati, 2017; Hidayati, 2023; Khoy et al., 2016; Lema, 2013; Tray et al., 2021). Then the final draft of questionnaires was pre-tested. The principal aim of this pre-test interview was to assess their contents, ensuring they contained questions essential and relevant to fulfilling the study's aims. The final questionnaire included Five main sections: (I) Farm demographics, (II) Tea production, (III) Market aspects, (IV) Institutional support (measuring the levels of satisfaction), and (V) Factors influencing the decisions of tea producers in farming practices.

3.6. Data

The research categorised data sources into two main types: 1) primary and 2) secondary data (Figure 3). Before collecting the primary data, the secondary data was collected from various sources, including academic journals, government papers or reports, articles, non-governmental organisations (NGOs), websites, and multiple publications. These sets of information offer valuable insights related to the research's goals and objectives (Cresswell, 2014). The next step was collecting the primary data by using a face-to-face interview and conducting the survey interviews for the survey questionnaires. This step was carried out in following stages:

- 1) Interview data: The face-to-face interviews were conducted with the leaders of CO producer organisations, the tea factory, and government officials. The interviews were noted down and voice-recorded in the Lao language and then transcribed into English. This process was conducted by a local enumerator with close online monitoring by the researcher from the 22nd to the 28th of December, 2023.
- 2) Survey data c: A formal set of questions was used to collect numerical information for survey data from CO and NCO producers from January 17 to February 5, 2024. The researcher and two local enumerators implemented the survey, one of whom can speak an ethnic language (called Phounoy), which was highly required to ensure effective communication with respondents. The survey data covers the farmers' demographics, farm characteristics, market aspects, and critical factors that affect the profitability of CO and NCO farming.

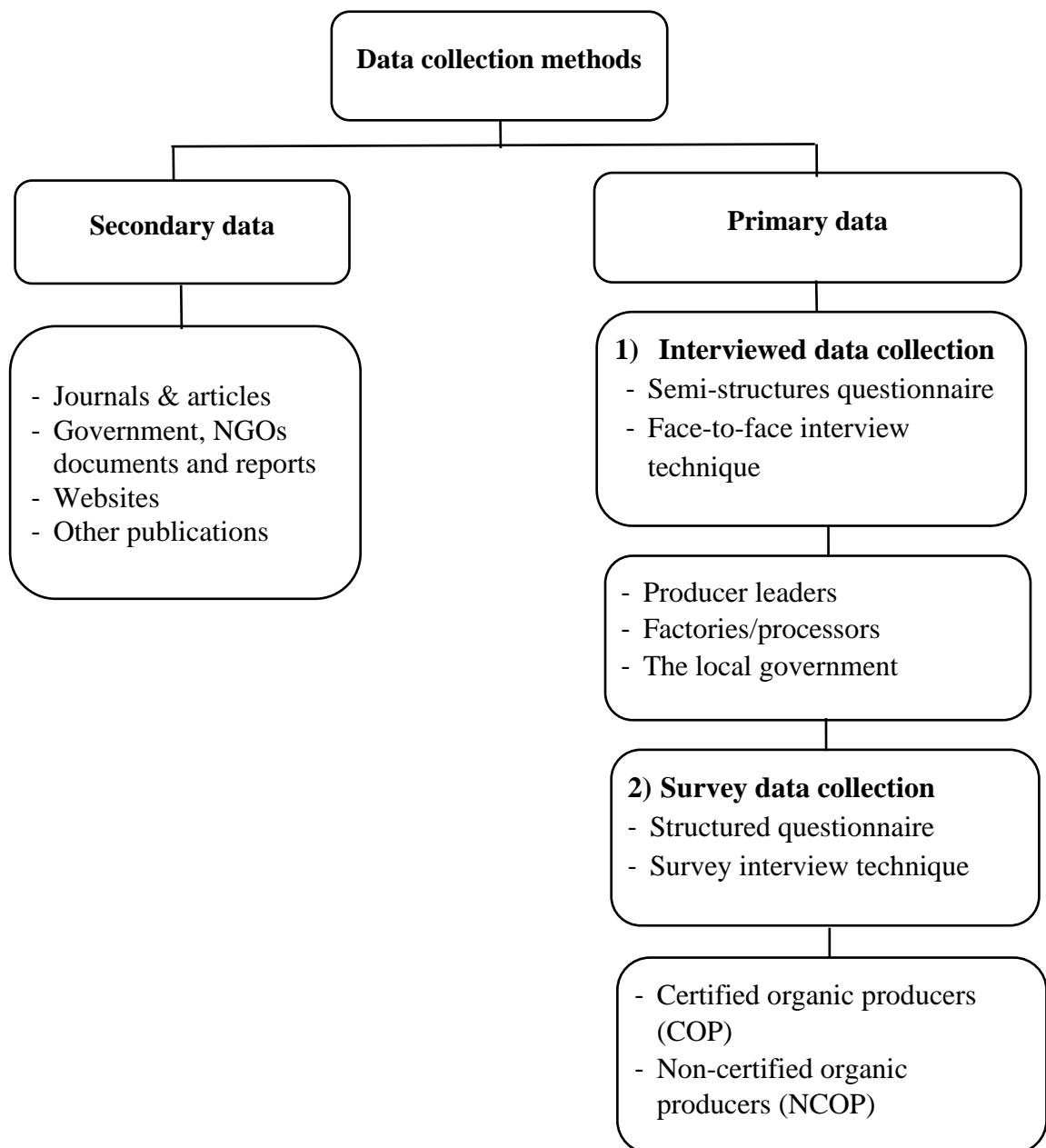


Figure 5: Data collection method

Kobo Toolbox was used for collecting survey data. This is an open-source and free data collection tool designed for use in areas with unreliable internet access (Poloju et al., 2022). Thus, it is suitable for the research location, which is remote and has limited access to the Internet. Additionally, its ease of use in distributing surveys via links and collecting descriptive data makes it particularly beneficial for wide-scale data-gathering efforts (Nampa et al., 2020). The original questionnaires were developed in English and translated into Lao using the Kobo tool. After the questionnaires had been developed completely, the links were generated in the

website account and sent to mobile devices (Android mobile phones) to collect data in the fields. All mobile devices installed the Kobo tool application before receiving the links and running the program.

3.7. Data analysis

As Creswell (2014) described, the analysis of interview data can occur during or after the interview phase. This research analysed the data after completing the interview stage. The data was transcribed and analysed to understand the following areas:

- 1) The overall concept, challenges, and opportunities in the operation of the CO producer organisation.
- 2) The working relationship between the factory and the producers.
- 3) Market access and support for the producers.
- 4) The enabling environment for the entire tea development sector in the province, including both CO and NCO farming.

This analysis supported the descriptive analysis by providing insights into phenomena that the descriptive analysis alone could not uncover, thus achieving more comprehensive results.

The data was cleaned through exploratory data analysis and validated to ensure its completeness, accuracy, and reliability. This step involved screening both hard copies and digital formats of the data, allowing the researcher to identify inconsistencies, irregularities, and gaps in the information collected via questionnaires (Chu et al., 2016). Digital formats, KoboTool box, and Microsoft Excel program were used in this study to record the collected data. The data from all enumerators' questionnaires were input into the KoboTool box. Once the data collection was completed, the raw data were exported into an excel format to be cleaned and validated.

STATA, a statistical software package (STATA/SE 18), was utilised to conduct comprehensive data analyses in this study (Gutierrez, 2010). Specifically, STATA was applied to analyse descriptive data, providing detailed summaries and insights into the basic features of the dataset. The software also was applied for T-test, Chi-square, Multiple linear regression, Multicollinearity and Heteroskedasticity test. The use of STATA ensured precise and reliable

statistical analyses, contributing significantly to the robustness and validity of the study's findings.

3.7.1. Descriptive data analysis

In this research, descriptive statistics were utilised to explain the producers' characteristics, farm characteristics, market aspects and institutional support toward CO and NCO farming systems. This method helped to clearly outline and summarise the essential attributes of the respondents, providing a straightforward survey overview of the data (Holcomb, 2016). Descriptive statistics consist of observations, means, minimums, maximums, percentages, and standard deviations of all variables for CO and NCO farming systems (table 3).

Table 3: The description of variables

Independent variables:	Type of variable	Type of measurement
Farmer demographics:		
Gender	Categorical	Gender of respondents (male = 1 and female = 0)
Age	Categorical	Number of years
Educational level	Categorical	Number of years
Tea farming experiences	Categorical	Number of years
Farm characteristics:		
Farm size	Continuous	hectares
Yield	Continuous	Kg/ha/year
Distance to market	Continuous	Kilometre
Total labours	Continuous	Numbers of people
Land titles	Categorical	Yes/No
Compost fertilizer uses	Categorical	Yes/No
Other commodities	Categorical	Yes/No
Profitability:		
Fresh tea price	Continuous	LAK/kg
Dried tea price	Continuous	LAK/kg
Income	Continuous	LAK/ha/year

Fixed cost	Continuous	LAK/ha/year
Variable cost	Continuous	LAK/ha/year
Profit	Continuous	LAK/ha/year
Market:		
Market support	Dummy	Yes/No
Smartphone ownership	Dummy	Yes/No
Purposes of mobile phone use in tea activities	Categorical	Percentage of purposes
Fresh tea sale volumes	Continuous	Kg/year/farm
Dried tea sale volumes	Continuous	Kg/year/farm
Institutional support:		
Agricultural input support	Dummy	Yes/No
Financial support	Dummy	Yes/No
Extension services	Dummy	Yes/No

3.7.2. The Chi-square tests

The Chi-square test (X^2) is a statistical method used to examine if there are notable differences between the expected frequencies and the observed frequencies across one or more categories. It is frequently used in research to test hypotheses concerning categorical data (Agresti, 2012). The outcome of the Chi-square test is assessed based on a statistical significance level (p-value ≤ 0.05), which helps determine whether there is a statistically significant relationship between two variables (McHugh, 2013). According to Franke et al., (2012), the Chi-square Test has three different types: 1) the Chi-square Goodness of Fit Test, used to determine if sample data fits a distribution from a population with a normal distribution; 2) the Chi-square Test of Homogeneity: applied for analysing the difference in proportions from two (or more) independent samples; 3) Chi-square Test of Independence: helps in determining if there is a significant association between two categorical variables. Among these types, the Chi-square Test of Independence meets the research nature of analysing the relationship between two categorical variables. This study determines the profitability CO and NCO as the dependent variables. In contrast, the independent variables include:

- 1) Farmer demographics: gender
- 2) Farm characteristics: certification, land documents, compost fertilizer uses, and other commodities
- 3) Market aspect: market support, mobile phone ownership, and purposes of mobile phone use in tea activities
- 4) Institutional support: agricultural input support, financial support, and extension services.

The equation of the chosen Chi-square test is given below:

$$x^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{i,j} - E_{i,j})^2}{E_{i,j}}$$

$$df = (r - 1) \times (c - 1)$$

$$x^2 \leq x_{1-\alpha}^2$$

The " x^2 " Represents the value of the Chi-square statistic. The contingency table dimensions are denoted by "r" for the number of rows and "c" for the number of columns. $O_{i,j}$ and $E_{i,j}$ represent the observed and expected frequencies, respectively, in the contingency table at row

i and column j. The formula for degrees of freedom in this setup is $(r - 1) \times (c - 1)$. The index i, ranging from 1 to r, corresponds to the observations of the first factor, and the index j, ranging from 1 to c, pertains to the observations of the second factor (Franke et al., 2012).

3.7.3. Independent T-test

The independent t-test is widely used to compare the means of two independent groups and determine whether statistically significant differences exist between them (Manfei et al., 2017). This test assesses whether two unrelated groups, which should come from populations with a normal distribution, have identical or different means. Defining the distribution of the difference between two sample means can be conducted by using the population variance, categorised into two types: equal and unequal (Kim, 2015). Classified as a parametric test, the independent samples t-test deals with continuous variables (Mishra et al., 2019). This research conducted 18 independent sample t-tests to evaluate the differences in farmer demographics, farm characteristics, and market aspects of CO versus NCO producers. For this research with unequal variances, the following specific equation was applied:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{S_{(1+2)} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

In this formula, t represents the test statistic calculated. X_1 and X_2 are the means of continuous variables of the two groups (CO and NCO, respectively). S_1 and S_2 refer to the standard deviations of variables of the two groups, respectively. n_1 and n_2 indicate the number of producers sampled from CO and NCO, respectively. To identify if there is a statistically significant difference between the means of two independent variables, it is required to check the significance (sig. 2-tailed) in the t-test for equality of means, which should be ≤ 0.05 (Mishra et al., 2019).

3.7.4. Empirical modelling of factors influencing the profitability of Certified Organic Farming system.

This study adopted Multiple linear regression analysis to determine factors that affect the profitability of the CO or NCO Farming system. Similar studies applied the linear regression model to analyse the factors influencing profitability (Ndungu et al., 2013; Nghi & Van Trinh;

Vukoje et al., 2022). Linear regression analysis was used to estimate the relationship between one or more independent variables (X_1, X_2, \dots, X_p) and the dependent variable (\hat{y}) (Figueiras et al., 1998). Using this model requires the tests for multicollinearity and heteroskedasticity before multiple linear regression. It is important to apply these tests to ensure the model's accuracy (Gujarati & Porter, 2009).

3.7.4.1. Conceptual Framework

The conceptual framework (Figure 1) identifies key factors influencing the profitability of tea production by comparing certified organic (CO) and non-certified organic (NCO) farming systems. These include farm inputs, farmer characteristics, and institutional support between the two farming systems. Farm inputs, such as farm size, labour, and production costs can directly affect profitability. Institutional factors encompass support from producer organisations and related institutions, facilitating access to extension services, market support, and credit services, including inspection and certification processes. These are essential for providing the support needed for CO and NCO farming practices. Farmer characteristics—education level, and farming experiences—significantly influence their ability to implement and benefit from effective farming practices (Lema, 2013).

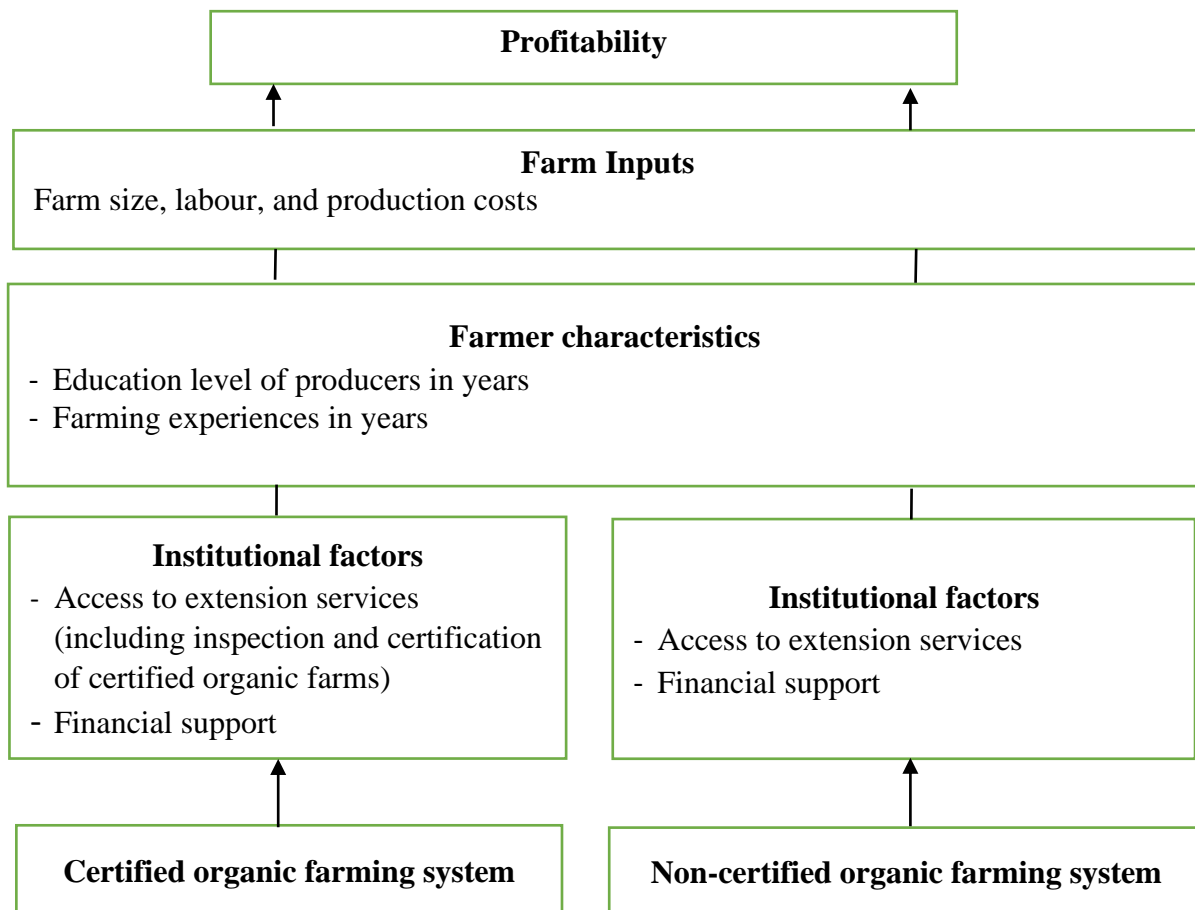


Figure 6: The conceptual framework of factors influencing the profitability of tea production

3.7.4.2. Multicollinearity test

Multicollinearity occurs when independent variables are highly correlated. It can inflate standard errors and give unreliable estimates (Amalare et al., 2023). It can be detected using the Variance Inflation Factor (VIF), with typically values over 10 ($r > 10$) indicating a problem (Wadud, 2017). By applying the test, the researcher could adjust some variable that are highly correlated to each other for avoiding problems in the multiple linear regression model. After adjusting and finalising a valid list of independent variables, the researcher used the variables in the regression model.

3.7.4.3. Heteroskedasticity test

Heteroskedasticity occurs when the variance of residuals is inconsistent, leading to inefficient estimates and biased statistics. In this test, Breusch-Pagan was applied to detect it (Gujarati & Porter, 2009). After testing, heteroskedasticity was presented. Therefore, the researcher used robust standard errors to improve the model. Fixing these issues enhances the reliability and clarity of the regression analysis (Wadud, 2017).

After running the Multicollinearity and Heteroskedasticity tests, the data were analysed and produced as descriptive statistics, followed by multiple linear regression, which was applied to determine the impact of the factors on the profitability of CO and NCO. Regarding the similar studies, common independent variables were identified to be analysed in the model, such as, education, farm size, farming experiences, number of labours, production cost, and extension services (Lema, 2013; Ndungu et al., 2013; Nghi & Van Trinh; Vukoje et al., 2022). Therefore, this study applied a similar set of independent variables and the following equation below:

$$\hat{y} = \beta_0 + \beta_1 X_{1i} + \dots + \beta_n X_{ni} + \varepsilon$$

Where:

\hat{y} = Profitability (Lao kip/ha)

β_0 = Constant

$\beta_1 \dots \beta_7$ = parameters to be predicted

X_{1i} = Educational level

X_{2i} = Farm size used for tea production

X_{3i} = Farming experiences (number of years)

X_{4i} = Labours used for tea production (number of labours)

X_{5i} = Production cost (Lao kip/ha)

X_{6i} = Credit

X_{7i} = Extension support

X_{8i} = Market support

ε = Random error term.

3.7.5. Empirical modelling of factors influencing the participation in certified organic farming system.

A binary logit regression model was applied to examine the factors influencing producers' decisions to participate in the certified organic farming system (COF). Various studies used this model to assess factors affecting decision-making of smallholder producers to participate in organic agriculture production and high value markets (To The & Nguyen Tuan, 2019; Tray, 2019; Xie et al., 2015). In this regression model, the dependent variable was binary, taking on only two values (0 and 1) (Gujarati & Porter, 2009). The binary logit regression was used to predict the probability of an outcome by categorising the dependent variable into one of two categories based on several independent variables (Tranmer & Elliot, 2008). According to Xie (2015), the logistic regression model with n independent variables can be represented as:

$$\text{logit}(P) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n \quad (1a)$$

$$\text{logit}(P) = \ln \left(\frac{P(Y_1)}{P(Y_0)} \right) \quad (1b)$$

$$\text{logit}(P) = \ln \left(\frac{P(Y_1)}{P(Y_0)} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n \quad (1c)$$

In the equation above, Y_1 (1b) means the producers decide to participate in certified organic farming system (COF), while Y_0 (1b) means the producers choose non-certified organic farming system (NCOF). β_0 denotes the constant (intercept), and β_1 to β_n (1a) are the regression coefficients (slopes), which are the estimated parameters indicating the change in log likelihood for a one-unit change in the corresponding independent variable. X_1 to X_n (1c) are independent variables representing the factors affecting the decisions of producers to participate COF. Regarding the literature (Bravo-Monroy et al., 2016; Bui & Nguyen, 2021; Mrinila et al., 2015), available data, and the study's context, ten explanatory variables were chosen for this research (Table 4). It was assumed that the dependent variable would be directly affected by the independent variables, either positively or negatively.

Table 4: The description of variables

Variable names	Type of variable	Type of measurement	Expected signs (+/-)
<u>Dependent variables:</u>			
Participation in Certified organic farming system (COF)	Dummy	COF = 1 NCOF= 0	
<u>Independent variables:</u>			
Farmer demographics:			
Age	Continuous	Number of years	(+)/(-)
Education	Continuous	Number of years	(+)
Tea farming experiences	Continuous	Number of years	(+)
Farm characteristics:			
Farm size	Continuous	hectares	(+)
Distance (From farms to markets)	Continuous	Number of Kilometres	(+)
Market:			
Market support	Dummy	Yes/No	(+)
Mobile phone ownership	Dummy	Yes/No	(+)
Institutional support:			
Agricultural input support	Dummy	Yes/No	(+)
Financial support	Dummy	Yes/No	(+)
Extension services	Dummy	Yes/No	(+)

Chapter 4: Results and Discussion

This chapter presents the results and discussion. The chapter is structured into three primary sections. The first section focuses on the descriptive analysis, which consist of five sub-sections comparing Certified Organic (CO) and Non-Certified Organic (NCO) producers in terms of demographics and farm characteristics, profitability market contributions, and institutional support. The descriptive analysis included using frequencies, percentages and means for exploratory data analysis and sample characterisation. Additionally, comparative analyses were performed to examine the differences between the two groups CO and NCO farming systems. The second section provides an overview of the factors affecting the profitability of CO and NCO farming systems. This section applied a multiple linear regression model to analyse the key factors. Finally, the third section of the chapter explains the factors influencing producers' decisions to participate in the CO farming system by applying a binary logistic regression model.

4.1. Descriptive analysis results

4.1.1. Demographics

The characteristics of Certified Organic (CO) and Non-Certified Organic (NCO) producers consisted of gender, age, educational levels, and farming experience (Table 1). The analysis was conducted on 304 tea producers, of whom 122 are CO producers, and 182 are NCO producers.

Regarding gender distribution among CO and NCO producers, the data indicated that both farming systems engaged more female than male producers, with a higher percentage of female producers among NCO producers than CO producers. Conversely, CO producers had a slightly higher percentage of male producers than NCO producers. However, there was no statistically significant difference in gender between the two groups.

The age distribution indicated that the most significant age group among CO and NCO producers fell within the Old Adults category (36-55 years), with a higher proportion of NCO

producers than CO producers (Figure 1). This suggested that NCO producers were more concentrated in this middle-aged group, indicating that individuals in this age range were more likely to engage in NCO farming practices. In contrast, certified organic producers were more evenly distributed across other age groups, including younger adults (26-35 years) and elders (66-80 years). This suggested that CO producers attracted a more diverse age range, potentially indicating broader appeal or accessibility across different life stages. However, there was no significant difference in age group distribution between CO and NCO producers, as indicated by the p-value (0.471).

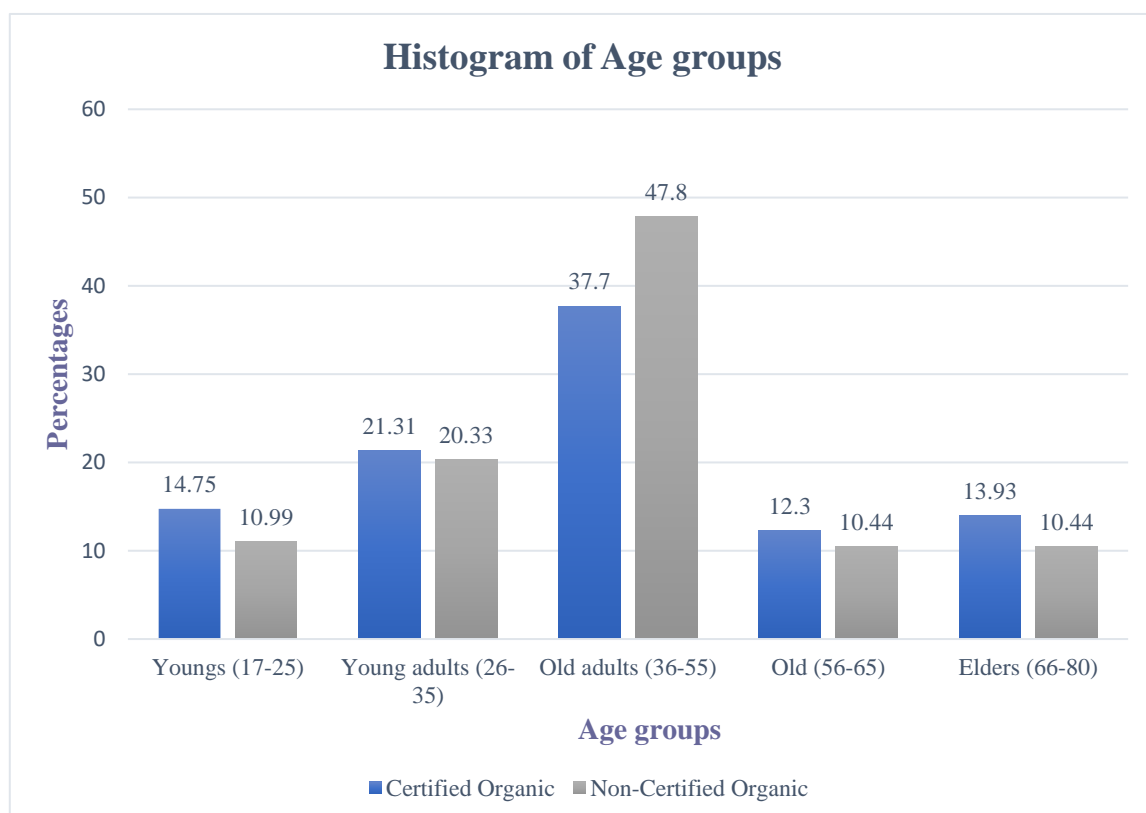


Figure 7: Age group distribution of CO and NCO producers.

Regarding educational levels, a significant difference at the 1% level is observed, as reflected by the p-value (0.005). CO producers tended to have higher rates of primary school education, while NCO producers had significantly higher rates of no education, senior high school education, and associate diplomas. The overall distribution suggested that CO producers had

higher educational achievement at the primary school level. In contrast, NCO producers had higher educational achievement at the senior high school and associate diploma levels.

The results for farming experience showed higher percentages in the 1-10 years and above 20 years categories for NCO producers. CO producers had more individuals with 11-20 years of farming experience. The distribution suggested that NCO producers are more experienced than CO producers, likely because NCO producers had been involved in tea farming for more extended periods. In contrast, some CO producers used to do other types of farming, relocated from other areas to settle and establish their tea farms. However, there was no significant difference in the distribution of farming experience between CO and NCO producers, as indicated by the p-value (0.3156).

Table 5: Demographical contributions of CO and NCO producers.

Variables	Category	CO (n = 122)		NCO (n = 182)		p-value
		Obs.	Percentage	Obs.	Percentage	
Gender	Female	67	54.92	106	58.24	0.566
	Male	55	45.08	76	41.76	
Age (Year)	Young (17-25)	18	14.75	20	10.99	0.471
	Young adult (26-35)	26	21.31	37	20.33	
	Old adult (36-55)	46	37.70	87	47.80	
	Old (56-65)	15	12.30	19	10.44	
	Elders (66-80)	17	13.93	19	10.44	
Educational level	No education	16	13.11	36	19.78	0.005***
	Primary School	57	46.72	54	29.67	
	Junior High School	36	29.51	48	26.37	
	Senior High School	9	7.38	30	16.48	
	Associate diploma	1	0.82	10	5.49	
	Diploma	1	0.82	0	0.00	
	Others	2	1.64	4	2.20	
Farming experiences	1-10 years	27	22.13	38	20.88	0.3156
	11-20 years	70	57.38	94	51.65	
	Above 20 years	25	20.49	50	27.47	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.1.2. Farm characteristics

The comparative results of farm characteristics (Table 6) include land title, compost fertiliser use, other commodities, farm size, distance to markets, total labour, and yield. The results indicated statistically significant differences in farm size, compost fertilizer use, yield, and distance to markets. At the same time, there were no significant differences in land documentation, total labour, and other commodities.

The use of compost was significantly higher among CO producers than NCO producers. While a small proportion (4.1%) of CO producers utilised compost fertilizer, none of the NCO producers reported the use of it. This difference was statistically significant at the 1% level (p -value = 0.006), highlighting that compost use was more applied among CO producers. CO producers had significantly larger farm sizes, averaging over 1.5 hectares, compared to less than 1 hectare for NCO producers; this difference was statistically significant at the 1% level (p -value = 0.0000). According to interviews with the leaders of CO producer organisations, CO producers were located in more remote areas where agricultural land was more accessible. In contrast, NCO producers mainly resided in urban areas, where the agricultural land is limited.

The distance to markets from the production areas (tea farms) and the markets in village centres was reported by growers. The results showed that CO producers had a shorter average distance, at 1.25 kilometres, compared to 1.95 kilometres for NCO producers. This suggests that CO farms were generally located closer to markets, which may provide logistical advantages in terms of transportation and access to buyers. The yield per hectare for NCO producers was higher than for CO producers, with an average yield of 3,107 kg/ha compared to 2,819 kg/ha for CO producers. This difference was statistically significant at the 5% level. Haq et al. (2020) found that farm size had a negative impact on tea productivity, increasing farm size, and tea productivity. This is because of the difficulty of managing larger and sloped areas. Additionally, dividing land into many parcels further reduces productivity (Haq et al., 2020).

CO producers had a higher percentage of land titles and lower engagement in other commodities (rubber, cassava, rice, and cardamom) than NCO producers. The average labour used per farm between CO and NCO was not statistically significant (p -value = 0.5196). However, the labour per hectare for both groups was statistically significant at the 5% level,

with 14 persons for CO farms and approximately 20 persons for NCO farms. Labours contributed significantly to yield, with Haq et al. (2020) showing that a 1% increase in family labour increases tea productivity by 10%, making it a valuable resource during peak seasons when labour shortages occur. Hiring labour also played an essential role in farm operations, particularly when family labour was unavailable, and similarly had a positive effect on tea productivity. This supports the finding that NCO producers, who used more labours per hectare, achieved higher yields per hectare than CO producers.

Table 6: Farm characteristic contributions of CO and NCO producers

Variables	CO (n = 122)		NCO (n = 182)		p-value
	Obs.	Percentage	Obs.	Percentage	
Categorical variables					
Land titles	122	100.00	180	98.90	0.245
Compost fertilizer uses	5	4.10	0	0.00	0.006***
Other commodities	14	11.48	20	10.99	0.895
Continuous variables		Mean		Mean	
Farm size (Hectare)		1.79		0.96	0.0000***
Distance (Km)		1.25		1.95	0.0000***
Total labours (Persons per farm)		17.78		11.83	0.5196
Total labour (Persons per hectare)		14.5		20.5	0.05**
Yield (Kg/ha)		2,819		3,107	0.0372**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.1.3. Profitability

The profitability of tea production between CO and NCO producers compared on per ha basis (Table 3) showed significant differences at the 1% level in variable (labour and seedlings) production costs, which were notably higher for NCO producers. Specifically, NCO producers had a significantly higher variable cost due to a greater number of hired labourers compared to CO producers. This higher labour requirement was particularly noticeable in production activities, especially harvesting. Thus, NCO producers faced higher expenses, potentially

impacting their overall profitability. Despite these cost differences, the average annual profit per hectare did not show significant differences. This can be attributed to higher yield from NCO farms. Although the difference in profit per hectare between the two groups was not statistically significant, CO producers achieved a higher profit level because they had lower production costs than NCO producers. Additionally, the higher profitability for CO producers may be related to tea prices, in which CO producers received higher prices for both fresh and dried teas. CO producers sold fresh tea under organic certification, which may account for a small premium. However, the tea prices showed no significant difference (p-value = 0.2040 and 0.4187, respectively) between CO and NCO producers, indicating that the current market did not differentiate between certified organic and non-certified tea prices for both fresh and dried products.

Table 7: Profitability of tea production of CO and NCO producers

Continuous variables	CO	NCO	p-value
	(n = 122)	(n = 182)	
	Mean	Mean	
Fresh tea price (LAK/kg)	10,214	9,748	0.2040
Dried tea price (LAK/kg)	51,144	48,696	0.4187
Income (x 000 LAK/ha/year)	28,000	30,100	0.3069
Fixed cost (LAK/ha/year)	457,744	507,127	0.6739
Variable cost (LAK/ha/year)	956,942	4,195,091	0.0050***
Profit (LAK/ha/year)	26,585,312	25,397,781	0.6027

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.1.4. Market

The market contributions between CO and NCO producers revealed significant differences in several key areas (Table 4). CO producers benefited substantially more from market support, with a notably higher proportion receiving such support (about 78%) than NCO producers (19%). This significant difference indicated that CO producers had better access to market assistance from their producer organisations, local government and NGO projects, which included marketing services such as price negotiation, seasonal contract farming, and standard compliance to meet the requirements of an organic buyer (a tea factory). In contrast, NCO producers individually obtained market support, mainly market information, from local traders and factories near their villages. There was also a significant difference in smartphone ownership between the two groups, with NCO producers owning smartphones (93%) more than CO producers (85%). The primary purposes of smartphone use for both groups—around 54% for CO producers and 48% for NCO producers—was to access information on tea activities, prices, and market requirements sourced from producer organisations (for CO producers) and local tea traders and factories (for NCO producers).

The sale volumes per farm of fresh tea also highlighted significant differences at the 1% level (p -value = 0.0000), with CO producers selling significantly larger quantities of fresh tea than their NCO producers. This difference was related to the larger farm sizes of CO producers compared to NCO producers. This suggested that CO producers were more integrated into the market due to the benefits of the volume and market support, which enhanced their ability to meet market demands and capitalise on their organic certification. There was no statistically significant difference between CO and NCO producers in terms of dried tea sale volumes, suggesting that this type of tea was processed and supplied to general markets in a non-certified organic form by individual CO and NCO producers.

Table 8: Market contributions of CO and NCO producers

Variables	Category	CO (n = 122)		NCO (n = 182)		p-value
		Obs.	Percentage	Obs.	Percentage	
Categorical variables						
Market support		96	78.69	35	19.23	0.000***
Smartphone ownership		104	85.25	169	92.86	0.032**
Purposes of smartphone use in tea activities	Tea prices	15	12.30	25	13.74	0.082*
	Tea prices and market requirements	13	10.66	41	22.53	
	Tea activities, Tea prices and market requirements	67	54.92	88	48.35	
	Tea prices, Tea activities	14	11.48	11	6.04	
	Tea activities	7	5.74	7	3.85	
	Others (Don't have, use for personal purposes)	6	4.92	10	5.49	
Continuous variables			Mean		Mean	
Fresh tea sale volumes	Kg/year/farm		3,658		2,366	0.0000***
Dried tea sale volumes	Kg/year/farm		96.54		75.99	0.4208

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.1.5. Institutional support

The findings on institutional support (Table 6) revealed significant differences between CO and NCO farming. The support included agricultural input, financial assistance, and extension services. CO producers received significantly more agricultural input support than NCO producers, with about 78% of CO producers benefiting from this support compared to only 23% of NCO producers. This substantial gap suggested that CO producers were better positioned to access essential inputs such as seeds, compost fertilizers, and other materials, enhancing their farming practices and overall productivity. Extension services were accessed by 99% of CO producers compared to about 89% of NCO producers. In terms of financial support, CO producers received considerably more support than NCO producers. The p-values for all these comparisons were less than 0.01, further confirming the significant differences at 1% level between the two groups. All forms of institutional support were provided mainly by the CO producer organisations to their members, as well as by government organisations and local NGOs through specific projects.

Table 9: Institutional support of CO and NCO producers

Categorical variables	Certified organic (CO) n = 122		Non-certified organic (NCO) n = 182		p-value
	Obs.	Percentage	Obs.	Percentage	
	Agricultural input support	95	77.87	42	
Financial support	85	69.67	17	9.34	0.000***
Extension services	121	99.18	163	89.56	0.001***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.2. Factors affecting the profitability of certified organic and non-certified organic farming systems.

The profitability of certified organic (CO) and non-certified organic (NCO) farming systems was affected by various factors. The profitability (LAK/hectare) was calculated based on tea profit – total tea income per year from annual selling fresh and dried teas minus total production costs per year (including fixed cost and variable cost) of CO and NCO producers. This study examined key variables such as education, farm size, farming experience, number of labourers, production cost per hectare, extension and financial support to assess their impact on profitability in both farming systems. The results indicated that farm size, production cost/ha, extension support, and financial support significantly affected profitability, while education, farming experience, and the number of labourers had no significant impact on profitability in either the CO or NCO farming systems. The coefficients, robust standard errors, and p-values for these variables are detailed in Table 9.

The statistical summary (Table 9) demonstrated overall statistical significance, as indicated by the low p-values associated with the F-statistics (Prob > F = 0.0000 for CO and NCO). This confirmed that the selected independent variables in this model were important for understanding key factors affecting profitability in both types of farming. The adjusted R-squared values indicated that the models explained approximately 40% (CO) and 34% (NCO) of the profitability variability. The adjusted R-squared values were presented within the accepted range (R^2 values between 0.3 and 0.7), indicating that the model provided a good fit for the predictor variables (Menard, 2000; Ratner, 2009). Assessing the model's robustness, several tests were conducted. The correlation matrix test for multicollinearity yielded positive results, with a mean VIF of 1.19 for CO and 1.09 for NCO, both well within the acceptable threshold of less than 10 (Table 7). The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was conducted to determine whether the variance of the error terms was constant in the CO and NCO farming systems. The test results revealed significant values for both CO and NCO, indicating that heteroskedasticity occurred in the model (Table 8). As a result, robust standard errors were applied to adjust for this issue and improve the reliability of the regression results.

An increase in farm size was associated with a statistically significant decrease in profitability for both CO and NCO farming systems. The effect was more substantial for CO, with significance at the 1% level (p-value = 0.000), compared to NCO, which showed significance at the 5% level (p-value = 0.013). The coefficients were -5,547,787 for CO and -11,000,000 for NCO, indicating that farm size negatively impacted profit in both CO and NCO farming systems. Ndungu et al. (2013), who examined factors influencing the profitability of an organic vegetable production system, found that farm size had a negative impact on profitability in organic production. However, these findings did not align with the results of Lema (2013) in Tanzania. Lema argued that farm size had a statistically significant positive relationship with the profit of organic and conventional coffee farming systems at the 1% significance level.

Variable cost negatively impacted profitability in CO and NCO farming systems. The coefficient was -1.621245 for CO and -.9718229 for NCO. The effect was statistically significant at the 5% level (p-value = 0.002) for CO and at the 1% level (p-value = 0.000) for NCO. This indicated that a higher variable cost led to decreased profitability, with a moderate level of confidence for CO and a high level of confidence for NCO. These findings were supported by OM (2023), in which variable costs (including labour and farming material costs) had significantly negative relationships with the farms' profit.

The coefficient for extension support was 2,264,719 for CO and -7,316,143 for NCO. The positive coefficient for CO suggested that extension supports increased profitability in the CO farming system. In contrast, the negative coefficient for NCO indicated that extension support decreased profitability in the NCO farming system. The result was highly significant at the 1% level (p-value = 0.006) for NCO but it is not significant for CO. Lema (2013) reported that extension support had a positive relationship with the profitability of organic coffee farming in Tanzania. The negative coefficient for NCO producers may be explained by the interview data, which revealed that they did not participate in producer organisations or NGO projects that provided free extension support. As a result, when they required assistance, they incurred additional costs, such as fuel or service fees for extension officials.

Financial support (access to loans) significantly reduced profitability in the CO farming system, with a high degree of confidence. However, its impact on NCO farms was not significant. The CO farming system had a negative coefficient of -7,080,277, indicating that financial support

significantly decreased profitability, with the result being highly significant at the 1% level (p-value = 0.001). Interview data further revealed that both CO and NCO producers were hesitant to take on debt and lacked confidence in managing credit effectively to increase income and repay interest. These findings align with similar studies where financial support or access to credit for producers negatively affected the profits of both organic and conventional farming systems. Although access to credit is crucial, the improper use of credit can significantly reduce profits in both organic and conventional farming systems (Lema, 2013; Yasin et al., 2014). Additionally, the GIZ project 'Microfinance in Rural Areas - Access to Finance for the Poor' in Laos reported that public financial and microfinance institutions offered interest rates ranging from 2% to 18% annually. Many borrowers struggled to understand these rates, risking confusion about the actual cost of credit, especially when bank staff did not explain them clearly. Those lacking basic math skills were more vulnerable to financial misconduct and faced difficulties managing household expenses and using financial services (GIZ, 2015).

The result of market distance showed statistically different significance for CO but not for NCO farms. The coefficients were -2,405,512 for CO farms and -1,225,195 for NCO farms, indicating that increased market distance (farther away from the market) negatively impacts profitability. For CO farms, the standard error was 1,355,219, with a p-value of 0.079, suggesting the effect is marginally significant at the 10% level. Although it was not highly significant for NCO producers, the relationship still suggested a potential negative influence of market distance on profitability as it increases the transaction cost of the producers. Similarly, Xaba and Masuku (2013) found that market distance negatively impacted vegetable production profitability for producers in Switzerland. They explained that producers located closer to markets experienced higher profitability due to lower transaction costs and better market access.

Table 10: Multicollinearity test results of CO and NCO farming systems

Variable	CO		NCO	
	VIF	1/VIF	VIF	1/VIF
Farm size	1.14	0.87	1.19	0.84
Number of Labours	1.28	0.77	1.21	0.82
Market distance	1.05	0.95	1.02	0.97
Variable cost	1.44	0.69	1.04	0.96
Extension support	1.15	0.86	1.02	0.98
Financial support	1.06	0.95	1.06	0.94
Mean VIF	1.19		1.09	

VIF: $r < 10$

Table 11: Heteroskedasticity test results of CO and NCO farming systems

Results	CO	NCO
	chi2(1) = 7.49	chi2(1) = 76.34
	Prob > chi2 = 0.0062	Prob > chi2 = 0.0000

Table 12: Factors affecting profitability of Certified organic and non-certified organic farming systems.

Variables	CO			NCO		
	Coef.	Robust Std. err.	P> t	Coef.	Robust Std. err.	P> t
Dependent variable: Profitability (LAK/ha)						
Independent variables:						
Farm size (X ₁)	-5547787	817195.4	0.000***	-11000000	4391767	0.013**
Number of Labors (X ₂)	15298.99	64381.63	0.813	588313.2	461165	0.204
Market distance (X ₃)	-2405512	1355219	0.079*	-1225195	1576480	0.438
Variable cost (X ₄)	-1.621245	.5101839	0.002***	-.9718229	.0979877	0.000***
Extension support (X ₅)	2264719	3883587	0.561	-7316143	2646156	0.006***
Financial support (X ₆)	-7080277	2039066	0.001***	-3497703	4301855	0.417
Constant (β_0)	43700000	4727888	0.000	41200000	2795856	0.000
Number of obs = 122			Number of obs = 182			
F (6, 115) = 12.81			F (6, 175) = 22.37			
Prob > F = 0.0000			Prob > F = 0.0000			
Adj R-squared = 0.4006			Adj R-squared = 0.3443			

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.3. Factors affecting the decision of producers to participate in certified organic farming.

In the logit model, there were ten independent variables (Table 10) that were selected and assumed to either positively or negatively influence the dependent variable. The analysis results of the model (Table 11) indicated that farm size, distance to markets, tea price, market support, smartphone ownership, agricultural input support, and financial support significantly affected the decision of producers to participate in certified-organic farming (COF). Specifically, farm size, market support, and financial support were the most influential positive factors, while smartphone ownership was the only negative factor. Among the independent variables, age, education, tea farming experience, and extension support had positive impacts but were not significant factors.

In terms of age, it had a positive coefficient (0.138), suggesting that the likelihood of participating in COF also increased as age increased. However, the effect was not statistically significant (p-value = 0.488). The marginal effect, which was 0.0144315, indicated that for each additional year of age, the probability of being certified organic increased by approximately 1.44%. According to Xie et al. (2015), older tea producers were more likely to choose organic farming practices with a positive impact at the 5% significance level. In contrast, Bui & Nguyen (2021) found that age negatively influenced the decision to apply organic farming practices, implying that younger tea producers in Vietnam tended to adopt these practices as an innovative approach. Similarly, Mrinila et al. (2015) found that older producers might find it challenging to manage the labour-intensive nature of vegetable organic farming, especially since it often requires more physical work than non-organic farming.

Farm size was a statistically significant factor (p-value = 0.000) influencing the decision of producers to participate in COF. The coefficient was 0.8653, suggesting a strong positive relationship between farm size and the likelihood of COF participation. The marginal effect (0.0904) indicated that as farm size increased, the probability of a producer adopting COF increased by approximately 9%. Similar studies also emphasised that farm size was a key factor influencing producers' decision to adopt organic farming practices due to their ability to absorb the higher initial costs and manage risks associated with certification (Kafle, 2011; Khanal et al., 2018). Also, larger farms utilised economies of scale to enhance their financial

and operational performance. For instance, corn farms exceeding 2,000 acres achieved an 8.0% return on equity, whereas smaller farms with less than 100 acres reported negative returns (MacDonald et al., 2013). Studies on coffee producers in Columbia (Bravo-Monroy et al., 2016) and tea producers in Nepal (Karki et al., 2011) revealed that producers with larger farm sizes were significantly more likely to adopt organic farming practices.

Market support was highly significant (p -value = 0.000) in influencing participation in COF. The coefficient of this factor (1.5793) indicated a strong positive association with the likelihood of producers choosing COF. The marginal effect of 0.1649 suggested that increased market support raised the probability of producers participating in COF by approximately 16.5%. According to the interview data, CO producers received market support through their producer organisations, which provided market information, facilitated contract farming, and ensured market access. The committee members of these organisations played a key role in coordinating sales activities among their producer members and an organic tea factory to ensure a steady supply of fresh tea. This result was supported by Bui & Nguyen (2021), who stated that market access significantly influenced the decision of tea producers in Vietnam to adopt organic production, as these producers could sell directly to customers or processing factories, while organic tea producers typically secured contracts with companies for their produce. Zhang et al. (2024) demonstrated that robust market support mechanisms, particularly through e-commerce platforms, significantly impacted the adoption of organic farming practices by providing better market access, improving price stability, and offering opportunities for higher returns on organically certified products.

Financial support, which included access to loans, welfare support, and certification, showed strong significance at the 1% level (p -value = 0.000), highlighting its crucial role in COF participation. With a coefficient of 2.3945, financial support was strongly linked to higher adoption of COF, and the marginal effect indicated a 25% increase in the likelihood of adoption with increased support. Xie et al. (2024) highlighted that organisational support, including financial subsidies and credit availability, was a key factor influencing producers' decisions to adopt environmentally sustainable practices, including organic farming. Bui & Nguyen (2021) similarly indicated that tea producers with greater access to credit were more likely to transition to organic farming. They also noted that insufficient financial capital was a significant obstacle to this transition, especially in the early years of converting to organic farming.

Distance to market (organic markets) was a significant factor in the likelihood of choosing COF, as indicated by the coefficient of 0.4637 and a p-value of 0.032, confirming its significance at the 5% level. This positive relationship suggested that producers closer to markets were more likely to adopt COF. The marginal effect (0.0484) indicated that for every unit increase in distance close to the market, the probability of adopting COF increased by approximately 4.84%. Interview data revealed that the villages of certified organic (CO) producers were located farther from the city centre compared to those of non-certified organic (NCO) producers in the study areas. However, these remote areas had an organic tea factory and some non-certified organic markets where their certified organic produces were supplied. This finding was in line with the studies of Jena et al., (2017) and Wollni & Anderson (2014), which found that producers located farther from markets are less likely to adopt organic farming. In contrast, a study on tea producers in Nepal (Karki et al., 2011) indicated that producers farther from markets were more likely to apply organic farming practices.

Smartphone ownership, which supported producers' communication and access to market information, showed a significant negative association with the likelihood of participating in COF, as evidenced by the coefficient of -1.28416 and a p-value of 0.039. This indicated that smartphone ownership significantly reduced the probability of participation in COF. The marginal effect (-0.1341) further suggested that owning a smartphone decreased the probability of participating in COF by approximately 13.4%. In the study area, interview data indicated that CO producers were located relatively closer to the organic market and received support from producer organisations in tea-related activities and market information. As a result, their reliance on smartphone usage was relatively minimal. Furthermore, elderly CO producers, particularly those living in remote villages, preferred verbal communication and direct, in-person interactions to obtain the market information and updates on the tea activities. Similar to the findings in Donkoh's study, these producers faced barriers to adopting digital tools (smartphones with advanced functions) for accessing agricultural information due to limited technological access and low levels of education. Consequently, CO producers relied on traditional methods, such as receiving updates directly from their producer organisations and buyers during daily collective activities, which provided the practical communication necessary for effective understanding and learning. This preference for traditional communication reflects the challenges faced by Ghanaian rice producers, who also relied on direct and practical training methods (harrowing and line planting) over digital technologies (Donkoh et al., 2019). In contrast, Nonvide (2021) found that in Benin, rice producers who

have access to digital technologies (a radio, television, or smartphone) were more likely to adopt agricultural technologies than those without these devices.

Table 13: Expected signs of explanatory variables on participation in Certified organic farming system (COF)

Variable names	Expected signs (+/-)	Rationale
Age	(+)/(-)	Older producers are less inclined to participate in COF
Education	(+)	Producers with higher education levels are more likely to participate in COF
Tea farming experiences	(+)	Producers who have higher experience in tea farming practices are more likely to participate in COF
Farm size	(+)	Producers who have larger farm sizes are more likely to participate in COF
Distance	(+)	Producers who are located close to the market are more likely to participate in COF
Market support	(+)	Producers who receive more support on market access are more likely to participate in COF
Smartphone ownership	(+)	Producers who own smartphones are more likely to participate in COF
Agricultural input support	(+)	Producers who receive greater support on agricultural inputs are more likely to participate in COF
Financial support	(+)	Producers who receive greater support on financial access are more likely to participate in COF
Extension services	(+)	Producers who receive greater support on extension services are more likely to participate in COF

Table 14: Factors affecting the decision of producers to participate in certified organic farming (COF)

Variables	Coef.	Std. err.	Marginal effect	Std. err.	p-value
Dependent variable: Certified organic farming system					
Independent variables:					
Age (X ₁)	.1382093	.1991467	.0144315	.0207568	0.488
Education (X ₂)	.0957066	.1169157	.0099934	.012169	0.413
Tea farming experiences (X ₃)	.4271762	.3365546	.0446046	.0349547	0.204
Farm size (X ₄)	.8652965	.2211689	.090352	.0213013	0.000***
Distance (X ₅)	.4637497	.2168097	.0484236	.022049	0.032**
Market support (X ₆)	1.579339	.4541912	.1649105	.0445371	0.001***
Smartphone ownership (X ₇)	-1.28416	.6220428	-.1340887	.0638983	0.039**
Agricultural input support (X ₈)	.6571154	.4336084	.0686143	.0447173	0.130
Financial support (X ₉)	2.394454	.4351419	.2500228	.0371133	0.000***
Extension support (X ₁₀)	1.164087	1.098879	.121551	.1142944	0.289
Constant	-5.646163	1.626222			0.001***

Noted: Number of obs = 304; LR chi2(11) = 201.90; Prob > chi2 = 0.0000; Pseudo R² = 0.4930

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Chapter 5: Conclusions and Recommendations

This chapter provides a conclusion, and a set of recommendations based on the key findings and discussions from the study. It is organised into three main sections. The first section presents the conclusions on the significant results of descriptive analysis, factors affecting the profitability of certified organic (CO) and non-certified organic (NCO) farming systems, and factors affecting the decision of CO and NCO producers to participate in organic farming. The second section outlines relevant recommendations that address identified gaps and critical issues emerging from the study's findings. The last section described the key limitations that occurred in the whole processes of research.

5.1. Conclusions

5.1.1. Descriptive analysis

CO and NCO producers had a higher proportion of female producers, with NCO engaging slightly more females. NCO producers also had a higher proportion of older adults (36-55 years), suggesting this age group was more inclined toward NCO practices, while CO producers were more evenly distributed across various age groups. A significant difference was observed in education levels, with CO producers having higher rates of primary school completion, whereas NCO producers had higher rates of no education and associate diplomas. CO producers had significantly larger farms, averaging 1.79 hectares, compared to NCO producers, who averaged 0.96 hectares, a difference that was statistically significant. Additionally, a small proportion of CO producers (4.1%) used compost, while none of the NCO producers reported using it. In terms of yield, NCO producers had a higher output per hectare, averaging 3,107 kg/ha, compared to 2,819 kg/ha for CO producers, which was also statistically significant. NCO producers had significantly higher variable and production costs compared to CO producers; however, the profits per hectare between the two groups were not significantly different. Both CO and NCO producers earned similar incomes, but CO producers managed to achieve slightly higher profits due to their lower production costs.

CO producers benefited significantly more from market support (78.69% of CO producers received support vs. 19.23% of NCO producers). However, no significant difference was found in the price of fresh and dried tea between the two groups. CO producers received significantly

more institutional support compared to NCO producers, with 77.87% of CO producers benefiting from agricultural input support, while only 23.08% of NCO producers received similar assistance. In terms of financial support, 69.67% of CO producers benefited, compared to just 9.34% of NCO producers. Additionally, extension services were accessed by 99.18% of CO producers, significantly higher than the 89.56% of NCO producers.

5.1.2. Factors affecting the profitability of CO and NCO farming systems

Farm size was found to negatively affect profitability in both CO and NCO systems. Larger farm sizes were associated with a decline in profits, which may be due to the challenges of managing larger and often with inclined landscapes in the region. These findings suggest that smaller, more intensively managed farms might perform better in terms of profitability. Labours and seedling contributed significantly to the variable costs, thus reduced profits. Extension services positively influenced the profitability of CO farms, but they had a negative impact on NCO farms. The positive role of extension support in CO farms highlights the importance of technical assistance in improving organic farming practices. Financial support, particularly in the form of credit, significantly reduced profitability in CO farms. This suggests that access to credit can harm farmers' economic stability if not paired with proper financial management and low-interest loans.

5.1.3. Factors affecting the decision to participate in Certified Organic Farming

The analysis of factors influencing the decision to participate in certified organic farming revealed that farm size, distance to markets, tea price, market support, smartphone ownership, agricultural input support, and financial support significantly affected the decision of producers to participate in certified-organic farming (COF). Larger farm size had a strong positive influence on the decision to adopt COF, indicating that as farm size increased, the likelihood of adopting organic certification rose by 9%, as larger farms are better equipped to absorb the costs and risks associated with certification. Distance to market also played a significant role in COF participation, showing that the closer producers were to markets, the more likely they

were to adopt COF due to improved market access and easier transportation. Tea price still had a positive correlation with COF participation, as higher prices can incentivise producers to shift towards organic practices, this factor was not statistically significant. Market support was one of the positive significant factors, where producers benefiting from contracts and guaranteed prices were more likely to adopt COF, highlighting the importance of strong market linkages in influencing the decision to participate. Conversely, smartphone ownership had a negative impact on COF participation, suggesting that traditional forms of communication may be preferred in the study area, and access to digital tools may not directly encourage organic certification. While agricultural input support was positively associated with COF participation, it was not statistically significant, though it suggests that access to inputs like fertilizers and seeds can play a role in encouraging adoption. Financial support emerged as another highly significant factor with producers having better access to credit and loans being 25% more likely to adopt COF, underscoring the critical role of financial resources in facilitating the transition to COF.

5.2. Recommendations

The study highlighted several significant issues faced by CO and NCO producers. One major issue is the high variable costs, particularly labour costs in tea production, which reduce the overall profitability of the producers. Another issue concerns tea prices for CO producers; despite receiving better market support, there was no statistically significant difference in the prices of fresh and dried teas compared to NCO producers. The study also noted that CO producers operate larger farm sizes but achieve lower yields per hectare than NCO producers, reflecting challenges in land-use efficiency. Additionally, while financial support (access to loans) negatively affected the profitability of both COF and NCOF systems, it positively influenced the decision of producers to participate in COF. This suggests that providing more effective financial support is essential to enhance profitability. To cope with these issues, there are several recommendations for technical and policy practices:

- The study found that increasing productivity and capital while minimising a labour cost is essential to increase profit levels in COF. CO producers currently manage an average farm size of 1.9 hectares with limited capital for farm inputs. Expanding COF areas will increase a labour cost and demand for inputs, which could further reduce profit margins. Therefore, efficient input use is crucial to reduce the negative impact of rising the cost.

Perhaps mechanization could be a viable option with adequate support on capital access and training.

- Additionally, providing tea producers with targeted training and cost analysis tools, through workshops and extension services, would help optimise input use and reduce unnecessary expenses, ultimately enhancing farm profitability. Policies promoting village-level investment to improve credit access for CO producers would enable them to acquire necessary farm inputs.
- Extension services should be intensified to promote the adoption of labour-saving technologies and improved farm maintenance practices. These services should be customised to the specific needs of CO and NCO producers, ensuring that the advice is practical and leads to productivity gains without incurring additional costs.
- Efforts should be made by local authorities and tea organisations to increase the farm gate price of certified organic tea. This can be achieved by highlighting the environmental and health benefits of organic products, while negotiating higher prices with buyers. A focused marketing strategy that appeals to both domestic and international consumer bases will enhance the product's value and demand.
- Local governments, producer organisations, and private stakeholders should collaborate to establish stronger market linkages for certified organic (CO) producers. This includes securing contracts with buyers and offering guaranteed prices to ensure stable income streams and incentivise greater participation in COF. Additionally, local governments should encourage private sector participation by offering subsidies or tax breaks to companies investing in the certified organic tea sector. Collaborations with private entities can improve infrastructure for processing, distribution, and export, ultimately expanding the market for certified organic tea and boosting its global competitiveness.

5.3. Research limitations

This research faced several limitations. First, the secondary data, especially statistical data, on tea production and trade in Laos was outdated and insufficient to provide a deep understanding of the tea sector in the country. Additionally, the limited availability of specific studies on tea in Laos restricted the ability to draw from existing research. The data collection process was time-consuming due to a limited number of enumerators, and poor weather conditions during

fieldwork from November to February made it challenging to access target villages. As a result, there was a delay in the research.

5.4. Future research

Given the valuable contributions and noted limitations of this research, further studies are strongly recommended.

- This research focused on a smaller region of Lao PDR, which may not reflect the full diversity of tea production practices. Future research should include other key regions, particularly the middle northern areas where ancient forest tea is widely grown, to capture variations in farming systems, market conditions, and institutional support, offering a more comprehensive view of organic and non-organic tea farming.
- While this research focused on fresh tea, future research should include processed tea (e.g., dried tea) to provide a more complete view of income generation and assess the impact of value addition on producer profitability and certification choices.

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Appendices

Appendix 1: Quantitative questionnaires

The questions for certified and non-certified organic producers

I. Name of enumerator :..... Contact number:.....
Questionnaire ID:..... Date of interview:...../...../2024

Demographics of producers

1.1. Producer characteristics

1. Name of the respondent:.....
2. Contact number:
3. Main occupation:.....
4. Gender of respondent:
 Male Female
5. Family size:.....(people)
6. Age of respondent:year
7. Highest education level:
 No Education/Not Finished primary Primary School Junior High School
 Senior High School Tertiary
8. How many years of your tea farming experience? years

1.2. Farm characteristics and productivity

1. How many years did you start growing tea? years
2. Which farming system do you adopt in your tea farms?
 Organic (Go to question 3) Inorganic (Go to question 4)
3. In which year did you start organic farming practices?year (number of years)
4. In which year did you start inorganic farming practices? year (number of years)
5. How many hectares of tea farms do you have in 2023? ha (number of hectares)
6. How many separated plots in this total area that you have?.....(number of plots)
7. How many hectares of the largest plot?.....ha

8. Please give us the details of your harvest in the largest plot per season:

When do you start picking tea in the dry season? From... –..... (Name of month)			When do you start picking tea in the rainy season? From..... – (Name of month)		
No. of days/plot	No. of people/day	No. of Kg/person/day	No. of days/plot	No. of people/day	No. of Kg/person/day

9. How many times do you harvest per month for the largest plot?.....(no. of months)

- Dry season:..... Time/month
- Rainy season:.....Time/month

10. What tea varieties do you plant in your farms?

- Commercial tea (Chinese tea variety)
- Ancient tea (400 year-old tea)
- Other, please specify.....

11. Why do you use these varieties?

- There is a high market demand
- Local authorities recommend them
- Buyers recommend them
- Other, please specify.....

12. Do you have other commodities on your farms? (Explore the percentage estimation of tea plants compared to others)

- Yes (Go to question 13)
- No (Go to question 14)

13. What types of crops do you grow?

- Cardamom
- Vegetables
- Fruits
- Rubber
- Other, please specify.....

14. Transportation assets you have:

- Car
- Motorbike
- Tractor
- Others, specify:.....

15. Communication assets you have:

- Smartphone
- Others, specify:

16. How do you use the communication assets for tea activities?
- Contact producer group/s about tea prices
 - Contact other farmers about tea prices
 - Contact buyers about tea prices and requirements (quality)
 - Follow up with a farmer group about tea activities
 - Contact other farmers about tea prices
 - Follow up with village authorities and local government about tea activities
 - Other, please specify.....
17. Do you have the land documents for your tea farms?
- Yes (Go to question 18) No (Skip question 18)
18. What kind of land document do you have? (Explore the property ownership through land access)
- Golden land title
 - Land use certificate
 - Other, please specify.....

II. Tea production

2.1. Current farming practices, inputs, and production costs

1. Do you prune the tea?
- Yes (Go to the question 2-5)
 - No (Go to the question 6)
2. Why do you apply pruning to your farms? (Choose maximum 2 choices)
- Increase productivity
 - Market requirements
 - Compulsory standards, please specify the standard.....
 - Be able to access pruning facilities
 - Others, please specify.....
3. What equipment or tools do you apply in pruning?
- Knives
 - Pruning scissors
 - Pruning machine
 - Others, please specify.....
4. How much do you pay for the pruning equipment?
- Knives:kip

- Pruning scissors:kip
 - Pruning machine:kip
 - Others:.....Kip
5. How many years do you use this equipment?
- Knives: year (number of years)
 - Pruning scissors: year (number of years)
 - Pruning machine: year (number of years)
 - Others:..... year (number of years)
6. Why don't you apply pruning to your farms?
- No different result for increasing productivity
 - No market requirements
 - No facility access
 - No labors
 - Others, please specify.....
7. What techniques do you apply for weeding?
- Grass shovel (Go to questions 8 - 9)
 - Machine (Go to questions 8 - 9)
 - Weedicide (Go to questions 10)
 - Other, please specify.....(Go to questions 8 - 9)
8. How much do you pay for the weeding equipment?
- Grass shovel:kip
 - Machine:kip
 - Other:kip
9. How many years do you use the weeding equipment?
- Grass shovel: year (number of years)
 - Machine: year (number of years)
 - Other: year (number of years)
10. How much do you pay for the weedicide per hectare (in 2023)?.....kip/ha
11. How many quantities do you apply weedicide in your farms (2023)?ml or L/ha
12. Do you apply fertilizers on the tea farms?
- Yes (Go to questions 13-15)
 - No (Go to question 16)
13. What types of fertilizers do you apply on the tea farms?

- Chemical fertilizers
 Compost fertilizers
 Manure
 Other, please specify.....

14. How many quantities do you apply fertilizer in your farms (2023)?
.....kg/ha/year
15. How much do you pay for fertilizers per kg (2023)?.....kip/kg
16. Do you control pests and diseases on the tea farm?
- Yes (Go to questions 17-19)
 No (Go to question 20)
17. What do you apply to control pests and diseases on the tea farms?
- Bio-pesticide
 Chemical pesticide
 Other (Please specify)
18. How many quantities do you apply pesticide in your farms (in 2023)?.....kg or ml/ha/year
19. How much do you pay for the pesticide per year (in 2023)?.....Kip/kg or ml
20. Do you buy seedlings in 2023?
- Yes (Go to question 21)
 No (Go to question 22)
21. How much do you pay for seedlings in total?.....kip/year
22. What method do you apply in picking tea leaves?
- Hand-picking/manual picking
 Hand plucking machine
 Others (Please specify)
23. How do you store the tea leaves after plucking? (Explore the post-harvest technique related to quality control)
- Wooden baskets
 Plastic bags
 Others, please specify.....

2.2. Standard and Certification schemes at the farm level

1. Do you comply with standards and certifications in your tea farm?
- Yes (Go to questions 2-5)
 No (Go to question 6)
2. Which standards and certifications do you comply with?
- EU organic

- International Fairtrade
 - Lao organic
 - Other, please specify.....
3. How much do you pay for the standard and certification fee, including all services (in 2023)?.....kip/year
4. Why do you comply with the standards and certifications?
- Market requirements
 - Higher prices
 - Other, please specify.....
5. Who provides technical support on standard and certification practices?
- Producer group's leaders
 - Extension staff of the government
 - Local NGOs' projects
 - Other, please specify.....
6. Why don't you comply with standards and certifications on your farm?
- Supply to inorganic markets with no requirements on standards
 - There is no different price from the current markets
 - Other, please specify.....

2.3. Labours

1. The number of working days on the tea farming activities by family members

Activities	Planting	Weeding	Pruning	Applying compost	Selling
No. of days/year					
No. of people/year					

2. Do you hire non-family members to work in your tea farms?

- Yes (Go to question 3)
- No (Skip question 3)

3. The number of working days on the tea farming activities by paid labors

Activities	Planting	Weeding	Pruning	Picking/ harvesting	Applying compost	Selling	Wage rate per day (kip)
No. of days/year							
No. of people/year							

III. Market

For Non-certified-organic producers:

1. Do you sell your fresh tea?

Yes

No (Go to question 4)

2. How many months per year can you sell your fresh tea?.....(number of months)

3. Which types of markets do you sell your fresh tea to?

Inorganic markets

Others, please specify.....

4. Do you sell dried tea?

Yes

No (Skip questions 5-6)

5. How many months per year can you sell your dried tea?.....(number of months)

6. Which types of markets do you sell your dried tea to?

Inorganic markets

Others, please specify.....

7. How long is the distance from your farms to inorganic markets?(km)

8. Please give detailed information about your sales in 2023:

Type of tea	Types of markets	Volume (kg/season)		Average price (Lao Kip/kg)	
		Dry season	Rainy season	Dry season	Rainy season
Fresh tea	Inorganic market				
	Others				
Dried tea	Inorganic market				
	Others				

9. Who do you sell tea to? (You can choose more than 2 choices)

Middle man (between producers and factories)

Tea factories near villages

Local collectors in your village

Others, please specify.....

10. Do you have other benefits from selling to these markets?

It is convenient for daily sales (i.e, buyers come to collect tea directly)

There is a stable demand throughout the year (both dry and rainy season)

- There are clear instructions about the quality requirement to get high prices
- It's independent to make a decision to sell tea to any buyers
- There is no strict requirement on a standard of tea leaves
- Others, please specify.....

For certified-organic producers:

11. How many tea types do you sell?
 - Fresh tea (Skip questions 20 - 27)
 - Dried tea (Skip questions 12 - 19)
 - Both teas (Go to questions 12 - 30)

12. How do you sell your fresh tea?
 - Sell through organic producer organisation only (Go to question 13)
 - Sell to inorganic markets only, not through the producer organisation (Go to question 14)
 - Sell through the organic producer organisation and inorganic markets (Go to question 15)
 - Others, please specify.....

13. Why do you sell to the producer organisation only? (You can choose more than 2 choices)
 - Get higher prices than other markets
 - Get cash immediately after selling
 - The organic buyers request to collect tea from the producer organisation directly
 - The organisation can facilitate sale activities between producers and buyers throughout the whole year
 - Others, please specify.....

14. Why do you sell to inorganic markets only, not through the producer organisation? (You can choose more than 2 choices)
 - Get higher prices than selling through the producer organisation
 - Get cash immediately after selling
 - It's more convenient because many buyers come to buy at farms directly
 - Others, please specify.....

15. Why do you sell through the organic producer organisation and inorganic markets? (You can choose more than 2 choices)
 - The organisation doesn't limit members to sell to other markets

- The organic buyer doesn't buy the whole volume of fresh tea from all members
- The organic buyer doesn't come to buy regularly from the members
- Others, please specify.....

16. Please give detailed information about your sales in 2023:

Type of tea	Types of markets	Volume (kg/season)		Average price (Lao Kip/kg)	
		Dry season	Rainy season	Dry season	Rainy season
Fresh tea	Organic markets				
	Inorganic markets				

17. For how many percent do you sell fresh tea through the organization?.....%
18. For how many percent do you sell fresh tea to inorganic markets?.....%
19. How many months can you sell your fresh tea per year?.....number of months)
20. How do you sell your dried tea?
- Sell through organic producer organisation only (Go to question 22)
 - Sell to Inorganic markets only, not through the producer organisation (Go to question 23)
 - Sell through the organic producer organisation and inorganic markets (Go to question 24)
 - Others, please specify.....
21. Why do you sell to the producer organisation only? (You can choose more than 2 choices)
- Get higher prices than other markets
 - Get cash immediately after selling
 - The organic buyers request to collect tea from the producer organisation directly
 - The organisation can facilitate sale activities between producers and buyers throughout the whole year
 - Others, please specify.....
22. Why do you sell to inorganic markets only, not through the producer organisation? (You can choose more than 2 choices)
- The producer organisation accepts only fresh tea
 - Get cash immediately after selling
 - Freely choose any buyers and prices

Others, please specify.....

23. Why do you sell through the organic producer organisation and inorganic markets?
(You can choose more than 2 choices)

- The organisation doesn't limit members to sell to other markets
- Be able to process dried tea and supply to many markets
- There are market opportunities of dried tea to supply
- Others, please specify.....

24. Please give detailed information about your sales in 2023:

Type of tea	Types of markets	Volume (kg/season)		Average price (Lao Kip/kg)	
		Dry season	Rainy season	Dry season	Rainy season
Dried tea	Organic markets				
	Inorganic markets				

25. For how many percent do you sell dried tea through the organisation?.....%

26. For how many percent do you sell dried tea to inorganic markets?.....%

27. How many months can you sell your dried tea per year?.....number of months)

28. How long is the distance from your farms to the collecting center of your producer organisation?(km)

29. How long is the distance from your farms to the nearest inorganic markets to sell tea?
..... (km)

30. Do you have other benefits from selling to the organic markets?

- It is convenient for daily sales (i.e, buyers come to collect tea directly)
- There is a stable demand throughout the year (both dry and rainy season)
- There are clear instructions about the quality requirement to get high prices
- There is knowledge sharing about how to improve productivity
- It's independent to make a decision to sell tea to any buyers
- There is no strict requirement on a standard of tea leaves
- Others, please specify.....

For certified and non-certified organic producers:

31. Do you grade your tea before selling to the organic market?

- Yes (Go to question 32)
- No (Go to question 33)

32. How do you grade the tea?

- Based on the number of leaves
- Based on quality leaves (no dry or dark spots)

- Other (Please specify)
33. Do you grade your tea before selling to the inorganic markets?
- Yes (Go to question 34)
- No (Go to question 35)
34. How do you grade the tea?
- Based on the number of leaves
- Based on quality leaves (no dry or dark spots)
- Other (Please specify)
35. Why don't you grade the tea before selling it?
- No difference in price
- No time
- Other (Please specify)
36. Do you sell tea to the same markets every year?
- Yes (Go to question 37)
- No (Go to question 38)
37. Why do you sell tea to the same markets?
- Provide the highest price
- The easiest way to sell
- Other (Please specify)
38. Why do you sell to different markets?
- To get the highest price
- To be flexible in selling
- Other (Please specify).....
39. Do you seek tea price information before selling?
- Yes (Go to question 40)
- No (Go to question 41)
40. Who do you check tea price information with?
- Producer group
- Neighboring farmers
- Local buyers
- Other, please specify.....
41. Why don't you seek tea price information?
- No need
- No facilities
- Others (Please specify)

42. How do you decide the tea price before selling?
- Accept the tea prices set by buyers
 - Negotiate with buyers
 - Other (Please specify)
43. What do you think about the tea income fulfilling your family's needs?
- Not Adequate
 - Adequate
 - Other (Please specify)

IV. Institutional support

4.1. Are you a member of a tea producer organization?

- Yes (Go to questions 4.2 – 4.3.)
- No (Go to questions 4.4 – 4.8)

4.2. Have you received any support from your producer organization?

- | | | | |
|-------------------------------|------------------------------|-----------------------------|-----------------------------------|
| 1. Agricultural input support | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.3.1 |
| 2. Financial support | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.3.2 |
| 3. Extension services | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.3.3 |
| 4. Market support | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.3.4 |

4.3. Please indicate your level of satisfaction or dissatisfaction with the above services

Please check (✓) in the box that you select based on your level of satisfaction
1 = Strongly Dissatisfied; 2 = Dissatisfied; 3 = Neutral; 4 = Satisfied; 5 = Strongly satisfied

Services	1	2	3	4	5
1. Agricultural input support (seeds, compost fertilizers, pruning equipment,...)					
Prices					
Quality					
Quantity					
services					
Other, specify.....					
2. Financial support (advance, credit, allowance,...)					
Loaning amount					
Loaning duration					
Interest rate					
Welfare contribution (give birth, get sick, others...)					
Other, specify:.....					
3. Extension services					
Production technology					
Quality and safety					
Farm inspection					
Production cost					
Product Marketing					
Business plan					

Other (specify:.....)

4. Market support

Price information

Buyer's information

Contact information

Product information

Market facilitation

Tea prices (negotiation with buyers)

Stable tea demand

Marketing cost

Other, specify:.....

5. Others

1. What are the key benefits from the membership?

2.

Access to organic markets

Stable market

Receive higher prices

Improve knowledge and skills in tea production

Access to credits

Other (specify).....

3. Is there any other institution that helped your tea farm activities? (Can choose more than 2 choices) (Explore whether the local government or NGOs have intervened in the tea farm activities)

District agriculture and forestry office

District industrial and commerce office

Provincial Agriculture and Forestry Office

Provincial Industrial and Commerce Office

Tea factories

Local NGOs, please specify.....

Others, please specify.....

4.4. Why don't you participate in the producer organization?

Non-benefits (specify).....

Distance conditions

Other

4.5. What are the key advantages of being a non-membership of any producer organization?

Access to unlimited markets

Sell to diverse buyers

Receive higher prices

Improve knowledge and skills in tea production

Access to credits

Other (specify).....

4.6. Have you received any support from local organizations/institutions?

- | | | | |
|-------------------------------|------------------------------|-----------------------------|-----------------------------------|
| 1. Agricultural input support | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.8.1 |
| 2. Financial support | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.8.2 |
| 3. Extension services | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.8.3 |
| 4. Market support | <input type="checkbox"/> Yes | <input type="checkbox"/> No | if no, please skip Question 4.8.4 |

4.7. What are the organizations that provide the services to you? (Can choose more than 2 choices)

- District agriculture and forestry office
- District industrial and commerce office
- Provincial Agriculture and Forestry Office
- Provincial Industrial and Commerce Office
- Tea factories
- Local NGOs, please specify.....
- Others, please specify.....

4.8. Please indicate your level of satisfaction or dissatisfaction with the above services

Please check (✓) in the box that you select based on your level of satisfaction

1 = Strongly Dissatisfied; 2 = Dissatisfied; 3 = Neutral; 4 = Satisfied; 5 = Strongly satisfied

Services	1	2	3	4	5
1. Agricultural input support (seeds, compost fertilizers, pruning equipment,...)					
Prices					
Quality					
Quantity					
services					
Other, specify.....					
2. Financial support (advance, credit, allowance,...)					
Credit amount					
Credit duration					
Interest rate					
Welfare contribution (giving birth, getting sick, others...)					
Other, specify.....					
3. Extension services					
Production technology					
Quality and safety					
Production cost					
Product Marketing					
Business plan					
Other (specify:.....)					
4. Market support					
Price information					
Buyer's information					
Contact information					

Product information
Market facilitation
Stable tea demand
Marketing cost
Other, specify:.....
5. Others

V. Factors influencing tea producers' participation in organic

Please check (✓) in the box that you select based on your level of satisfaction

1 = Not Important; **2** = Little Important; **3** = Important; **4** = Very Important; **5** = Extremely Important

Certified-organic producers:

Factors	1	2	3	4	5
1. Economic factors					
Tea demand					
Stable tea prices					
Market growth					
Increasing people's income					
Welfare support					
Availability of loan/subsidy					
Sufficient infrastructure					
2. Social factors					
High trust relationship					
Effective communication					
3. Technological and environmental factors					
Cropping technologies					
Information and communication technology					
Environmental awareness of organic practices					

Non-certified organic producers:

Factors	1	2	3	4	5
1. Economic factors					
Tea demand					
Stable tea prices					
Market growth					
Increasing people's income					
Welfare support					
Availability of loan/subsidy					
Sufficient infrastructure					
2. Social factors					
High trust relationship					
Effective communication					

3. Technological and environmental factors

Cropping technologies

Information and communication technology of
agricultural practices and environmental awareness

Appendix 2: Qualitative questionnaires

I. Questions for Producer Organisation

General background about the producer organisation's director/manager

1. Demography

- 1) Can you introduce yourself? (Full name, age, highest education level, gender)
- 2) What is your position in the producer group?
- 3) What are your main responsibilities?
- 4) Which year that you started working in the current responsibilities?
- 5) Have you ever worked in the position before? If yes, please explain

2. Background of the Producer Organisation

- 1) When was this organization established?
- 2) Why was this organization established? (Explore the reason)
- 3) How many memberships have you had in this organization since the beginning and how many now? (Explore how the members play their role in tea activities)
- 4) What is the rule for entering and exiting the membership?

3. Producer organisation roles

- 1) How does the organization play a role in tea activities? (Explore input, market, training, information, finance, other services, etc.)
- 2) Who are the key partner organizations that PO has? (local GoL, NGOs,...)
- 3) What kind of partnerships does the PO has with different partners? (Formal or informal)
- 4) What activities does the PO collaborate with partner organizations?
- 5) How does the organization coordinate with the key partners and other stakeholders (buyers, the government, etc.) to support the tea activities? (Explore the coordination method/mechanism of PO with key stakeholders).
- 6) What are the organization's roles in coordination among members to support the tea activities? (Explore the coordination method/mechanism of PO with their members regarding decision-making, knowledge transferring, etc.).

4. PO activities and services

- 1) What types of tea are you buying from the producer organization's members?
- 2) Who do you sell the tea to? How many percent of your tea is sold to each market?
- 3) Why do you choose those markets? Please give me the top 3 main reasons
 - organic markets?

- Inorganic markets?
- 4) With organic markets, how are you dealing with them in terms of:
 - Types of tea:.....
 - Volume:
 - Price:
 - Standard and Certification:
 - Quality:
 - Contract:
 - Relationship with buyers/consumers:
- 5) With inorganic markets, how are you dealing with them in terms of:
 - Types of tea:
 - Volume:
 - Price:
 - Standard and Certification:
 - Quality:
 - Contract:
 - Relationship with its customers:
- 6) How do you support your members in producing tea to supply organic markets?
 - Production:
 - Extension:
 - Standard and Certification:
 - Training:
 - Loan:
 - Marketing:
 - Others (specify:):
- 7) How do you support your members in producing tea to supply the inorganic markets?
 - Production:
 - Extension:
 - Standard and Certification:
 - Training:
 - Loan:
 - Marketing:
 - Others (specify:):

5. Producer organisation's management

- 1) What is the organizational structure? Voting rights?
- 2) Did you receive any organizational management training courses? What are they?
- 3) How does the organization decide or adopt rules and regulations?

- 4) What are the primary sources of income for the PO's operation? (Explore the independent degree of the PO to operate the organizations sustainably)

6. Challenges and future strategies of the producer cooperative

- 1) What are the main opportunities of the producer organization from current tea production practices and organic markets?
- 2) What challenges does this organization face in supporting tea activities?
- 3) What are the organization's main challenges to facilitate the linkages between the members and the buyers in organic markets?
- 4) Are there any challenges with the members in supplying quality produce for organic markets?
- 5) What are the challenges in coordinating with other stakeholders in the value chain?
- 6) What are your next 5-year product, market, and operational strategy strategies?

II. Questions for the government

1. Identity

- 1) What is your name?
- 2) What is your position? Please describe your role.
- 3) How long have you been working in the tea-related division/sector?

2. Institutional roles

- 1) How does this institution play the role of in the tea sector? (Explore the authorities in programs related to tea sector development)
- 2) What are the key policies in supporting tea development sector? (at district and provincial level?)
- 3) What are the specific policies in supporting organic agriculture? (at district and provincial level?)
- 4) What have been the challenges in the tea sector development? (explore the social, economic and environment aspects)?
- 5) What are the opportunities in the tea sector development? (explore the social, economic and environment aspects)

III. Questions for tea processors/tea factories

1. Identity

- 1) Can you please tell me about your personal details? (Name, age, educational background, main job)
- 2) What is your position in the company/ business? (Explore the role)
- 3) How long have you experienced in the tea business?
- 4) What is your tea factory's legal ownership status?

2. Tea sourcing activities

- 1) Who is/are your suppliers? (Explore main suppliers of tea within the reason)
- 2) How many types of tea leaves do you buy?

- 3) How do you arrange sourcing volume per season/month/etc? (Explore per year volume)
- 4) What is the average price of buying tea leaves per kg?
- 5) Who sets the price in a transaction?
- 6) How do you arrange the quality of tea that you buy? (Explore certification if any)
- 7) Who sets the quality?
- 8) How do you arrange transactions with suppliers/farmers? (Explore transaction term and form)
- 9) How does the current transaction system with suppliers impact your tea business? (Explore the system to deal with selling and buying methods such as using cash, credit, online payment, etc)

3. Tea processing before marketing

- 1) How many types of tea products do you produce?
- 2) What is the percentage of each product type that you produce?
- 3) How do you process tea before selling? (Explore the main processing steps, including storing, packing, etc)
- 4) Who is responsible for processing the tea? (Explore labor using, skill and knowledge, etc.)
- 5) How do you arrange tea quality (including safety)? (Explore certification if any)
- 6) What is the average cost of tea processing per unit (kg)?

4. Tea marketing (processed form)

- 1) Who is/are your buyer/s? (Explore main buyers within the region and the selling frequency)
- 2) How do you arrange marketing volume per season/month/etc? (Explore per year volume)
- 3) What is the average price of tea selling?
- 4) Who sets the price in a transaction?
- 5) How do you arrange the quality of tea selling? (Explore the market requirements in HVMs)
- 6) Who sets the quality?
- 7) How do you arrange transactions with buyers? (Explore transaction term and form)
- 8) How does the current transaction system with buyers impact your tea business? (Explore the cost, etc)
- 9) How do you access market information? (Explore in relevant to price, quality, and buyer)
- 10) What are the challenges to obtain the information?
- 11) How do you access other information in order to support your tea business (i.e. government support, finance support, ect)? (Explore the challenges)

5. Institutional support

- 1) Who are the key stakeholders supporting your tea business? (Explore the role of government/NGO/other)

- 2) Which parties can support you to improve the tea processing business (explore whether government, cooperative, firms, or others, within the support expectation)
- 3) Who are the significant tea players in this area (i.e., buyers, industry, or exporters in the Phongsaly district and province)?

Appendix 3: Human Ethics Approval



Dear:

Thank you for submitting a low risk notification for your research/teaching/evaluation.

This email is to acknowledge receipt of the low risk notification and to inform you that the details of your project have been recorded in our database for inclusion in the annual reports to the Health Research Council Ethics Committee (HRCEC) and the Massey University Research Committee (URC).

You may proceed with your research, though it is advisable to provide a couple of weeks before commencing, as all low risk notifications are checked for completeness and clarity by a Research Ethics Advisor. You may be contacted if your application is incomplete and/or further clarification is required.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis.

If a sponsoring organisation, funding authority (e.g., the Health Research Council) or a journal require evidence of ethical approval from a Human Ethics Committee (with an approval number), you need to complete a full Massey University Human Ethics application to be reviewed and approved by one of our Human Ethics Committees. Applications must be submitted and approved prior to the commencement of the research.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact the Research Ethics Office, email humanethics@massey.ac.nz.

Please include the following statement on all public documents (e.g., information sheet, consent form) related to your project:

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.

If you have any concerns about the ethical conduct of this research that you want to raise with someone other than the researcher(s), please contact Massey University Human Ethics by email: humanethics@massey.ac.nz.

I wish you all the best in your research, teaching or evaluation activities and appreciate your thoughtful consideration of ethics principles and practices.

Ngā mihi nui,

Dr Brian Finch Chair, Human Ethics Chairs' Committee and Director (Research Ethics)