



Evaluating the international market potential for value added Ceylon cinnamon products from Matara district, Sri Lanka

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Swedish University of Agricultural Sciences, SLU

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Evaluating the potential and feasibility of entering the international market with value added Ceylon cinnamon products from the Matara district, Sri Lanka

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Abstract

Ceylon cinnamon (*Cinnamomum zeylanicum* Blume) has experienced increased global demand due to trends towards natural and clean label products, particularly in North America, Asia, and Europe. However, Sri Lanka currently exports approximately 90% of cinnamon as raw quills with minimal value addition (only 10% of exports), limiting potential economic returns. To become more competitive within the global spice market, Sri Lanka needs to add value into raw spice and explore value added products. This study aimed to evaluate the potential for value-added Ceylon cinnamon products from Matara district while addressing labor shortages through women's empowerment in the value chain.

A comprehensive survey of 75 cinnamon farmers across four villages in Matara district (Kamburupitiya, Thihagoda, Hakmana, and Matara region) was conducted using structured questionnaires, and the study examined production capabilities, women's participation, value addition potential, and market constraints. Results revealed that most farmers (53.3%) were middle-aged with substantial experience, operating medium-scale farms and producing moderate quantities annually. Women demonstrated significant participation in post-harvest activities such as peeling, processing, and management, though their involvement was limited in physically demanding tasks. Less than half of the farmers 37.3% were currently engaged in value addition, primarily due to high initial investment costs, labor shortages and transportation challenges. Critical barriers to value addition were lack of modern equipment and limited market information, along with higher certification costs, unawareness of the international quality, food, hygiene and export standards and inadequate processing facilities. Despite these constraints, the majority of 80% farmers expressed strong interest in receiving training, with most identifying higher income potential as primary motivation for value addition. Women in the farmer families faced multiple barriers to engage in cinnamon production and processing, including household responsibilities, cultural constraints, and limited access to resources, reflected in low female employment rates in the district.

The study identified significant potential for value-added products such as cinnamon powder, food products, and essential oils, with strong international market demand observed in Sweden. However, success requires addressing infrastructure gaps, providing technical training, ensuring financial support, and creating supportive policies for women's empowerment. Strategic interventions focusing on small-scale, home-based value addition enterprises could enhance competitiveness while addressing labor shortages through increased women's participation in the Ceylon cinnamon value chain.

Keywords: Ceylon cinnamon, value addition, women empowerment, Matara district, international market, rural development

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Abbreviations

Abbreviation	Description
SLU	Swedish University of Agricultural Sciences
DEA	Department of Export Agriculture, Sri Lanka
amsl	Above mean sea level
EU	European union
CAGR	Compound Annual Growth Rate
GI	Geographical Indication
GMP	Good Manufacturing Practices
NES	National Export Strategy
EDB	Sri Lanka Export Development Board
SLF	Sustainable Livelihood Framework
GVC	Global Value Chain

1. Introduction

1.1 Background and Problem Statement

Sri Lanka's Ceylon cinnamon (*Cinnamomum zeylanicum* Blume) industry stands at a critical juncture. Despite controlling approximately 85-90% of global true cinnamon production the country exports roughly 90% of its cinnamon as raw quills, with only 10% undergoing value addition (De Silva et al., 2020; ITC, 2020). This export pattern results in substantial foregone economic benefits, as value-added cinnamon products can command 8-10 times the price of raw materials (Bandara & Gunaratne, 2021). Meanwhile, global markets increasingly demand premium, certified, and value-added natural products, presenting both opportunities and challenges for Sri Lanka's smallholder-dominated cinnamon sector.

The Matara district, contributing 15-20% of national cinnamon output, exemplifies these challenges while simultaneously offering unique opportunities for value chain upgrading (DEA, 2023). The district's cinnamon industry faces interconnected constraints: critical labour shortages, particularly of skilled peelers; limited processing infrastructure; weak market linkages; and restricted participation of women despite their significant informal contributions to production. These challenges are compounded by smallholder farmers' limited access to capital, technology, and international quality standards knowledge, creating barriers to value addition and export competitiveness.

Simultaneously, the district experiences substantial female underemployment (31% in 2023), while women express strong interest in participating in cinnamon value chains if provided appropriate support (DEA, 2023). This presents a dual opportunity: addressing labour shortages while advancing women's economic empowerment and rural development objectives aligned with Sustainable Development Goals (SDGs) 1, 5, 8, and 12.

Despite Sri Lanka's comparative advantage in Ceylon cinnamon and growing international demand for natural clean-label products, the industry remains heavily reliant on raw quill exports. The limited presence of value-added products and inadequate integration of smallholders, especially women into upgraded value chains reduce the potential for income growth and inclusive rural development in producing regions such as Matara.

1.2 Research Rationale and Significance

The rationale for this study lies in assessing the potential and feasibility of entering international markets with value-added cinnamon products originating from the Matara district. By analyzing farmers' production capacity, socio-economic conditions, women's participation, and prevailing market challenges, the research seeks to identify strategic interventions capable of strengthening the cinnamon value chain. More specifically, the study aims to evaluate the capacities and constraints faced by farmers in developing value-added products, while also exploring to enhance women's involvement in processing and production. These objectives

hold both economic and social significance, aligning directly with global development priorities, particularly Sustainable Development Goals (SDG) 1 (No Poverty), SDG 5 (Gender Equality), and SDG 8 (Decent Work and Economic Growth). Matara district, with its distinctive agro-climatic and socio-economic characteristics, serves as a significant case for examining pathways through which value-added Ceylon cinnamon can be successfully positioned in and compete within international markets.

1.3 Research Objectives

1.3.1 Main Objective

The main objective of this thesis is to evaluate the potential of value-added Ceylon cinnamon products to enhance global market competitiveness while addressing labour shortages through the empowerment of women in the Matara District, Sri Lanka.

1.3.2 Specific Objectives

1. To assess the current capacity and constraints of cinnamon farmers in Matara district Sri Lanka to develop Ceylon cinnamon value added products.
2. To evaluate the current capacity to develop the value added Ceylon cinnamon products and encourage the involvement of rural female farmers to the production process.

1.4 Scope and Structure

This thesis examines the Ceylon cinnamon value chain in the Matara district through primary data from 75 farmers across four villages: Kamburupitiya, Thihagoda, Hakmana, and Matara region. The study focuses on smallholder farmers' perspectives, women's participation dynamics, value addition potential, and international market requirements.

The thesis is structured as follows. Chapter 2 reviews the literature on Ceylon cinnamon production, value addition, gender in agricultural value chains and global market dynamics. Following this Chapter 3 provides an overview of the applied theoretical frameworks. Chapter 4 describes the research methodology, including sampling, data collection, and analytical approaches. Chapter 5 presents result on farmer responses, production patterns, women's roles, value addition, and constraints. Chapter 6 discusses results within the context of applied theoretical frameworks and existing literature. Finally, Chapter 7 presents conclusions, limitations, recommendations and future research directions.

By integrating livelihood and value chain perspectives this research contributes to understanding how traditional agricultural sectors can be transformed to meet contemporary market demands while advancing social equity and sustainable development in rural areas.

2. Literature review

2.1 History of the Ceylon Cinnamon

Ceylon cinnamon is referred to as Sri Lanka's miracle spice. Identified by its botanical name, *Cinnamomum zelanicum* Blume, it is native to Sri Lanka. Since the beginning of cultivation, it is among the oldest spices that humans have found. The most significant spice exported from Ceylon in the past was cinnamon and in the international marketplace, Sri Lankan cinnamon has made a name for itself as "Ceylon cinnamon" (De Silva, et al. 2020).

During the 14th and 15th centuries, cinnamon became an essential spice among western nations to preserve fresh meat and foods from bacterial growth (Kumar et al. 2023). Former traders also considered Ceylon cinnamon to be a miraculous spice, and Ibn Battuta, a traveler who visited Sri Lanka in the fourteenth century, wrote a detailed account of cinnamon in Sri Lanka (Kanapathypillai, 1969). Arabs, Portuguese, Dutch, and British traders have promoted Ceylon cinnamon to the world market from time to time since ancient eras and one of the main causes of the 15th-century global exploration was the search for cinnamon. The Portuguese developed a profitable trade of exporting cinnamon to Europe in the 16th and 17th centuries and after capturing the island in the middle of the 17th century, the Dutch began growing cinnamon in large quantities on plantations (Barceloux, 2008).

2.2 Significance of Ceylon Cinnamon

Ceylon cinnamon (*Cinnamomum zelanicum* Blume), also known as "true cinnamon," is a highly valued spice both globally and within Sri Lanka for its distinctive aroma, mild flavor, and medicinal properties. Native to Sri Lanka, Ceylon cinnamon is considered superior to other commercial cinnamon types, such as cassia (*Cinnamomum cassia*), due to its lower coumarin content, which makes it safer for long-term human consumption (Ranasinghe, et al. 2013).

Globally, there is a strong demand for Ceylon cinnamon in the food, pharmaceutical, and cosmetic industries. It is primarily exported in the form of quills, and less in the form of powder, oil, and extract. Ceylon cinnamon is famous for its antioxidant, anti-inflammatory, antidiabetic, and antimicrobial properties (Jayaprakasha, et al. 2003 and Gruenwald, et al. 2010). According to the International Trade Centre (ITC), Sri Lanka report over 80% of the global supply of Ceylon cinnamon, positioning it as the world's leading exporter of true cinnamon (ITC, 2020).

Cinnamon is mostly grown in Sri Lanka's southern coastal region, especially in the districts of Matara, Galle, and Hambantota. But also, in inner parts of Sri Lanka as Rathnapura, Matale and Kalutara districts (Samarawickrema, 2015).

Cinnamon farming contributes significantly to the livelihoods of rural communities, involving approximately 350,000 people in cultivation, processing, and trade (Sri Lanka Export Development Board, 2023). Moreover, Ceylon cinnamon is one of the top agricultural export commodities, generating over USD 232 million in foreign exchange earnings in 2022 (Central Bank of Sri Lanka, 2022).

In addition to its economic value, cinnamon cultivation is environmentally sustainable. The plant can be grown with minimal inputs, helps prevent soil erosion on sloping terrain, and fits well into agroforestry systems. Its multipurpose nature with bark, leaves, and oil all having commercial value, adds to its appeal for value-added product development and export diversification (Pathirana, et. al. 2020)

Given the increasing global demand for natural and organic health products, there is a growing opportunity for Sri Lanka to expand its market share through the development of high-value cinnamon-based products such as essential oils, pharmaceuticals, and herbal teas.

2.3 Description of Ceylon Cinnamon

Ceylon cinnamon (*C. zeylanicum* Blume) is a member of the Lauraceae family, a vast group of trees and shrubs that are primarily evergreen, with roughly 53 genera and 2,500–3,000 species spread across tropical and subtropical climates. Eight species of *Cinnamomum*, including the cultivated *C. zeylanicum* Blume, can be found in Sri Lanka's central hills and the humid, tropical evergreen forests in the southwest (Pathirana, et. al. 2020).

The perennial woody Ceylon cinnamon tree develops up to 10-15 meters height in its natural habitat. But as shown in the figure 1, at the cultivation field it is maintained up to 2-3 meters (Pathirana, et. al. 2020). Ceylon cinnamon is characterized by its stems, the bark, which is nearly 10 mm thick, with a pale yellowish-brown colour and superior sweet aroma. It has ovate to elliptical, shiny dark green leaves that are glabrous and panicles that are inflorescences. The tiny pale yellow flowers arranged in panicles, which develop into small, purple colour fruits with a seed (Abeysinghe, 2020).

Ceylon cinnamon species can be found in Sri Lanka's wet (>2500 mm of annual rainfall) and intermediate (<2500 and >1750 mm of annual rainfall) zones as in the Matara, Galle, Ratnapura, and Kalutara districts, with temperatures between 25-30°C, and elevations up to 1000 meters above sea level. However, it may also be grown at low elevations (less than 300 m amsl) and mid elevations (more than 300 and less than 900 m amsl). It is currently grown mostly along the Negombo to Matara coastal belt, and all these specific geographical and climatic conditions contribute to the unique properties of Ceylon cinnamon, differentiate it from other cinnamon varieties (Department of Export Agriculture n.d.).

Cinnamon can be grown in a variety of soil types, from loamy and lateritic gravelly soils in Sri Lanka's central hill country and southern coastal belt to white silicaceous sandy soils (also known as "silver sands") in Negombo. Red Yellow Podzolic (RYP), the primary soil found in Sri Lanka's wet and intermediate zones, is the best soil for cultivating cinnamon (Samaraweera, et al. 2020).

Although countries such as Seychelles, Madagascar, and parts of India, are now cultivating cinnamon, Sri Lanka remains the significant place of true Ceylon cinnamon, representing approximately 80-90% of global production (FAO, 2020).



Figure.1 Cinnamon cultivation. (Photographed by Gunathilake)

2.4 Production of Ceylon Cinnamon

As highlighted in figure 2, the dried inner bark (extracted from shoots that are around two years old), is the primary product made from Ceylon cinnamon. The production process consists of peeling, scraping, and drying of the inner bark, which naturally curls into the characteristic quills or cinnamon sticks which are categorized according to their thickness, appearance, and aroma (De Silva & Esham, 2021). Other important products are quillings or broken pieces of quills, featherings which is the bark scrapings, and chips or bark pieces. Essential oil extracted from the bark, leaves, and roots is also commercially important for its aromatic compounds, primarily cinnamaldehyde (65-80%) and eugenol (5-10%) (Ranasinghe, et al. 2013).

From the past decades, Ceylon cinnamon cultivation and production techniques have been advanced, but in many areas, traditional methods are still used. Seeds or stem cuttings are used for the vegetative propagation. The first harvest can be obtained within two to three years, and to maintain tree health and easy harvesting, a good management technique, such as proper trimming, should be done at correct stage of growth. Removing the outer bark, scraping and drying of quills are high labour involvement tasks and it needs competent workers to achieve the required distinctive quality (Pathirana, and Senaratne, (2020)).

The supply chain of cinnamon in Sri Lanka is thus complex, constituting several different types of stakeholders, such as smallholders, larger producers, small and large collectors, warehouses, commission agents, village merchants, exporting bodies, middlemen etc (Samarawickrema, 2015).



Figure 2. Processing of cinnamon (Phtographed by Gunathilake)



Figure 3. processing of cinnamon - removing the bark (Department of Export Agriculture, 2023)

2.5 Importance of Ceylon Cinnamon

The phytochemically active chemicals in Ceylon cinnamon are unique, and are associated to antibacterial, antioxidant, and other therapeutic properties. The level of flavonoid, antioxidant property, composition, and chemical features of cinnamon oils mainly determine by the age of the bark and leaves, harvesting dates, extraction techniques, and solution type (Muhammad, et al. 2017).

Ceylon cinnamon provides a range of applications and industrial use, covering cosmetic, medical, and culinary sectors. The dried inner bark, which is processed into the quills, ground cinnamon, and the essential oil that is derived from roots, bark, and leaves through steam distillation are the most valuable and popular product in the fragrance and pharmaceutical industries (Jayaprakasha & Rao, 2011).

Ceylon cinnamon has been utilized in traditional medicine systems for a long time. In the cosmetic industry, Ceylon cinnamon extracts and essential oils are incorporated into perfumes, soaps, and skincare products, valued for their pleasant fragrance and potential skin benefits (Jayaprakasha & Rao, 2011). Additionally, the essential oil finds application in aromatherapy practices, where it is providing stress relief and improve cognitive function (Khan et al. 2004).

Studies have demonstrated its potential in glycemic control, with several clinical trials suggesting benefits for patients with type 2 diabetes (Pathak, et al. 2021). Also, it has antimicrobial, anti-inflammatory, and antioxidant properties attributed to compounds such as cinnamaldehyde, eugenol, and various polyphenols present in the spice . Importantly, Ceylon cinnamon contains substantially lower levels of coumarin, a potentially hepatotoxic compound compared to Cassia varieties, making it safer for regular consumption (Ranasinghe et al. 2013).

2.6 Ceylon cinnamon in the world market

According to the Department of Export Agriculture (DEA), Sri Lanka produced approximately 22,000 metric tons of cinnamon in 2022, generating over USD 240 million in export earnings. The cinnamon industry thus plays a vital role in the national economy, especially in the southern coastal belt, contributing significantly to foreign exchange earnings, rural livelihoods, and socio-economic development.

The global demand for Ceylon cinnamon has been steadily increasing, driven by growing consumer awareness of its superior quality and health benefits compared to other cinnamon varieties. The world market for cinnamon was valued at approximately USD 760 million in 2018 and is projected to reach USD 1.2 billion by 2026, growing at a CAGR of 5.9% (www.mordorintelligence.com). However, Ceylon cinnamon accounts for only about 7-10% of the global cinnamon trade, with the majority being Cassia varieties from China, Vietnam, and Indonesia (Ramadan, M.F. and Farag, 2025). International buyers of Ceylon cinnamon are predominantly from Mexico, Colombia, Peru, and other Latin American countries, where it is traditionally preferred for its delicate flavour profile (EDB 2023). Though Cassia continues to dominate the market due to its stronger flavour and lower price, the US market has showed increasing interest, especially in the culinary and health food sectors (EDB 2023).

2.6.1 Trade Dynamics and Export Trends

The Geographical Indication (GI) certification for Ceylon Cinnamon signifies that the product originates from Sri Lanka and meets the distinct quality standards specific to that region. This certification protects the authenticity of the "Ceylon Cinnamon" name, ensuring that only true Sri Lankan cinnamon carries this label. As a result, Sri Lanka has a strong competitive advantage in the global market for value-added cinnamon products. The GI certification also helps Ceylon Cinnamon in the European Union (EU) market, distinguishing it from lower-quality alternatives such as *Cinnamomum cassia* (srilankabusiness.com)

Good Manufacturing practices (GMP) is a system for ensuring that products are consistently produced and controlled. It is necessary to incorporate high quality into the manufacturing process. GMP addresses every facet of production, from the initial resources, facilities, and machinery to employee training and personal cleanliness (cinnamonacademy.lk)

This is beneficial because it ensures the cinnamon is safe for consumption, free from contaminants, properly handled throughout production, and maintains its quality and potency. GMP certification gives consumers confidence that the product meets international safety and quality standards from harvest to final packaging.

According to the Sri Lanka Export Development Board, Sri Lanka exports cinnamon as in processed or semi-processed forms such as powder, quills (Alba, C5, M5 grades), and oil. Major export destinations include the United States, Mexico, Peru, Colombia, Germany, and the United Arab Emirates. Thus, despite Sri Lanka's dominance in Ceylon cinnamon production,

value-added exports remain underexploited compared to raw quill exports. Barriers such as lack of advanced processing infrastructure, inconsistent quality, and limited branding and marketing have hindered full utilization of the sector's potential ((Kodippili and Mapa, 2025).

Looking forward, the demand for value-added cinnamon is expected to grow further, driven by rising health consciousness, demand for natural flavouring agents, and innovation in food technology. Ceylon cinnamon's unique properties offer Sri Lanka a strategic opportunity to position itself as a premium supplier of differentiated cinnamon-based products in global niche market. Still, despite these identified advantages, entering to the global cinnamon market is restricted, due to supply chain constraints like small scale production, transportation, lack of quality consideration and trained peelers in the Ceylon cinnamon production (Sugathadasa, et al. 2021)

2.7 Benefits of Value Addition

Examples of value addition of spices are for example processing spices into oils, powders, or extracts. Through such processes not only the physical characteristics are altered, but it may also significantly extend the shelf life of the product by reducing moisture content and microbial activity. Value-added products may also more easily be branded and produced in a system that enables traceability, especially when combined with certifications like organic, fair trade, or geographical indications. To work towards branded products is seen as positive since this gives an opportunity to build consumer trust and thus create a competitive advantage in domestic and international markets (Perera & Wijesinghe, 2023).

Compared to raw spice exports, value-added spice products command significantly higher prices. For instance, cinnamon oil can fetch up to 8–10 times the value of raw bark (Bandara & Gunaratne, 2021). It is thus suggested that smallholder farmers would benefit from being integrated into value-added supply chains.

Global consumers are increasingly seeking natural, organic, and health-promoting products, creating specialized markets with high value for functional foods, nutraceuticals, cosmetics, and wellness products. Ceylon cinnamon is known for its low coumarin content and health properties such as anti-inflammatory, antioxidant, and glucose controlling effects (Ranasinghe, et al. 2013) . These attributes can be expanded to market value-added derivatives such as Essential oils, Cinnamon tea mixtures, Capsules, Cosmetics, and skincare products.



Figure 4 Value added Ceylon cinnamon production.

(a) dog chive (b) cinnamon leaf oil product unit. (Photographed by Gunathilake)



(c)



(d)

(c) candle (d) body lotion (Spaceylon, 2025)

2.7.1 Strategic Position and Value-Addition Potential

Sri Lanka's competitive edge lies in its GI-certified Ceylon cinnamon, which is promoted as a superior product in global markets. However, while the country holds a dominant position in raw cinnamon exports, it has not fully capitalized on value-added product exports due to constraints such as limited processing infrastructure, lack of quality standards fragmented value chains, and insufficient market linkages (De Silva, and Esham, 2021.). Strengthening the country's capacity to process, certify, and market essential oils, extracts, and cosmetic-grade ingredients remains a strategic priority to enhance export revenue and meet rising global demand.

Value addition in spices is a critical strategy to increase economic returns, reduce post-harvest losses, and enhance market competitiveness. Rather than exporting raw or semi-processed spices, many producing countries now focus on transforming them into high-value products such as essential oils, powders, functional foods, and cosmetics. This approach allows producers and processors to capture more value along the supply chain (Jeewanthi et al. 2020). Essential oils are among the most commercially valuable spice derivatives. They are extracted using steam distillation or solvent extraction techniques and are widely used in aromatherapy, pharmaceuticals, perfumery, and food preservation (Mohapatra, et al. 2022). For example, cinnamon bark oil contains cinnamaldehyde, a compound with proven antimicrobial and antioxidant properties (Gunathilake, et al, 2021).

Powdering is a common form of spice value addition, improving convenience and extending usability. High-quality spice powders are used in culinary applications, packaged foods, and seasoning blends. These products are marketed for their anti-inflammatory, antioxidant, and metabolic benefits (Jeewanthi et al. 2020).

The global shift toward plant-based health supplements is increasing the demand for spice-derived pharmaceutical products. Spice-based tea blends incorporate cinnamon for their flavour and medicinal benefits. These products cater to the wellness market and are often branded as detox teas, digestion aids, or immune boosters. Spices are increasingly used in the cosmetics industry due to their natural origin and bioactivity. Cinnamon oil are incorporated into skincare, oral care, and hair care products for their antimicrobial and aromatic properties.

The demand for organic and herbal cosmetics for skin care and therapy has boosted the inclusion of spice-based ingredients on the global market.(Guo et al., 2024).

2.8 Matara District Context

2.8.1 Availability of Skilled Labor and Traditional Knowledge

The Matara District is an area in Sri Lanka that is of high importance to the cinnamon industry. The district is predominantly represented by smallholder-based growers, with average landholdings ranging from 0.5 to 2 hectares (Bandara & Gunaratne, 2021). According to the Department of Agriculture (2022), over 30,000 farming families in the district are directly or indirectly engaged in cinnamon cultivation, peeling, processing, and trading. Family labour plays a crucial role, especially in cinnamon peeling, which is a skill passed down through generations. Matara District is one of the most productive cinnamon-growing areas in Sri Lanka, with ideal agro-climatic conditions and a skilled peeler base (Pathirana, et. al. 2020).

The cinnamon from Matara is particularly prized for its smooth bark, delicate aroma, and high oil content, contributing to premium-grade exports and the district contributes to approximately 15–20% of the national cinnamon output (DEA, 2023). Its coastal areas, such as Akuressa, Kamburupitiya, Thihagoda, and Dikwella, are noted for both large plantations and smallholder farms that dominate the local production landscape.

Sri Lanka's cinnamon industry is labor intensive and relies on a highly skilled workforce, especially for tasks such as bark peeling, quill making, and oil distillation. Matara district is renowned for its traditional cinnamon peelers, many of whom have inherited their competence and knowledge about peeling over generations (Samartawikrama, 2015). Existing growers' traditional skills thus provide a comparative advantage in producing hand-rolled quills, cinnamon powder, and oils, which are highly valued in high-end markets for their quality and purity (Kodippili and Mapa, 2025). The availability of such skilled labour has been a major driver of the Matara area's reputation for producing fine, hand-crafted quills, a niche that automated processing in other countries has not been able to replicate (Samartawikrama, 2015). Several training programs led by the Department of Export

Agriculture (DEA) and private sector aim to revive peeling skills, introduce mechanization, and enhance value addition while preserving traditional methods.

Recent policy efforts such as the National Export Strategy (NES) and support from the Sri Lanka Export Development Board (EDB) have promoted spice sector diversification and value chain upgrading (EDB, 2023).

The crop serves as a major source of income for rural households, contributing significantly to poverty alleviation and employment generation. In some district secretariat divisions, more than 60% of household income is derived from cinnamon-related activities (Marambe et al. 2021). Moreover, cinnamon cultivation in Matara is linked to traditional knowledge systems and community-based processing practices, which preserve the quality and authenticity of Ceylon cinnamon in global markets.

Several local and national initiatives, such as the "Cinnamon Value Chain Development Programme", have been implemented to provide training, improve productivity, and enhance market access for smallholders in Matara (EDB, 2023). These efforts aim to increase the adoption of Good Agricultural Practices (GAP), improve post-harvest handling, and promote value addition.

3. Theoretical Framework

This study uses an integrated theoretical approach combining the Sustainable Livelihood Framework (SLF) and Global Value Chain (GVC) analysis to examine the potential for value-added Ceylon cinnamon production in Matara district while advancing women's empowerment.

3.1 Sustainable Livelihood Framework

The Sustainable Livelihood Framework, developed by the UK Department for International Development (DFID, 1999), provides a broad viewpoint for understanding how rural households construct livelihoods from available assets under specific vulnerability contexts and institutional environments (Scoones, 1998). The framework conceptualizes livelihoods through five capital assets.

Human Capital: These assets refer to skills, knowledge, health, and labour capacity, assets that enable individuals to engage in productive activities. In addition to this it also includes competencies such as technical, managerial, and communication skills, as well as abilities like leadership, creativity, and adaptability. Additionally, physical and mental fitness are included, supporting overall productivity and performance (Sairmaly, 2023).

Social Capital: Here the assets refer to networks, relationships, trust, and collective action capacity that taken together facilitate cooperation and mutual support (Ostrom, 2009). This encompasses both farmer-to-farmer networks, women's groups, community associations and relationships with extension services, buyers, middlemen, input suppliers, government agencies. Social capital operates at multiple scales; household-level cooperation in labour sharing, village-level collective marketing and processing arrangements.

Natural Capital: Including natural resource such as land, water, soil quality, biodiversity, and environmental services, landholdings (size, topography, soil type), and climatic conditions (rainfall patterns, temperature regimes, water availability for irrigation), and finally genetic diversity and crop varieties. The quality and accessibility of natural capital is claimed to have a direct influence on production potential and vulnerability to environmental shocks.

Physical Capital: These assets refer to the infrastructure and productive related assets, including processing equipment, storage facilities, transportation networks, irrigation systems, and market infrastructure (Scoones, 1998). Physical capital determines the feasibility of value addition activities and affects raw material access, post-harvest loss rates, product quality, and market access.

Financial Capital: finally these assets includes access to credit, loans, savings, remittances, pensions, and financial services necessary for investment and risk management (DFID, 1999). Financial capital enables acquisition of other capital forms, purchasing equipment, investing in training, or buying land. Limited financial capital limit the livelihood diversification and low-income return.

The SLF framework emphasizes that livelihood outcomes depend not only on asset grants but also on the vulnerability context as shocks, trends, seasonality and transforming structures and processes as institutions, policies and market conditions that taken together facilitate the use and accessibility of assets (Scoones, 2015; Morse & McNamara, 2013). This framework is particularly relevant for understanding how Matara's cinnamon farmers, especially women can leverage existing assets while overcoming constraints to achieve improved livelihood outcomes through value addition.

Applied to this study, the Sustainable Livelihoods Framework (SLF) helps analyze how the existing capital assets of Matara's cinnamon farmers either enable or constrain value addition. It also highlights that women's access to these assets differs from that of men. Furthermore, the SLF illustrates how these assets influence the value chain, while institutional and policy environments engage the opportunities for upgrading. Ultimately, strategic interventions can strengthen asset bases, enhance value addition, and improve prosperity and adaptability of livelihoods

3.2 Global Value Chain Framework and Upgrading Strategies

Process Upgrading describes a strategy suggesting that production efficiency can be enhanced through the adoption of superior technologies, reorganization of production systems, or the use of higher quality inputs. This type of upgrading focuses on optimizing internal operations to reduce costs, improve productivity, and ensure consistent quality (Humphrey & Schmitz, 2002).

Product Upgrading explain how moving toward the production of more advanced, differentiated, or higher-value products within the same value chain can be a successful strategy. It emphasizes product innovation, improved design, and adherence to higher quality standards to meet evolving market demands and capture better prices (Giuliani et al., 2017).

Functional Upgrading build on a strategy emphasising the importance of new, higher value functions or relinquishing low value activities within the value chain. This may involve expanding into areas such as processing, branding, or marketing, thereby capturing a greater share of value creation and strengthening producers' strategic positions within the chain (Humphrey & Schmitz, 2002).

Chain Upgrading, this strategy builds on how moving into entirely new value chains by improving current capabilities can be successful. As such it involves leveraging current skills, resources, and knowledge to diversify into related or higher value activities, thereby enhancing competitiveness and income opportunities. According to Humphrey and Schmitz (2002), this form of upgrading allows producers to transition beyond their traditional markets or products into new chains where greater value can be captured through innovation,

3.3 Linking the Sustainable Livelihood Framework and the Global Value Chain Framework

This study integrates The Sustainable Livelihoods Framework (SLF) and the Global Value Chain (GVC) frameworks to evaluate the potential of value-added Ceylon cinnamon products to enhance global market competitiveness.

Both the SLF and the GVC framework are closely linked with strong livelihood assets such as skills, equipment, credit, and social networks, give households the capacity to move into higher-value activities like processing, marketing, and entering premium markets. In addition to this, successful upgrading within value chains strengthens those assets by generating higher income, building entrepreneurial and technical skills, expanding networks, and enabling re-investment in better infrastructure. Women's empowerment is essential to this process, as addressing their specific constraints in finance, training, and social norms allows them to participate more fully in value chains, improving both household livelihoods and value chain competitiveness (Malhotra 2023). However, institutions, through policies, market systems, and cultural behaviours determine whether these benefits are including and sustainable. Together, the integration of SLF and GVC shows that rural development requires simultaneous investment in household asset building and value chain transformation.

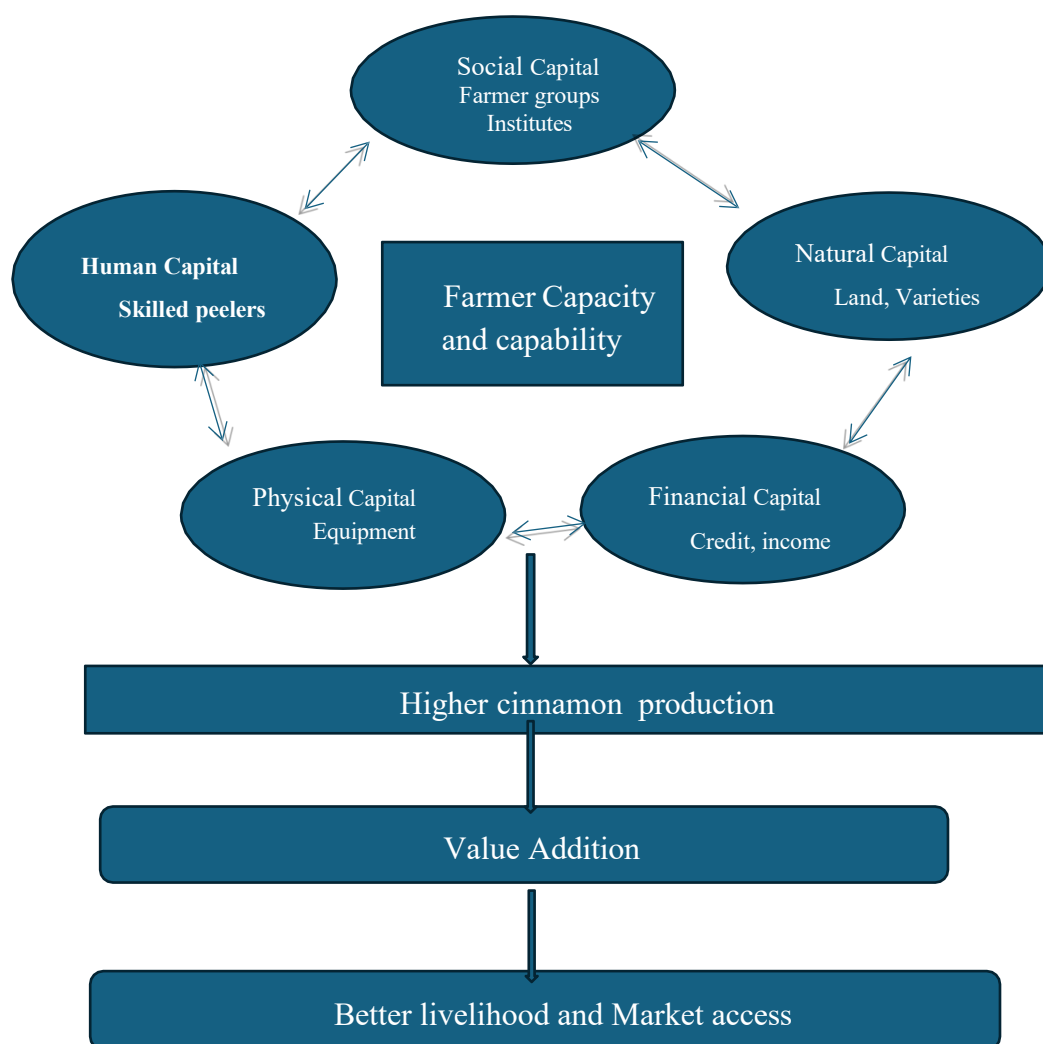


Figure. 5 Schematic diagram of analytical framework showing theories and linkages between them in relation to topics in this study. Created by Gunathilake

4. Methodology and Data collection

A pre study was carried out in Sweden to identify the Cinnamon based products and their availability in the market. Data for the main study was retrieved from Ceylon cinnamon growing farmers in Sri Lanka.

4.1 Preliminary study in Sweden

A preliminary study was conducted as a market observation in the city of Malmö, Sweden, between mid-March and early April 2025. Over a two-week period, 40 different types of firms were visited in Malmö to document and analyze the availability of various value-added cinnamon products on the market.

Sampling Strategy:

- Observation was done by visiting retail outlets representing different market segments.
- Included 12 supermarkets (ICA, Coop, Willys, Hemköp), 6 specialty food stores, 5 health food stores, 4 tea specialty shops, 5 restaurants, 5 juice bars and 3 artisanal bakeries.
- Geographic distribution across Malmo city centre, suburban areas, and immigrant-dense neighbourhoods.

Value-Added Product Categories Identified:

1. Artisanal Food Products: Cinnamon-infused honey, specialty chocolates, spice blends
1. Wellness Products: Ceylon cinnamon capsules, herbal tea blends
2. Culinary Applications: Pre-mixed kanelbulle (cinnamon bun), seasonal baking mixes, mix with smoothies and crushers.
3. Lifestyle Products: Cinnamon-scented candles and sticks, soaps, aromatherapy oils

4.2 Data collection method in Sri Lanka

Data were collected during mid-April to end of May in 2025 in the Matara district, Sri Lanka, using a standardized questionnaire with both closed and open-ended questions. The questionnaire was first written in English and later translated in Sinhala language to facilitate effective communication with respondents. For a complete overview of included question see Appendix 1.

Farmer families and locations were selected in collaboration with the Department of Export Agriculture and Cinnamon Research Institute Sri Lanka. These institutes have a data base of the cinnamon production farmers in the regions and are presently conducting farmer trainings and evaluating programmes relevant to value addition.

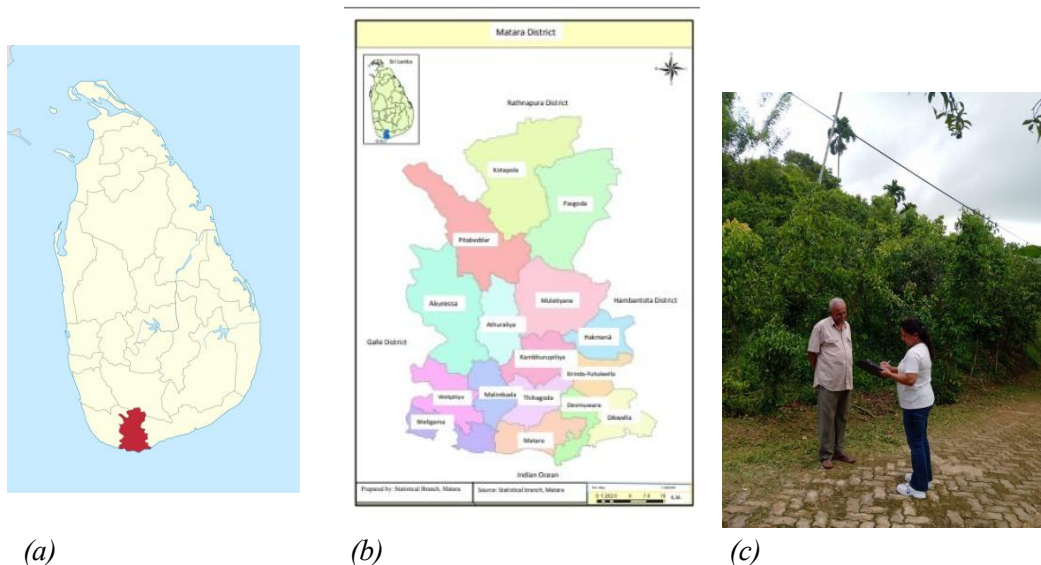


Figure 5 Map of Sri Lanka and Matara district(a) https://en.wikipedia.org/wiki/Matara_District
Matara District Map (b) and interview with a farmer (c) photographed by mahinda

The survey thus employed a stratified random sampling approach within the purposely selected villages in Matara district with the coordination of Cinnamon Research Institute. Relevant villages were selected based on the following criteria: cinnamon production intensity, accessibility, and presence of women's groups. The final sample consisted of 75 cinnamon farmers, distributed across four locations: Kamburupitiya (22 farmers), Thihagoda (28 farmers), Hakmana (18 farmers), and Matara town area (7 farmers). Due to missing data 5 questionnaires were deselected from the final result.

The questionnaires were distributed with the help of local extension officers. Information was gathered through discussions with farmer groups, home visits, visits to cultivating lands, processing centres, collecting centres as well as to the training programs conducted by the cinnamon research institute. Most of the questionnaires were answered after a brief introduction of the objectives of the survey. When necessary, further details and clarification of the questions were described during the answering of the questionnaire.

4.3 Data Analysis

The quantitative data analysis was conducted using IBM SPSS for descriptive statistics, and frequency analysis, while Microsoft Excel was employed for data visualization. The analytical approach included multiple statistical methods to comprehensively examine the collected data. Measures such as frequencies, percentages, means, and standard deviations were used to

analyse the data. Especially percentages of the respondents on different questions in the questionnaire were calculated.

4.4 Ethical and safety considerations evaluate

To reduce health hazards, safety procedures were followed during the field visits.

4.5 Relevance to SDGs

SDG 1: No poverty: By exploring the potential and feasibility for value added cinnamon products, the project aims to increase the income levels of rural farmers in the Matara district, by addressing poverty alleviation through enhancing the long-term financial stability of the smallholder farmers.

SDG 5: Gender equality: This research emphasizes the empowerment of rural women farmers by facilitating their active participation in the value chain. It would be a chance to increase their socioeconomic status by providing opportunities for entrepreneurship, skill development and financial independence.

SDG 8: Decent work and economic growth: Promoting value added cinnamon products creates opportunities for sustainable employment and economic growth. Enhancing production capabilities and integrating women led farming groups into international markets by enhancing decent and equitable work conditions.

SDG 12: Responsible consumption and production: By focusing on sustainable practices in cinnamon cultivation and processing, the project contributes to responsible consumption and production patterns. It aligns with global preferences for clean label and natural products.

SDG 17: Partnership for the goals: The research establishes collaborations between local farmers, international market, and stakeholders, fostering partnerships that strengthen the value chain and address global and local sustainability goals.

Relevance to "Development Assistance for a New Era" by Ministry of Foreign Affairs (Government.se, 2025). This project will support the rural development through sustainable agriculture, and directly contributes to equitable growth and promotes freedom through financial independence and empowerment for women.

5. Results

5.1 Sociodemographic characteristics of cinnamon farmers

The sociodemographic result of the 75 cinnamon farmers is presented in Table 2. The result show that the majority of the farmers (53%) are between 46-60 years old. Gender distribution showed 54% male and 45% female respondents, indicating relatively balanced survey participation.

Table.1 Sociodemographic characteristics of cinnamon farmers

Variable	Category	Frequency	Percentage
Age Group	31-45 years	18	24.%
	46-60 years	40	53%
	Above 60 years	17	22%
Gender	Male	41	54%
	Female	34	45%
Education Level	Primary	0	0%
	Secondary	25	33%
	Higher Education	44	58%
	Other	6	8.%
Experience	5-10 years	20	26%
	11-20 years	25	33%
	>20 years	30	40%
Land Size	1-2 acres	22	29%
	2-5 acres	36	48%
	More than 5 acres	17	22%
Income Level	Less than Rs. 100,000	0	0
	Rs. 100,000 - Rs. 300,000	40	53%
	Rs. 300,001 - Rs. 500,000	21	28%
	Rs. 500,001 - Rs. 1,000,000	14	18%

Education levels were notably high, with 58% having completed higher education, 33% secondary education, and no farmers with only primary education (from grade 1 to 6). Experience in cinnamon cultivation was substantial, with 40% having over 20 years of experience, 33% with 11-20 years, and 26% with 5-10 years experience.

Annual income from cinnamon sales showed that 53% of the farmers earned Rs. 100,000-300,000, representing moderate economic returns. Only 18% achieved higher income brackets of Rs. 500,000-1,000,000, while lower income categories comprised the remaining farmers. This income distribution indicates limited profitability under current production and marketing systems.

5.2 Production and market access

Nearly half of the farmers operated on medium-scale landholdings of 2–5 acres, followed by 29% with 1–2 acres and 23% with more than 5 acres. According to their answers their annual production capacity was moderate with 47% producing 100–500 kg, 37% producing 501–1000 kg, while only 16% produced more than 1000 kg. Most farmers practiced annual harvesting method, meaning that they only have one yearly income from the cinnamon cultivation.

The result for questions addressing product and value addition show that currently raw quills are the prominent production of a majority of the growers. Fewer grower report producing powder (20%) or oil (4%). About 89% expressed an interest for initiating value addition in the future.. They are also interested in producing cut cinnamon sticks (41%), cinnamon based food products (60%), and powder (25%).

The result also show that the use of traditional or manual peeling and processing was most common, followed by semi-mechanized processing, with only a small proportion using fully mechanized systems.

Finally, the majority of the farmers (81%) report that they sold their products through middlemen, with only 8% selling directly to exporters, 7% to cooperatives, and 4% to local markets.

5.3 Production constraints and challenges

The result for production challenges, see table 2, show that all farmers identified high production costs and price fluctuations as major challenges. In addition to this climate issues and labour shortages are also seen as production challenges.

Table. 2 Farmers reported major production challenges

Challenge Category	Percentage of Farmers Affected
High production costs	100%
Price fluctuations	100%
Climate issues	97%
Labor shortages	90%

5.3.1 Post-harvest challenges

When reporting on challenges linked to post-harvesting major difficulties are identified in relation to processes and activities linked to drying, storage, processing, and quality. The limited access to processing centres are also reported as a severe obstacle to reach a higher quality production. Farmers specifically highlight the insufficient infrastructure at village levels, as well as lack of access to storage rooms and transport facilities. Examples of key gaps in supporting services include a lack of quality testing facilities, limited market information access, and insufficient processing centers. Farmers do however express more positive result for services provided by extension services and training facilities from the government authorities.

5.4 Support needs and expansion plans

5.4.1 Required support for value addition

Farmers express support needs for marketing, storage facilities, equipment access, and quality testing capabilities. Still it can be concluded that the willingness to expand cultivation and production remained limited, with only 21% planning for expansion. Most of the farmers remained undecided or were not planning to initiate expansion of their business. More than 60% of the participants expressed a strong preference for small-scale or home-based businesses, whereas fewer (2%) preferred large-scale or commercial manufacturing.

Results show, (see Table 3) that the main constraints for engaging in value adding activities were high initial investments, difficulties with transportation, labour shortages and limited credit access. Apart from these constraints farmers also reported concern regarding lack of storage, limited market information and quality control challenges.

Table. 3 Main constraints for value adding activities.

Constraint Type	Percentage
High initial investment	97%
Transportation issues	85%
Labor shortages	84%
Limited credit access	81%
Lack of storage	76%
Limited market information	70%
Quality control challenges	48%

Still the result show that basic awareness of ISO (69%) and organic certification (65%) existed among a majority of the farmers yet the understanding and awareness of specialized certifications like HACCP and Fair Trade remained minimal or absent. After discussion with them, it can be identified that farmers neither have awareness of European Spice Association (ESA) specifications or American Spice Trade Association (ASTA) cleanliness specifications.

Table. 4 Awareness of the Quality Standards.

Standards Awareness	Percentage
ISO	69%
organic certification	65%
GMP	28%
HACCP	7%
Fair Trade	0%

5.5 Knowledge and Skill Gaps

Finally, when asked about gaps in knowledge skills the result, see table 4, clearly show that limited market information and standards awareness, combined with lack of business skills, represent critical barriers to value chain upgrading and engaging in international market.

Table. 5 Knowledge, Skills, and Awareness Gaps

Type of Gap	Percentage Reporting
Lack of market information	100%
Lack of standards awareness	100%
Lack of business skills	98%
Lack of value addition knowledge	65%
Lack of technical skills	60%

5.6 Female Participation in the Cinnamon Value Chain

In this section the result for female respondents, in specific, is presented. The results, see Table 5, show that when women are engaged in the cultivation, they are primarily active in maintenance (99%), peeling (96%), processing (96%), and planting (92%) activities. In contrast, fewer women were involved in management, harvesting, marketing, account keeping and land preparation. This distribution demonstrates that women's contributions are heavily concentrated in labour-intensive and post-harvest activities, with less involvement in decision-making or marketing process.

A majority (33%) of the women reported working 2–4 hours a day in the production, followed by 29% working 4–6 hours, and 24% working less than 2 hours. The group reporting

working most, more than 6 hours or fully engaged in production constituted 13% of the participating women.

Table. 6 Women Participation in Cinnamon Value Chain

Category	Measure	Result
Household Participation	Women per household (1-2)	90%
Primary Activities	Maintenance & weeding	98%
(High involvement)	Peeling	96%
	Processing	96%
	Planting	92%
Limited Activities	Management	60%
(Low involvement)	Marketing & selling	24%
	Account keeping	20%
Time Commitment	2-4 hours/day	33%
	4-6 hours/day	29%
Training Status	No training	44%
	Peeling training only	50%
	Business/marketing training	0%
	Processing methods	7%
Main Barriers	Household responsibilities	79%
	Low wages	49%
	Cultural restrictions	0%
	Safety	0%
	Mobility issues (Transport)	0%
Current Value Addition	No participation	37%
	Powder production	29%
	Packaging	24%
	Quality checking	10%
	Oil extraction	7%
Support Needed	Technical training	90%
	Financial support	82%
	Equipment	77%
Group Formation	Interested in groups	68%
	Current membership	16%

Women's involvement in value addition activities remains limited. Over one-third (37%) reported no participation in value-addition. Among those who are engaged, the most common activities were cinnamon powder production (29%) and packaging (24%), fewer were engaged in quality checking (10%) or oil extraction (7%). These activities reflect women's current role in entry-level value addition tasks, mostly limited to household or village-based processing.

The result show that the support requested were technical training related to new technology and methods (90%), financial support (82%), and equipment support (77%). In addition, they

requested marketing training, business management training, childcare facilities, and transport support. Women also expressed strong interest in in group formation, with 16% already being a group member. The results indicate that almost all respondents (about 100%), believe that proper marketing support would lead to an increase in sales. In addition to this they also express that training in value addition would be positive for gaining better prices as well as support reaching the global market. Respondents express an interest in learning about modern equipment (99%), financial support (68%), and technical training (56%) to acquire knowledge about new techniques.

Training opportunities for women were limited and unevenly distributed. Nearly half of the women (44%) had received no training at all. Among those trained, 50% had training in peeling techniques, while only 16% received instruction in processing methods. Value addition training was almost absent (7%), and the result also explain that none had received training in business management or marketing. Despite these gaps, they demonstrated a strong interest in professional development, with 80% indicating that they were very interested in learning peeling as a profession.

6. Discussion

6.1 Demographic structure and human capital implications

The predominance of middle-aged farmers (53% aged 46-60 years) in the Matara districts cinnamon sector reflects broader demographic trends observed in agricultural systems globally. Often explained as an ongoing rural to urban migration trend among youth seeking alternative employment opportunities. In a future scenario where this development continues there is an evident risk that the traditional knowledge accumulated among the older growers will diminish, in combination with a lack of workforce which evidently may lead to sustainability challenges for the sector's future.

The Sustainable Livelihood Framework's (SLF) conceptualization of human capital becomes particularly relevant here. Scoones (2009) emphasizes that human capital affect not only skills and knowledge but also the capacity for labour and health status across different age groups. The aging demographic suggests potential future constraints in physically demanding activities like skilled peeling and processing, indicating the urgency of strategies to engage younger generations and women in the value chain.

The high education levels observed (59% with higher education) differ from typical smallholder groups in developing countries. This educational capital, as conceptualized in the SLF framework, represents a significant yet underutilized asset.

However, the disconnect between education levels and actual value addition practice (only 37% engaged) suggests that educational capital alone is insufficient without complementary assets particularly financial capital, physical infrastructure, and market linkages. This finding supports Morse and McNamara's (2013) argument that livelihood outcomes depend on the interaction of multiple capital assets rather than any single dimension.

6.2 Land holding patterns and production constraints

The predominance of medium-scale operations (48% with 2-5 acres) positions Matara district cinnamon sector between subsistence and commercial agriculture. This scale presents both opportunities and constraints when examined through value chain upgrading theory. Humphrey and Schmitz (2002) argue that medium-scale producers often face challenges, they are too large to benefit from household flexibility but too small to achieve economies of scale necessary for major capital investments.

The positive correlation between land extent and value addition practice (39% of farmers with >5 acres engaged compared to 29% with 1-2 acres) supports this theoretical perspective. However, it also challenges simplistic assumptions about scale requirements. The data suggest that strategic interventions targeting appropriate technologies and collective action could enable smaller producers to engage in value addition.

Production volumes, with 46% producing 100-500 kg annually reflect the constraints identified by Jayasingha et al. (2018), who documented that 92% of Sri Lankan cinnamon farmers achieve less than 1000 kg/ha yields. This productivity challenge compounds the value

addition potential: low volumes make it difficult to justify investment in processing equipment or achieve consistent supply for buyers.

For the Matara district cinnamon sector, process upgrading encompasses improved peeling techniques with skilled peelers enhancing quill quality, better post-harvest handling minimizing contamination and quality degradation. Additionally increased mechanization of labour-intensive tasks, where technically feasible and economically viable, as well as the adoption of Good Agricultural Practices (GAP) which may improve yield and sustainability.

6.3 Labour dynamics

The significant shortage of skilled peelers (100% of farmers reporting difficulties) represents the most critical constraint facing Matara's cinnamon sector. This finding validates concerns raised by about skilled labour availability threatening the sustainability of Ceylon cinnamon's competitive advantage. The limited access to peelers, 47% with only 1-2 available, constrains both current production and expansion potential.

From a value chain governance perspective (Humphrey, 2004), the shortage of skilled labour represents a key constraint that limits the sector's ability to upgrade. Peeling quality directly affects product classification, pricing, and market access. Although traditional knowledge transfer through generational learning remains valuable, it is insufficient to meet the growing demand—particularly as younger generations pursue alternative livelihoods. In the Matara cinnamon context, traditional peeling expertise has been accumulated over generations, with processing knowledge transmitted through family networks. However, the lack of integration with formal education and the unrealized productivity potential of women further constrain the sector's development.

The seasonal employment pattern (47% hiring seasonally, 45% not hiring externally) indicates a highly informal labour market with limited institutional structure. Such structures often perpetuate low wages and poor working conditions, evident in the 49% identifying low wages as barriers to women's participation creating a vicious cycle of labour shortage and inadequate professionalization.

6.4 Women's participation

6.4.1 Integration of gender and value chain analysis

The participation of women in cinnamon production (92% in planting, 99% in maintenance, 96% in peeling, 96% in processing) was identified. This pattern is consistent with broader gender dynamics in agricultural value chains where women provide substantial labour in production and post-harvest activities but are excluded from decision-making, resource control, and benefit capture (Njuki et al., 2011).

However, this existing skill base presents strategic opportunities. Meaning that women's proficiency in peeling and processing provides a foundation for upgrading into higher-value activities. The challenge lies in transforming these existing contributions from household

support roles into recognized professional activities with commensurate compensation and decision-making power.

The prevalent barriers of household responsibilities and low incomes indicate a complicated interaction between social and economic constraints limiting female participation throughout the value chain.

6.4.2 Barriers through a sustainable livelihood framework lens

The identification of household responsibilities as the primary barrier (79%) reflects broader structural constraints affecting women's livelihood strategies. The SLF framework recognizes that vulnerability contexts including gender norms and household responsibilities facilitate the use and access of assets (DFID, 1999). Women's limited time availability hampers their capacity to participate in collective action and training.

The low wage issue (49% identifying this as a barrier) reflects women's structurally low labour market value, particularly in agriculture. This wage gap limit women's contribution to equal or superior productivity with quality peeling. Addressing this requires not only training or equipment providing but also find solution to present devaluation of women's economic contributions. Notably, the result show that 100% did not identify cultural constraints, training deficits, or limited decision-making power as barriers.

6.4.3 Training Gaps and Capacity Building Opportunities

The training deficit, 44% receiving no training, with complete absence of business management or marketing training represents a critical human capital constraint. This gap takes on particular significance given the 80% expressing interest in professional training, indicating high motivation that could support successful capacity building initiatives.

This pattern validates targeted interventions can transform traditional skills into entrepreneurial capabilities. However, it also highlights the limitations of purely technical training approaches. Value chain literature emphasizes that upgrading requires not just production skills but business competencies including financial management, quality control, marketing, and negotiation (Humphrey & Schmitz, 2002). The complete absence of such training among female farmers indicates that current support systems continue to constrain to technical roles rather than enabling entrepreneurial advancement.

The preference for collective action, 68% interested in or already participating in groups provides foundation for addressing these capacity gaps through peer learning and cooperative arrangements. Such collective structures could facilitate shared investments in processing equipment, joint marketing, and mutual skill development.

6.5 Value Addition

6.5.1 Interest in and practice of value addition

The major gap between the high interest in value addition (89%) and the relatively low level of actual engagement (37%) calls for a deeper analysis through both livelihood and value chain lenses to understand the barriers preventing upgrading. The transition from selling raw quills to engaging in value addition offers significant advantages such as convenience, longer shelf life, and the potential to secure better prices due to differentiated uses and improved market value. However, realizing these benefits requires access to specialized equipment, technical knowledge, quality control systems, compliance with safety regulations and quality standards, as well as capabilities in packaging, branding, and understanding consumer preferences and price points.

From the Sustainable Livelihood Framework (SLF) perspective, this gap indicates limitations in several forms of capital as physical capital (processing equipment, storage facilities), financial capital (investment funds, access to credit), and social capital (market linkages and collective marketing arrangements). The finding that 97% of respondents identify high initial investment costs as the primary barrier supports studies indicating that capital requirements remain the most significant constraint to value-added agriculture in developing countries (Barrett et al., 2022).

However, financial limitations alone cannot fully explain this disparity. The observed relationship between education and engagement in value addition where 64% of those practicing value addition possess higher education suggests that knowledge and information together also play crucial roles. This supports Bandara and Gunaratne's (2021) conclusion that a lack of market information and uncertainty about returns discourage investment, even among farmers with some level of capital access.

6.5.2 Product Preferences and Market Alignment

The strong preference to producing cinnamon-based food products (60%) and cinnamon sticks (41%) recorded, compared to other products such as oil (4%) and cosmetics (12%), reflects farmers' rational assessment of entry barriers and required competencies. Developing food products and stick packaging demands relatively modest technical knowledge and investment, whereas oil distillation and cosmetic formulation require specialized equipment, technical expertise, and strict adherence to safety and quality regulations.

This preference aligns with the value chain upgrading theory, which emphasizes pursuing "appropriate upgrading trajectories" that correspond to producers' existing capabilities and resource constraints (Humphrey & Schmitz, 2002). However, the survey was unable to capture detailed information regarding more innovative products such as dog chews and cocktail-smoked cinnamon, despite their exposure to international buyers. The lack of shared information and participants hesitate to share commercial achievements become obstacles to joint upgrading initiatives, limiting opportunities for collaborative learning and coordinated market advancement.

6.5.3 Scale Preferences and Household Production

The preference for small-scale, home-based processing among the respondents reflects both constraints and opportunities. From a livelihood perspective, home-based production aligns with existing asset configurations, limited land, modest capital and family labour availability while accommodating women's household responsibilities. This model has precedent in successful rural enterprise development where household-level processing evolved into small-scale commercial operations (Ellis, 2004). However, scale limitations create challenges for market access and quality standardization. International buyers typically prefer consolidated supply from fewer producers to reduce transaction costs and ensure consistent quality (Reardon et al., 2009).

6.6 Market Access and Value Chain

Limited direct market access is reflected in only 8% of farmers selling directly to exporters and 7% through cooperatives. Which also highlights weak institutional mechanisms for collective action and market linkage. This situation contrasts with successful value chain upgrading cases in other contexts, where well-organized farmer cooperatives and contract farming arrangements have enabled direct relationships with processors or exporters, improving both price capture and access to market information (Barrett et al., 2012).

The dominance of intermediaries significantly constrains farmers' bargaining power, access to market information, and motivation to enhance quality. When producers are unable to observe end-market prices or understand the value premiums attached to quality improvements, they lack the information necessary to make informed investment decisions in upgrading activities. Consequently, the incentive structure remains weak, perpetuating dependence on intermediaries and limiting innovation.

To overcome these barriers, diversification of market opportunities through complementary activities can strengthen the cinnamon value chain. Developing cinnamon-based tourism experiences such as farm visits, traditional processing demonstrations, and eco-friendly tourism initiatives can leverage local heritage knowledge and cultural assets. Additionally, producing organic fertilizer from cinnamon waste streams can promote circular economy linkages, creating new income opportunities and reinforcing sustainability.

Overall, Sri Lanka's cinnamon value chain exhibits governance characteristics where smallholder producers are heavily dependent on intermediaries and exporters who control market access and capture a disproportionate share of value. Achieving meaningful upgrading therefore requires a shift toward more inclusive governance models, where producers gain greater control and benefit through component or relational regulation that ensures fairer value distribution and stronger direct market participation.

6.6.1 Price fluctuation and risk

The significant constraint of price fluctuations (100%) as major challenges reflects market structure deficiencies common in commodity agriculture. Price volatility creates substantial

risk for farmers contemplating value addition investments, uncertain output prices combined with fixed investment costs discourage capital commitments, particularly among resource-constrained smallholders displaying a resistance to risk (Barrett et al., 2012). The Ceylon cinnamon sector's price dynamics, influenced by global market fluctuations, quality variations, and intermediary market power create uncertainty that discourages long-term investment in quality upgrading or value addition.

6.7 Production constraints

6.7.1 Climate vulnerability and adaptive capacity

Even though the Matara district's has a natural capital advantages in suitable agro-ecological conditions there are uncontrolled concerns related to climate issues (rainfall patterns, temperature variations, and extreme weather events). The vulnerability context in the SLF framework recognizes that such shocks, trends, and seasonality in environmental conditions directly affect livelihood assets and strategies (Scoones, 2009). Climate challenges in Matara's cinnamon belt, including erratic monsoons, increasing temperatures, and changing pest dynamic, represent external shocks that reduce productivity and threaten quality standards necessary for international markets. This vulnerability takes on particular significance given climate change projections for Sri Lanka showing increased rainfall variability and temperature extremes (Sugathadasa et al. 2021).

Value addition emerges in this context as a climate adaptation strategy. By processing and storing products during favourable seasons, farmers can smooth income variability and reduce exposure to climate-induced production fluctuations. However, realizing this potential requires addressing the infrastructure and capital constraints currently preventing value addition engagement.

6.7.2 Post-harvest loss and infrastructure deficits

The widespread problems with drying, storage, processing, and quality degradation reflect severe infrastructure deficits that constrain value capturing. For Ceylon cinnamon, post-harvest handling quality directly influences product grading and price realization, making these constraints particularly costly.

The limited processing canters identified as primary obstacles validate infrastructure investment priorities. However, addressing this requires attention to appropriate scale and location. Village-level processing canters, as suggested by farmers, could enable women's participation while reducing transportation costs and spoilage. This aligns with evidence from other agricultural contexts where decentralized processing infrastructure improved product quality, reduced losses, and enhanced women's participation by locating facilities near homes (Reardon et al., 2009).

The physical capital dimension of the SLF framework emphasizes that infrastructure affects not only current productivity but also investment incentives and market access possibilities (Scoones, 2009). Without adequate storage and processing facilities, farmers cannot credibly commit to consistent quality supply required for direct buyer relationships or value-added

production. This creates another dimension of the low-value trap inadequate infrastructure discourages upgrading investments, which perpetuates dependence on intermediaries and low-value transactions.

6.8 Quality standards and international market access

6.8.1 Certification Knowledge Gaps

The moderate awareness of ISO (69%) and organic certification (65%) alongside minimal knowledge of HACCP (7%) and absence of Fair-Trade awareness (0%) reveals selective exposure to international standards. This pattern likely reflects which certifications have been promoted through existing extension programs versus those requiring specialized training or private sector engagement.

More significantly, the complete lack of awareness regarding European Spice Association (ESA) specifications and American Spice Trade Association (ASTA) cleanliness standards represents a critical barrier to accessing premium markets. These specifications govern hygiene, pesticide residues, microbial contamination, and authenticity. De Silva, and Esham(2020) highlighted that Ceylon cinnamon's competitive advantage depends precisely on meeting these specialized standards, and the adaptation this with farmers become programmatic.

6.8.2 Certification as barrier versus opportunity

The 97.3% identifying high certification costs as constraints reflects well-documented tensions in certification systems. The quality standards intended to ensure consumer safety excludes exactly those producers who might benefit most from premium market access. For Matara's cinnamon farmers, particularly women-led enterprises, certification costs without guaranteed price create impossible barriers to global market entry.

7. Conclusion

This study assessed the potential for value-added Ceylon cinnamon production in the Matara District and examined how interventions that address labour shortages could advance women's economic empowerment. Using the Sustainable Livelihood Framework alongside Global Value Chain analysis, the research shows that the sector possesses the foundational assets and market interest necessary for upgrading, but that realization of this potential is constrained by a set of interlinked limitations.

Three core constraints emerge as decisive. First, acute labour scarcity especially of skilled peelers threatens both the sustainability of production and the consistency of product quality; traditional knowledge transfer is weakening as younger people pursue alternative livelihoods, creating a skills limitations for quality and better processing.

Second, severe capital and infrastructure deficits block investment in processing and storage, high initial costs, limited credit access and uncertain price returns discourage the smallholders to purchase of processing equipment or establishing village-level facilities, while inadequate transportation, storage and processing centres increase post-harvest losses and low income returns.

Third, market-access and governance problems persist dependence on intermediaries, unequal information about end-market prices and quality factors, and the absence of testing facilities restrict farmers' ability to meet buyer requirements or capture higher margins.

Technical and production constraints further limit upgrading. Widespread gaps in knowledge about international standards (ESA, ASTA) and low certification uptake (e.g., HACCP 6%, Fair Trade 0%) restrict entry to premium markets, traditional processing methods, while culturally important, produce variability that complicates standardization. In addition, high production costs, climate vulnerabilities, moderate volumes and small landholdings limit economies of scale and raise the risk profile of any capital investment.

Although women contribute substantially to production, household responsibilities, low wages, lack of business and marketing training, limited decision-making power and mobility constraints confine many to technical tasks rather than entrepreneurial roles. At the same time, expressed interest in collective action and professional training shows clear potential for empowerment if structural barriers are addressed.

In sum, successful value-chain upgrading in Matara will require coordinated, multi-dimensional interventions, targeted skills development for processing, accessible finance and investment in village-level processing and testing infrastructure, strengthened market linkages and transparent standards information, and specific actions to develop women's business capacities and agency. Only by converting fragmented individual efforts into coordinated collective action backed by appropriate policies, infrastructure investment and institutional

support can smallholders, especially women, capture larger shares of value while safeguarding their livelihoods.

7.1 Recommendations

Based on the research findings and integrated theoretical analysis, this study proposes multi-level recommendations targeting government agencies, development organizations, private sectors, and farmer communities. Policy and institutional interventions should focus on establishing village-based processing infrastructure equipped with grinding equipment, packaging materials, quality testing tools, and storage facilities. Locating these centers within villages would enable women's participation while reducing transportation costs. Financial mechanisms should include microcredit facilities, equipment leasing arrangements, and group lending schemes with favorable terms for women-led enterprises, supported by government subsidies covering 50–70% of initial investment costs.

Furthermore, strengthening standards awareness through comprehensive training on international quality certifications (ESA, ASTA, HACCP, and organic standards) and creating certification support centers would improve market compliance. Reforming market linkages through direct relationships between cooperatives and exporters, transparent price mechanisms, and collective marketing support would enhance farmers' bargaining power.

Capacity building and women empowerment initiatives should integrate technical and business skill development, covering areas such as peeling, processing, financial management, and marketing. Training programs should be flexible and accessible to women, incorporating childcare facilities and home-based learning modules. Supporting women groups would promote collective action for joint processing, marketing, and input purchasing, with attention to legal registration, governance, and financial management. Gender specific interventions must address barriers such as childcare availability, wage equality, and safe, inclusive work environments.

Product development and market access strategies should prioritize accessible value-added products such as packaged cinnamon sticks, powder, spice blends, and simple food products, gradually expanding to higher-value commodities like essential oils and nutraceuticals. Establishing real-time market information systems and leveraging the Geographical Indication (GI) certification for branding and marketing would strengthen Ceylon cinnamon's premium position. Research and development efforts should pilot demonstration projects that showcase viable value-addition models, promote women leadership, and document learning for replication. Investment in small-scale, affordable processing technologies and climate adaptation research including climate-resilient varieties, early warning systems, and agroforestry models would enhance sustainability. Finally, coordination and partnership mechanisms should include multi-stakeholder platforms bringing together government, research institutions, farmer groups, exporters, and financial bodies to facilitate partnership and collaboration. Public-private partnerships should ensure fair benefit sharing while supporting consistent quality supply and technical assistance for producers.

7.2 Future Research Directions

Future research should include longitudinal studies tracking households involved in value addition to assess income growth, livelihood resilience, and women empowerment outcomes over time. Comparative analyses across major cinnamon producing districts such as Galle, Hambantota, and Kalutara would help identify contextual variations influencing upgrading potential and gender participation. Economic modelling of alternative governance structures such as direct exports, contract farming, and cooperative marketing would provide empirical evidence for policy and business innovation. Consumer preference studies in key export markets are needed to understand willingness to pay for attributes such as organic certification, fair trade, and origin authentication, informing more effective branding strategies.

Further research should also focus on gender dynamics, developing localized empowerment indicators that go beyond income to capture social and decision-making changes. Technological studies should assess the feasibility and adoption barriers of small-scale value-addition innovations while balancing mechanization with rural employment security.

Institutional and policy analysis would help identify coordination failures and gaps in existing spice sector programs, ensuring better alignment with smallholder needs. Finally, research into social capital and collective action should examine the sustainability of farmer cooperatives and women's groups, while applied product innovation research should explore new Ceylon cinnamon based products for food, pharmaceutical, and cosmetic markets, including emerging uses like dog chews and cocktail applications.

7.3 Research Barriers and Constraints

The research encountered several significant logistical and access challenges during field data collection in Matara district. Coordinating farmer visits across four geographically dispersed villages including Kamburupitiya, Thihagoda, Hakmana, and the Matara region required extensive travel and careful time management. The scattered nature of cinnamon farming communities required close coordination with the Department of Export Agriculture and Cinnamon Research Institute to identify and access appropriate respondents.

Data quality and sampling presented had limitations during the survey process. Missing or incomplete data resulted in the exclusion of five questionnaires from the final analysis, reducing the usable sample from an intended 80 to 75 respondents. Concerns about commercial confidentiality and information security were additional barriers to comprehensive data collection. Several farmers reluctance to share detailed information about their innovative products, commercial achievements, and specific market arrangements.

Consequently, the study was unable to fully capture information about novel products such as dog chews and cocktail-smoked cinnamon that some farmers were reportedly producing for niche markets.

The research also faced time and resource constraints that affected the scope of data collection. The field survey period spanning from mid-April to the end of May 2025 was relatively compressed for conducting comprehensive value chain analysis across multiple villages. This limited time-frame may not have fully captured the seasonal variations in production activities. Conducting the survey during a specific period may have missed insights from farmers engaged in different phases of the production cycle or those with varying seasonal employment patterns.

7.4 Popular Science Summery

Ceylon cinnamon, Sri Lanka's iconic spice, is famous worldwide for its aroma, flavour, and health benefits. Yet, although Sri Lanka produces nearly 90% of the world's true cinnamon, most exports leave the country as raw quills, limiting income opportunities for local farmers. Developing value-added products such as cinnamon powder, essential oils, teas, and cosmetics, offers a path to higher earnings, rural development, and global market competitiveness.

This study examined the potential for such value addition in the Matara district, one of Sri Lanka's main cinnamon growing areas. Surveys of 75 farmers revealed strong interest in value-added production but major constraints including high investment costs, lack of modern equipment, limited access to finance, and insufficient knowledge of international quality standards. Farmers also face challenges related to price fluctuations, labour shortages, and climate variability.

Women already play key roles in planting, peeling, and processing, but have limited involvement in management and marketing. Strengthening their participation through training, financial support, and small-scale processing opportunities could both address labour gaps and enhance household incomes.

Ceylon cinnamon holds remarkable potential not just as a spice, but as a driver of sustainable rural development in Sri Lanka. By promoting value addition, improving local facilities, and empowering women in the industry, Sri Lanka can strengthen its position in the global market while enhancing livelihoods in cinnamon-growing communities. With coordinated support from government, private stakeholders, and international partners, the humble cinnamon stick could become a symbol of both cultural heritage and economic resilience.

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Appendix 1

Ceylon Cinnamon Farmer Survey

Note: This will be an anonymous data collection and your name won't be appearing in any context. Interviews will be conducted in Sinhala language.

Basic Information

1. Age Group:
 - ☐ 18-30 years
 - ☐ 31-45 years
 - ☐ 46-60 years
 - ☐ Above 60 years
2. Gender:
 - ☐ Male
 - ☐ Female
3. Education level
 - ☐ Primary
 - ☐ Secondary
 - ☐ Higher Education
 - ☐ Other (Specify):
4. Experience in cinnamon farming:
 - ☐ Less than 5 years
 - ☐ 5-10 years
 - ☐ 11-20 years
 - ☐ More than 20 years

Land and Production Details

5. Total land area under cinnamon cultivation:
 - ☐ Less than 1 acre
 - ☐ 1-2 acres
 - ☐ 2-5 acres
 - ☐ More than 5 acres
6. Average annual cinnamon production:
 - ☐ Less than 100 kg
 - ☐ 100-500 kg
 - ☐ 501-1000 kg
 - ☐ More than 1000 kg
7. How often do you harvest cinnamon per year?
 - ☐ Once
 - ☐ Twice
 - ☐ Three times
 - ☐ More than three times
8. Which type of cinnamon products do you currently produce?
 - ☐ Raw cinnamon quills
 - ☐ Cinnamon powder

- ☐ Cinnamon oil
- ☐ Cinnamon tea
- ☐ Other (please specify):

9. How do you process your cinnamon?

- ☐ Traditional/manual peeling and processing
- ☐ Semi-mechanized processing
- ☐ Fully mechanized processing

Income from cinnamon production

10. What is the average income per harvest?

- ☐ Less than Rs. 50,000
- ☐ Rs. 50,000 - Rs. 100,000
- ☐ Rs. 100,001 - Rs. 200,000
- ☐ More than Rs. 200,000

11. What is your annual income from cinnamon sales?

- ☐ Less than Rs. 100,000
- ☐ Rs. 100,000 - Rs. 300,000
- ☐ Rs. 300,001 - Rs. 500,000
- ☐ Rs. 500,001 - Rs. 1,000,000
- ☐ More than Rs. 1,000,000

12. Has your income from cinnamon increased or decreased in the past 5 years?

- ☐ Significantly increased
- ☐ Slightly increased
- ☐ Remained the same
- ☐ Slightly decreased
- ☐ Significantly decreased

Labor and Employment

13. Number of family members involved in cinnamon cultivation:

- ☐ 1-2 people
- ☐ 3-4 people
- ☐ 5 or more people

14. Do you employ external workers for cinnamon processing?

- ☐ Yes, regularly
- ☐ Yes, seasonally
- ☐ No

15. How many trained cinnamon peelers do you have access to?

- ☐ None
- ☐ 1-2 peelers
- ☐ 3-5 peelers
- ☐ More than 5 peelers

Women's Participation

16. How many women in your household are involved in cinnamon-related activities?
- ☐ None
 - ☐ 1-2 women
 - ☐ 3-4 women
 - ☐ More than 4 women
17. What is the current role of women in your cinnamon production? (Select all that apply)
- ☐ Land preparation
 - ☐ Planting
 - ☐ Maintenance/weeding
 - ☐ Harvesting
 - ☐ Peeling
 - ☐ Processing
 - ☐ Value addition
 - ☐ Marketing/selling
 - ☐ Account keeping
 - ☐ Management
 - ☐ No involvement
 - ☐ Other (please specify):
18. What is the average time spent by women per day in cinnamon-related activities?
- ☐ Less than 2 hours
 - ☐ 2-4 hours
 - ☐ 4-6 hours
 - ☐ More than 6 hours
 - ☐ Seasonal involvement only
19. What training have women in your household received for cinnamon-related activities? (Select all that apply)
- ☐ Cultivation techniques
 - ☐ Peeling techniques
 - ☐ Processing methods
 - ☐ Value addition
 - ☐ Business management
 - ☐ Marketing skills
 - ☐ No training received
 - ☐ Other (please specify):
20. What are the main barriers for women's participation in cinnamon production? (Select all that apply)
- ☐ Household responsibilities
 - ☐ Cultural barriers
 - ☐ Lack of training
 - ☐ Physical demands of work

- ☐ Limited decision-making power
- ☐ Limited access to resources
- ☐ Safety concerns
- ☐ Limited mobility
- ☐ Low wages
- ☐ Other (please specify):

21. Are women interested in learning cinnamon peeling and value addition as a profession?

- ☐ Yes, very interested
- ☐ Somewhat interested
- ☐ Not interested
- ☐ Already involved
- ☐ Not sure

22. What roles do women currently perform in your cinnamon production? (Select all that apply)

- ☐ Cultivation
- ☐ Peeling
- ☐ Processing
- ☐ Value addition
- ☐ Marketing
- ☐ Management
- ☐ None

23. What value addition activities are women currently involved in? (Select all that apply)

- ☐ Making cinnamon powder
- ☐ Preparing cinnamon tea
- ☐ Oil extraction
- ☐ Product packaging
- ☐ Quality checking
- ☐ None
- ☐ Other (please specify):.....

24. What support would women need to increase their participation? (Select all that apply)

- ☐ Technical training
- ☐ Financial support
- ☐ Equipment support
- ☐ Childcare facilities
- ☐ Transportation support
- ☐ Marketing training
- ☐ Business management training
- ☐ Other (please specify):

25. Would women be interested in forming/joining women's groups for cinnamon activities?

- ☐ Yes, very interested
- ☐ Somewhat interested
- ☐ Not interested
- ☐ Already part of a group

- ☐ Need more information

Value Addition

26. Are you currently involved in any value addition activities?

- ☐ Yes
- ☐ No

27. Which value-added cinnamon products are you interested in producing? (Select all that apply)

- ☐ Cinnamon powder
- ☐ Cinnamon tea
- ☐ Cinnamon oil
- ☐ Cinnamon sticks (cut pieces)
- ☐ Cinnamon-based food products
- ☐ Cinnamon-based cosmetic products
- ☐ Other (please specify):
- ☐ Not interested in value addition

28. What are your main reasons for interest in value addition? (Select all that apply)

- ☐ Higher income potential
- ☐ Better market opportunities
- ☐ Reduce dependency on middlemen
- ☐ Employment for family members
- ☐ Year-round income generation
- ☐ Better price stability
- ☐ Other (please specify):

29. What are the main constraints preventing you from starting/expanding value addition? (Select all that apply)

- ☐ Lack of technical knowledge
- ☐ High initial investment costs
- ☐ Lack of processing equipment
- ☐ Limited access to credit
- ☐ Lack of storage facilities
- ☐ Limited market information
- ☐ Transportation issues
- ☐ Labor shortage
- ☐ Quality control challenges
- ☐ Packaging difficulties
- ☐ Other (please specify):

30. What type of support would you need to start value addition? (Select all that apply)

- ☐ Technical training
- ☐ Financial support/loans
- ☐ Equipment support
- ☐ Marketing support

- ☐ Storage facility support
 - ☐ Packaging support
 - ☐ Quality testing support
 - ☐ Other (please specify):
31. How much could you invest in value addition equipment/facilities?
- ☐ No capacity to invest
 - ☐ Less than Rs. 100,000
 - ☐ Rs. 100,000 - Rs. 300,000
 - ☐ Rs. 300,001 - Rs. 500,000
 - ☐ More than Rs. 500,000
32. Do you have space at your property for value addition activities?
- ☐ Yes, adequate space available
 - ☐ Yes, but limited space
 - ☐ No space available
 - ☐ Need to check requirements first
33. Are family members interested in participating in value addition activities?
- ☐ Yes, very interested
 - ☐ Somewhat interested
 - ☐ Not interested
 - ☐ Haven't discussed yet
34. What is your preferred scale of value addition operation?
- ☐ Small-scale (home-based)
 - ☐ Medium-scale (small factory)
 - ☐ Large-scale (commercial factory)
 - ☐ Not sure
35. Do you have any experience in food processing or value addition?
- ☐ Yes, with cinnamon products
 - ☐ Yes, with other products
 - ☐ No experience
 - ☐ Other (please specify):
36. Would you be interested in forming/joining a farmer group for value addition?
- ☐ Yes, very interested
 - ☐ Maybe, need more information
 - ☐ No, prefer to work independently
 - ☐ Already part of a group
37. What concerns do you have about value addition? (Select all that apply)
- ☐ Risk of investment loss
 - ☐ Market uncertainty
 - ☐ Competition from large processors
 - ☐ Time management
 - ☐ Quality maintenance

- ☐ Storage issues
- ☐ Energy/electricity costs
- ☐ Other (please specify):

Market Access and Challenges

38. How do you currently sell your cinnamon products?

- ☐ Direct to exporters
- ☐ Through middlemen
- ☐ Local market
- ☐ Cooperative society
- ☐ Other (please specify):

39. What are your main challenges in cinnamon production? (Select all that apply)

- ☐ Labor shortage
- ☐ High production costs
- ☐ Price fluctuations
- ☐ Climate issues
- ☐ Disease problems
- ☐ Lack of technical knowledge
- ☐ Limited access to market
- ☐ Other (please specify):

Training and Support

40. Have you received any training in cinnamon cultivation or processing?

- ☐ Yes
- ☐ No

41. What type of support would you like to receive? (Select all that apply)

- ☐ Technical training
- ☐ Financial support
- ☐ Marketing support
- ☐ Value addition training
- ☐ Equipment support
- ☐ Other (please specify):

Future Plans

42. Are you planning to expand your cinnamon production in the next 5 years?

- ☐ Yes
- ☐ No
- ☐ Undecided

43. Are you interested in producing more value-added products in the future?

- ☐ Yes
- ☐ No
- ☐ Maybe

Constraints in Meeting International Market Demand

44. What quality standards are you aware of for international markets? (Select all that apply)

- ☐ ISO Standards
- ☐ HACCP certification
- ☐ Organic certification
- ☐ Fair Trade certification
- ☐ GMP (Good Manufacturing Practices)
- ☐ Not aware of any standards
- ☐ Other (please specify):

45. What are your main challenges in meeting international quality standards? (Select all that apply)

- ☐ Lack of knowledge about standards
- ☐ High cost of certification
- ☐ Difficulty maintaining consistent quality
- ☐ Limited processing facilities
- ☐ Poor storage conditions
- ☐ Inadequate packaging
- ☐ Limited testing facilities
- ☐ Other (please specify):

46. What production constraints do you face? (Select all that apply)

- ☐ Shortage of skilled peelers
- ☐ High labor costs
- ☐ Limited land availability
- ☐ Old plantations/low productivity
- ☐ Disease problems
- ☐ Climate issues
- ☐ Poor soil conditions
- ☐ Lack of irrigation
- ☐ Other (please specify):

47. What post-harvest challenges do you encounter? (Select all that apply)

- ☐ Improper drying facilities
- ☐ Poor storage conditions
- ☐ Quality deterioration
- ☐ Pest problems
- ☐ Mold/fungal growth
- ☐ Transportation issues
- ☐ Limited processing facilities
- ☐ Other (please specify):

48. What technical constraints limit your production? (Select all that apply)

- ☐ Lack of modern equipment
- ☐ Limited processing technology

- ☐ Poor irrigation systems
- ☐ Limited access to quality planting material
- ☐ Lack of disease control methods
- ☐ Limited soil testing facilities
- ☐ Other (please specify):

49. What knowledge and skill gaps affect your production? (Select all that apply)

- ☐ Limited technical knowledge
- ☐ Lack of market information
- ☐ Poor understanding of standards
- ☐ Limited business skills
- ☐ Inadequate pest management knowledge
- ☐ Limited value addition knowledge
- ☐ Other (please specify):

50. What support services are lacking in your area? (Select all that apply)

- ☐ Extension services
- ☐ Quality testing facilities
- ☐ Market information services
- ☐ Training facilities
- ☐ Processing centers
- ☐ Transportation services
- ☐ Other (please specify):

Additional Comments:

Thank you for participating in this survey!

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