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Value Chain Analysis of Ngoc Linh Ginseng AT Nam Tra My District, Quang Nam Province, Vietnam

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Abstract

Ngoc Linh ginseng tree has recently been recognized with very high economic value for the farmers at Nam Tra My, which has led both local planters and internal and external enterprises to concentrate on hiring forest environment services for planting. This research was conducted to identify actors in the value chain of Ngoc Linh ginseng, assessing the net profit and added value of actors in the research area, thereby proposing appropriate management policies and mechanisms to exploit the development potential successfully and offering sustainable benefits for the participants, and the local. The primary data source was collected by surveying 246 people comprising planters, collectors, wholesalers, retailers, and Ngoc Linh ginseng processors. Through this study, the farmers play significant roles in maintaining and expanding the production scale; the collectors, wholesalers, and retailers play decisive roles in consumption activities; and the processor role is recorded at a low level. Hence, it is required to plan Ngoc Linh ginseng production area and apply safe production procedures to ensure that Ngoc Linh ginseng quality and invest in high-end production lines and technology for high-quality Ngoc Linh ginseng products.

Keywords: Value Chain, Value Chain Analysis, Value Chain Chart, Ngoc Linh Ginseng, Medical Materials, Vietnam.

Introduction

Ngoc Linh ginseng tree (its scientific name is *Panax Vietnamensis*) is known as a valuable ginseng found surrounding Ngoc Linh Mountain Top, under the canopy of virgin forest located at 3 districts namely Nam Tra My (Quang Nam), Dak Glei and Tu Mo Rong (Kon Tum). The study findings released by the Institute of Medicinal Materials - the Ministry of Health unveiled that the root of Ngoc Linh ginseng is skimmed with saponin compounds, including 26 saponin compounds generally found in Korean ginseng, US ginseng, Japanese ginseng, and 26 saponin compounds with new structure which have not been found in any ginsengs in the world. Among these, MR-2 is the main ingredient of Ngoc Linh ginseng that may support and prevent cancer (Vu Duy Dung et al. 2019).

Known as a western mountainous district of Quang Nam Province, Nam Tra My is characterized by natural area of 82,546.04 hectares, covered by virgin forest at the bottom of 2,598 metres high Ngoc Linh Mountain Range. This is a habitat of various minor ethnic groups such as Ca Dong, Xe Dang, M Mong, Co, etc. (accounting for 96%). The local economy is mainly based on agro-forestry production, planting Ngoc Linh ginseng, *Codonopsis Pilosula*, Tra My Cinnamon, *Gynostemma Pentaphyllum*, *Amomum Longiligulare*, etc. (Nam Tra My District's Portal 2021). Ngoc Linh ginseng tree has recently been recognized with very high economic value for the farmer at Nam Tra My.

Currently, engagement in farming Ngoc Linh ginseng is recorded for the local households, household

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groups, and numerous internal and external enterprises that rush into hiring forest environment services for planting Ngoc Linh ginseng. Appropriate management policies and mechanisms are required for the farming and business of Ngoc Linh ginseng at Nam Tra My to successfully exploit the development potential, offering sustainable benefits for the participants and facilitating the local agricultural and rural economic development. That is why the in-depth survey on the Ngoc Linh ginseng value chain in Nam Tra My District was selected and conducted by the group of authors.

Up to now, a series of value chain studies have been launched in Vietnam, such as vegetable value chain (Hang 2018), coco seed (Tran 2011), avocado (GTZ 2006), orange (Nguyen et al. 2019), etc. Meanwhile, few studies analyzed the medical materials value chain, such as the study on “Value chain development of medical materials in Quang Ninh province” by Tran (2019), “Study on medical tree value chain - *Phyllanthus Urinaria* L tree” of Huynh Bao Tuan et al (2013), or “Study on value chain of medical materials products as herbal bath at Sa Pa District” of Ngo (2010), “Value chain analysis of citronella at Tuy Phuoc District, Binh Dinh Province” of Nguyen et al. (2021), etc. Moreover, the Ngoc Linh ginseng value chain has not been analyzed by any studies. This is recognized as a study gap that is concerned and fulfilled by the group of authors.

Literature Review

Concept of Value Chain and Value Chain Analysis

Concerning the value chain concept, there are three main approaches: the Fillière approach (chain, loop), the analysis framework of Michael Porter, and the global approach.

The value chain concept was initially introduced in 1980 by Michael Porter, with the meaning as a critical tool for enterprises to create added value for customers (Porter 1985). The Fillière approach was applied to analyze agricultural production systems (rubber, cotton, coffee, etc.) in developing countries within the French colonial system. In this context, the Fillière approach specifically focused on how local production systems connect with processing, production, trading, export, and final consumption industries.

The researcher Kaplinsky Rapheal (Kaplinsky and Morris 2000) introduced the concept of the value chain in global analysis. According to Kaplinsky, the value chain encompasses a series of essential activities that facilitate the transformation of a product or service from an abstract idea into a tangible reality. These activities span various production phases, involving a combination of physical transformation and the utilization of diverse production services. The value chain extends from distribution to the final consumers and concludes with the disposal of the product after its use. In essence, the value chain represents a sequential arrangement of activities executed within an enterprise to facilitate the successful introduction of a specific product to the market. These activities encompass a range of functions, including conceptual development, product design, input procurement, pre-, during-, and post-production organization, marketing and distribution, and the provision of post-sales services. By establishing this activity chain, suppliers, producers, and end-users are interconnected, with each stage contributing to the enhancement of the final product's value.

The value chain refers to the series of activities conducted by different stakeholders, including primary producers, purchasers, processing manufacturers, distributors, and service providers, to convert raw materials into a final retail product. It encompasses the entire range of activities within a single enterprise and emphasizes the value-added processes throughout. This broad perspective highlights the interconnections and interdependencies among these activities rather than solely focusing on product flows from raw materials to finished products and their supply to consumers.

Value chain analysis is a methodological approach used to examine and evaluate how value can be

enhanced within the various activities involved (Porter 1985). It focuses on studying the nature of relationships among participants in the value chain and the influence of these relationships on development (Gidey et al. 2016). Key participants within the value chain include input suppliers, farmers, processors, carriers, collectors, wholesalers, retailers, and end-users. In an effective value chain, these participants collaborate and support each other, thereby increasing the competitiveness of the entire value chain. This collaborative effort ensures that the product is efficiently managed from the farm to its delivery to the end users (Tadesse & Bakala 2018).

Analysis Contents of Value Chain

There exist diverse perspectives on the value chain analysis, and certain authors have provided summaries of the analysis contents and toolkits.

By GTZ's "ValueLinks" (2007), the process of value chain analysis encompasses several fundamental aspects: i. Chain mapping, which involves the identification and visualization of the actors and activities within the chain; ii. Quantification and analysis of chain details, entailing the measurement and evaluation of various elements within the chain; iii. Economic analysis of the chain, examining the financial viability and profitability of distinct segments.

Furthermore, to effectively serve the value chain development, several crucial steps should be undertaken. This includes the careful selection of an appropriate value chain, the application of findings from the chain analysis to formulate policies aimed at enhancing the chain, the facilitation of chain development, the strengthening of business affiliation relationships among chain agents, the establishment of private-public, the provision of financial mechanisms for supporting the value chain, the development and implementation of standards about quality, societal impact, and ecological considerations, the improvement of the overall business environment, and the implementation of robust management and control measures to ensure sustainable economic.

M4P (2008) revealed that the contents and approaches utilized in value chain analysis to enhance the effectiveness of the value chain for poverty alleviation may include: i. Selection of priority value chains for analysis; ii. Value chain mapping; iii. Cost and profit analysis; iv. Technology and knowledge analysis and upgrades; v. Analysis of income generated through the value chain; vi. Analysis of employment opportunities within the value chain; vii. Governance analysis and services; viii. Analysis of linkages.

In Vietnam, the examination of value chains holds significant importance for the overall sustainable development of the country, particularly within the agricultural product category, amidst the prevailing trends of integration and globalization. Through the findings derived from value chain analysis, the formulation of strategies and the implementation of measures for upgrading the chain and establishing horizontal and vertical linkages become imperative. These endeavors aim to augment added value, income generation, and market accessibility for the various agents involved in the value chain, ensuring long-term sustainability.

Methods

Data Collection Method

Primary data was collected from reports provided by the People's Committee of Nam Tra My District, the Statistical Yearbook of Nam Tra My District, and the Statistical Yearbook of Quang Nam Province.

The primary data for this study was collected through a comprehensive survey involving 186 households, household groups, and enterprises engaged in the cultivation of Ngoc Linh ginseng trees. The survey targeted specific locations, namely Tra Linh, Tra Cang, and Tra Nam Communes, which are known for having the largest plantation areas of Ngoc Linh ginseng trees and a high concentration of experienced

households and groups in this field. Furthermore, in-depth interviews were conducted with key stakeholders, including managers from the People's Committee of Nam Tra My District and scientists affiliated with Quy Nhon University. In order to facilitate an interactive exchange of ideas and perspectives, two focused group discussions were organized, one at the People's Committee of Nam Tra My District and another at Tra Linh Commune. These rigorous data collection methods were employed to ensure the acquisition of comprehensive and reliable information for the study.

Furthermore, an extensive survey was undertaken, encompassing 19 collectors, 20 wholesalers, 20 retailers, and 1 Ngoc Linh ginseng processing plant. This comprehensive approach ensured the inclusion of key stakeholders across the entire value chain of Ngoc Linh ginseng, providing a holistic perspective on the industry.

Analytic Method

The study employed a systematic approach to value chain analysis, implementing the following steps:

- (1) Prioritization: The priority of Ngoc Linh ginseng in Nam Tra My District was determined as the focus of the value chain analysis.
- (2) Mapping: A comprehensive value chain mapping was conducted, encompassing the key actors, activities, and linkages involved in the Ngoc Linh ginseng tree value chain in Nam Tra My District.
- (3) Cost and profit analysis: A detailed assessment of costs and profits was performed for the agents operating within the Ngoc Linh ginseng value chain in Nam Tra My District. This analysis considered the total value generated by the value chain, considering opportunities for engagement and benefits for individuals living in poverty. The analytical framework proposed by GTZ (2007) guided this assessment.
- (4) Technology, knowledge, and upgrades: Concurrent with the third step, an analysis of technology, knowledge, and potential upgrades was conducted. This analysis, based on the M4P (2008) approach, examined the technological aspects and identified possible enhancements within the value chain.

By following these rigorous analytical steps, the study aimed to gain a comprehensive understanding of the Ngoc Linh ginseng value chain in Nam Tra My District. The findings would then inform strategies for improvement and poverty reduction.

Results

Identify Value Chain Analysis Priority of Ngoc Linh Ginseng Located at Nam Tra My District

Through the study initiated by the group of authors, the value chain analysis of Ngoc Linh ginseng tree was affirmed to be necessary for crop transformation study in Nam Tra My District because The market demand was high and increasingly high in terms of Ngoc Linh ginseng products; Potential for job generation for the local labor, especially the minor ethnic persons and the poor households; Potential for income increase and stability; Thanks to characteristics of Ngoc Linh ginseng tree, farming this plant not only offered high economic value but also helped to protect the natural forest environment; Planting and trading in Ngoc Linh Ginseng at Nam Tra My may further create added value by expanding list of products and customers.

Furthermore, many favorable factors were available to develop the value chain of Ngoc Linh ginseng tree at Nam Tra My District, such as The Government approved the Master Development Plan of Medical Materials for 2020 with a vision for 2030 and many incentive policies were launched to develop the value chain of medical materials. The Prime Minister promulgated Decision No. 787/QĐ-TTg on recognizing Ngoc Linh Ginseng - Vietnam Ginseng as the national product. Quang Nam Provincial Authority promulgated Resolution No. 2117/QĐ-UBND on approving the Ngoc Linh ginseng planning area, including seven communes (Tra Nam, Tra Linh, Tra Cang, Tra Don, Tra Tap, Tra Don, and Tra Leng); the Resolution No. 41/2017/NQ-HĐND on mechanism on encouragement, preservation and development of Ngoc Linh

ginseng in Quang Nam Province in the period of 2018 - 2025; Resolution No. 09/2022/NQ-HDND stipulating a mechanism to encourage the conservation and development of Ngoc Linh Ginseng and other medicinal plants in Quang Nam province from 2022 to 2025.

Currently, Ngoc Linh ginseng tree created various products to be marketed, including fresh and processing Ngoc Linh ginseng root; fresh and processing Ngoc Linh ginseng leaves; Ngoc Linh ginseng seed as seedling and processing purposes; 1 or 2-year Ngoc Linh ginseng seedling. However, within the scope of this topic, our research group only focused on analyzing the value chain of Ngoc Linh ginseng seed and root as the two highest economic value products from Ngoc Linh ginseng tree.

Value chain analysis of Ngoc Linh ginseng root at Nam Tra My District

Value chain mapping of Ngoc Linh ginseng root at Nam Tra My District

The value chain of Ngoc Linh ginseng root at Nam Tra My District was characterized by five main functions: input supplying, planting, collecting process, trading, and consuming. Agents participating in the Ngoc Linh ginseng value chain, comprising farmers (households, household groups, cooperatives, and enterprises); collectors (public servants, local officials, or businesses of Ngoc Linh ginseng; processors (by simple methods: drying, submerging in wine or honey, by farmers, collectors, and processors); consumers including wholesalers and retailers.

(1) Input supplier

Many agents are involved in input supply, directly or indirectly, to farm ginseng at Nam Tra My District. Input suppliers provided seedling and 1-2 years seedling trees, fertilizers, production process, and tools; human resources; garden care and protected technique; forest environment assignment; credit support. The ginseng planting land mainly originated from the forest environment service lease land, with an initial lease term of 25 years.

(2) Ginseng farmer

Ngoc Linh ginseng farmers at Nam Tra My included households and household groups (approximately 834.48 hectares), cooperatives, and enterprises (about 380.23 hectares).

The main functions of the value chain undertaken by the ginseng farmers included preparing the planting beds; sowing seeds or planting trees; clearing vines, regenerating bushes and weeding on ginseng beds; additional fertilization of mountain humus for plants; pest control; protecting ginseng trees from rodents and ginseng thieves; harvesting and post-harvest handling.

Table 1: Statistics of Farming Area (Calculated on Forest Environment Service Leasing Area).

No.	Commune	Farming area (ha)
1	Tra Cang	133.49
2	Tra Don	15.75
3	Tra Don	11.90
4	Tra Leng	17.00
5	Tra Linh	707.65
6	Tra Nam	288.48
7	Tra Tap	40.44
Total		1,214.71

Source: Department of Agriculture and Rural Development of Nam Tra My District.

Statistical results of a survey on 180 ginseng farming households covering an area of 1 ha or more were described in Table 2.

Table 2: Statistics of Ginseng Farmer Survey.

Classification criteria		Quantity	Percent (%)
Age of ginseng farming household owner	15 – 29	12	6.45
	30 – 39	60	32.26
	40 – 49	51	27.42
	50 – 59	29	15.59
	60 or more	34	18.28
Qualification of ginseng farming households	Primary school	108	58.06
	Secondary school	44	23.65
	High school	24	12.90
	Vocational school, college and university	10	5.39
Number of years of ginseng farming experience household's owner	1 - 10 years	52	27.96
	11 - 20 years	90	48.39
	21 - 30 years or more	44	23.65
Total		186	100.00

Source: Survey by the Group of Authors.

(3) *Businessman*

In this study, the businessman comprised collectors, wholesalers, and retailers. The average age of local collectors was 38.5; wholesalers and retailers were aged 43 and 39, respectively. On average, the ginseng collector had (9.5 years) experience than that of wholesalers (7.5 years) and retailers (6 years). Most of the collectors were from local ginseng enterprises and kiosks at ginseng exhibitions, and approximately 2.5% of collectors were known as local public officials. Wholesalers and retailers specialized in trading mainly came from Ho Chi Minh City and Hanoi. The average fund volume of collectors, wholesalers, and retailers was VND 1-2 billion, VND 500 - 600 million, and VND 100 - 200 million. Collectors, wholesalers, and retailers operated all year round. Trading was mainly based on both purchase orders of buyers and monthly Ngoc Linh Ginseng exhibitions. The number of fresh whole-root Ngoc Linh ginseng consumed at each ginseng exhibition varied within the range of 50 - 60 kg on average.

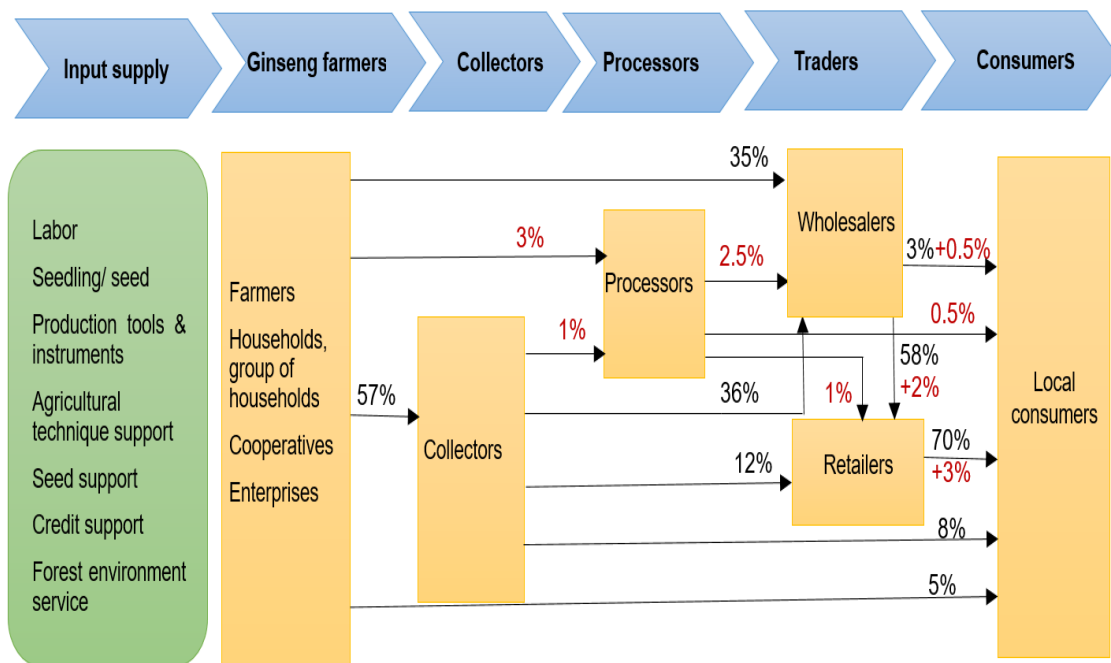
(4) *Processor*

Ginseng products were mostly self-processed by Ngoc Linh ginseng planting households, household groups, and enterprises or collectors. Currently, only one processing plant is located in Nam Tra My District, equipped with a production line and production technology (Tra My Agricultural Products and Medicinal Herbs Joint Stock Company) and put into operation in early 2023. However, its main products were local agricultural products, while only Ngoc Linh ginseng submerged in wine and honey was available. The processing plant's input materials originated generally from the ginseng garden of the plant.

(5) *Consumers*

Consumers interested in health or oriental medicine, and so on, were identified as Ngoc Linh ginseng consumers. Consumers purchased fresh raw ginseng roots to process as Ngoc Linh ginseng wine, honey or dried ginseng chips, ginseng tea, etc., for health enhancement.

Figure 1 demonstrated intact Ngoc Linh ginseng root value with black diversion figures for whole fresh ginseng root and red diversion figures for processed ginseng root. The survey results unveiled that about 96% of Ngoc Linh ginseng sold at the market is whole fresh root, and only 4% is processed by the farmer or collector to satisfy the market demand. The role of the processor factor in the value chain was low, so the following analyses only focused on raw ginseng (accounting for 96% of the total harvested ginseng quantity).

Figure 1: Value chain mapping of Ngoc Linh ginseng root at Nam Tra My District.

Source: Survey by the Group of Authors.

Cost - Benefit Analysis (CBA) of Agents in the Fresh Intact Ngoc Linh Ginseng Value Chain

It generally took seven years from planting the ginseng to harvesting. During that time, about 95% of the ginseng plants planted will be collected, and only 5% of the Ngoc Linh ginseng plants will continue to be cultivated so that the ginseng roots grow and harvest seeds over the years. Among ginseng roots harvested at the garden after seven years, Ngoc Linh ginseng roots that type 1 (ginseng tree nine years old or more, 10-12 roots/kg) account for 0.15%. Ngoc Linh ginseng roots type 2 (ginseng tree eight years old, 15-17 roots/kg), accounting for 0.75%. Ngoc Linh ginseng type 3 (ginseng tree with seven years old, 20-22 roots/kg), accounting for 22.86%, and Ngoc Linh ginseng type 4 (ginseng tree with six years old, 25-30 roots/kg) accounting for 76.24%.

The average income of farmers from selling whole fresh Ngoc Linh ginseng was VND 27,768,000,000/ha after at least seven years of cultivation. The selling price of fresh Ngoc Linh ginseng varied within the range of VND 110- 220 million/kg depending on (1) age, (2) weight, (3) aesthetics, (4) farming area, and (5) market. In the value chain of raw Ngoc Linh ginseng, intermediary costs accounted for 3.87% of the total income of farmers of that seedling made up over 90%. The output of selling raw 7-year ginseng was approximately 232 kg. The average selling price was approximately VND 119.7 million/kg. The added value was VND 26,696,430,000, accounting for 96.14%. The net profit of farmers is VND 26,365,645,000/ha, accounting for 94.95% of their income.

For the farmer, after seven years of planting, 1 hectare of Ngoc Linh ginseng generated an income of VND 3,766,520,000/year. Although the annual economic value was very high, the Ngoc Linh ginseng tree was qualified to harvest roots and generate profit from year four. As the initial investment costs were very high and the payback period was long, the poor farmers who are hard to invest often determined to work for the ginseng garden owners to earn income, learn planting techniques, and accumulate cultivating experience.

Table 3: Analysis of Raw Ngoc Linh Ginseng Value Chain Criteria from Farmers.

Items	Cost by 1 ha (VND/ha)	Cost by 1kg of ginseng (VND/kg)	Percent (%)
Selling price	27,768,000,000	119,700,000	100.00
Intermediate expenses	1,071,570,000	4,619,000	3.86
Seedling	1,005,175,000	4,333,000	3.62
Fertilizer	2,380,000	10,000	0.01
Production tools and instruments	36,275,000	156,000	0.13
Transportation	27,740,000	120,000	0.10
Added value	26,696,430,000	115,081,000	96.14
Labor	227,695,000	981,000	0.82
Land lease	20,100,000	86,000	0.07
Bank loan interest	62,100,000	268,000	0.22
Gross profit (GPr)	26,386,535,000	113,746,000	95.03
Depreciation of ginseng garden sentry box	20,890,000	90,000	0.08
Net profit (NPr)	26,365,645,000	113,656,000	94.95

Source: Survey by the Group of Authors.

When purchase orders are available, the collector will arrive at Ngoc Linh ginseng farms and directly take up products from the farms. Besides, monthly ginseng market days were a good time for collectors to acquire fully diversified ginsengs. The collectors purchased 57% of fresh Ngoc Linh ginseng from farmers and sold through channels, including wholesalers from Ho Chi Minh City and Hanoi, accounted for 36%; retailers accounted for 12%; consumers accounted for 8%; besides their only use 1% to processing into different products. During the ginseng market days, under the supervision of the competent authorities, the price of each ginseng was publicly announced. Hence, the ginseng's selling price was not found with a big difference regardless of high or low procurement volume. The average price of fresh Ngoc Linh ginseng roots marketed by the collectors was VND 125,600,000/kg.

Table 4: Analysis of Raw Ngoc Linh Ginseng Value Chain Criteria Per Kg from Collectors.

Items	Value (VND)	Percent (%)
Selling price	125,600,000	100.00
Intermediate expenses	120,270,000	95.76
Procurement of raw Ngoc Linh ginseng	119,700,000	95.30
Transportation	300,000	0.24
Packaging	15,000	0.01
PR	255,000	0.20
Added value	5,330,000	4.24
Labor	50,000	0.04
Profit (GPr= NPr)	5,280,000	4.20

Source: Survey by the Group of Authors.

The wholesalers from Ho Chi Minh City and Hanoi generally made in advance purchase orders and directly acquired products at ginseng gardens during harvesting time. Wholesalers also signed a sales contract with farmers to ensure fully provided ginseng quantity. Besides, they also purchased from the local collectors or ginseng market days organized for acquisition. Wholesalers directly bought raw Ngoc Linh ginseng from farmers (35%) for VND 119,700,000/kg and local collectors (36%) for VND 125,600,000/kg. The average buying price of raw Ngoc Linh ginseng was VND 122,690,000/kg, accounting for 87.29%. Meanwhile, the expenses related to transportation, packaging, advertising, and labor were negligible, so the wholesalers earned 11.87% of profit, equivalent to VND 15,225,000/kg.

Table 5: Analysis of Raw Ngoc Linh ginseng value Chain Criteria Per Kg from Wholesalers.

Items	Value (VND)	Percent (%)
Selling price	140,550,000	100.00
Intermediate expenses	123,665,000	87.99
Procurement of raw Ngoc Linh ginseng	122,690,000	87.29
Transportation	750,000	0.53
Packaging	25,000	0.02
PR	200,000	0.14
Added value	16,885,000	12.01
Labor	200,000	0.14
Profit (GPr = NPr)	16,685,000	11.87

Source: Survey by the Group of Authors.

Most retailers bought raw Ngoc Linh ginseng from wholesalers (58%) for VND 140,000,000/kg.

Table 6: Analysis of Raw Ngoc Linh Ginseng Value Chain Criteria Per Kg from Retailers.

Items	Value (VND)	Percent (%)
Selling price	145,000,000	100.00
Intermediate expenses	138,230,000	95.33
Buying price of raw Ngoc Linh ginseng	137,530,000	94.85
Transportation	520,000	0.36
Packaging	70,000	0.05
PR	110,000	0.08
Added value	6,770,000	4.67
Labor	90,000	0.06
Profit (GPr = NPr)	6,680,000	4.61

Source: Survey by the Group of Authors.

Moreover, they visited ginseng market days to directly acquire Ngoc Linh ginseng products from collectors having kiosks at such markets (12%) at an average price of VND 125,600,000/kg. Costs of buying raw Ngoc Linh ginseng was VND 137,530,000/kg, accounting for 94.85%. Retailers sold for VND 145,000,000/kg, earning a profit of VND 6,770,000/kg, accounting for 4.67% of their income.

Analysis of Links in raw Ngoc Linh Ginseng Value Chain

Distribution market channels of raw Ngoc Linh ginseng trees at Nam Tra My District:

Channel 1: Ginseng farmers → Collectors → Wholesalers → Retailers → Consumers

Channel 2: Ginseng farmers → Collectors → Retailers → Consumers

Channel 3: Ginseng farmers → Collectors → Consumers.

Channel 4: Ginseng farmers → Wholesalers → Retailers → Consumers.

Channel 5: Ginseng farmers → Retailers → Consumers.

Channel 6: Ginseng farmers → Consumers.

It was estimated that 232 kg of fresh Ngoc Linh ginseng roots are marketed after seven years of cultivating by ginseng farmers at Nam Tra My. All channels were employed to sell products, mostly channel No. 1 and No. 4. Channel No. 1 was the most general channel, in which ginseng farmers made the highest contributions (81.99%) to increase in net value to the products and the retailers earned the lowest net added value (3.54%). At the remaining channels, lacking one or some participatory agents

increased the net added value of the remaining agents because they must cover the tasks and roles of non-participatory agents.

Table 7: Added Value and Net Added Value in Channels of Raw Fresh Ngoc Linh Ginseng Roots' Value Chain.

Items	Farmers	Collectors	Wholesalers	Retailers	Total
Channel 1: Ginseng farmers → Collectors → Wholesalers → Retailers → Consumers					
Selling price	119,700,000	125,600,000	140,000,000	145,000,000	
Intermediate expenses	4,619,000	119,700,000	125,600,000	140,000,000	
Added value	115,081,000	5,900,000	14,400,000	5,000,000	
Additional expenses	1,425,000	50,000	200,000	90,000	
Net added value	113,656,000	5,850,000	14,200,000	4,910,000	138,616,000
% Net added value	81.99	4.22	10.24	3.54	100.00
Channel 2: Ginseng farmers → Collectors → Retailers → Consumers					
Selling price	11,700,000	125,600,000		145,000,000	
Intermediate expenses	4,619,000	119,700,000		125,600,000	
Added value	115,081,000	5,900,000		19,400,000	
Additional expenses	1,425,000	50,000		90,000	
Net added value	113,656,000	5,850,000		19,310,000	138,816,000
% Net added value	81.88	4.21		13.91	100.00
Channel 3: Ginseng farmers → Collectors → Consumers					
Selling price	119,700,000	125,600,000			
Intermediate expenses	4,619,000	119,700,000			
Added value	115,081,000	5,900,000			
Additional expenses	1,425,000	50,000			
Net added value	113,656,000	5,850,000			119,506,000
% Net added value	95.10	4.90			100.00
Channel 4: Ginseng farmers → Wholesalers → Retailers → Consumers					
Selling price	119,700,000		140,000,000	145,000,000	
Intermediate expenses	4,619,000		119,700,000	140,000,000	
Added value	115,081,000		20,300,000	5,000,000	
Additional expenses	1,425,000		200,000	90,000	
Net added value	113,656,000		20,100,000	4,910,000	138,666,000
% Net added value	81.96		14.50	3.54	100.00
Channel 5: Ginseng farmers → Retailers → Consumers					
Selling price	119,700,000		143,000,000		
Intermediate expenses	4,619,000		119,700,000		
Added value	115,081,000		23,300,000		
Additional expenses	1,425,000		200,000		
Net added value	113,656,000		23,100,000		136,756,000
% Net added value	83.11		16.89		100.00
Channel 6: Ginseng farmers → Consumers					
Selling price	119,700,000				
Intermediate expenses	4,619,000				
Added value	115,081,000				
Additional expenses	1,425,000				
Net added value	113,656,000				113,656,000
% Net added value	100.00				100.00

Source: Survey by the Group of Authors.

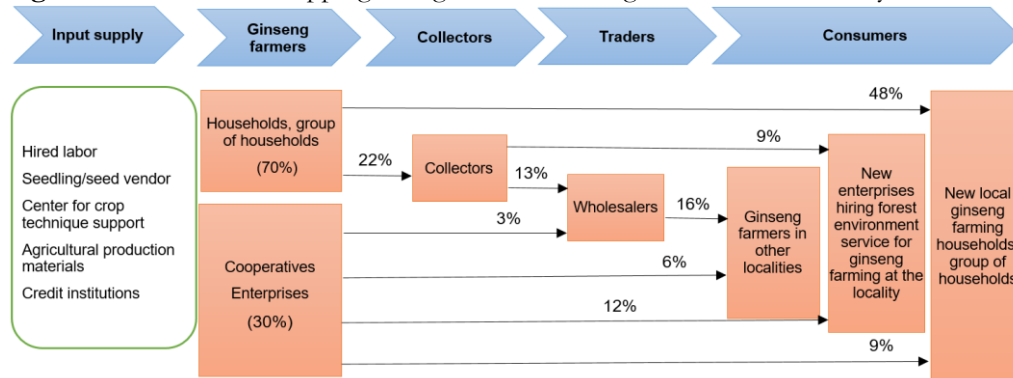
Among all the chain's supply channels, ginseng farmers played the most viral keys and, in many cases, undertook various functions before and after planting. The net added value of ginseng farmers was always higher than other agents; this was the numerous motivations for ginseng farmers to increase the farming area and investment into seedlings, focusing on ginseng cultivating, caring for, and protecting ginseng trees.

Value chain analysis of Ngoc Linh ginseng seed at Nam Tra My District

Value chain diagram of Ngoc Linh ginseng seed

Agents participating in the Ngoc Linh ginseng seed value chain included farmers (households, household groups, cooperatives, enterprises), collectors (local collectors or Ngoc Linh ginseng enterprises and business establishments), wholesalers and consumers (newly ginseng planting households, locality household groups, new enterprises hiring forest environment service for ginseng planting at other localities (ginseng acclimatization)).

Figure 2: Value Chain Mapping of Ngoc Linh Ginseng Seed At Nam Tra My District.



Source: Survey by the Group of Authors.

Cost - Benefit Analysis (CBA) of agents in the Ngoc Linh ginseng seed value chain

The selling price of Ngoc Linh ginseng seeds varied between sellers, namely ginseng farming households, household groups, cooperatives, and enterprises. The cooperatives and enterprises generally owned better seed quality, having invoices and certificates of origin of the seeds and further providing technical services. However, due to negligible quality differences and relatively different selling prices (VND 100,000/ ginseng seed, originating from the households, household groups against VND 120,000/ seed, from the cooperatives and enterprises). While 48% of local farmers acquired seeds from long-time ginseng planting households and household groups, only 21% of new local farmers purchased Ngoc Linh ginseng seeds from cooperatives and enterprises to start a new crop.

Table 8: Analysis of Ngoc Linh Ginseng Seed Value Chain Criteria Per Hectare from Farmers.

Items	Value (VND)	Percent (%)
Selling price	39,504,000,000	100.95
Intermediate expenses	1,587,925,000	4.06
Seedling	1,416,615,000	3.62
Fertilizer	3,355,000	0.01
Production tools and instruments	128,860,000	0.33
Transportation	39,095,000	0.10
Added value	37,916,075,000	96.89
Labor	353,740,000	0.90
Land lease	28,330,000	0.07
Bank loan interest	87,520,000	0.22
Gross profit (GPr)	37,446,485,000	95.69
Depreciation of ginseng garden sentry box	29,435,000	0.08
Net profit (NPr)	37,417,050,000	95.62

Source: Survey by the Group of Authors.

New farmers generally purchased a certain quantity of seeds from cooperatives and enterprises for efficiency comparison between seeds from 2 different sources. Similarly, most ginseng farmers in other areas are selected to buy seeds and seedlings from cooperatives and enterprises or from wholesalers to ensure the seed's authenticated origin.

For Ngoc Linh ginseng seeds, added value accounted for 96.89% of the total, and net profit made up 95.62%. Total additional costs were VND 105,590,000/ha (0.27%), mainly for tools protecting seeds from loss due to animals and workers taking such seed protection tools to the tree. Because net income and profit from Ngoc Linh ginseng seed were generally higher than that of raw Ngoc Linh ginseng root, many farmers wanted to nurture the ginseng trees through the years to harvest and sell seeds rather than roots.

Table 9: Analysis of Ngoc Linh Ginseng Seed Value Chain Criteria Per Seed from Farmers.

Items	Farming Households, Group of Households		Farming Cooperatives, Enterprises	
	Value	Percent (%)	Value	Percent (%)
Selling price	100,000	100.00	120,000	100.00
Intermediate expenses	4,261	4.26	4,261	3.55
Seedling	3,801	3.80	3,801	3.17
Fertilizer	9	0.01	9	0.01
Production tools and instruments	346	0.35	346	0.29
Transportation	105	0.11	105	0.09
Added value	95,739	95.74	115,739	96.45
Labor	949	0.95	949	0.79
Land lease	76	0.08	76	0.06
Bank loan interest	235	0.24	235	0.20
Administration	0		6,000	5.00
Gross profit (GPr)	94,479	94.48	108,479	90.40
Depreciation of ginseng garden sentry box	79	0.08	79	0.07
Net profit (NPr)	94,400	94.40	108,400	90.33

Source: Survey by the Group of Authors.

The cooperatives and enterprises involved in ginseng farming pay additional administrative fees to facilitate seed sales with clear invoices and certificates of origin. The main findings unveiled that Ngoc Linh ginseng farmers as households and household groups earn a net profit of VND 94,400/seed while the cooperatives and enterprises earned VND 108,400/seed.

Households and household groups, in addition to direct sales of seeds to new farmers, sold the remaining (22%) to the collectors. Such collectors collected seeds from households and household groups and sold them to wholesalers with complete invoices and documents. Profit earned by the collectors would be VND 13,818/seed, accounting for 11.52%.

Table 10: Analysis of Ngoc Linh Ginseng Seed Value Chain Criteria Per Seed from Collectors.

Items	Value (VND)	Percent (%)
Selling price	120,000	100.00
Intermediate expenses	106,168	88.47
Procurement of Ngoc Linh ginseng seeds	100,000	83.33
Transportation	28	0.02
Packaging	12	0.01
PR	128	0.11
Administration	6,000	5.00
Added value	13,832	11.53
Labor	14	0.01
Profit (GPr = NPr)	13,818	11.52

Source: Survey by the Group of Authors.

Wholesalers purchased Ngoc Linh ginseng seeds from collectors (13%) and from farming enterprises

(3%), then resold to other local farmers, facilitating Ngoc Linh ginseng acclimatization to areas with terrain and climate conditions favorable for Ngoc Linh ginseng tree growth and development. Profit earned by the wholesalers would be VND 19,422/seed, accounting for 13.87%.

Table 11: Analysis of Ngoc Linh Ginseng Seed Value Chain Criteria Per Seed from Wholesalers.

Items	Value (VND)	Percent (%)
Selling price	140,000	100.00
Intermediate expenses	120,490	86.06
Procurement of Ngoc Linh ginseng seeds	120,000	85.71
Transportation	352	0.25
Packaging	20	0.01
PR	118	0.08
Added value	19,510	13.94
Labor	88	0.06
Profit (GPr = NPr)	19,422	13.87

Source: Survey by the Group of Authors.

Analysis of links in raw Ngoc Linh ginseng seed value chain

From the above agents, various consumption channels may be established for the value chain of Ngoc Linh ginseng seeds:

Channel 1: Ginseng farmers → Collectors → Wholesalers → Consumers.

Channel 2: Ginseng farmers → Collectors → Consumers.

Channel 3: Ginseng farmers → Retailers → Consumers.

Channel 4: Ginseng farmers → Consumers.

Table 12: Added Value and Net Added Value in Channels of Ngoc Linh Ginseng Seeds' Value Chain.

Items	Farmers	Collectors	Wholesalers	Total
Channel 1: Ginseng farmers → Collectors → Wholesalers → Consumers				
Selling price	100,000	120,000	140,000	
Intermediate expenses	4,261	100,000	120,000	
Added value	95,739	20,000	20,000	
Additional expenses	1,339	14	88	
Net added value	94,400	19,986	19,912	134,298
% Net added value	70.29	14.88	14.83	100.00
Channel 2: Ginseng farmers → Collectors → Consumers				
Selling price	100,000	120,000		
Intermediate expenses	4,261	100,000		
Added value	95,739	20,000		
Additional expenses	1,339	14		
Net added value	94,400	19,986		114,386
% Net added value	82.53	17.47		100.00
Channel 3: Ginseng farmers → Retailers → Consumers				
Selling price	120,000	140,000		
Intermediate expenses	4,261	120,000		
Added value	115,739	20,000		
Additional expenses	1,339	88		
Net added value	114,400	19,912		134,312
% Net added value	85.17	14.83		100.00
Channel 4: Ginseng farmers → Consumers				
Selling price	107,200			
Intermediate expenses	4,261			
Added value	102,939			
Additional expenses	1,339			
Net added value	101,600			101,600
% Net added value	100.00			100.00

Source: Survey by the Group of Authors.

When the Ngoc Linh ginseng tree grew in good climate conditions without disease and was well nurtured, 3-year-old trees began to flower and produced seeds (1-2%), 4-year-old trees created ginseng seeds of about 30%, and 5-year-old trees released 100% of ginseng seeds. The number of trees for seeds was approximately 11,690, equivalent to 372,680 ginseng seeds accumulated through the years. After seven years of planting and harvesting ginseng trees for sale, 5% of trees were often left for collecting seeds and more developing ginseng roots.

All channels were employed to sell the ginseng seeds in channel No. 4 from farmers to consumers was mainly used, accounting for 75%. The main findings unveiled that channel No. 1 is the most general channel, in which collectors and wholesalers make nearly similar contributions to net added value, approximately 14.8%. Among all supply channels of the chain, the farmers still played the most crucial role and obtained the highest net added value.

Overall Evaluation

Production and consumption of Ngoc Linh ginseng products have been a long time. In the past, the natural Ngoc Linh ginseng was exploited in the mountains, and nowadays, Ngoc Linh ginseng has become the locality's main medical plant. Despite promissory development potential, the production scale was still restricted, not deserving of its inherent potential. The main findings revealed that regardless of the raw fresh Ngoc Linh ginseng roots' value chain or Ngoc Linh ginseng seeds' value chain, farmers also played the most significant roles and obtained the net highest added value corresponding to their invested time and efforts. Despite long-time and cost-intensive nurturing for input, profit was only generated in the fifth year. Compared with farming other medical materials, the Ngoc Linh ginseng tree offers a remarkable value, helping many households to get rid of and become billionaires. Therefore, the ginseng farming area and the number of new ginseng farmers were increasingly high, as, in addition to the high economic value, the development of Ngoc Linh ginseng also maintains the natural forest area sustainably.

Conclusions

Ngoc Linh ginseng tree is a valuable medical material and the national product of Vietnam. Not only contributing to curing disease and health care but also high economic value tree to develop agriculture and countryside in Nam Tra My. After seven years, Ngoc Linh ginseng trees offer active outcomes to the farmers, while root harvesting output is estimated to be 232 kg/ha and several seeds are approximately 372,680 seeds/ha; moreover, the farmers also harvest leaves and seedlings for using short-term goals/investment as stepping-stones towards achieving the long-term goals/investment. Generally, from the perspective of total revenue after seven years, the farmers may obtain over VND 70 billion/ha, including the main profit from fresh Ngoc Linh ginseng roots and seeds. Meanwhile, the initial and year-based investment costs are approximately VND 4 billion/ha.

Agents participating in the supply chain of Ngoc Linh ginseng products at Nam Tra My district include input suppliers, ginseng farmers, collectors, processors, wholesalers, and retailers. The role of each agent in the chain is different; the farmers play the decisive key in maintaining and expanding the production scale, while the collectors, wholesalers, and retailers play vital roles in consumption activities. In this study, the part of ginseng processors is recorded at a low level in the ginseng value chain.

Hence, in the future, when the enterprises focus on investment into high-end production lines and technology for Ngoc Linh ginseng, the future Ngoc Linh ginseng value shall be further improved. Even penetrating foreign markets as successfully conducted by North Korean ginseng. For this purpose, it is required to plan Ngoc Linh ginseng production area and apply safe production procedures to ensure that Ngoc Linh ginseng quality is not impaired, not mixed with foreign ginseng categories to be imported

from the North or China, adversely affecting Ngoc Linh ginseng trademark of Nam Tra My District.

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