



TRA VINH UNIVERSITY



The International Conference

VALUE CHAIN OF AGRI-PRODUCTS IN THE MEKONG DELTA REGION: TRANSITION FOR SUSTAINABLE DEVELOPMENT

2024



NHÀ XUẤT BẢN
ĐẠI HỌC QUỐC GIA THÀNH PHỐ HỒ CHÍ MINH

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Tra Vinh University

Tra Vinh University (TVU) is a dynamic and forward-thinking institution in Vietnam, renowned for its commitment to academic excellence, research, and community engagement. Established with a strong focus on applied sciences and sustainable development, TVU has made significant strides in fields such as agriculture, aquaculture, environmental science, and business management. The university is a pioneer in promoting eco-friendly agricultural practices, circular economy models, and value chain development for agri-products in the Mekong Delta region. Through its extensive network of international collaborations, including partnerships with prestigious institutions like the University of Liège and other Philippine universities, TVU continuously enhances its research capabilities and academic programs. With a strong emphasis on innovation, entrepreneurship, and skill-based education, TVU plays a crucial role in shaping the future of sustainable agriculture and rural development in Vietnam and beyond.

TVU has also achieved international recognition through its FIBAA (Foundation for International Business Administration Accreditation) certifications for several academic programs. These accreditations demonstrate the university's adherence to global standards in education quality, curriculum development, and student-centered learning. The recognition by FIBAA underscores TVU's commitment to fostering high-quality education in business, economics, and management, further enhancing its reputation as a leading institution in Vietnam. With a strong emphasis on innovation, entrepreneurship, and skill-based education, TVU plays a crucial role in shaping the future of sustainable agriculture and rural development in Vietnam and beyond.

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The University of Liège, one of Belgium's leading academic institutions, has established a strong reputation for excellence in research, innovation, and international collaboration. With a history spanning over 200 years, the university is recognized for its contributions to various fields, including agriculture, environmental sciences, biotechnology, and logistics management. It is home to cutting-edge research centers and has played a pivotal role in advancing sustainable development practices through interdisciplinary studies. The University of Liège consistently ranks among Europe's top institutions for scientific research, fostering global partnerships to address pressing challenges such as climate change, food security, and circular economy initiatives. Its commitment to academic excellence and applied research makes it a valuable partner in shaping the future of sustainable agriculture.

MESSAGE

Dear distinguished guests, esteemed colleagues, and dear participants,

It is with great honor and pleasure that I welcome you all to the International Conference on the Value Chain of Agri-products in the Mekong Delta: Transition for Sustainable Development, hosted by Tra Vinh University in collaboration with the University of Liège. This gathering marks an important milestone in our collective effort to enhance the sustainability of agricultural value chains, particularly in the Mekong Delta region, one of the most vital agricultural hubs in Vietnam.

The challenges posed by climate change, economic uncertainties, and evolving global markets require a comprehensive and innovative approach to agricultural development. This conference provides a crucial platform for scholars, experts, and practitioners to share insights, exchange knowledge, and explore collaborative opportunities in key areas such as eco-agriculture, post-harvest preservation, economic efficiency of agri-products, logistics management, circular economy, and sustainable agriculture. These topics are not only relevant but also essential for shaping the future of the agricultural sector in the region and beyond.

At Tra Vinh University, we are committed to fostering research, innovation, and capacity-building initiatives that contribute to the resilience and sustainability of our agricultural systems. Through this conference, we aim to strengthen academic and institutional partnerships, particularly with the University of Liège, to advance research and practical solutions that benefit farmers, enterprises, and communities.

I extend my sincere gratitude to all participants, researchers, and organizers who have contributed their time and expertise to making this event a success. Your valuable discussions and contributions will serve as a driving force for sustainable agricultural transformation in the Mekong Delta and inspire further collaboration in the future.

Once again, welcome to the conference, and I wish you all a productive and enriching experience.

Sincerely,

Assoc. Prof. Dr. Diep Thanh Tung

Vice Rector of Tra Vinh University

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MARKET DEVELOPMENT FOR MEDICINAL PLANTS IN CENTRAL VIETNAM'S MOUNTAINOUS AREAS: INSIGHTS FROM THE LINKAGE BETWEEN SAM BO CHINH GROWERS AND ENTERPRISES

Nguyen Van Chung¹, Nguyen The Long¹

Abstract

Sam Bo Chinh plant plays an important role in socioeconomic development for ethnic minorities in A Luoi Distric, Thua Thien Hue Province, Central Vietnam. This study aims to explore production characteristics of Sam Bo Chinh production and the linkage between Sam Bo Chinh growers and enterprises in production and consumption. The study was conducted based on 25 semi-structured interviews with smallholder farmers, interviewing two representatives of enterprises and three key informants at the locality, as well as collecting related secondary information. The research findings indicated that Sam Bo Chinh production is considered as a new livelihood for local people when it provides employment and improves income for them. The production effectiveness resulted from the linkage between smallholder farmers and enterprises through a farming contract. Smallholder farmers have to produce Sam Bo Chinh under regulations and technology standards of the enterprise, while the enterprise supports input factors and guarantees output market for Sam Bo Chinh flowers and roots. This linkage is a very tight linkage, which was verified by 88% of smallholder farmers. Over 80% of smallholder farmers confirm that they can get various benefits in Sam Bo Chinh production including increased productivity, quality and price, and decreased costs and risks. However, qualification, number of labor, technology and production experience of growers affect the linkage between them at 64%, 76%, 76% and 88% respectively. Therefore, smallholder farmers need to upgrade themselves in production activities, and compliance with enterprise regulations has become an essential condition to maintain and develop this linkage.

Keywords: *Sam Bo Chinh, linkage condition, linkage effectiveness, mountainous areas*

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I. INTRODUCTION

The development of medicinal plants plays an increasingly important role in promoting livelihoods and improving income for households in mountainous and rural areas of Vietnam [1]. According to state policy, the medicinal plant sector is oriented as one of the key pillars for sustainable agricultural development, aimed at harnessing the vast potential of natural resources and the abundant labor force from rural areas [2]. The development of medicinal plants not only improves people's living conditions but also significantly contributes to poverty reduction, job creation, and the expansion of opportunities to export high-value agricultural products [1, 3]. In this context, Sam Bo Chinh (*Abelmoschus sagittifolius* (Kurz), Merr), a valuable medicinal plant with numerous health benefits, has been cultivated in the mountainous A Luoi District of Thua Thien Hue Province. This area, with favorable natural and climatic conditions, has become a key region for the development of medicinal plants in the province [4]. Consequently, local residents have capitalized on this advantage to cultivate Sam Bo Chinh (SBC) on their existing agricultural land. This activity has also attracted investment and fostered linkages with enterprises that support input provision and guarantee product output.

The linkage model between enterprises and smallholder farmers has been recognized as a strategic solution to promote the development of the agricultural sector, including medicinal plants. This collaboration not only helps farmers access modern farming techniques and investment capital, but also ensures a stable market for their products through farming agreements with enterprises [5]. In the medicinal plant sector, this model enhances product quality, ensures export standards, and improves farmers' incomes. Enterprises, in turn, can optimize their supply chain and enhance brand reputation through the consistent and high-quality products supplied by farmers [6, 7]. Enterprises play a leading role in guiding production by leveraging their market knowledge and understanding of specific product demands. With robust resources, they can invest in cultivation areas and develop advanced technical processes to meet modern production standards. They are also well-versed in legal regulations concerning quality, ensuring that products meet all market requirements. Additionally, enterprises are crucial in bringing products to consumers, directly contributing to product marketing and consumption [6].

Amid these opportunities, the linkage model between SBC Hoang Gia Limited Company, headquartered in Hue City (referred to as the enterprise) and smallholder farmers in the production and consumption of SBC in A Luoi District, Thua Thien Hue Province, has been established and has gradually proven its effectiveness. This model serves as a foundation for promoting the cultivation of SBC, as it is increasingly becoming

a new livelihood activity for many local households. Given this reality, this study was conducted to provide an in-depth understanding of the conditions for forming and implementing the linkage, the effectiveness of the linkage, and the factors influencing the model between the enterprise and smallholder farmers. Additionally, the results in this study will contribute concrete evidence to the practical development of production activities connected with value chain linkages, thereby promoting the sustainable development of the local medicinal plant sector and expanding potential into other agricultural products and services. Moreover, through the interactive relationship between smallholder farmers and the enterprise, policymakers and stakeholders can devise reasonable strategies to advance the development of the medicinal plant sector in Thua Thien Hue, improve the livelihoods of local people, and promote sustainable rural economic development.

II. LITERATURE REVIEW

Linkages in production and business, particularly in the agricultural sector, are an essential strategy adopted by many countries worldwide. These linkages play a crucial role in improving market access and optimizing support services, thereby enhancing agricultural productivity and business efficiency [8]. Agricultural production linkages are understood as voluntary, mutually beneficial economic activities that are closely bound by a pre-agreed arrangement among stakeholders to achieve the objective of participating in the linkage process [9]. Various studies have demonstrated the practical benefits of such linkages, including creating a strong competitive advantage, reducing costs, improving product quality, mitigating risks, and increasing value through collaboration among stakeholders in input supply, production, processing, and product distribution [10]. Additionally, reducing production costs, overcoming the limitations of individual participants, generating added value, and creating more jobs, all contribute to enhancing product competitiveness, increasing profits for enterprises, and improving rural farmers' livelihoods. These are further benefits of engaging in linkage activities [11].

The realities mentioned above have driven the formation and development of linkages among stakeholders in production and business activities. In general, the implementation of linkages should be based on the principles of voluntariness and equality among participants to establish a stable and mutually beneficial relationship [5]. Horizontal and vertical linkages are the two most common forms of collaboration in production and consumption. Horizontal linkage refers to collaboration among stakeholders within the same stage, such as between producers or between processors. In contrast, vertical linkage involves collaboration among stakeholders across different stages of the chain, such as between producers and processing enterprises [12]. In the context of value chain development, vertical linkages are becoming increasingly

prevalent [13], as they enhance the ability to distribute and increase the value of products or services through this collaboration [14].

The key feature of vertical linkages in the context of agricultural production is the collaboration between farmers and enterprises that purchase and process products. This form of linkage is an essential component of economic relationships, where both parties work together voluntarily, understanding and coordinating with one another. This process takes place through various forms of economic cooperation aimed at fostering close collaboration, ensuring stable and sustainable production, improving farmers' quality of life, and generating economic benefits for the enterprises [15]. Such linkages play a critical role in ensuring that all participants benefit, while promoting voluntary engagement and accountability from each stakeholder. This contributes to enhancing agricultural production efficiency, protecting brand reputation, strengthening competitiveness, and elevating the role of the government in economic management through the application of laws, policies, and development plans [16]. Models of linkage between smallholder farmers and enterprises in agriculture have been synthesized and presented by Shepherd [17] and by Nga and Cuong [16] as follows:

Table 1. Forms of collaboration between smallholder farmers and enterprises in agricultural production and consumption

Model	Characteristics
Direct centralized model	Vertical coordination model, the buyer (enterprise) exclusively purchases all products from smallholder farmers, subsequently processes and markets them. Specifically, the buyer directly signs a contract with individual farmers without involving any intermediaries. Typically, farmers are informed in advance about the agreed quantity and the quality, which is strictly monitored.
Multistakeholder model	This model involves multiple agents participating between buyers and farmers, such as the government and enterprises. The most prominent expression of this model is the “four-household” relationship: Government - Farmers - Scientists - Enterprises. Among these, the roles of enterprises and farmers are the most critical.
Central core model	This is a centralized model with a relatively simple approach. The buyer of the product is an enterprise that owns the land, facilities, and plantations. The seller of the product is the dependent farmer who only engages in production activities and sells the product back to the enterprise.
Intermediary model	The buyer (enterprise) connects (signs a purchase contract) with farmers through intermediaries such as cooperatives, farmer groups, or associations representing several farming households.
Informal model	Used by private companies, small-scale artisanal processing facilities, and semi-manual processing operations, this model involves farmers

Model	Characteristics
	cultivating raw materials in the surrounding areas. It is typically organized through verbal agreements between market participants and is characterized by seasonal agricultural markets with minimal processing stages.

The five models of collaboration between enterprises and smallholder farmers described above illustrate differences in characteristics, linkage conditions, and levels of integration. Furthermore, these linkages will vary based on the characteristics of the products and services. This study employs the “direct centralized model” to analyze the characteristics of the linkage, linkage conditions, linkage effectiveness, and influencing factors. The study uses SBC as a case study to explore and accurately analyze the nature of the linkage model in each specific product case. These topics will be discussed in the following sections.

III. METHODOLOGY

3.1. Study area

The study was conducted in Quang Nham Commune, A Luoi District, Thua Thien Hue Province. This locality has the largest area of SBC cultivation in the district, with approximately 3 hectares and 25 households participating out of a total of 9.2 hectares of SBC in the entire district in 2023. In addition to its potential for developing SBC, Quang Nham Commune is also a key area in the district’s plan to develop 360 hectares of medicinal plants during the 2021-2025 period. This provides a foundation for local authorities and residents of Quang Nham Commune to leverage resources from policy initiatives and internal strengths to develop the local economy based on medicinal plants.

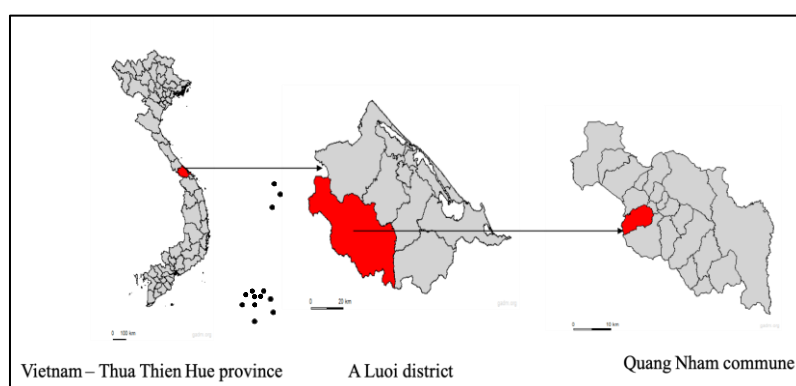


Figure 1. Research location

3.2. Research objectives and sample

The linkage in the production and consumption between SBC growers (smallholder farmers) and the enterprise is the research subject of this study. The research gathers

primary information from SBC growers, representatives of the enterprise, and local authorities. It employs both qualitative and quantitative research methods, collecting data from all 25 smallholder farmers currently cultivating SBC in the area and participating in the linkage with the enterprise.

3.3. Data collection

The study collected primary data through semi-structured interviews with 25 smallholder farmers, in-depth interviews with 3 representatives from the local government of Quang Nham Commune and 2 representatives of the enterprise. The information gathered pertains to the characteristics of smallholder farmers, the nature of the linkage, conditions, effectiveness and benefits of the linkage, and factors influencing the collaboration between the enterprise and farmers. Additionally, secondary data related to SBC production activities and development plans are obtained from socio-economic reports at the study site and relevant research studies.

3.4. Data processing

The collected data was compiled and processed by SPSS software. Basic descriptive statistics, such as mean values, standard deviations, and frequencies, were employed to analyze the indicators and research content. Additionally, a 5-point Likert scale was used to evaluate the effectiveness and factors influencing the linkage between enterprise and smallholder farmers.

IV. RESULTS AND DISCUSSION

4.1. Characteristics of Sam Bo Chinh

SBC was discovered 300 years ago by the Cham people in Chau Bo Chinh (now Bo Trach and Quang Trach Districts, Quang Binh Province). It is considered a valuable ginseng product; however, after a long period of neglect without restoration or development, in 2017, the people of the Truong Son mountain range began researching and reviving this plant species [18]. SBC was officially cultivated in A Luoi District, Thua Thien Hue Province in 2021. The plant, a herbaceous species, typically grows to a height of 30–50 cm. Its growing season generally starts in spring, with planting taking place between December 25 and February 28 (next year), and flowering occurs primarily from June to August. During cultivation, farmers can harvest and sell the flowers. Once the plants mature (with leaves turning yellow), the roots are harvested by removing the stems and leaves, leaving the tuberous roots to be sold to buyers.

The results from in-depth interviews indicated that SBC is a medicinal plant with numerous health benefits. Both the roots and flowers of SBC are used as raw materials for processing products such as wine infusions, honey infusions, beverages, teas, and

various dishes depending on consumer demand. Due to its valuable medicinal properties, SBC holds significant economic potential, especially in the pharmaceutical and healthcare industries. Therefore, cultivating SBC not only provides economic benefits but also contributes to the preservation and sustainable development of Vietnam's traditional medicinal resources.

From 2021 to 2023, the cultivation of SBC in Quang Nham, Son Thuy, Hong Bac, and Hong Kim Communes, A Luoi District, Thua Thien Hue Province, has made remarkable progress, bringing substantial economic prospects and income to local residents, particularly ethnic minority groups living in the area. In 2021, SBC was first trialed in Quang Nham Commune. This cultivation model quickly proved its effectiveness, generating an income of approximately 200 - 300 million VND per hectare. In 2022, smallholder farmers received support from the enterprise in Thua Thien Hue Province, ensuring market access and transferring production techniques. As a result, SBC not only generates high profits but also provides stable employment for ethnic minority communities, contributing to poverty reduction. By 2023, SBC had become an integral part of the district's medicinal plant development project

4.2. Characteristics of smallholder farmers

Although SBC is a new crop in the area, it has demonstrated a certain level of suitability to the local soil conditions, as well as the interest and investment from the local population. Currently, 25 smallholder farmers in the district are participating in a linkage model with the enterprise through the production and consumption of SBC. These households are pioneers in the initial experimental phase in the region, with the following demographic characteristics of the participatory households:

Table 2. Demographic characteristics of smallholder farmers

Items	Unit	Quantity	SD
Age of household head	Age	53.2	5.3
Demography of household	Person	4.8	1.0
Total number of labor	Labor	4.1	0.7
Number of labor in SBC cultivation	Labor	2.4	0.8
Female labor in SBC cultivation	Labor	0.7	0.4
Male labor in SBC cultivation	Labor	1.7	0.7
Educational level of household head	Grade	8.3	2.5
SBC cultivation area	Ha	0.2	0.2
Income of SBC cultivation in 2023	Million VND	43.5	46.5
Other income of household in 2023	Million VND	75.8	91.7

The prominent characteristics of smallholder farmers are their relatively low average age, around 53.2 years, placing them in the middle-aged demographic with an abundant labor force, averaging 4.1 workers per household. On average, 2.4 workers per household are involved in SBC cultivation, with male labor being the predominant workforce. This highlights the households' significant investment in this activity, as a substantial portion of their labor is dedicated to the cultivation process. Furthermore, the relatively young age of household heads provides a foundation for them to sustain and develop this activity by adopting new knowledge and techniques for cultivating this new crop, thus ensuring practical production efficiency.

Additionally, the average planting area per household is 0.15 hectares, with a high variability in land size among households, as indicated by a standard deviation of 0.2 hectares. The land used for cultivation is entirely owned by the households, and this represents their primary productive resource, contributing 37.9% of their total household income. However, the average education level of household heads is only at the secondary school level, which is a common trait among mountainous communities, who face significant challenges in education and improving their qualifications [19]. This issue may partly hinder their ability to access scientific and technological advancements, as well as to enhance their production capacity in alignment with market-oriented goals.

4.3. Production outcomes of Sam Bo Chinh

Fresh SBC roots and flowers are the two products harvested from its cultivation. At the time of harvest, the plant's leaves and stems are removed to collect the root. The roots are then thoroughly washed, removing all dirt and sand, and are carefully inspected to discard any damaged roots. As for the flowers, harvesting is conducted in the morning, between 8 and 10 a.m., to ensure freshness before they are transferred to cold drying machines. The flowers must meet color requirements, being bright and fresh with no signs of mold. These are the standard specifications set by the purchasing enterprise to ensure the linkage in product consumption is maintained.

Establishing clear product standards and specifications not only guarantees product quality but also fosters trust and efficiency within the supply chain, from farmers to distributors and ultimately to the end consumers. As a result, SBC cultivation has generated significant economic benefits for farmers through the sale of roots and flowers. This is reflected in the data on output, revenue, and income. However, profit indicators are not presented here, as farmers do not track the labor hours they invest; instead, income is used as a proxy to partially assess the effectiveness of this activity.

Table 3. Production outcomes of Sam Bo Chinh in 2023

Item	Unit	Quantity	SD
Root			
Productivity	Kg/year	444	628.2
Selling price	Million VND/kg	0.1	-
Revenue	Million VND/year	44.7	62.7
Flower			
Productivity	Kg/year	27.9	37.1
Selling price	Million VND/kg	0.5	-
Revenue	Million VND/year	13.9	18.5
Production outcomes			
Total revenue	Million VND/year	58.6	40.4
Total cost	Million VND/year	15.1	20.2
Total income	Million VND/year	43.5	26.7

The research results indicate that in 2023, revenue from SBC cultivation came from the sale of both flowers and roots, with roots contributing the largest portion, accounting for 76.3% of the total revenue from SBC cultivation for smallholder farmers. This revenue stems from the linkage model between enterprise and smallholder farmers, where enterprise purchases all the flowers and roots. However, the selling price of SBC flowers is five times higher than that of the roots. The purchase price for fresh SBC roots is 100,000 VND/kg, while the price for SBC flowers reaches 500,000 VND/kg. This highlights the significant potential for increasing the value of SBC flowers.

The average annual income generated for smallholder farmers is approximately 43.5 million VND. This figure is highly meaningful for the ethnic minority populations in mountainous areas, as this income helps improve their livelihoods and quality of life. These findings indicate that SBC cultivation has initially provided substantial income, contributing to the overall household earnings. It also reflects the effectiveness of the linkage between farmers and enterprise in the production and purchase of SBC products. This is considered a new direction for diversifying income-generating activities for households, while also offering a strategy for local economic and social development.

4.4. The linkage between smallholder farmers and the enterprise

4.4.1. Characteristics of the linkage

The direct centralized model is a linkage between the enterprise and SBC growers through the establishment of direct purchase contracts between the enterprise and smallholder farmers. This model not only ensures a steady supply of SBC products for the enterprise's business operations but also provides smallholder farmers with a stable market. As a result, smallholder farmers do not need to worry about finding customers or fluctuations in market prices, allowing them to concentrate on improving the quality and productivity of their crops. In addition to the product purchase contracts, the enterprise offers technical and financial support services, including the provision of SBC seedlings, fertilizers, and the organization of training sessions on effective SBC cultivation techniques. These activities significantly enhance the quality of the final product while ensuring the sustainable development of the local SBC industry.

4.4.2. Conditions for participation in the linkage model

To participate in the linkage model with the enterprise, smallholder farmers must adhere to strict regulations set by the enterprise to ensure the production of high-quality and consistent products. Specifically, the land designated for cultivation must be located in isolated areas, away from potential pollution sources such as cemeteries or industrial zones, to avoid negative impacts on the quality of the SBC roots. An irrigation system must be established to supply clean, uncontaminated water, ensuring that the water used meets the growth and development requirements of the SBC plants. Additionally, the cultivation and care processes must strictly follow the technical guidelines provided by the enterprise. This includes selecting seedlings, fertilization methods, pest and disease control, and harvesting techniques to ensure the quality of the final product.

The main responsibility of smallholder farmers is to follow the technical procedures as instructed by the enterprise. This involves regularly updating production information, images, and videos for the enterprise's technical team to closely monitor the production process and provide timely support when necessary. Furthermore, detailed record-keeping of the production log is required, serving as a basis for evaluating the cultivation process and as evidence of compliance with the agreed-upon production conditions.

On the enterprise side, there is a commitment to invest in necessary resources such as high-quality seeds, disease treatment products, and ground cover sheets to support farmers throughout the cultivation process. These supplies are provided upfront, with farmers reimbursing the costs after harvest. The prices of these materials are transparently and uniformly announced at the beginning of the cultivation season. Transparency and fairness in providing materials not only help build trust between the enterprise and

farmers but also contribute to ensuring a stable and efficient production cycle, aiming for sustainable development for both parties.

Additionally, the enterprise commits to purchasing the entire yield of SBC that meets the quality standards and specifications set by the company. Products that do not meet these standards will not be purchased. After the purchase, the enterprise guarantees payment to the farmers within 10 days of receiving the full quantity of the harvested product, and a contract termination document is issued, ensuring transparency and fairness throughout the collaboration process.

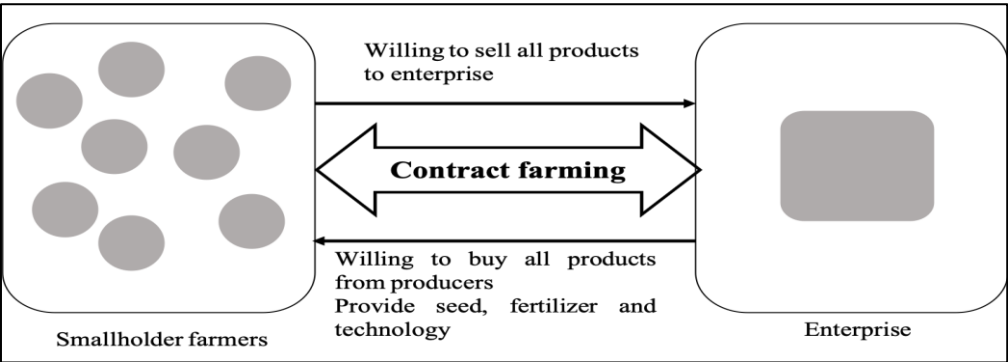


Figure 2. The interaction between smallholder farmers and the enterprise

4.4.3. Linkage degree between the enterprise and smallholder farmers

The study utilized a Likert scale with 5 levels including very strong, strong, neutral, weak, and very weak to assess the degree of linkage between enterprise and smallholder farmers, based on the perspectives and understanding of the smallholder farmers. This evaluation was grounded in the experiences and outcomes of the households participating in the linkage, ensuring both the reliability and practical significance of the results.

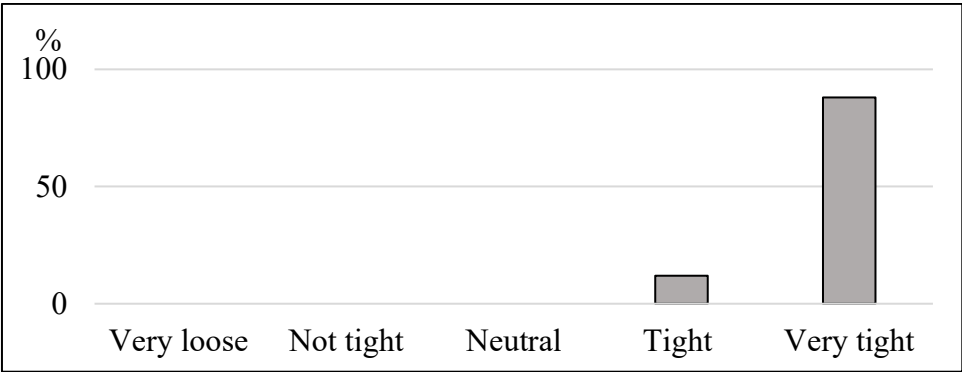


Figure 3. Linkage degree between the enterprise and smallholder farmers

Respectively, 88% and 12% of smallholder farmers assess the linkage between the enterprise and smallholder farmers as very tight and tight. This indicates that the

community highly values the linkage in the production and consumption of SBC, with no smallholder farmers choosing alternatives other than tight and very tight linkage, and the majority opting for very tight. These results reflect the farmers' trust and confidence in the linkage, as well as their high valuation of this connection. This linkage is characteristic of a production contract model, consistent with Ton et al. [20], which suggests that production contracts provide numerous benefits and values to participants, and all parties involved make efforts to maintain this linkage.

4.4.4. Linkage efficiency between the enterprise and smallholder farmers

This linkage has indeed impacted the SBC cultivation activities of the smallholder farmers. The study has examined the effects of this linkage on trends in changes in production area, yield, costs, and income since the linkage establishment. These indicators are crucial in determining whether to continue and expand SBC cultivation by the smallholder farmers and the locality, as well as in maintaining and strengthening this linkage. The study utilizes indicators of increase, decrease, or unchange, allowing smallholder farmers to self-assess based on their perspectives and practical production experiences.

Table 4. Change tendency in Sam Bo Chinh cultivation of smallholder farmers

Indicators	Increase (%)	Decrease (%)	Unchange (%)
Production area	68	12	20
Yield	92	-	8
Income	100	-	-
Production cost	12	56	32

Under the influence of the linkage between the enterprise and smallholder farmers, there has been a trend of increase in all indicators related to area, yield, and income. Specifically, 100% of the farmers report that their income has been consistently increasing. This is a significant result in practical terms, as income provides smallholder farmers with the motivation to expand production and improve their quality of life [21]. Additionally, both area and yield show a trend of increase, with 68% and 92% respectively. The increase in these two indicators results from the production efficiency and the value of the linkage. With support in input factors combined with technical advice and strict monitoring and supervision, yield is consistently ensured and increased, which in turn boosts farmers' income. This increased income provides a basis for smallholder farmers to expand their production area and enhance their family economy. This trend of increasing area aligns with the data from the Department of Agriculture and Rural

Development of A Luoi District, which reports an additional 2 hectares of SBC cultivation in recent years.

4.5. Benefits of the linkage between the enterprise and smallholder farmers

In addition to the benefits for the enterprise, such as a stable and high quality supply of raw materials, the participation of smallholder farmers also receives various advantages. The study employs a 5-point Likert scale to assess the benefits received by smallholder farmers, categorized as very high, high, neutral, low, and very low.

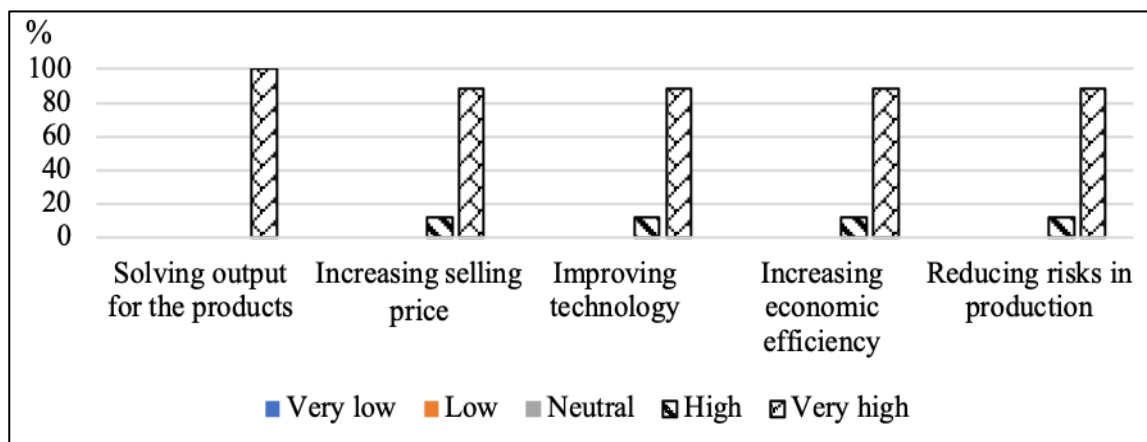


Figure 4. The benefits from the linkage participation between the enterprise and smallholder farmers

The research results indicate that 100% of the smallholder farmers assess the benefits from the linkage as high and very high. Notably, 88% of smallholder farmers rate the benefits of improved selling prices, enhanced technical skills, increased economic efficiency, and risk mitigation as very high. Additionally, 100% of farmers consider the assurance of SBC product output as a very high benefit. This reflects smallholder farmers' satisfaction with the linkage and demonstrates the validity of the production model connected with the value chain, where smallholder farmers' benefits are enhanced. Unlike other agricultural products such as lotus, green tea, and seafood in Thua Thien Hue Province, where smallholder farmers may face dependency issues with buyers [22, 23, 24], this model shows that smallholder farmers are not disadvantaged in their relationships with buyers. This result also provides a basis for local authorities to use as evidence of the effectiveness of production linkage, potentially expanding the model to other regions and agricultural products.

4.6. Elements influencing the linkage participation of smallholder farmers

Given the benefits provided by the linkage, smallholder farmers are keen to continue and maintain this connection to ensure stability in production and increase

income. According to the smallholder farmers' assessments, participating in, maintaining, and developing this linkage involves various factors related to both internal capacities of the smallholder farmers and external elements. These factors are crucial for meeting the standards and expectations set by the enterprise, thereby sustaining and expanding the linkage.

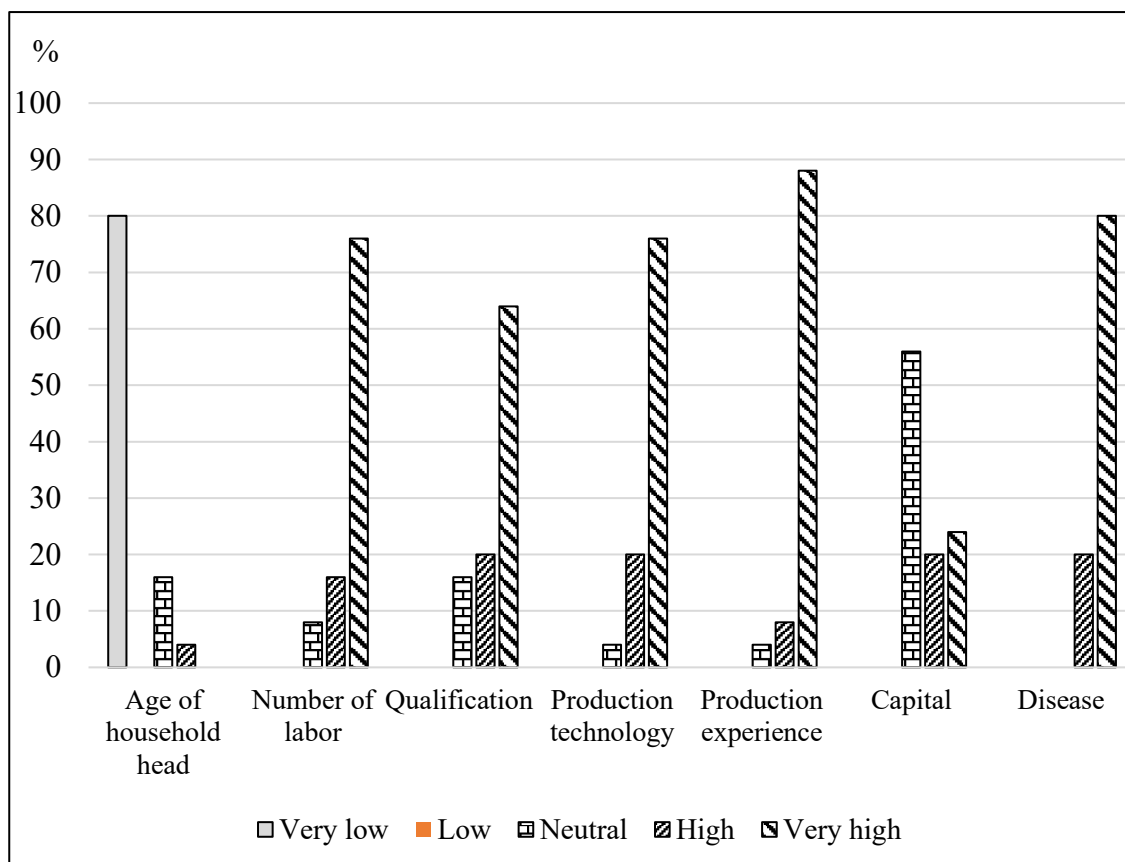


Figure 5. Elements influencing the linkage participation of smallholder farmers

The research findings indicate that factors such as production experience, production techniques, educational level, labor force, and disease have a significant impact on farmers' participation in the linkage; over 92% of smallholder farmers estimated these factors as having high and very high influence. These factors are crucial for smallholder farmers to produce SBC that meets the quantity and quality requirements setting by enterprise. This compliance satisfies both smallholder farmers and enterprise in terms of contract farming and achieves economic and social value. In addition to these internal factors, disease (such as leaf wilt and root rot) poses a major challenge for smallholder farmers, as it has led to the death of a portion of SBC plants, which farmers have not yet managed to resolve. The loss of SBC plants results in a loss of income for smallholder farmers and fails to meet the quantity requirements of the enterprise.

Moreover, while access to capital also affects participation in the linkage, the percentage of households rating its influence as high or very high is below 25%. This is due to the contract provisions where the enterprise is willing to support input costs for smallholder farmers and recover the initial investment costs after harvest. This arrangement significantly reduces the initial investment pressure and production costs for smallholder farmers, facilitating their willingness to participate. Age is not a significant factor influencing linkage participation, as 80% of smallholder farmers rate its impact as very low. This suggests that enterprise is primarily concerned with whether farmers can meet production conditions stipulated in the contract, which is a crucial condition governing the linkage.

V. CONCLUSION

The production linkage between the enterprise and SBC growers brought significant benefits to both parties and contributed to the development of the agricultural sector and the local economy. The linkage with the enterprise provides smallholder farmers with a stable market for their products. Instead of having to search for markets and face price risks, smallholder farmers can focus on production when they know that their products will be purchased by the enterprise as per the production contract. Meanwhile, the enterprise provides technical support, modern farming methods, and plant care advice. This not only enhances productivity and product quality but also helps smallholder farmers access advanced technologies, reducing risks from diseases and weather conditions. The enterprise's product quality requirements drive smallholder farmers to adhere to strict production processes, thereby improving product quality. High quality products benefit the enterprise and enhance the reputation of local agricultural products in the market. The linkage between the enterprise and smallholder farmers fosters agricultural production, creates job opportunities, improves the livelihoods of ethnic minority communities in mountainous areas, and encourages sustainable development in processing industries. This linkage provides not only short-term benefits but also helps build long-term partnerships, based on mutual trust and shared benefits. The effectiveness of this model has been demonstrated, providing a foundation for authorities to expand the model to other areas within the district and to other agricultural products more broadly. While this study has clarified the nature of the linkage between enterprise and smallholder farmers, it has not compared participatory households with non-participatory households to identify gaps. This is a limitation of the current study and suggests a direction for future research to explore and analyze the linkage model in agricultural production and business from multiple perspectives.

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