ANALYSIS OF THE GINGER VALUE CHAIN IN CAO BANG PROVINCE AND RECOMMENDATIONS FOR IMPROVMENTS

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I. Introduction

The demand for ginger has been steadily increasing over the years and the international ginger trade is thriving with a variety of end markets. In recent years, Vietnam has caught up and has become one of the major players in the globalized ginger markets. The total ginger export turnover of Vietnam reached over USD 5 million in 2018, of which the total export turnover of unprocessed ginger and processed reached USD 2.9 million (accounting for 0.4% of the world's global export volume), ranking Vietnam in the top 15 largest ginger exporters in the world. (Workman Daniel, 2019) respectively. In response, ginger is currently planted in most provinces and cities nationwide. In many places the ginger value chain has been developed in the direction of commercializing products, expanding area and improving quality, becoming the main value chain, contributing substantially to local economies and local livelihoods.

Cao Bang province has a vast production potential due to its vast area of arable land (nearly 150 thousand hectares of land for agricultural development accounting for about 20% of the natural land area)[1] and its suitable soil characteristics for cultivating ginger. Ginger has been planted in Cao Bang for a long time, but traditionally mainly local ginger (gừng gié) was planted. Ginger was neither planted in a concentrated form nor in commercialized fashion. Between 2000 and 2005, the area of ginger, mainly "buffalo" ginger, began to increase strongly to meet export demand and reached the its peak in 2015 (150 hectares). Some districts such as Ha Quang and Nguyen Binh have become concentration areas for the production of ginger. For these localities, ginger has contributed positively to the restructuring of traditional cropping systems based on corn and rice growing. However, initially ginger cultivation was rather unplanned and sprouting on an ad hoc basis causing high market risks through volatility of the markets. Annual price fluctuations have been substantial with prices varying between VND 20,000/ kg dropping to VND 2,000 / kg the following year.

Cao Bang province has had many supporting programs and projects (from local budgets and non-governmental organizations' fund) to support ginger planting and consumption. Model training in ginger planting techniques were developed and rendered, followed by more value chain type of interventions around 2015. For example, the Commercial Smallholder Support Project (CSSP) funded by IFAD has developed the ginger value chain based on building linkages between smallholder groups and local enterprises. Linkage development is essential because enterprises not only buy products on a contractual basis, but also directly transfer and support technologies and supply seeds to farmers through contract farming arrangements.

However, at the same time, the ginger value chain also faces many difficulties, and which might if not being addressed lead to unsustainable development. Firstly, the process of linkages between farmer household groups and enterprises is currently not really stable and lacking long term business like relations. Ginger price still fluctuates greatly year by year.

[1]http://giamngheo.mic.gov.vn/Pages/TinTuc/tinchitiet.aspx?tintucid=136736

This causes default in terms of complying with contracts as prices are set during the time of planting the ginger but with prices increasing over time, incidences of free-riding, selling the final produce to open markets rather than to the contracted buyer, are frequent. In addition, ginger production has commercialized rapidly as have growing areas, with little attention to environmental sustainability. As a result, the frequent occurrence of diseases and pest affects productivity and quality of the product. A third challenge is the tendency to sell Ginger too young decreasing prices. Because of mentioned challenges, the area under Ginger cultivation has been decreasing since its peak in 2015.

The current market for farmers consists currently of fresh / unprocessed sales of ginger to local enterprises. The fresh products must go through many stages of post-harvest such as processing, packaging and export in places quite far from Cao Bang (Hanoi, Hoa Binh, Bac Ninh) by agents downstream of the value chain. Information on the final stages of this value chain is currently missing or has not been thoroughly analyzed and evaluated. This is a significant limitation for the general strategic planning process of the provincial authorities as well as for fostering more strategic improvements that would require the inclusion of upstream chain actors. The underlying research aims to address these shortcomings, by assessing and studying the overall value chain and providing downstream, local actors with the required information and insights to take such strategic measures. More specifically, the analytical analysis on the ginger value chain provided through this research will contribute to development of IFAD project operation strategy in Cao Bang (CSSP). This is crucial because the ginger value chain has been selected as a strategic intervention area for the project during the period 2017-2022.

This study is carried out based on the proposal of CSSP Cao Bang (*direct instruction of market analysis methodology through the research of a value chain*) wit additional technical support through the VCB-N. The VCB-N member CASRAD was selected to conduct the research in compliance with the approved proposal.

In addition to the main objective mentioned above, this research also provides instruction on market system analysis for CSSP Cao Bang. The research was implemented during a period of 5 months (from July to November 2019) with the funding of VCB-N and CSSP Cao Bang.

Location of the research: Cao Bang, Hanoi, Hai Duong, Bac Ninh, and Hoa Binh.

II. Objectives of the research

General objective:

The general objective of the research is to analyze the current state of the ginger value chain from production to export stages and provide recommendations to improve the overall chain functioning. The analysis and recommendations for improving the chain functioning will focus on addressing challenges identified in the various specific chain phases as well as challenges in the overall functioning and further development of the entire value chain / market system for ginger.

Specific objective:

To achieve the general objective, the following specific research objectives have been formulated:

- Analyzing the status of the ginger value chain including the current situation of production, domestic and foreign consumption markets;
- Analyzing the local market system of the Cao Bang ginger value chain, focusing on support services at the local levels (province and district);
- Formulate specific recommendations for improvement of the Cao Bang ginger value chain that support the development of strategic interventions in the ginger value chain by local actors in Cao Bang.

III. Contents of the research

Within the given limited scope in terms of time and capacity, the main content of this research includes:

- Desk review of existing research on domestic and foreign ginger value chains: the Cao Bang ginger value chain is one of the local value chains contributing to the general ginger value chain of Vietnam and the world, so the general domestic and foreign ginger value chain plays an important role in analyzing and planning the plan of Cao Bang ginger value chain development.
- Mapping and analyzing the local Cao Bang ginger value chain from input supply, production, and consumption.
- Research of the market system of the Cao Bang ginger value chain including direct as well as in-direct or supporting chain actors.

IV. Method of research

1. Theoretical framework

Researching the value chain and market system

While conducting research of the Cao Bang ginger value chain a market system approach was used. Main or direct chain actors involved in the value chain all have a core function in exchange of goods and services along the chain. The market system approach distinguishes also supportive actors like financing institutions and regulatory or policy making actors that influence the context in which the value chain operates.

A market system is a multi-function, multi-player arrangement comprising the core function of exchange by which goods and services are delivered and the supporting functions and rules which are performed and shaped by a variety of market players.(The Springfield Centre, 2015)

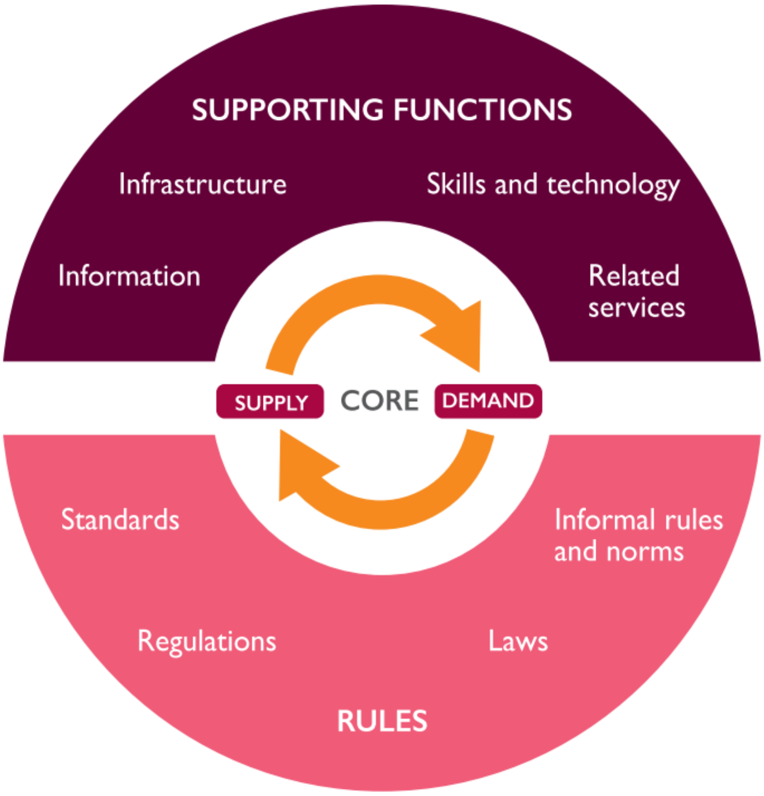


Figure 1: Market system

Source: The Springfield Centre (2015)

At the downstream or production end of the chain farmers and laborers from mountaneous regions in Vietnam are the core actors. This research focusses particularly on those actors at the production end being classified as poor. For this reason, '*Making Markets Work Better for the Poor*' (M4P), a Toolbook for Practitioners of Value Chain Analysis was used as leading document in conducting the research. The main tools from M4P that guided the research include:

- Value Chain mapping
- Analyzing issues related to governance, coordination, regulation and control of agents in the value chain
- Analyzing relations and linkages among chain actors;
- Analyzing prices and profit margins per actor;
- Analyzing the overall participation of the poor in the value chain stages.

Relationship and governance of the value chain

According to Kaplinsky and Morris (2001), there are five types of governance regarding the functioning of markets;

- Market governance: Sale and purchase transactions are in simple form, without co-operation between participants. It is called the coordination type of free market. Buyers neither control nor set specific requirements for sellers. Trading is determined by market prices.

- Modular: This type of coordination is based on specific order by buyers in the form of “giving key in hand". Supplier be fully responsible for technology transfer to buyers. In this case, the relation between buyer and seller is more complex and binding than that of free market type.
- Relational: This type is based on the relationship between buyers and sellers and the basis of mutual interdependence between the two parties. The bilateral trading relation is formed by reputation and social acquaintance. In this relation, large companies often specify needs, requirements and control of goods suppliers.
- Captive: This type governances value chains with few buyers, suppliers are completely dependent on buyers and their control. Power often is controlled by large companies / buyers.
- Hierarchial: This type is reflected in the vertical integration of large companies / enterprises which control all stages of the chain from production to processing, consumption, and sale of products.

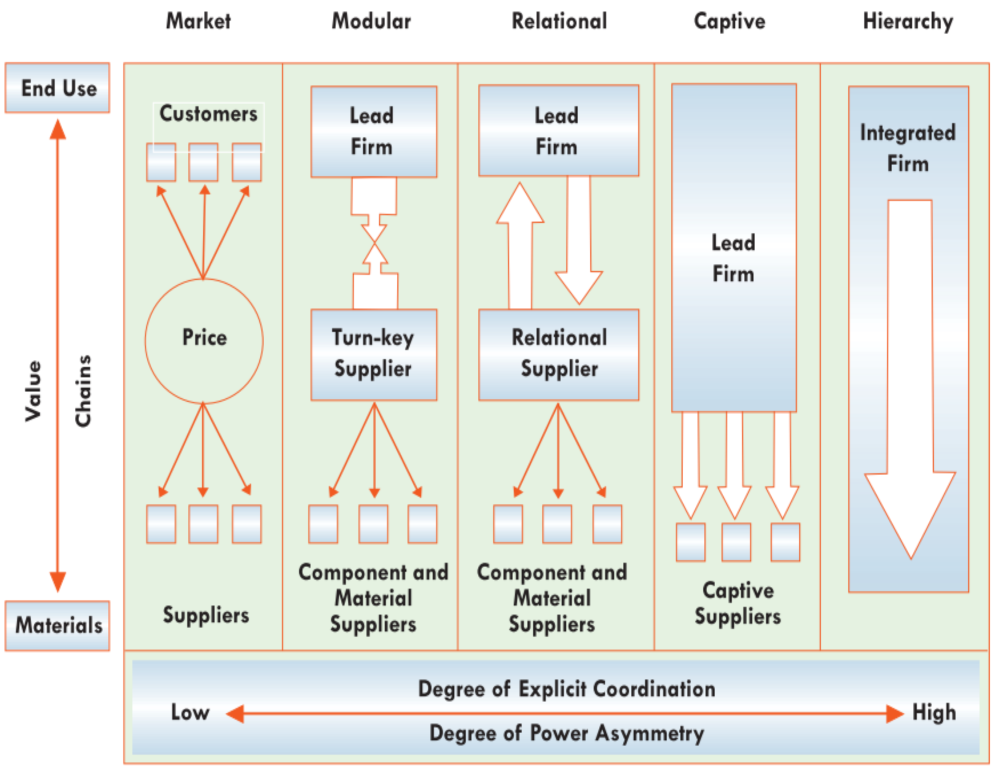


Figure 2: Value chain governance

Source: Kaplinsky and Morris (2001)

2. Method of collecting information

The research was based upon secondary as well as primary information sources and data.

Secondary information

The research includes the collection of secondary information and data related to the actual status of the ginger value chains in Cao Bang and neighboring provinces. Collected information includes socio-economic development reports, ginger chain development action plans, ginger area statistics at commune level related to the period 2015 to 2019 (Van An, Thuong Thon and Quang Thanh), complemented by District level (Ha Quang and Nguyen Binh districts) and Provincial level data (Cao Bang province).

The research team worked with governmental organizations to collect information on local institutions and policies in support of development of ginger value chains in Cao Bang province. Notably, the team worked with the Department of Agriculture and Rural Development to obtain information related to programs/ plans and projects of supporting development of agricultural production in the province in the period of 2015-2019. Also relevant project documents of projects/ programs that support the ginger value chain particularly the CSSP Cao Bang were taken into account.

In addition, online documents and other resources were consulted: data regarding the trade of ginger including import and export data of Vietnam and the world on the website as provided by the International Trade Center (ITC) and data provided by the International Food and Agriculture Organization (FAOSTAT) covering recent 10 years.

Primary information

Primary data are collected with the following methods:

Holding 3 focal group discussions with the participation of 35 farmers in communities, namely, Van An and Thuong Thon, Ha Quang district and Quang Thanh communities, Nguyen Binh district to collect information on current production status (production conditions, production costs, and others) and ginger consumption (quantity, price, information exchange, etc).

Interviews with main actors of the value chain and market system, including representatives of the two districts of Ha Quang and Nguyen Binh (4 people), policy makers and managers of the province (3 people), enterprises in Cao Bang and other localities -Hanoi, Hai Duong, Bac Ninh (11 people) in order to collect information on the state's supporting policies, market information, linkages among actors in the ginger market system of Cao Bang province.

Observation: Observing the ginger trading activities of actors at ginger collecting places to grasp market information: quantity, price, information exchange, and others in the ginger value chain.

Method of information analysis

Secondary and primary information were collected for comparison and synthesis in order to develop a coherent description of the value chain. The collected pieces of information were compared and verified by main actors in the value chain and market system. In addition, this research used the following analytical tools:

SWOT analysis

After an overall analysis of the market system, in-depth analysis of the value chain were conducted using the SWOT analysis framework. The SWOT analysis were used to in detect core issues which require intervention. Based upon identified strengths, weaknesses, opportunities, and challenges the core strategy for improving the Cao Bang ginger value chain was prepared.

The SWOT also supported the analysis on competitive advantages such as cost and other advantages of the Cao Bang ginger value chain.

V. Results of research and discussion

1. Overview of the world ginger market

Ginger is planted in nearly 40 countries around the world for medicinal and food purposes. Most of the current ginger production is from India, Nigeria, China, Indonesia, Nepal, Thailand, Cameroon, Bangladesh, Japan, and Mali. These are the top 10 countries with ginger production in the world (Workman Daniel, 2019). In 2018, the global ginger production reached approximately 3.3 million tons, an increase of 6.7% compared to 2017. In the 2007-2018 period, the world ginger production tends to increase continuously, about + 6.5% / year. The average annual increase in the exported ginger quantity during 2007-2018 is + 2.5%. However, such increase is considered discontinuous because there are times when export quantity may have decreased compared to previous years. In 2018, the world's total ginger export was 564 thousand tons, down 15.1% compared to 2017 and 16.9% compared to 2016.

According to the latest report by Indexbox (2019), the total value of profits of the world ginger market, excluding shipment costs, retail and profit of retailers valued USD 5.3 billion in 2018, up 2.8% compared to 2017 (USD 5.15 billion), but still down approximately 5.4% compared to 2016 (USD 5.6 billion). The ginger export value in 2018 reaches USD 754 million. In the same year, China was the largest exporter, reaching USD 490 million, accounting for 65% of global export value. Thailand (USD 56 million) ranks second, accounting for 7.5% of total export value. The third is Peru, accounting for 5.6 % of the total export value. Exported ginger around the world is mostly unprocessed. In 2018, the value of unprocessed ginger export reached USD 780.2 billion, down 9.3% in a five-year period from 2014, but up 2.3% between 2017 and 2018. In addition, the value of processed ginger export reached USD 74.9 million (2018), up 0.3% in a 5-year period from 2014, but slightly down -0.01% from 2017 to 2018. The average export price in 2018 was USD 1,336/ ton, up 15% compared to 2017. Ginger export price also varies greatly among exporting countries, for example, the highest export price is from Peru (USD 1,989/ ton), and the lowest prices are fetched for ginger from Thailand (USD 1,033/ ton).

The total ginger import of the world in 2018 was 645 thousand tons, down -8.3% compared to 2017, valuing in total USD 823 million. The ginger value reached a peak of USD 897 million in 2017, but from 2015-2018 the import value has not regained its growth rate as in previous years (2007-2015). The average ginger import price of ginger in 2018 was USD 1,275 USD/ton, up 11% compared to 2017. In the period of 2007-2018, import price tended to increase with an average growth rate of 11 years + 5.1% / year. Imported ginger price varies greatly from country to country. Germany has an import price of USD 2,672/ ton, while Bangladesh has only USD 279/ ton. The differences in prices are mainly related to different quality standards between countries (Source: IndexBox AI Platform, 2019).

The globalized ginger market has a seasonal sourcing pattern. Depending on the season ginger is supplied by major countries as described in Table 1 below. Some countries have ginger planting seasons evenly throughout the year such as Brazil, China, Spain, South Africa, and Thailand. In Vietnam, the ginger harvest season is mainly in October, November to March, but the time from planting to harvesting is relatively long, at least 9 months. The long growing season provides the Vietnamese ginger however with competitive advantages in terms of superior quality as compared to other sourcing destinations.

Table 1: Ginger planting and harvesting season in some countries

Countries	Febr.	Marc.	Apr.	May	June	July	Augu.	Sept.	Oct.	Nov.	Dec.	Jan.
Brazil												
China												
Spain												
India												
Romania												
Thailand												
Vietnam												
South Africa												

2. Overview of the Vietnamese ginger market

Vietnam has been a ginger import and export country for nearly 20 years. In 2018, Vietnam's total ginger export value was USD 2.66 million, accounting for 0.4% of total global export value, ranking 15th in the world. In 2012, Vietnam's ginger export ranked the 6th.

Besides, Vietnam is also a ginger importer with a total import value of USD 392.81 thousand, accounting for only 0.1% of the total global import value, ranking 65th in the world.

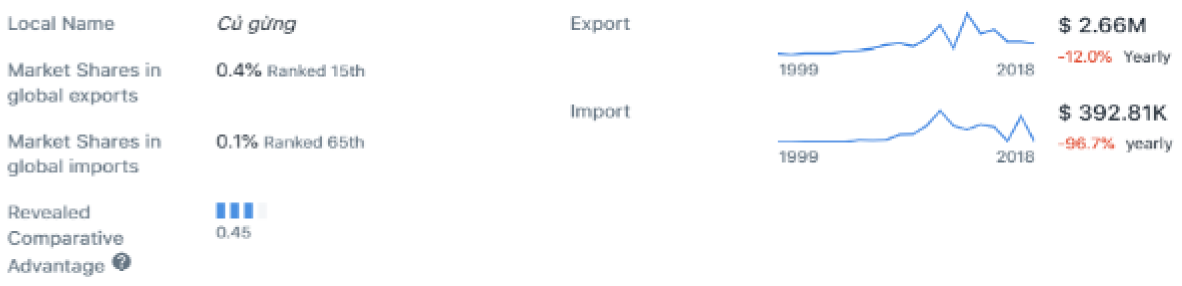


Figure 2: Vietnam's ginger import-export value during 1999-2018

(Source: https://www.tridge.com/intelligences/ginger/VN)

Vietnam's ginger import and export value has shown a sharp decrease in the recent 6 years. Export value and import value decreased by 12% / year and by 96.7% / year respectively. It is due to Vietnam's comparative advantage index for ginger being very low (rated 0.45). Meanwhile, competitive advantage rating for competitors like China (3.87), India (2.23), Nigeria (9.21), and Thailand (10.56) are much higher

Vietnamese ginger has been exported to many countries in the world totaling at least 10 countries. Vietnam export destinations for the year 2018 include in the order of volume: Indonesia (28.4%), The US (25.2%), Canada (8.5%), England (4.9%), Philippines (4.7%), India (4.3%), Thailand (3.5%), Crechia (2.4%), South Africa (2.1%). Ginger is not only purchased from Cao Bang but also from other provinces such as Bac Kan, Nghe An, Thanh Hoa, Hoa Binh, Lao Cai, Yen Bai, Son La, etc. However, Cao Bang ginger is considered the best quality. Vietnam also imports fresh ginger from other countries listing the following 10 counties in order of volume; Nigeria (46.2%), India (27.5%), Canada (8.2%), Japan (8.1%), Thailand (4.4%), Indonesia (3.3%), Netherlands (1.5%), Singapore (0.4%) and South Korea (0.3%).

3. Overview of socio-economic natural conditions of Cao Bang province

3.1 Natural conditions

Cao Bang covers a total natural area of 6,707.9 km². The North and Northeast border Guangxi Province, China, with a 333 km long border. The West borders Ha Giang and Tuyen Quang provinces, the South borders Bac Kan province, the South East borders on Lang Son province. Being a mountainous border province, far from major economic centers of the Northeast region and the whole country, Cao Bang has ***3 border gates with China, namely Ta Lung, Hung Quoc and Soc Ha.*** This is an important advantage, creating favorable conditions for the province to trade with neighboring provinces of China.

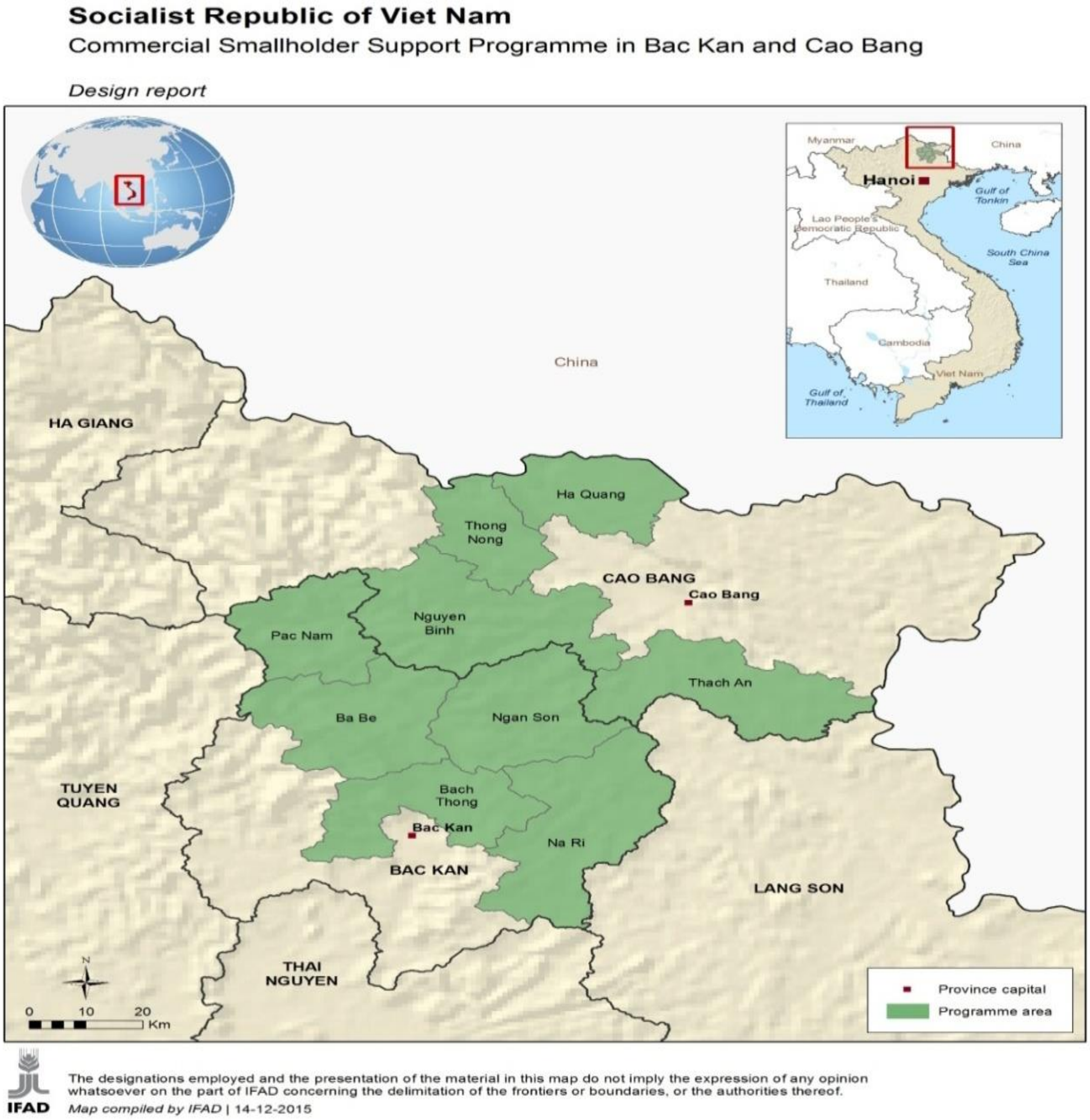


Figure 3: Map of districts in CSSP area

Cao Bang's topography is divided complicatedly by many high mountain ranges, with short streams, narrow valleys, and steep slopes with many hills and mountains. The total area of hilly land accounts for 90% of the total natural area of the province. Limestone mountain account for 25%, and soil mountains account for 65%. The average altitude of the whole province ranges from 600 - 1,000 m above sea level.

Cao Bang is characterized by a mountainous continental climate type during all 4 seasons of the year. Most noticeably are summer and winter, when the temperature amplitude varies greatly, with little rain and uneven distribution. The rainy season is from May to August (solar calendar) with an average annual rainfall of about 1,500 mm. Most rain is received in the districts of Nguyen Binh, Bac Ha Quang, Thong Nong, Tra Linh, Quang Uyen, Phuc Hoa, and Ha Lang with 1,500-1,900 mm. While the average rainfall in the districts of Hoa An, Nam Ha Quang and Trung Khanh is 1,300 - 1,500 mm. The area is known for experiencing extreme weather events such as whirlwinds, hoarfrost, and hail. The highest average annual temperature is 35^{o}c, the lowest is 0oC. Every year there are 3 summer months, from June to

August, with an average temperature of 30 – 34 ^{o}c. The hottest month is June of the solar calendar. In winter, the average temperature is 5 – 6 ^{o}c, and the coldest month is January when temperatures can drop to zero degrees. Climate and topographic characteristics give Cao Bang advantages to form diversified agricultural and forestry production sub-regions. There are speciality product such as chestnut, seedless persimmon, soybean with high protein content, tobacco, ginger, H'mong cow, black pig, black jelly, vermicelli and others which can't be cultivated in other areas due to inappropriate conditions.

3.2 Socio-economic conditions and policy environment

Cao Bang is residence to many ethnic minority groups, of which Tay group accounts for about 40% of the population, the rest are Nung, H'mong, Dao, etc. Livelihoods of these ethnic groups mainly rely on agro-forestry type production systems. However, according to the provincial statistics in 2017, the rate of investment capital for the province's agricultural sector is only about 10% of the total investment of the province. According to Cao Bang's socio-economic development strategy for the period of 2010-2020, Cao Bang province focuses on changing crop structure towards diversification and development of high-yield crops such as canna and ginger, while reducing the cultivation rate and increasing livestock (pigs and cows) in the income structure.

To achieve the set objectives, Cao Bang province has issued a series of specific resolutions and policies to support production development and link consumption markets for agricultural products in general and for ginger in particular. Ginger is also named "the plant of poverty reduction" for many farmers in the province. The ginger development policy of the province is operationalized through the resolutions/ decisions of Cao Bang province that directly affect the development of the Cao Bang ginger value chain, including:

- Dispatch No. 27 / CV-UBND of Cao Bang province dated 8 January 2016, added ginger to the list of crops supported by the Government's Resolution 30 A on the program of rapid and sustainable poverty reduction for 61 poor districts.
- Decision No. 2468/ QD-UBND of Cao Bang province dated 21 December 2017 on approving the project of searching domestic consumption market and branding for Cao Bang's products, especially agroforestry products for the period of 2017-2020. According to this decision, the total budget to promote connecting production and consumption of products is VND 1,560 million, of which separate funding for building a pilot model of consumption of agricultural products and ginger supply is VND 500 million. In this model, the province plans to promote linkages between producers (household groups and cooperatives) and enterprises.
- Decision No. 16/ QD-UBND of Cao Bang province dated 10 May 2018 on promulgating regulations on implementation of policies to support production development, livelihood diversification and replication of poverty reduction models under the national target program of sustainable poverty reduction in Cao Bang province for the period of 2017-

2020. According to this decision, the maximum amount of supported ginger seed is 3,000 kg / ha, urea fertilizer is 120 kg / ha, phosphate fertilizer is 170 kg/ ha, kalicloride 220 kg/ ha, NPK Lam Thao phosphatefertilizer is 500 kg / ha.

- In addition, there are also a number of resolutions indirectly related to ginger chain development as listed in **Appendix 5.**

In addition to the provincial policies, Cao Bang project programs also facilitate the development of value chains including the development project for smallholders in Cao Bang province (CSSP) funded by the International Fund for Agricultural Development (IFAD), phase 1 from 2008 to 2014 and phase 2 from 2017 to 2022. The project's objective is to increase sustainable income and reduce vulnerability poor and near poor households in the targeted communities of the project. The ginger value chain is one of the strategic intervention areas for the project. Notably the project intervenes through:

- Support for planning the development of communities and district value chains: a report reflects on analysis of Cao Bang ginger value chain in 2015 providing detailed analysis and planning for the development of the ginger value chain of Van An commune in 2018. The results of the above reports and plans indicate some main causes of damage to ginger yield: tuber decay, yellow leaves and in addition the report provides recommendations to strengthen farmer groups and improving access to the market through supporting group formation, improving group management capacity and promoting linkages between farmer groups and enterprises.
- Support interest groups of ginger planting farmers through co-competitive funding (CSA). Through this fund, up to now (15th October 2019), only five interest groups of ginger planting farmers have been supported with capital (03 groups in Ha Quang district and 02 groups in Nguyen Binh district). The total investment of the fund is VND 75 million, divided into 3 stages: phase 1 invested with VND 20 million with a counterpart fund of VND 20 million; Phase 2: VND 25 million provided that initial investment is profitable; Phase 3: remaining VND 30 million, provided groups continue to operate effectively.
- Agricultural Promotion Investment Fund (APIF). The Fund's regulation is that only private enterprises and cooperatives operating for a minimum of 12 months are eligible to apply for funding. So far, no enterprises and cooperatives in the ginger chain have access to this capital. The cause of limited use of the funds is the slow disbursement speed of the project.

4 Research result of ginger value chain in Cao Bang province

4.1 Cao Bang ginger market system

Overview of Cao Bang ginger market system is shown in Figure 4 below:

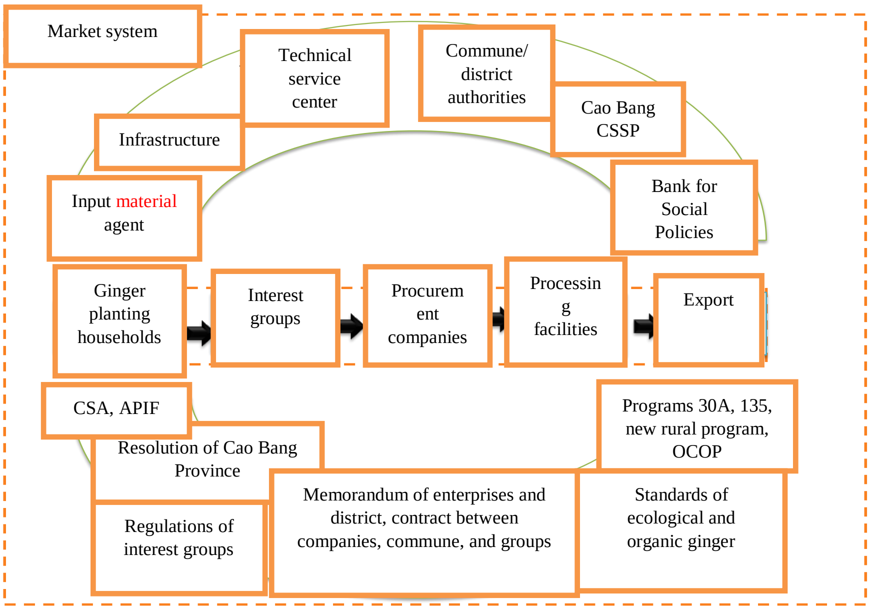


Figure 4: Cao Bang ginger market system

(Sourse: Survey result of Casrad, 2019)

Cao Bang ginger chain supporters (in-direct chain actors)

The People's Committees of Ha Quang and Nguyen Binh districts and the People's Committees of Van An, Cai Vien and Thuong Thon communes and others have directly implemented the policy of promoting the agricultural value in Cao Bang province. Representatives of the district authorities signed a memorandum of cooperation and the People's Committees of communities signed three-party economic contracts (enterprises, farmer groups and the state) with ginger processing companies to promote the ginger value chain.

Vietnam Bank for Social Policies is a state-owned credit institution that implements lending programs to support poor and near-poor households in the Cao Bang ginger market system.

Technical service centers of Ha Quang district and Nguyen Binh district are the specialized agencies of the districts directly promoting agricultural development through provision of technical extension support. The centers have a network of specialized staff to support communities. Regarding the ginger value chain, the staff of the centers support farmers in the development of farmer interest groups and provide training on ginger planting and management to households.

Infrastructure: At present, traffic roads to the ginger planting material area are very bad, the asphalt roads are degraded, there are some sections of concrete roads, the rest are mainly dirt roads and aggregate roads. In Cao Bang province, there are 03 border gates to China, namely Ta Lung, Hung Quoc and Soc Ha. This is a good opportunity for Cao Bang ginger to be exported to China.

Actors providing input materials

Agricultural inputs are mainly supplied by small agents located directly in villages and communes. Agents currently supply mainly chemical fertilizers and pesticides for ginger. They also provide mineral fertilizer, but the price is very high, restricting ginger growers to apply mineral fertilizers as they cannot afford it.

Cao Bang CSSP is a continuation of the former project '*Business Development with the Rural Poor' (DBRP*), financed through ODA loans from the International Fund for Agricultural Development (IFAD). The implementation phase of Cao Bang CSSP is from 2017 to 2022. Cao Bang CSSP support communities to make plans for ginger chain development and set up interest groups for planting ginger. The capital to support the development of the ginger chain is supposed to be derived from the Fund for Agricultural Promotion Investment Fund (APIF) and the co-competitive fund (CSA) as mentioned above. The view of Cao Bang CSSP is to empower communities through developing local institutions like interest groups, cooperatives and enterprises that are able to develop their own plans and access and be responsible for the capital investments from mentioned schemes.

Regulations / supporting policies related to the development of Cao Bang ginger chain

In addition to the resolutions / decisions of Cao Bang province, direct and indirect impacting the development of the Cao Bang ginger value chain described in the policy environment section, the ginger market system is in addition shaped through the following regulations:

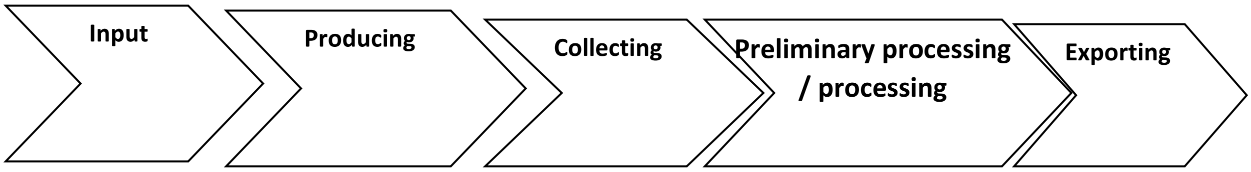
Contracts that stipulate the trade linkages between production and consumption of ginger thus between enterprises and farmer groups, farmers and People's Committees of communities. The main content of these 3-partite contract defines the role of each of the 3 actors: i) the People's Committees of the communities support ginger seed and other conducive activities that help enterprises to source raw material while helping farmer groups to access stable markets; ii) the enterprises commit to source the product, provide technical instructions and advise on ginger planting techniques for farmer groups and; iii) farmer groups commit to plant ginger according to the amount of seed received, the planting process instructed by enterprises and selling all products to enterprises.

A memorandum regarding ginger chain development between the People's Committees of Nguyen Binh district and Ha Quang district with enterprises. The main content of the memorandum entails that enterprises commit to source products from assigned production sides while the District People's Committees commit to support enterprises to develop cultivation areas from which to source the product.

An additional set of regulations influencing the chain are quality standards like for organic ginger set by ginger buying companies in compliance with EU and USDA standards (Source: survey results of Casrad, 2019).

4.2 Stages and diagram of the value chain

Cao Bang ginger value chain consists of five (5) main stages: Input provision, producing, collecting, preliminary processing / processing and finally exporting. See the diagram below for details:



Activity	Seed Fertilizer Technical training Capital	Planting Caring Harvesting Preliminary processingShipping to purchase places	Collecting Loading Transport	Classifying Processing ginger starch Ginger vinegar Dried ginger Storing	Export
Agents	Householders Enterprises Districts and communes input material agents	Ginger planting householders	CIG farmer group Purchase companies in the province Companies outside of the province	Export companies outside of the province Purchase companies in the province	Export companies outside of the province
Products	Seed Manure NPK fertilizer techniques	Fresh ginger	Fresh ginger	Fresh ginger Ginger starch Dried ginger	Fresh ginger Dried ginger

Participation of the poor	Much (100%)	Much (100%)	None	None	None
Location of operation	Cao Bang	Cao Bang	Cao Bang	Hanoi, Bac Ninh, Hai Duong, Hoa Binh, Bac Kan, Lang Son, Thai Nguyen	Hanoi, Hai Phong, Cao Bang

Figure 5: Main stage of Cao Bang ginger value chain

Three of the 5 stages are in Cao Bang province: input supply, productio and collection. The other two activities: primary processing/ processing and export are carried out outside of Cao Bang province.

Analysis of technology applied in the chain

Producing

According to the technical process of planting ginger provided by the Technical Service Centers of Nguyen Binh and Ha Quang districts and A and B companies, 300 kg of ginger seed is sufficient for cultivating 1,000m^2, applying 0.3 kg of seeds for each 1m^2. The recommended seed amount allows planting with a density of 6 stems/ m^2. The weight of 1 ginger stem is 0.05 kg (50 g). However, in fact, in some localities such as Quang Thanh commune, Nguyen Binh district, people plant ginger at a density of 0.67-1kg seed/ m^2, 50% higher as compared to the recommended instructions. In general, the quality of the seeds supplied by the local seed companies is not very high and lacking pest control measures. Currently, the survival rate in seeding is low at only 40-60%, that is, in 1 ha of ginger, only 40-60% of planted seeds become productive plants. The Ginger planting season starts in March and runs till December.

The area of Ginger in planted in Cao Bang under the programme of ‘connecting product production to consumption’ cultivated according to organic ginger standards total 30 hectares (2019) while the area cultivated according to ecological ginger standards totals 36 hectares (2019). The remaining area of ginger not cultivated under a specific standard.

Ginger is now mainly grown on mountainsides, intermingled with rocks, making it difficult to apply farm machinery. Soils are ploughed using manual labour or with the use of buffaloes. Ginger is grown by digging planting holes. The area was ginger is planted in prepared seed-beds is small.

Application of fertilizer consists mainly of manure which is self-composted but has not been decomposed. Even the use of fresh manure is common in Quang Thanh commune, Nguyen Binh district. This is one of the causes of decay.

The transport of root ginger (in bamboo baskets or sacks) from planting places to collection places (main road or hamlet centers) is mainly done by human labour without support, only if infrastructure allows, motorbikes are used.

Two main diseases are common in ginger, namely yellow leaves and tuber decay, both resulting in very low yields. Diseases result in non-proportional use of seeds at 3: 1, meaning that farmers use 3 KG of seeds to produce 1 KG of commercial ginger, while 1 ;1 should be common. Currently, farmers are not aware of the causes of both diseases and are not able to treat the plants effectively. According to experts, the cause of tuber decay is due to infection from untreated seed and soil and fresh manure in combination with heavy rain after prolonged hot weather.

Concluding, the main challenges faced by ginger growers during the production process are i) waste of seed, ii) low sprouting rates, iii) lack of mechanization in land preparation and transportation, iv) people’s failure to follow recommended ginger planting techniques and v) the lack of effective measures to prevent or control common diseases like yellow leaves and tuber decay.

Purchase

Companies sourcing ginger products in Cao Bang (companies A and B) currently collect buckets of ginger (ie not classifying products) directly from ginger farmers. Ginger is collected by trucks weighing 2.5 tons in small roads, then transferred to trucks of over 10 tons or containers (25 tons) to transport to processing companies in Hanoi and other provinces nearby Hanoi. Transportation cost from Cao Bang to consumption places varies between VND 6-8 million / 25 ton container.

Main problems in the procurement process relate to high transportation cost because it requires two times of loading and unloading and the distance from place of production to place for final processing is relatively far.

Processing and export

Ginger is now processed into three main products: dried ginger, pickled ginger and refined ginger. The products exported to Japan are manufactured according to Japanese technological processes. Other companies and dried ginger and refined ginger export companies hire third parties to carry out processing stages. Currently, applied technologies are Vietnam-made, which allows for an average recovery rate of 1kg of dried ginger/ 10-11kg of fresh ginger.

Company E in Bac Kan has a wood-burning furnace to dry ginger. Furnaces are manufactured by Vietnamese mechanical companies and funded by a project in Bac Kan province. The total production and sourcing area of the company is over 600 m^2. Currently, the furnace is not used because of the low market demand for dried ginger in export markets.

Thus, in terms of processing, in addition to the company exporting pickled ginger to Japan with modern processes and technologies, other companies use the local wood-fueled furnace technology to dry ginger.

4.3 Current status of production and main products of the ginger value chain, seeds and applied technologies

Currently, Cao Bang ginger is mainly planted in districts of Ha Quang, Thong Nong, Nguyen Binh, Hoa An, Bao Lam, Bao Lac, and Thach An with concentration areas located mostly in Ha Quang and Nguyen Binh districts. In 2019, the total area of ginger in the province is estimated to reach about 100 hectares with a total production of about 1,200 tons. Ginger production from 2016 to 2019 tends to decrease slightly (about 10 hectares) despite the support of mentioned programmes. Results from this survey show that the main cause of this the decreasing production area is related to ginger diseases, making the activity unprofitable for producers.

The Ginger variety commonly grown is referred to as "buffalo" ginger (originated from China) with big tuber, less fiber, being less spicy, yet suitable for export. Local ginger varieties tend to have smaller tubers, more fibre and being more spicy. This variety of ginger is preferred in the domestic market.

Figure 6: Local ginger

Figure 7: "Buffalo" ginger

Ginger does not have high technical and managing (production, post harvest handling, storage) requirements. After cleaning, ginger seeds are planted in dug pits with a density of 6-10 stems/ m^2 while only decomposed manure is applied. Very few households use chemical fertilizers and almost no pesticides are used.

Young ginger and old ginger

Ginger is harvested distinguishing two maturity phases: young and old or mature ginger, of which old ginger accounts for 95% of the harvest. The main reason for harvesting and selling young ginger is related to risk-mitigation, farmers deciding to harvest already in case diseases are detected in young plantations. After purchasing young ginger, enterprises process them into pickled ginger to sell to countries having a demand for this product such as Japan and Korea.

Ginger according to organic standards

According to some interviewed enterprises, the demand for organic ginger exports has increased strongly in recent years, particularly in European countries, Korea and Japan, according to some interviewed enterprises. In Ha Quang district, only 1 enterprise has developed a production area for organic ginger. At first the enterprise started with a small area of 5 hectares, so far based on early success, the model has been increased to 25 hectares in 2019.

Products of the ginger value chain

Cao Bang ginger products are sold in both fresh and processed forms. In Cao Bang, fresh ginger is packed in plastic bags and then transported to processing places in the Red River Delta.

Figure 8: Packed fresh ginger from Cao Bang

Processed ginger products of the Cao Bang ginger value chain targeting export markets are mainly processed and traded through agents outside Cao Bang province like Hanoi, Hai Duong, Bac Ninh and Hoa Binh (Survey results of Casrad survey, 2019). Among processed products, dried sliced ginger for export is the main end-product, accounting for over 90% of total processed products traded. In addition, there are also a number of other processed products such as pickled ginger root, salted young ginger, ginger essential oil, all accounting for low quantities.

Dried ginger slices

Canned ginger

Essential ginger oil

Pickled ginger tuber

Pickled ginger slices

Dried ginger slices

Figure 9: Some processed ginger products

Summary of main findings: The ginger production area of the province is about 100 ha and has been steadily decreasing from its highest coverage of 150 hectares in 2016, 90% of the production area is dedicated to "buffalo" while the balancing area is under cultivation of local ginger. Ginger is cultivated mainly without applying to external standards and only a small area (25 ha) is cultivated according to organic standards. Products derived from Cao Bang ginger are quite diverse: dried ginger, pickled ginger, essential ginger oil, etc. Dried sliced ginger is the dominant export product accounting for 90% of the total export volume.

4.4 Cao Bang ginger market

Cao Bang Ginger is rated by companies as having good quality (good taste, low fiber content) and good shape (nice, regular sized tuber). These quality specifications allow for high recovery rates of processed ginger, reaching 1 kg dry ginger / 10-11 kg fresh ginger. However, the biggest disadvantage of Cao Bang ginger value chain is related to its high transportation cost. Usually the cost of transporting fresh ginger from Cao Bang to Hanoi is about VND 300-500/ kg, equivalent to 7-10 million/ a 25-ton container.

Cao Bang ginger is mainly sold in raw form (75%) to export and processing companies, a small amount (20%) of fresh ginger is sold to other collectors for export. Standard for dried ginger depend on requirements of the concerned customer but is usually less than 12% humidity, no mold or impurities. Export standards for fresh ginger usually requires from 90% humidity or more, tubers having a minimum size of 100 grams and a minimum delivery quantity of a container of 25 tons. Different customers may require washed or unwashed ginger, the latter being most common (80% of sales are unwashed ginger).

The current tendency is an increase of demand for processed ginger. To reduce transportation costs, companies wish to open processing facilities right in the cultivation and sourcing area. This is an opportunity for Cao Bang province to participate up-chain and value-added activities thus increase value adding at local levels.

Cao Bang ginger now has an advantage over other ginger planting areas in the North, by already (partly) meeting ecological and organic standards for ginger. The purchase price of organic unprocessed / raw ginger has always been higher than that of regular ginger, with a premium price of about VND 1,000-2,000/ kg as compared to regular produce. The major export markets for organic ginger export are Europe and the USA. According to enterprises, the demand for organic ginger is steadily increasing over the years. Export markets for ginger sourced in the North of Vietnam include India, Bangladesh, Japan, Europe, USA, etc. According to the statistics of H Company, complemented by an export consultant in Hanoi, as of August 2019, the number of ginger orders through the company by foreign export destinations in order of importance: India (25%) Pakistan (12.5%), Bangladesh (12.5%), Middle East countries (25%), and other markets (25%). The H Company estimates the demand, thus required volume to be sourced, around 4,000 tons / year. The price of ginger trading is determined by the price setting at global markets at the time of transaction.

Summary of main findings: Cao Bang is considered one of the best regions for ginger production in the country having suitable natural conditions for the development of organic ginger. Currently, Cao Bang ginger is mainly sold raw to processing companies for export purposes (75%), the balancing volume is directly exported in unprocessed form (20%). Cao Bang ginger markets mainly include Europe, USA, Japan, and Middle Eastern countries. Demand for Cao Bang ginger is about 4,000 tons / year, while production figures meet about 20% of the market demand only.

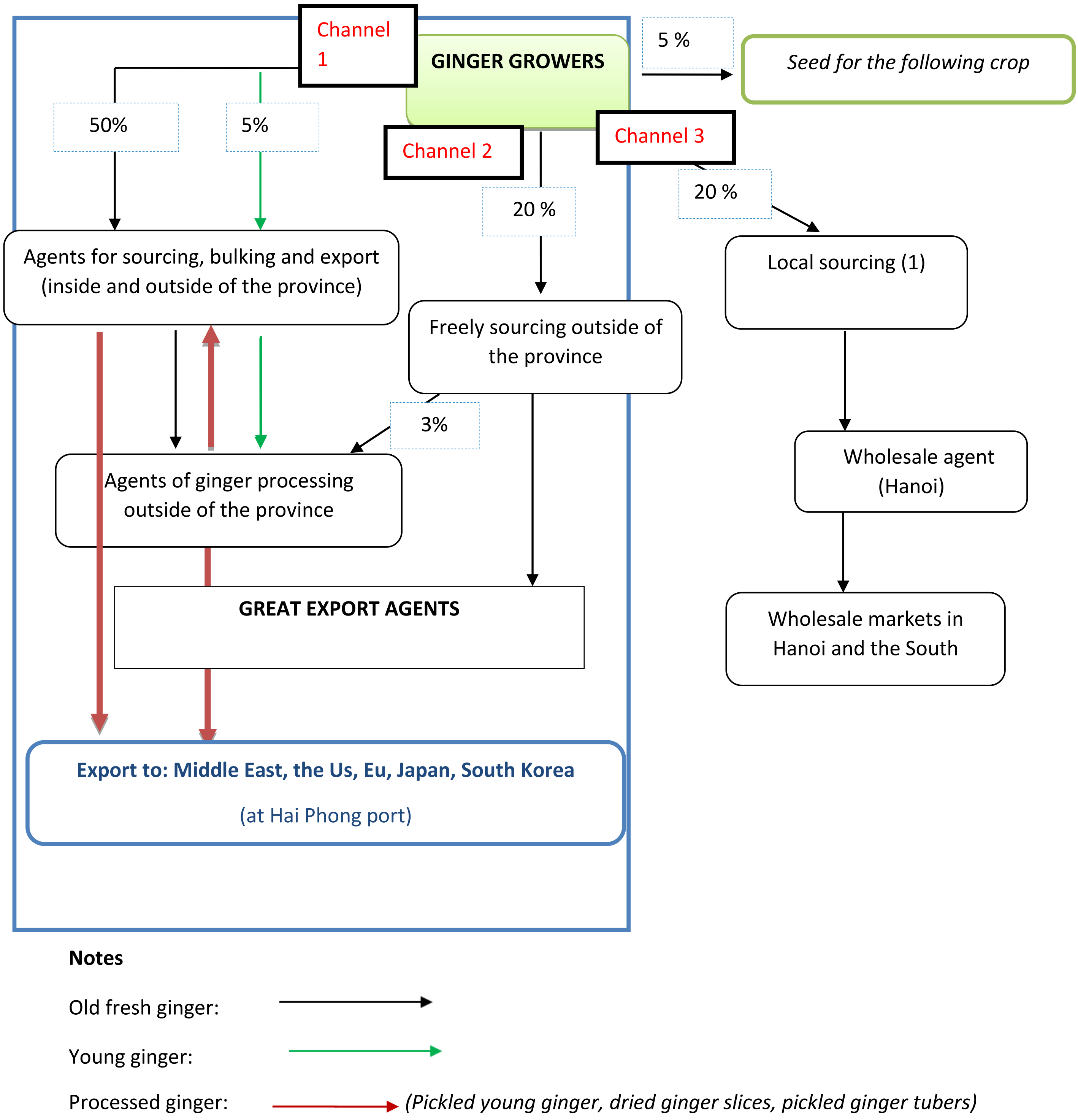


Figure 10: Diagram of Cao Bang ginger value chain in 2019

4.5 Analysis of Cao Bang ginger value chain

According to a report from the Department of Agriculture and Rural Development of Cao Bang province, as per 2019 the total Provincial area under ginger cultivation is estimated at 100 hectares, reaching a total output of 1,200 tons, an average yield of 12 tons/ ha. According to Figure 10, most of Cao Bang ginger is supplied to export channel, of which 55% (50% of this being old ginger) is supplied through contract farming arrangements.

There are three (3) main supply channels within the Cao Bang ginger value chain as shown in the diagram 10 above, these includes 2 export channels and 1 domestic supply channel.

<u>Channel 1 - Export channel through signed contract</u>

Ginger households>>>representatives of groups + authorities>>>export agents inside and outside the province>>>processing and export agents>>> importing actors in foreign destinations

According to channel 1, collecting and export agents outside of the province often rely on representatives of farmer groups and local authorities to source goods under signed contracts. The volume of ginger supplied and marketed through this channel accounts for 55%, or about 600 tons of Cao Bang's total ginger output per year. Ginger is then transported to processing facilities in the Red River Delta (Hanoi, Bac Ninh, Hai Duong, Hoa Binh and others) for further processing before being exported. There are two types of export agents: (1) agents directly sourcing goods in Cao Bang and, (2) agents buying ginger through wholesales for further processing and export. During the 2019 cropping season, 3 main buyers can be distinguished respectively Company A, Company B and Company C, all practicing contract farming type of arrangements in sourcing ginger.

This specific supply arrangement is characterized by the signing of tri-partite contracts between local authorities, producers and the company before each production season. Mentioned companies sign a memorandum of cooperation for ginger production and procurement with district authorities (such as in Nguyen Binh and Ha Quang). A complementary 3 partite contract is then signed by representatives of company, commune authorities and representatives of ginger producing groups. Each contract containes the following main stipulations:

- Companies sell seed to households;
- Companies will purchase the produced ginger from producing households against market price at date of delivery with a guaranteed minimum price of VND 5,000 / kg (in case market price is below VND 5,000 / kg);
- Companies provide technical training and advise to ginger growers.
- Producers guarantee to sell their product to the contracting company (and not default through side-sales)

Ginger is included under the poverty reduction program, so poor households signing such contract farming contracts will enjoy a 100% subsidy for costs of seed and a part of fertilizer according to the support regulations of Cao Bang province.

Organic ginger for export markets

A specialized chain in this category of contract farming arrangement is the ginger value chain for organic ginger targeting export markets in EU and the US. An enterprise specialized in exporting organic ginger (dried slices) is capable of exporting 600-1,000 tons of products/ year. However, the amount of organic ginger purchased from Cao Bang only meets about 15-20% of this demand. Strict adherence to the technical process for organic products (currently the enterprise holds organic certificates for export from USDA, EU) has far reaching consequences for the supply chain. The requirements stipulate that products must be produced by and sourced from producers through close and transparently coordinated linkages between all chain actors. All actors in the organic chain even if not dealing directly with producers like exporting companies must comply with the organic standards thus participate in the process of surveying, monitoring and evaluating organic standards for ginger.

Summary of main findings: The supply chain of organic ginger for export markets accounts for 55% of the total output of ginger produced in Cau Bang province. This is the initial result of the successful policy for promoting stronger coordination and linkages between all actors in the ginger value chain. Through this model of coordinated chain transactions, some Cao Bang ginger products were able to meet the strict market standards for organic ginger (complying with USDA and EU organic standards).

***Channel 2:* Export channel without link**

Farmers >>> sourcing actors from outside the province>>> processing and export agents>>>export

During the harvesting season, buyers from neighboring provinces such as Bac Kan, Hai Duong, Hanoi and Tuyen Quang come directly to Cao Bang to source without prior contracting on the free market through local sourcing agents. The volume sourced through this channel accounts for 20% of the total annual ginger production in Cao Bang (200 tons/ year).

Ginger price through this channel is usually VND 500-1,000 higher as compared to the ginger supplied through contract farming arrangements. This is the main reason for farmers to default on their existing contracts and side-sell produce to these buyers at the open market. According to a survey of a ginger buying company, ginger purchased through this channel sometimes includes “buffalo” ginger from China. Small amounts of ginger sourced through this channel are there-after supplied to processing and export agents.

The volume of ginger being sold by producers at the open market to buyers from neighboring Provinces, thus without prior contracts being signed, is still substantial and counts for 20% of the total ginger production in Cao Bang. The higher price these free buyers offer motivates farmers to side sell thus default on existing contracts. The control on this supply chain is lacking allowing for mixing Cao Bang ginger occasionally with Chinese ginger causing reputation damage to the Cao Bang ginger.

Channel 3: Fresh ginger supply to domestic market through free sourcing

Farmers >>>>local collectors>>>Hanoi traders>>>Wholesale market of agricultural products

This channel accounts for 20% of the total production of Cao Bang ginger. Ginger is purchased through local collectors, brought to Hanoi wholesale places and transported to Northern and Southern provinces. According to the value chain diagram, the remaining 5% of ginger are kept by farmers for seed for the following crop, equivalent to about 18 hectares. This is a relatively small number compared to 100 hectares of ginger grown annually in the province. This is also an issue underlined by local seed support programmes.

Summary of main findings: The volume of ginger supplied through this channel accounts for a relatively large proportion of the total Cao Bang ginger production. This is an opportunity for Cao Bang ginger producers to diversify market. The amount of seed retained by farmers is small due farmer rely on to the seed support from Program 30 A. This attitude is however not sustainable in the long term as the project might come to an end.

Through this supply channel Cao Bang ginger is sold as a fresh and unprocessed product and is transported to other locations for processing and export packaging. The transportation of unprocessed products over long distances increases transportation costs and often damages the product. The additional costs for transportation and damage occurring during transportation affects the at-gate price setting for farmers.

Main actors involved in the value chain

***Households**:* Most of ginger planting household in Cao Bang are involved in interest groups supplying ginger to buyers and export actors inside and outside of the province. These groups are formed voluntarily by members of CIGs development program of CSSP. Currently there are 15 ginger planting interest groups a total of 500 households, mainly in Ha Quang district (400 households) of Bao Bang. These interest groups are involved in signing contracts for production and supply of ginger products to enterprises. Although ginger does not require much care, it is necessary to apply new techniques to prevent risks of diseases. Therefore, upon joining these interest groups, in addition to receiving technical assistance from the provincial public service organizations, ginger household also receive direct support from contracting enterprises. However, according to surveys, the overall operation of the ginger interest groups is still challenging, and groups internal organizational functioning is rather weak. Many groups face challenges in terms of selling ginger under contracts, complying with recommended production process, managing group funds, etc. The fact that the groups are very diverse in terms of background of the members creates also challenges. Particularly poor households being group member, tend to default on contracts by sides selling if prices at the open markets peak. Such free-riders behavior damages the reputation of the groups.

Collecting and export agents inside and outside the province: There are 3 enterprises involved in collecting fresh ginger, two from within Cao Bang Province and one from outside the Province. The two Cao Bang enterprises collect fresh ginger without processing or exporting. The enterprise outside the province exports ginger. This is also the only enterprise in Cao Bang that has built an organic production area. After fresh ginger is shipped outside the province, drying is done through service providers and there after the ginger is packed and shipped through Hai Phong International sea port. Transportation is also carried out by rented transportation companies.

Free buyers from outside the province: These agents are all private enterprises from outside Cao Bang Province. On average, there are about 5-6 of such buyers active during the harvesting season. These agents use local informants to approach farmers. These buyers only buy fresh ginger from Cao Bang which is than transported to supply merely domestic markets in Vietnam.

Ginger processing agents outside the province: These agents are all located outside Cao Bang under the main processing clusters in the Northern Vietnam including Hanoi, Bac Ninh, Hai Duong, Hoa Binh and Thai Nguyen. The processing agents are hired by export companies for the drying of the produce before exporting the produce.

Major exporting agents: After being collected and processed ginger is exported through specialized export agents. These agents receive the processed and packed from suppliers for export purpose only. Like the main processors also the main export agencies are located in the industrial clusters in Northern Vietnam including Bac Ninh, Hai Duong and Thai Nguyen). The Cao Bang ginger is exported to large extend by two of such exporting companies having long lasting relations with suppliers in Cao Bang. The largest of the two companies was established in 19990 and handles export volumes ranging from 1,000 -3,000 tons of ginger per year, equivalent to 100-300 tons of dried ginger.

Local collecting agent: These local collectors collect fresh ginger to supply wholesalers in major wholesale markets in Hanoi and the South, responding to the domestic demand for fresh ginger in the country.

4.6 Analysis of governance, coordination, regulation and control of agents in the value chain.

Referring to the description of the governance structure of the Cao Bang ginger value chain two main governance principles can be distinguished:

- Governance according to free market: Ginger is supplied through free market arrangements and pricing / conditions negotiated at farm gate without prior contracts being in place. Contact between producers and buyers are limited to the transaction after harvest. The free market channel also supplies export markets.
- Relational governance: In this case companies purchase products on contractual basis and often within long-term trade relationships. Contracts are signed with a floor price of VND 5,000/ kg, providing some security to farmers in terms of risk mitigation. Yet this does not withhold some farmers to default on contracts by side-selling produce if prices in the open markets are at their peak. but this contractual relationship has not been considered as close due to non-compliance with the contract: to sell goods outside. Enterprises also engage in providing technical advisory services and training to contracted farmers.

4.7 Analysis of relationship and linkage between the actors in the chain

The two most important actors in the Cao Bang ginger value chain are the ginger producing farmers and ginger sourcing and exporting enterprises. Ginger is produced by many small-scale households. To assure some effectiveness in the sourcing and bulking operations as well as in product quality and uniformity, coordination between does small holder households is a prerequisite. For this reason, the forming and strenghthening of ginger producer groups is essential. Effective coordination between farmers and ginger collectors and between ginger collectors and export actor ensures a smooth exchange of information, sharing benefits and can mitigate risks as the chain can timely anticipate - respond to market fluctuations.

Horizontal relation: farmer-farmer

Despite the support and advice of the existing IFAD project, the operations of the ginger planting interest groups in Cao Bang has so far not been really effective. The groups have rules on common activities and operate a general fund based upon members’ contribution. After households receive seeds from the support programme, members voluntarily contribute VND 2,000/ kg to the general fund to pay for group's activities like group meetings. However, overall group coordination is still weak in many groups and groups are not effective in guiding members to comply with recommended production practices. Internal cohesion within groups is still weak hampering the foreseen functioning of the groups as anchor points and hubs for training and strengthening farmers capacities.

Figure 11: Collecting and export purchasing enterprises train ginger planting farmer group

Vertical relation: farmer-enterprise

The cohesion of ginger production groups is weak, affecting the relation between farmer groups and ginger collecting enterprises. For example, currently the production groups have not formulated internal regulations and sanctions for default on contracts by members. Therefore, free-rider ship, benefiting from the advantages and services of being a group member but at the same time not complying with contracts signed with buyers, affects the functioning and reputation of the producer groups. If not addressed, this may affect the future of the groups and the willingness of buyers and local authorities to engage with thegroups in tri-partite partnerships.

As of 2019, there are three enterprises involved in contracts with 15 ginger planting interest groups in the districts of Ha Quang and Nguyen Binh. In the current arrangements, collecting companies have a memorandum for supporting ginger cultivation with district authorities, and economic contracts with communities to provide ginger seed (fund from program 30a) and economic contracts with farmer interest groups to arrange for the supply of produce to the companies.

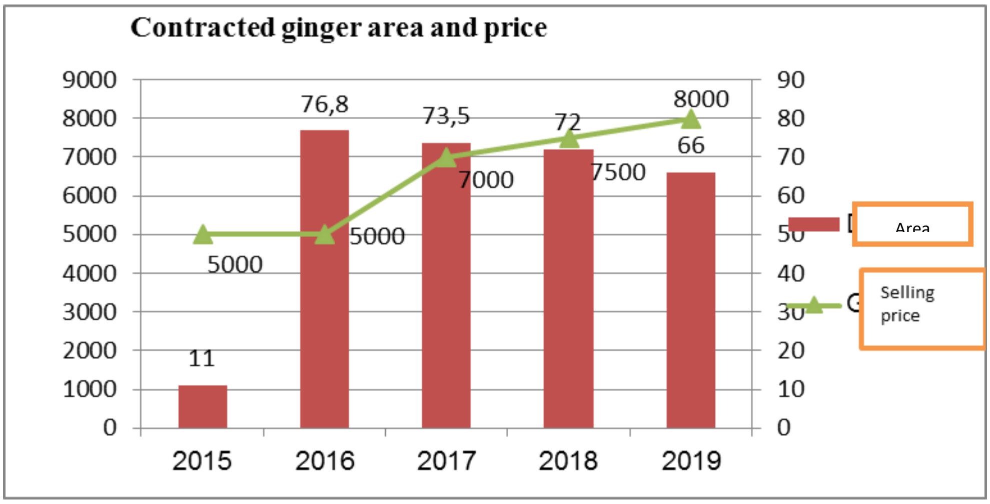


Figure 12: Contracted ginger area and price setting

(Source: Survey result of Casrad, 2019)

The graph above depicting changes in the total cultivation areas and price setting per year show that during the first year of the contract arrangements (2015), the total area of ginger was 11 hectares. The total area under ginger cultivation increased to 65 hectares by 2016. From 2016 to 2019, the area of ginger has been steady at 66 hectares or more. Ginger price setting tends to increase steadily over the past years from VND 5,000 (2015) up to VND 8,000 (2019). The minimum price in the contracts has been steady at VND 5000, - for regular ginger and VND 6000, - for organically produced ginger. Price setting for actually prices at times of harvest is done based upon actual prices at the global market at the time of the transaction.

Farmers are directly trained by technicians appointed by enterprises (especially for organic ginger planting). For regular ginger production, farmers are trained according to local agricultural promotion programs. In addition, farmers are provided subsidies of 100% of costs for seeds as offered through the 30A programme at a price of VND 21,000/ kg.

4.8 Analysis of prices, costs, and profit of the value chain

The average production area under ginger cultivation by small-holder households in Cao Bang varies between 2,000 to 3,000 m2/ household. Ginger yields in 2019 reached 12 tons/ ha (regular ginger) and 11 tons/ ha (organic ginger), which is down 4-8 tons/ ha. As compared with production figures of previous years. 1 kg seed generated 3-4 kg of commercial product as compared 6 - 7 kg of commercial product in previous years Survey results including 35 ginger producing households indicate that the reduction in yields / hectare is the main cause of the lower Return on Investment / economic efficiency for ginger in 2019.

The total cost of ginger cultivation is estimated at VND 79 million/ ha (regular ginger), VND 73 million/ ha (organic ginger). Seed costs are VND 63 million/ ha, accounting for over 50% of total investment costs and over 80% of total costs for inputs. The received subsidy for the costs of seeds are there-for very much appreciated by ginger cultivating households. It means at the same time that without the subsidies ginger cultivation would no longer be economically feasible under current production and pricing regimes. After deducting all costs, with the selling price of VND 8,000/ kg (regular ginger) and VND 10,000/ kg (organic ginger), the losses would be substantial at (-) VND 21 million/ ha (regular ginger) and (-) VND 250 thousands/ ha (organic ginger). The value of organic ginger is double the price of regular ginger. With the current low productivity and high cost, the breakeven point for ginger planting households would require a price setting at VND 9,700 for regular ginger and VND 10,000 for organic ginger.

Table 2: Accounting costs and profits of ginger planting households

Unit: VND

Area: 1.000 m^2		**Comparison**					
		Regular ginger			**Organic ginger**		
Time of production: 10 months	Unit	Quantity	Unit price (VND'000)	Value (VND'000)	Quantity	Unit price (VND'000)	Value (VND'000)
I. Input							
1. Materials				**7,910**			**7,350**
Seed	kg	300	21	6,300	300	21	6,300
Manure	kg	1.500	0,7	1,050	1,500	0,7	1,050
NPK fertilizer	kg	100	5,6	560			
Ure fertilizer							
Pesticide							
2. Labor costs		**37**		**3,825**	**35.5**		**3,675**
Ploughing	Man power	2.5	150	375	2.5	150	375
Planting	Manpower	5	100	500	5	100	500
Covering dry grass	Manpower	5	100	500	5	100	500
Removing grass	Manpower	9	100	900	9	100	900
Fertilizing, cultivating soil	Manpower	5.5	100	550	5	100	500
Harvesting	Manpower	10	100	1,000	9	100	900
Total costs 1+2				**11,735**			**11,025**
II. Selling products	Kg	1.200	8	**9,600**	11,000	10	11,000
III. Profit				**-2,135**			**-25**

(Source: survey results of Casrad, 2019)

For the collector / buying companies the story is different as even with fluctuating market prices, a profit margin is guaranteed. According to the survey results, buying companies sourcing ginger on contractual basis for further processing and export sales will gain a profit of VND 260/ 1kg of fresh ginger. transportation costs account for a very large proportion, 75% of the total cost of companies. Transportation costs are high because of the remoteness of Cao Bang and the long distance to be covered to reach processing destinations. (up to 350 km to Hanoi and neighboring Provinces). This is the main disadvantage of the Cao Bang ginger producers and for Cao Bang as a strategic area for ginger cultivation as a whole the results of cost analysis for companies based upon 1 kg of fresh ginger (regular) are as follows:

Table 3: Accounting of costs and profits of companies covering products

Unit: VND

Items	Unit	Quantity	Unit price	Value
			(VND'000)	(VND'000)
I. Input				
1Intermediary costs				8
Ginger purchase	kg	1	8	8
2. Increased costs				2.24
Loading costs	kg	1	0.3	0.3
Transport costs	kg	1	1.5	1.5
Management costs	kg	1	0.2	0.2
Loss costs	kg	0.03	8	0.24
Total costs (1+2)				10.24
II. Selling products	kg	1	10.5	10.5
III. Net profit				0.260

(Source: survey results of Casrad, 2019)

Regarding export markets dried sliced ginger is the dominant product with good market potentials and growing demands. Survey results show that the net profit from export of dried sliced ginger is VND 93,300 / kg of processed ginger equivalent to the profit / capital ratio of 87.5%. Currently, the cost for buying the raw produce accounts for 98% of the total costs. According to enterprises, although the price of ginger in Cao Bang is 3 times higher than that of imported ginger from Nigeria, they still prefer Vietnamese ginger because of its superior quality.

Table 4: Accounting of costs and profits of processing and exporting dried sliced ginger

Items	Unit	Quantity	Unit price	Value
			(VND'000)	(VND'000)
I. Input				
1. Intermediary costs				**105**
Ginger purchase	kg	10	10.5	105

2. Increased costs				**1.70**
Processing costs	kg	1	0.3	0.30
Transport costs	kg	1	1.2	1.20
Management costs	kg	1	0.2	0.20
Total costs (1+2)				**106.7**
II. Selling products	kg	1	200	**200**
III. Net profit				**93.3**

(Sources: Survey results of Casrad, 2019)

According to calculations, 1 kg of fresh ginger with current selling price in Cao Bang of VND 10,500/ kg, will after processing produce 0.1 kg of dried ginger. With the price of VND 200,000 / kg for dried ginger, the value of the product increases about VND 9,300/ kg compared to the price paid for fresh ginger. Drying ginger, although a relatively simple intervention, not requiring huge investments or advanced technology, is adding substantial value to the product!

Table 5: Added value in the Cao Bang ginger chain

No.	**Items**	**Producing agent** 1 kg of fresh ginger VND 1,000	**Fresh ginger collecting agent (with contracts)** 1 kg of fresh ginger VND 1,000	**Dried and sliced ginger export agent** 0.1 kg of dried gingerfrom 1 kg of fresh ginger VND 1,000
1	Value	8	10.5	20
2	Intermediate costs	6	8	10.5
3	Increased costs	3.2	2.24	0.17
4	Added value (1-2)	2	2.5	9.5
5	Net added value (4-3)	1.2	0.26	9.33

5. SWOT analysis Cao Bang value chain for ginger

Strength	**Weakness**
- Natural conditions suitable for planting ginger, especially for growing ecological and organic ginger standards - There are existing supply links for ginger products between enterprises and interest	- Farming households in Cao Bang are mostly poor families with limited education. This hampers to uptake of more advanced cropping methods. - There are no control measures or preventive

groups (CIGs) and households. - Current support programmes, particularly for subsidizing seeds make the Cao Bang production of ginger highly competitive and still lucrative for farmers.	measures in place to prevent diseases like tuber decay and yellow leaf - Ginger producing households have very limited resources to do additional investments in the production process to intensify production. - Cost of ginger seed is high, accounting for 50% of total investment cost. - Ginger is only sold in unprocessed raw form, actually no added value stays in Cao Bang. - The return on investments for seeds is very low due to low quality of seeds and current seeding practices causing high losses. - Transportation costs for raw ginger products are high, as Cao Bang is located far from processing destinations. - The bad conditions of roads causes further transportation issues and damage to the produce.
Opportunities	**Challenges**
- Demand for ecological, organic, and processed ginger is increasing. - Cao Bang's fresh ginger products only meet about 20% of the market demand. - Raw material areas border three border gates with China: Hung Quoc, Soc Ha and Ta Lung. - The province has programs and policies to support ginger cultivation and for building linkages between chain actors (VCD) - There are new rural programs and the one product per commune program (OCOP).that could further support the ginger value chain - Access to two sources of funding: co-competitive funding (CSA) and an agricultural promotion investment fund (APIF).	- Cao Bang has higher transportation cost than production areas that are closer the the processing / export destinations weakening its competitiveness. - Ginger production is mainly based on rain fed agriculture making it vulnerable to weather conditions and increasingly occurring extreme weather events (draughts, floods, hail storms etc.). - Due to topographical factors, it is difficult to apply mechanization to ginger production. - Ginger is a very price volatile products and market prices fluctuate largely over the years.

VI. Conclusion and recomendations

Conclusion

The potential for developing the Cao Bang ginger value chain looks promising yet requires strategic interventions along the entire chain. Current market demands justify further investments in the Cao Bang ginger value chain, with an output of Cao Bang ginger currently totaling about 1,000 tons/ year it covers only about 20% of the purchasing demand of processing and export agents.

Yet, the total production area has been decreasing the past years. Decreasing production has multiple causes which have to be addressed. The decrease in production figures is directly related to challenges in profitability at farmers levels. The failure to address the occurrence of many common diseases in ginger (root rot and yellow leaves) affects negatively the profitability and sustainability of the chain.

Compared to other localities across the country, Cao Bang has the competitive advantage of already meeting organic standards for a substantial part of the ginger sourced from Cao Bang. Cao Bang has suitable conditions for growing ginger under organic standards and the profitability of the value chain for organic ginger looks good with promising levels of profitability, in particular, the organic ginger for export markets shows a high demand from buyers. Buyers and exporting companies are looking for an expansion of the volume supplied and for assuring a steady and secured supply of organic ginger.

Financial analysis of the ginger value chain shows some risks in terms of sustainability. State development policies and related subsidies seem necessary to allow poor mountainous households to access the ginger value chain. However, the current subsidies, particularly those recovering the costs for the purchase of seeds, bring in unsustainable practices and distort market mechanisms. Without subsidies the cultivation of ginger against current price setting is no longer profitable at smallholder level. This brings in uncertainties as the policies for access to these subsidies may not sustain in the future. In addition, without current subsidies the competitiveness of the Cao Bang value chain will decrease as compared to other sourcing areas (domestically and abroad) in case the subsidies are no longer available.

Financial analysis shows that ginger processing allows for substantial value adding and is highly profitable. In general, the demand for processed ginger, in particular for export markets, has been increasing over the years. This is an opportunity for Cao Bang ginger industry to invest in value adding processing activities instead of functioning as sourcing ground for raw material only.

Enterprises' are showing interest in developing processing facilities close to major production and sourcing areas like Cao Bang in order to reduce transportation costs occurring in the transportation of fresh ginger. However, the establishment processing facilities at production sites goes beyond the capacities of local enterprises. Additional support from local authorities in terms of policies and the acquirement of land and capital seems necessary. Investment in processing should be considered seriously however, as it would substantially improve the competitiveness of the Cao Bang ginger value chain at the same time allows for localizing added value having promising pro-poor development effects.

The development of stronger linkages between chain actors particularly between collectors, exporters and producers through groups, allowing for better coordination and increased efficiency of the overall value chain is one of the decisive factors to the existence and competitiveness of the Cao Bang value chain. Currently, although this linkage has been established with the support of local authorities, the developed relations are in reality still rather weak and show challenges in terms of sustainability. The latter is very much related to high levels of default among farmers in complying with contracts signed with buyers.

Enterprises do engage in rendering technical assistance to contracted farmers, supplemented by technical support provided through public line agencies. In addition, improving the internal organizational functioning and overall capacity of production groups is seen as a key to increasing efficiency and sustainability of the chain. This is a challenging task as local agricultural promotion agencies have a lack of staff and must focus on a number of other important crops (rice and corn).

Another competitive advantage of the Cao Bang ginger relates to his superior quality of the ginger produced in Cao Bang. The quality of Cao Bang ginger is recognized and valued by the market. This competitive advantage is however jeoparded by the current practice of buyers from outside the Province that source ginger from Cao Bang at an ad hoc basis and frequently mix the Cao Bang ginger with ginger sourced elsewhere (merely low-quality ginger from China). In the long term, this practice will affect the overall good reputation of the Lao Bang ginger and affect the interests of local agents in asserting and marketing the brand of Cao Bang ginger.

Recommendations

Planning material areas

In the future of ginger production areas, planning of material areas by provincial and district governmental authorities, other chain actors particularly the sourcing agents must get involved as to assure their interest and demands are taken into account. This is necessary to allow for improved coordination in sourcing relations and enhancing overall efficiency of the ginger value chain. In order to minimize costs for the transportation of fresh products to collecting and processing destinations, planning policies should focus on rehabilitating and/or completing infrastructure that is used to transport ginger. For areas under organic ginger production, it is necessary to have general areal planning and promulgate specific regulations to ensure that from contamination by traditional farming.

Policy of supporting production and collection

Agencies and organizations need to research techniques to assist enterprises and farmers to deal with technical issues. In areas of organic ginger production, many methods for preventing and treating pests and diseases according to organic standards must be piloted and transferred to farmers. In particular, there is a need for:

- Soil: Applying soil conservation techniques to avoid soil erosion;
- Seed: Improve seed handling and storage and increase the germination / survival rates of seeds from 40% to 90%;
- Fertilizers: Composting / microbial organic fertilizer, made accessible in production areas;
- Pest and disease control: Take effective measures to prevent root rot and yellow leaves;
- Methods of harvesting improve post-harvest handling and transportation to avoid damaging / reducing quality of produce (replacing sacks with bamboo or plastic baskets);
- Supporting policies targeting the ginger value chain and in particular poor households cultivating ginger in districts like 30A and 135 should be asses on effectiveness and revised accordingly in order to assure sustainable impact on the livelihood of ginger producing households in poor districts of Cao Bang Province.

Policy of supporting farmer group organization

Continue to develop and strengthen ginger producing interest groups, eventually leading to the establishment of cooperatives. Local resources should be mobilized and integrated with the intervention strategies of the various external projects to enhance group formation and strengthening. For example, streamline the different loan programs farmer groups can access and make provided financial services like from CSA and APIF under IFAD projects accessible to smallholder ginger farmers and/or smallholder ginger farmer producer.

Policies of strengthening capacity of local enterprises

The ginger export is depending on the ability to reach buyers in international market and supply consistent volumes of quality produce. Local enterprises play a crucial role in particularly the consistent supply of quality produce. Therefor local enterprises should be supported to perform their role in the chain in an efficient manner. In particular the drying process is critical thus enhancing the capacity and skills of processing enterprises is highly recommended. The provincial authorities may further assess in what way to support local enterprises best. In the end the future success of the Cao Bang ginger value chain will among others depend on the local ability to not only produce quality ginger in an efficient manner but also to process the produced ginger locally. Enhanced efficiency in the chain would also allow for higher at farm gate prices. The development of the ginger value chain that combines local production with supply to local processing facilities will have substantial competitive advantages and assure that value added stays in the region. The latter has great advantages in terms of local economic development and poverty alleviation.

Branding policy

Cao Bang province should develop a marketing strategy for ginger based upon building up a reputation of superior quality of the Lao Bang ginger. The branding of the ginger produced in Cao Bang would allow for capitalizing on its competitive advantage in terms of quality of the Cao Bang ginger. Such branding strategy should be developed in close collaboration with local enterprises and could include geographical indications, referring to the area of production. Branding is regarded as an essential part of any future strategy to further develop the Cao Bang ginger value chain.

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Appendix

1. Policies related to the ginger value chain development

Resolution No. 31/2017/NQ-HDND dated 8 December 2017 of the Provincial People's Council stipulating a number of spending norms to support production development, livelihood diversification and replication of poverty reduction models for the implementation of the sustainable national poverty reduction in Cao Bang province in the period of 2017-2020.

Resolution No. 28/2018/NQ-HDND dated 12 December 2018 of the People's Council on approving policies to support the linkage of production and consumption of agricultural products in Cao Bang province.

Resolution No. 58/2016/NQ-HDND dated 5 August 2016 of the Provincial People's Council on promulgating specific policies to support enterprises and cooperatives invest in agriculture and rural areas in Cao Bang province

Decision No. 347/QD-UBND dated 29 March 2019 on the allocation of targets for the capital plan to implement national target programs in 2019, including the allocation of capital to support the development of associated production in value chain, connecting production with consumption, with the total budget is VND 25,245 million.

The project of restructuring the provincial agriculture for the period of 2016-2020 of People's Committee of Cao Bang Province approved in October.

For cultivation*: Develop cultivation in the direction of applying high and sustainable technological advances, producing commodity, increasing productivity and product quality, ensuring food safety and raising efficiency of land use, labor, and capital. Call for investment in the processing industry, especially deep processing, post-harvest preservation towards modernization to reduce post-harvest losses and enhance the added value of products. Encourage enterprises to link production and consumption of agricultural products with farmers. Ensure food security, enhance the efficiency of land use to reach an output of 130,000 tons; focus on developing about 1,000 hectares of endemic and pure rice with high quality to become commodities. Use hybrid and transgenic corn varieties with high yield and drought tolerance to reach an output of 180,000 tons, meeting processing and breeding materials. Develop special vegetable, fruit, medicinal plants, mushrooms, fruit trees areas. Maintain and develop commodity crops such as tobacco, 5,000 hectares, sugarcane 3,500 hectares, cassava 5,000 hectares, and peanut 5,000 hectares, etc.*

New rural program: Support infrastructure construction

OCOP program (one commune one product) is being implemented. Support product and market development for local products.

2. **Code list of Cao Bang ginger processing, consumption and trading enterprises interviewed**

Figure 8: Code of interviewed companies' name

No.	Name of company	Code
1	Duc Chung Co., Ltd.	A
2	Truong Tho Company	B
3	DACE Company	C
4	Tuan Tam Company	D
5	Minh Be Co., Ltd.	E
6	Pacific Company	F
7	Son Ha Spice Company	G
8	Vietgo Company	H

3. **List of ginger areas in contracted product region area and potential of area expansion in the region**

Table 9: Ginger area under product covering contracts of Cao Bang province

District/ company	Ginger area in 2018 (ha)	Ginger area in 2019 (ha)	Potential of expanding ginger area (ha)
Ha Quang district	**72**	**52**	**100**
Company A	22	22	
Company C	50	30	
Nguyen Binh district		**14**	**100**
Company A		8	
Company D		3	
Livelihood diversification project(30A)		3	
Total	**72**	**66**	**200**

4. Some field images

Picture 1: Group discussion

Picture 2: Ginger field

Picture 3: Interview

Picture 4: Ginger procurement by enterprise

Picture 5:Interview

Picture 6:Ginger harvesting

Picture 7: Transport truck

Picture 8: Processing factory

Picture 9: Ginger field with yellow leaf disease

Picture 10 : Procurement place

Picture 11: Young ginger tubers

Picture 12: Pickled ginger