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GREEN SUPPLY CHAIN - SOLUTIONS TO IMPROVE THE COMPETITIVENESS OF THAINGUYEN TEA

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Abstract

Thainguyen is one of the three biggest tea producing areas in Vietnam. Thainguyen tea has been famous for hundreds years, not only all over the country but also in many countries, for its delicious bitter-sweet green tea. The price of Thainguyen tea is also higher than many other provinces tea, but is still much lower than the average price of many other big tea exporting countries. Small and handicraft production, small trading and lack of relationship between all components of tea supply chain are the main reasons. Develop green supply chain is a good solution to improve the competitiveness of Thainguyen tea in long-term. After over viewing green supply chains theory, this article assesses the current situation of tea supply chain in Thai Nguyen and propose solutions for developing green supply chains for Thai Nguyen tea products.

Keywords: Competitiveness, green supply chain, tea production, tea supply chain, Thainguyen province.

Introduction

Thainguyen province now has 21.361 ha tea (2016), fresh buds tea yield reached 211.244 ton/year. Joining the tea supply chain in Thai Nguyen now has 29 enterprises, 30 cooperatives and 50 craft villages and hundreds of tea producing, processing and consuming facilities with over 60 thousand tea households - farmers.

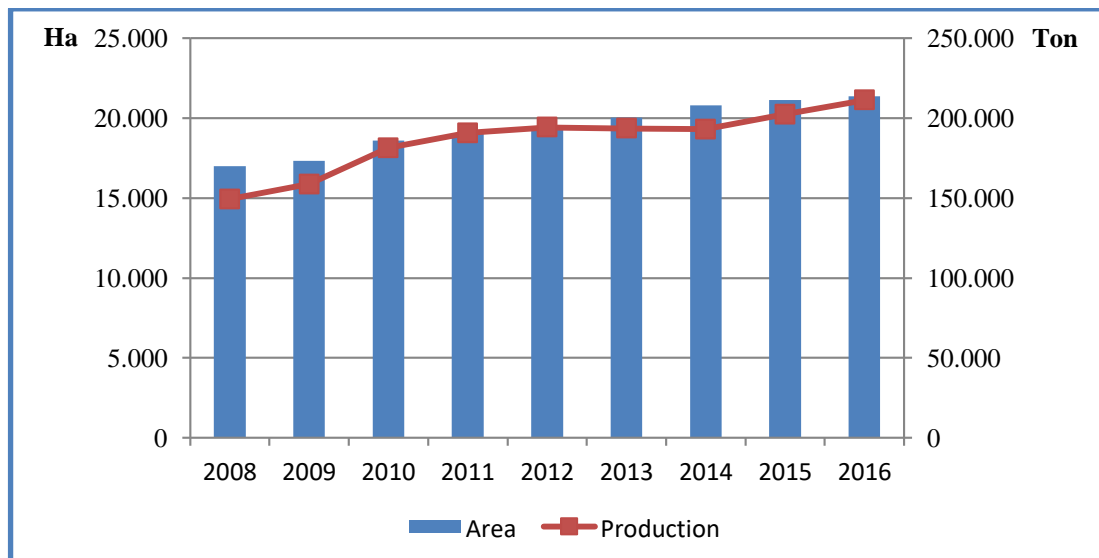


Fig.1: Tea area and production of Thainguyen

Source: Thainguyen statistic office, 2010 to 2016

Export turnover has steadily increased from 2008 to 2014, tea exports in 2014 reached 19.7 million USD but down to 6.4 million USD in 2016. At present, Thai Nguyen tea import market is mainly Middle East countries, some Asian countries and Eastern European countries, in which Pakistan accounts for 50% of Thai Nguyen's export tea output, the rest is mainly in China and Taiwan. Although the export price of Thai Nguyen tea is higher than the national average: the price of black tea is from \$ 2,200-2,500 per ton, the green

tea is from \$ 2,800-3,500 per ton but the tea export volume is not high and trending decreased although more units involved in exports.

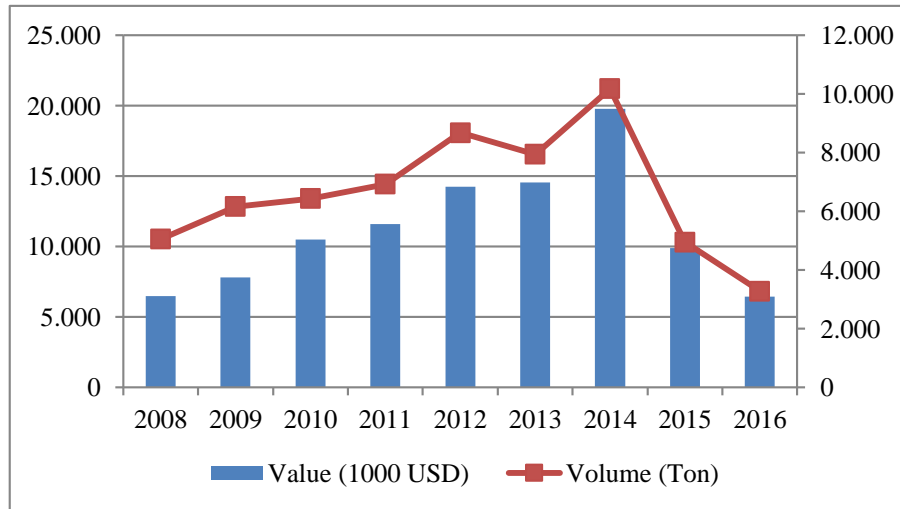


Fig.2: Tea volume and turnover of Thai Nguyen

Source: *Thai Nguyen statistic office, 2010 to 2016*

The quality assurance is considered to be the biggest barrier for Thai Nguyen tea products for export. The main reason are that most tea processing enterprises in the province do not have raw material areas; the production is still fragmented, the tea products do not follow any general standards; not close links with enterprises in the cultivation, harvesting and processing tea; the purchase between businesses and tea growers have not contracted closely.

Experience from leading tea exporters such as Japan and Sri Lanka shows that green supply chain development is the key solution to increase volume and value for tea products. Therefore, in order to develop the Thai Nguyen tea industry in a sustainable way and reach out to the overseas market ... it is necessary to have the agreement between management agencies, scientists and members of the tea supply chain (tea farmers and procedure factories, businesses) in building and implementing green supply chain strategies for the tea industry. This article aims to assess the current situation of tea supply chain in Thai Nguyen and propose solutions for developing green supply chains for Thai Nguyen tea products.

Literature review about green supply chain in agriculture

Green supply chain is the sequence of processes involved in the materials management, production and distribution of a product by applying advanced technology for minimizing environmental damage throughout the process. Also, green supply chain contributes to creating firms' sustainable value based on the balance between economic performance and environmental protection (Dashore and Sohani, 2013).

In the early period of green supply chain application, there were five main factors for assessing supply chain performance, including: green design, green operations, reverse logistics, waste management, and green manufacturing (Scupola, 2003). However, the nature of green supply chain has now been changed by some factors. In general, green supply chain involves in the following four factors:

Firstly, green purchasing: Using the raw materials that have little negative impacts on human health and living environment; appreciating energy-saving materials and reusable products.

Secondly, green manufacturing/ materials management: Firms develop a green manufacturing system by using necessary resources, cycling waste, minimizing industrial flue gases. Or firms can manufacture environmentally friendly "green" products, particularly products used in renewable energy systems.

Thirdly, green distribution: This factor involves in building, carrying out modes of transport to carry goods throughout the circulation process, from purchasing to manufacturing, distributing and reusing. Priority is given to selecting the modes of transport that have little impacts on the socio-ecological environment.

Fourthly, reverse logistics: Putting together steps in planning, carrying out and controlling the circulation process of raw materials, semi-finished products and relevant information from points of sale back to the

starting point with the aim of recovering of values and taking appropriate measures to handle defective products, reused products...

Effective appliance of green supply chains to the economy in general and to corporate activities in particular will yield numerous economic benefits for the participants. Firms will improve their product quality, creating sustainable values as well as reducing the economy's environmental impacts, especially during the period the global economy is being seriously affected by climate change (Sanjay, 2010).

Green supply chains have widely been applied and brought into play their performance in all sectors, including agriculture. Basically, green supply chains in agriculture involve all the fundamental factors of a green supply chain and the specific features of the agricultural sector (Singh, 2012). Green supply chains in agriculture are mainly concentrated in safe agricultural product supply chains, starting from manufacturing under standard models to storing, circulating and transferring to the hands of consumers.

In green supply chains in agriculture, there is the participation of individuals, cooperatives, distributors and flows of materials, raw materials, finished products to the hands of end-users. Green supply chains in agriculture are a collection of activities of manufacturing, transferring quality agricultural products to best meet market needs. In each line, each type of product, one or more supply chains can be applied at the same time, depending on the particular characteristics of manufacturing and consumer market. Standing out in relief in the agricultural sector against the general global economy at present are safe agricultural product supply chains which have been being widely established and applied by manufacturers, providers.

The aim of developing, expanding agricultural supply chains is establishing a human health safety and environmentally friendly agricultural product supply system. Safe agricultural product green supply chains allow minimizing food unsafety, avoiding overuse of plant protection drugs, prohibited substances, antibiotics in husbandry, aquatic and sea products to meet retailers' requirements and strict agricultural product import regulations of developed countries (Sixiao, 2011).

Materials and Methods

The main method used in this study is systematization from the synthesis of theories; systematic, statistical, comparative methods to analyse the secondary data from reports of Thainguyen statistic office, Thainguyen department of Agriculture and Rural development about the situation in supplying tea in Thainguyen province.

Authors also use results from our survey about tea supply chain in Thainguyen province in 2015. The study used the questionnaire as the instrument of the study. There were 3 questionnaires for 3 groups: tea producers (worker farmers, cooperative farmers, contract farmers and household farmers), tea processors (cooperate and tea processing companies) and tea traders (collectors, wholesales and retails). Each questionnaire had 3 groups of questions, general background of the respondents, their business (capital, labor, cost, price...) and their relationship with other components of tea supply chain. 320 respondents were chosen from tea producers by random method. Due to time and money constraint, 30 processors (including 14 companies and 16 cooperatives) were conveniently selected as respondents of study. 150 traders were chosen by random method. Even though this small sample might not be able to represent of all the population, it is considered as appropriate sampling because of using a relatively homogeneous group and this is helpful to minimize random error that might occur in using a heterogeneous sample such as the general public. And the Statistical Package for Social Science (SPSS) version 22.0 was used to analyze data.

Results and Discussions

Tea supply chain in Thai Nguyen

Fig.3 describes the current tea supply system in Thai Nguyen in which the main chains include:

SC1: Unlinked household farmers sell tea leaves for local customers: This supply chain consume about 4% fresh tea leaves of unlinked farmer. Tea leaves have a lot of usages: drinking fresh tea leaves is habit of many families in Thainguyen, they also use them for bathing young children.

SC2: Unlinked household farmers - Household collectors – (Retailers in other provinces) - Domestic customers. Product of this SC is primary green tea (traditional green tea). In this SC, household collectors often primarily produce tealeaf and bought to customers. Some big farm households also take the collectors role in SC when they buy tealeaf from smaller farm. Because of very low price of tealeaf, about 60% unlinked household farmer often keep the tealeaf to primarily produce and buy directly to customers (20% dry tea) with traditional tea product, with no brand name, simple packaging. The rest of products were bought to other province retailers.

SC3: Household farmers – Companies and Co-operatives – (Distributors) - Domestic and foreign customers. Only about 19% of Household farmers sign contract with Companies and Co-operatives and half

of them are seasonal contracts. Especially in winter harvest, Companies and Co-operatives often difficultly collect tealeaf from these component because in Tet holiday they can sell dry tea with much higher price.

SC4: Worker farmers – Companies - Domestic customers and foreign customers.

There are 12 companies that have tea area and use worker farmers in their land. These companies also collect tealeaf from Unlinked and contract farmers with other 17 companies.

SC5: Cooperative farmers – Co-operative - Domestic customers and foreign customers. In 5 recent years, with the many projects to develop tea production, the role of co-operative is now more important to help cooperative farmers produce with higher productivity and sell with higher price.

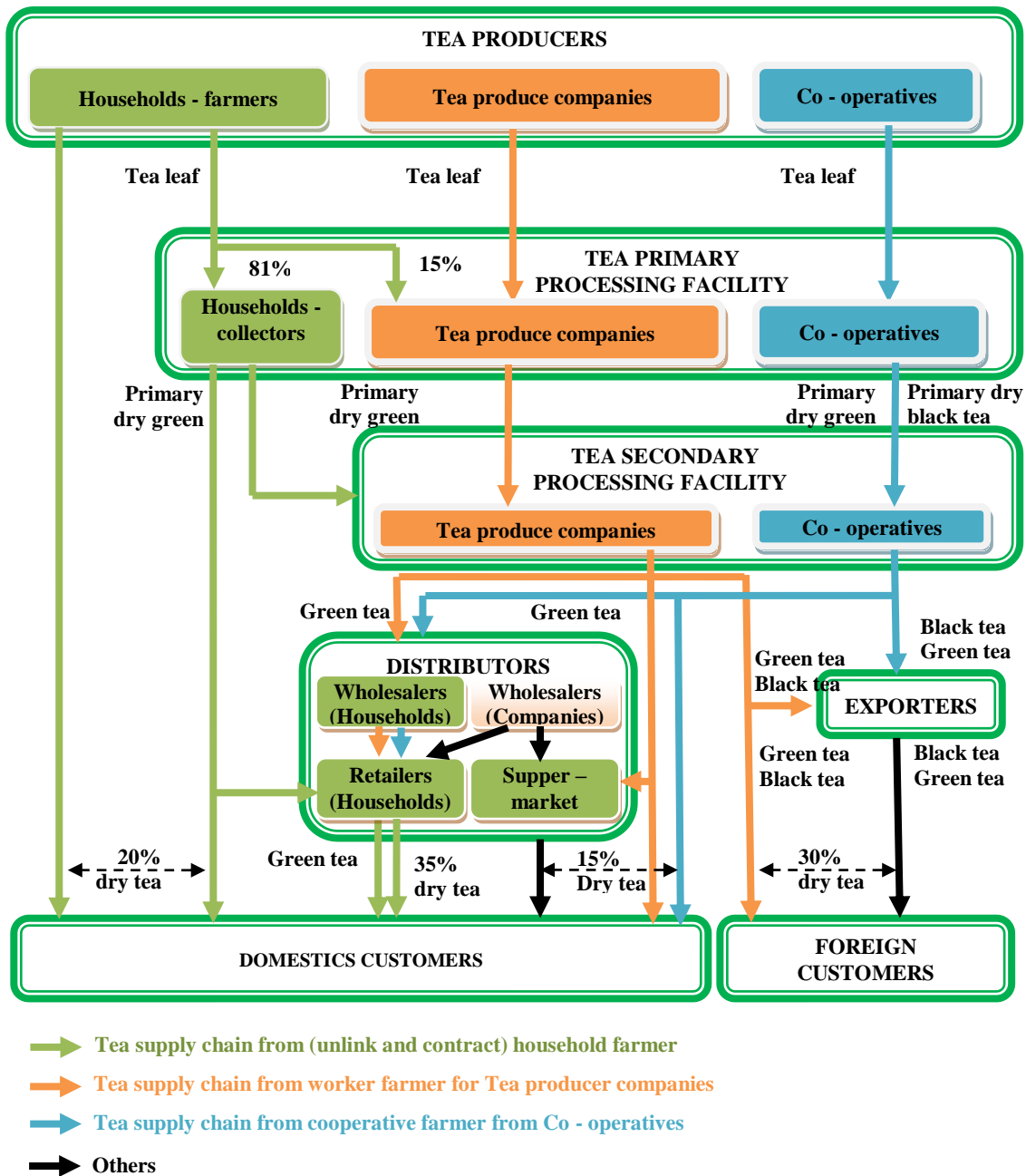


Fig. 3: Tea supply chain in Thainguyen

Source: Analysis of authors in 2015

Green supply chain activities

Green purchasing

The higher price of fresh tea from certificated tea area shows that the raw material market of tea has changed and has started to look for high quality ingredients to ensure food hygiene and safety and especially clean raw materials for processing industry to build and consolidate Thai Nguyen tea brand in the domestic market as well as in the world.

However, as most of the tea plantations are planted in small areas, the raw material (tea leaves) for tea processing has not yet been properly handled properly and therefore, reduces the value of tea products.

Green manufacturing/ materials management

Along with changing new tea varieties, people also start to take notice of hygiene and food safety for tea product as well as safety in agricultural producing procedure. Currently, Thai Nguyen has been implementing planning production areas for safe tea in the province. This is the basis for attracting investment in producing high-quality tea. Building production area for safe tea in the organic direction, limiting using inorganic fertilizers, chemical pesticides; Application of Good Agriculture Practices (GAP), from production to processing into finished products; Producing process should be attached with certification of domestic and international organization, such as VietGAP, GlobalGAP, Uzt Certified, etc. For example, Tan Huong tea cooperatives (Phuc Xuan commune, Thai Nguyen city) has been granted UTZ Certified; Van Tai Tea JSC, households in Hong Thai hamlet (Tan Cuong commune, Thai Nguyen city); Lang Chung hamlet, Trung Hoi commune; Huong Hoi hamlet, Son Phu commune, Dinh Hoa district are also issued with Global Gap on tea. Up to 2016, Thainguyn has over 80% tea area in the tea production areas focused on safe production, application of good agricultural practices (VietGAP); There are 63 certified production models of VietGAP tea with a total area of 735.6 ha with more than 2,100 households; the output of fresh tea buds is over 8,000 tons, earning 15-20% higher income for growers.

Table 1: Number of Unit and areas of tea certified by Vietgap, GlobalGAP, Uzt Certified in Thai Nguyen province from 2011 to 2016.

	Number of Unit	Acreage (ha)	Validated (ha)	Expired (ha)
Thai Nguyen city	10	82,7	26	56,7
Song Cong city	1	10	10	0
Pho Yen	4	46,2	20	26,2
Dinh Hoa	9	89,34	31	58,34
Vo Nhai	2	24,7	0	24,7
Phu Luong	9	114,2	88,5	25,7
Dong Hy	8	114,7	44,6	70,1
Dai Tu	20	253,8	174,75	79,05
Total	63	735,64	394,85	340,79

Source: Thainguyn department of Agriculture and Rural development (2017)

However, this area of fresh tea is only accounting for 3% of total tea area in Thainguyn province. Despite Thainguyn government has planned to develop Vietgap and others tea area up to 1200ha in 2020, but it is still very small area of all, and the implementation of this plan is very difficult because perception of the farmers in planting and primary processing tea; unsuitable price with other tea products; cost and time limit of certifications...

Table 2: Plan to develop tea production of Thainguyen province in period 2017-2020

Year	Area (ha)	Area has product (ha)	Productivity (quintal/ha)	Output (ton)	Certificated area (VietGap and other)	New area and new varieties replaement area (ha)		
						New area	Replacement area	Total
2017	21560	18825	112,6	212000	200	200	800	1000
2018	21760	19384	113,5	220000	400	200	600	800
2019	21910	19700	114,2	225000	400	150	550	700
2020	22060	20000	115	230000	400	150	550	700
Total	87290	77909	455,3	887000	1400	700	2500	3200

Source: Thainguyen department of Agriculture and Rural development (2017)

Each year, the volume of processed tea in Thainguyen province is 40.465 tons, of which only 8,000 tons are processed in the enterprise, accounting for 20% of the total output with the main products: black tea OTD, CTC green tea flavored for export; 80% of the remaining tea output is processed by traditional methods, semi mechanized by rotary machines, crushers and small processing lines in 43 communes and over 60 thousand households in 140 tea production and processing villages, with two main products: high-quality green tea and green tea. On the processing stage, the rate of self-processing and selling to the tea wholesalers is very high. Due to the small processing scale, the quality control of individual households is still difficult.

Green distribution

Thai Nguyen tea is sold both domestically and internationally, in which the local market consumes 70% green tea and specialty green tea. Only 30% of processed tea is exported with price \$ 1,400-1,500 per ton, the main import markets are Middle East countries, some Asian countries and Eastern Europe.

Most of people in Thai Nguyen now tend to supply clean tea, especially in collective tea area. Currently, Thai Nguyen agencies is positively cooperating to inspect, support people to supply tea from production process of safe tea VietGAP, creating to improve income value of tea plant for famers.

Among enterprises in Thai Nguyen, Tan Cuong - Hoang Binh Company has the most diversified products and also uses a variety of packages from iron, aluminum, paper boxes, plastic bags, wooden boxes, carved boxes. Safe packaging ensuring to protect the taste and quality of the product make it competitive and affirms the brand. Other business often use iron, paper boxes, paper boxes, plastic bags which often do not ensure to protect the taste in distribution process.

Reverse logistics

Reverse logistics take not much interest from the provincial government and components of tea supply chain. There isn't any component in supply chain can complete the procedure in planning, carrying out and controlling the circulation process of raw materials, semi-finished products and relevant information from points of sale back to the starting point with the aim of recovering of values and taking appropriate measures to handle defective products, reused products...Information sharing and relationship between components of tea supply chain are very weak.

Effectiveness of tea supply chain components

One important finding of our study in 2015 is that, the closer their relationship with other components of tea supply chain was, the higher price they can buy and the more benefit they can get (Table 3).

Table 3: Effectiveness of tea supply chain components

Unit: Thousand VND

Components	Consumption contract (% Production)			Cost	Price	Benefit
	Unlinked	Seasonal contracts	Long-term contracts	Mean	Mean	Mean
Worker farmers	0	10	90	28,89	71,21	42,32
Cooperative farmers	5	31	64	33,25	68,15	34,90

Contract farmers	13	36	64	30,90	70,91	40,01
Household farmers	81	13	6	41,25	64,72	23,47
Tea leaf household collectors	52	31	17	36,63	93,53	56,90
Tea producer companies	24	34	42	73,70	195,27	121,58
Co – operatives	0	36	64	105,41	188,00	82,58
Wholesale companies	0	36	64	182,11	230,88	48,77
Wholesale – Households	61	22	17	192,94	237,35	44,42
Retail- Households	78	13	9	205,11	250,87	45,76
Supermarkets	0	30	70	206,02	290,64	84,63

Source: Analysis of authors in 2015

Worker farmers, contract farmers and Cooperative farmers: typically enjoy better living standards than other tea farmers. These farmers receive benefits, such as stable output procurement and prices, access to good quality company land, technical training on developing VietGap production project, inputs on credit, and a retirement pension and social insurance against sickness (worker farmers only).

Unlinked household Farmers: About 80% tea farmers in Thainguyen are unlinked farmer. Unlinked farmers specializing in tea production are typically not as well off as their counterparts that are vertically integrated with processing companies. Poor unlinked farmers do not have the necessary conditions to benefit from tea value chain involvement, even though market expansion may open opportunities for them. The analysis suggests several constraints to these farmers, namely: a lack of land, capital to invest in improving tea varieties or processing equipment, inputs, labor, irrigation (essential for profiting from lucrative dry season production), and technical training. Many of them also take the collectors role and do business basing on the traditional Thainguyen tea brand.

These results are the same with results of Ngo Thi Huong Giang dissertation (2015), a linear regression model was used to show the relationship between the degree of association among members of Thainguyen tea supply chain with three factors: contracting, level of sharing information and decision number and the better relationship a component has with others in tea supply chain, the higher benefit they can get.

Conclusion - Solutions to develop green tea supply chain in Thainguyen province

In authors' recent research on factors that affect agriculture green supply chains in Vietnam, six factors were found to have significantly and positively affecting the green supply chains in Vietnam agriculture, namely: (i) manager commitment, (ii) new technology, (iii) human resource quality, (iv) knowledge & experience, (v) logistics management, and (vi) consumer awareness (Yen & Khuyen, 2017).

In this article, basing on analyzing the current tea supply chain in Thainguyen according to four main activities of green supply chain, the same factors are also found as the barriers to apply green supply chain for tea product: lack of manager commitment; Small and handicraft production, small trading with loose relationship; low human resource quality and short of logistics management makes difficulties to the brand managers of Thainguyen tea in stabling the tea quality and lead to reducing tea price. Purchasing, producing and distributing are not green enough; do not meet the increasing requirements of hygiene and safety food in the international market, that make the output of tea exports of Thai Nguyen decrease in recent years. Therefore, to develop green tea supply chain in Thainguyen province effectively, government, enterprise, scientists and tea planters need do some urge solutions:

Thainguyen government should take measures to manage, orient the development of green supply chains in agriculture and other fields as well in line with socioeconomic development orientation of the province. They should create an operating environment for participants in green supply chains by increasing exchanges between supply chains, between firms participating in supply chains, between domestic and foreign firms. At the same time, province agencies should intensify propaganda about the effects of green supply chains in agriculture on the environment and on consumer health so as to increase both tea farmers and customer awareness.

Trade associations, such as VITAS, Thainguyen farmer association, Thainguyen tea association should be empowered to conduct market surveys that help components of tea supply chain stay abreast of key developments in the sector.

Government and scientists help enterprises and farmers to strengthen the innovation and application of science and technology in tea production and processing such as: support for firms to renovate technology, receive new technology transfer from abroad to Vietnam; design vocational training courses for unskilled

workers through training courses on clean agricultural production, technology application; exchange and learn from the experiences of countries with developed systems of green supply chains in agriculture, create models in accordance with international standards such as VietGab.

Enterprises need improve knowledge about management the green supply chain in all process: Purchasing, production, distribution and reverse logistics, from that improve chain participants' knowledge, experience by making suitable policies, regularly organizing vocational training courses for new members. From that, firms can improve HR quality, establish close interpersonal relationships when participating in green tea supply chains, and improve chain success.

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