

Production and Marketing of Fresh Oranges: A Case Study in Tuyen Quang Province, Vietnam

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Abstract

Orange is one of the world's most important economic fruit crops. Orange is the local fruit tree that has been cultivated for generations in Tuyen Quang province of Vietnam. Orange production has significantly improved the income of farm households and alleviated the rural poverty in Tuyen Quang in recent years. This paper aimed to investigate the actors involved in the orange supply chain in the province. The study used descriptive statistics and chain analysis methods to explore the problems in each stage of the orange supply chain. A total of 195 respondents including input suppliers, orange farmers, collectors, wholesalers, retailers, consumers, and public stakeholders were selected for direct interviews. The study revealed that the production and marketing of orange fruit in the province faces several constraints, such as spontaneous production, excessive supply, high seasonality, and difficulties in selling. There existed no preservation or processing facilities for oranges, resulting in high post-harvest losses. Oranges have been entirely consumed in domestic markets, not exported. In order to develop orange production and marketing in Tuyen Quang province towards concentrated commodity production, the study recommended feasible solutions for each stage as well as the whole of the orange supply chain.

Keywords

Fresh oranges, production, marketing, orange supply chain

Introduction

Tuyen Quang is a mountainous northern province of Vietnam, with a dominant agro-forestry economy. The province has favorable natural, economic, and social conditions suitable for agricultural production, especially for oranges (Van and Khanh, 2015).

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Oranges have been planted in Tuyen Quang for many generations and are considered as a high economic value crop. Orange production has significantly created jobs for rural people, contributed to income generation for farm households, and thus helped to alleviate poverty in rural areas. By 2015, the range production area of the province had reached 7,242 ha with more than 4,000 growers. The aggregated orange production area of the province is 4,429.8 ha, distributed among 15 communes of two districts, Ham Yen and Chiem Hoa, of which the Cam Sanh orange (local name) is the dominant variety (96.9%). The area of Sanh oranges for harvesting is 3,600 ha, with an average yield of 127 quintals per ha, reaching over 45,000 tons/year worth over 450 billion VND ($\approx$ 20.43 million USD) (DARD, 2016). However, the development of orange production still has had many limitations with respect to varieties, product quality, commodity output, material facilities, techniques for harvesting, preserving and processing, branding, and market expansion. The management of food quality and safety standards is not strict. The linkages in the production and marketing of products between the growers and enterprises have not been promoted. Infrastructure, machinery, and equipment for protecting and processing products have not been invested (Ham Yen Center of Fruit Trees, 2017). Therefore, after being harvested, the orange fruits must be sold right away. The rate of damaged and rotten products is high, and orange fruit consumption is seasonal. Orange fruits are mainly sold in the domestic market with low and unstable prices. The situation of "*good season, devaluation*" is still happening regularly. This paper aims to describe the general situation of production and marketing of fresh orange fruit from Tuyen Quang, as well as to survey the actors involved in the orange supply chain, thereby identifying problems and suggesting possible solutions for the development of orange production in the province.

Site Description and Methods

Site description

The study was conducted in Tuyen Quang province, Vietnam. Ham Yen and Chiem Hoa districts were selected because they have the

largest concentration of orange production areas in the province, with an area of oranges representing 98% of the total orange area, and with harvested oranges accounting for 99% of the total production of the province in 2015 (Tuyen Quang Statistic Department, 2016). In-depth studies with orange farmers were conducted in the following communes in the selected districts: Yen Thuan, Bach Xa, Minh Khuong, Minh Dan, Phu Luu, Tan Thanh, Yen Lam, Yen Phu and Tan Yen, Minh Huong, Nhan Muc, Bang Coc and Thai Son communes (Ham Yen district); and Trung Ha and Ha Lang communes (Chiem Hoa district). The total area of agricultural land was 82,030 ha, including 13,433.8 ha of agricultural land, 67,846.1 ha of forestry land, and 537.4 ha for aquaculture and other agricultural land. The area has a tropical monsoon climate with an annual average rainfall of 1,600 - 1,800 mm and the average number of rainy days is 150 days/year. There are many large streams in the area with the Lo River flowing through. These are the sources of water for production and living. In addition, this area has a rain and heat regime suitable for the development of fruit trees, especially the orange tree (Van and Khanh, 2015). There were 22,027 households, 91,583 people, and 53,057 employees in the study area (of which, there were 25,604 agricultural employees, accounting for 48.25%). The poverty rate in the whole region was 28.17% (Tuyen Quang Statistic Department, 2016).

Sampling and data collection

This study used descriptive statistics and supply chain analysis methods to survey actors involved in the supply chain of oranges in Tuyen Quang province. Data were collected using questionnaires from stakeholders in the orange supply chain. The data were also collected by the Participatory Rural Appraisal (PRA) interview method from many actors. Agricultural production involves a number of actors at different stages. Identifying and evaluating the relationships as well as the impact of these actors are essential to build a strategy for developing the industry (Zhang and Aramyan, 2009). Like other agricultural

products, orange production in Tuyen Quang involves many actors. Among them, each actor is diverse and connects with other actors through multiple networks. This study employed a sample size of 195 respondents, which was comprised of 60 orange farmers, 15 input suppliers, 15 collectors, 15 wholesalers, 15 retailers, 60 consumers, and 15 public stakeholders. The study also employed simple random and purposive sampling techniques to arrive at a sample size of 195. A simple random sampling technique was used to select the growers and consumers, while a purposive sampling technique was used to select the key informants such as local officials, who acted as experts for this study. The key informants were selected based on their positions and ability to provide the required information at the district, commune, and village levels. Moreover, we employed the purposive sampling technique because the study was interested in interviewing respondents who were knowledgeable and experienced, and who could provide accurate information concerning this study. Using questionnaires, we collected data on demographic characteristics, number and names of orange varieties used, farmers' preferences for certain varieties, production practices, orange output, volume of oranges sold, production cost per output unit, and average selling price per kilogram of oranges produced in

the agricultural season of 2017/2018. Questionnaires were administered by two trained enumerators together with the researchers, from August 2017 to February 2018.

Results and Discussion

General production and marketing of fresh orange fruit from Tuyen Quang

Orange production status

Tuyen Quang is known as the "kingdom of Sanh oranges" because these oranges are planted on a total area of about 7,000 ha, and are one of the special fruits of the province, with a high economic efficiency and great competitiveness and potential. By 2025, the area of oranges in the province is expected to expand to about 10,000 ha, mainly concentrated in several districts such as Ham Yen and Chiem Hoa. The province is planning to expand its orange-growing areas towards VietGAP. In 2005, orange trees were planted mainly in Ham Yen district with an area of 2,572 ha. By 2015, the area of oranges grown in the whole province had reached 7,242 ha. However, there are many risks associated with the further expansion of the area of oranges if this process is spontaneous and not linked to the planning, processing, and marketing of the products, or if not accompanied by strict management of the quality and brand of the products.

Table 1. Orange fruit production status from 2005 to 2015 in Tuyen Quang

Year	Area of fruit trees (ha)	Planted area of oranges (ha)	Gathering area of oranges (ha)	Orange productivity (tons ha ⁻¹)	Production of oranges (tons)	Area of oranges/Area of fruit trees (%)
2005	8,506	2,572	1,868	7.17	13,395	30.2
2006	8,307	2,620	1,902	7.13	13,568	31.5
2007	8,300	2,770	2,313	6.04	13,963	33.4
2008	8,313	2,758	2,241	7.46	16,715	33.2
2009	8,430	2,688	2,371	5.99	14,200	31.9
2010	8,193	2,583	2,307	6.28	14,491	31.5
2011	7,275	2,665	2,477	5.74	14,223	36.6
2012	7,562	2,826	2,497	8.50	21,227	37.4
2013	7,598	3,056	2,572	8.35	21,473	40.2
2014	10,052	5,139	3,354	12.83	43,048	51.1
2015	12,631	7,242	3,715	13.50	50,153	57.3
2015/2005	1.48	2.82	1.99	1.88	3.74	1.90

Source: Tuyen Quang Statistical Yearbooks (2005, 2010, and 2015).

Table 2. Structure of orange varieties in Tuyen Quang province in 2010 - 2015

Orange varieties	2010		2015	
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)
Sanh orange (rough skin orange)	2,424	99	4,292.5	96.8
Valencia	15	0.6	61.3	1.4
Others	15	0.6	79.0	1.8
Total	2,455	100.0	4,433	100.0

Source: Tuyen Quang DARD (2016).

The data in Table 1 show that oranges were the dominant crop by the total area of fruit trees in Tuyen Quang province. By 2005, the total area of fruit trees in the province was 8,506 ha, of which, the area for growing oranges reached 2,572 ha, accounting for 30%. In the period 2005 - 2015, the area of fruit trees increased by 1,546 ha, while the area of oranges increased by 2,567 ha. As a result, there was a change in crop structure, with 1,021 ha of other fruit trees (longan, litchi, and mango, etc.) being converted into orange tree plantings.

The investments in intensive cultivation, pest control, and scientific and technical applications have been the focus of growers. The quality and design of orange fruit have gradually improved. The average yield increased from 7.17 tons ha⁻¹ in 2005 to 13.5 tons ha⁻¹ in 2015. In 2015, orange output was over 50,000 tons, and the revenue was over 500 billion VND ($\approx$ 22.7 million USD) with the average selling price at a farm gate was 10,000 VND kg⁻¹ ($\approx$ 0.45 USD kg⁻¹) (DARD, 2016). However, orange yields were not stable. The average productivity was only 6.28 tons ha⁻¹ in 2010, 0.89 tons ha⁻¹ lower than 2005 due to unfavorable weather conditions. In the past 10 years, the area of oranges increased by two times, and the rate of orange area increased from 30% to 51% of the total fruit tree area. The above analysis shows that oranges are the dominant fruit trees of Tuyen Quang province, which are constantly expanding in area and rising rapidly with respect to productivity and output.

According to the report of DARD (2016), the total area of oranges in the whole province was 4,433 ha, of which the dominant orange variety grown was the "Sanh" orange with an area of 4,292.5 ha, accounting for 96.8%. The rest of the other orange varieties like Canh, Chanh, and Valencia accounted for 3.2% of the

total area. The figures in Table 2 show that although the area of Sanh oranges planted in the province decreased from 99% in 2010 to 96.8% in 2015, Sanh oranges are still the most popular with the largest area. This is the orange variety selected for the project of developing the concentrated commodity orange production area of the province from 2015 to 2025.

Marketing of fresh orange fruit

Tuyen Quang is famous for the Ham Yen Sanh Orange which has a distinctive sweet taste. However, the rough skin oranges are still limited in the market. This is mainly a spontaneous market sought by orange growers. Arising from these difficulties, since 2015, based on the directions of the provincial People's Committee, the Department of Trade and Industry and the Center of Trade Promotion, Tuyen Quang, have actively promoted and connected with domestic large markets such as Hanoi, Da Nang, and Ho Chi Minh city. By these steps, Ham Yen Sanh oranges have been initially penetrated into nationwide markets and gradually stabilized the consuming market.

Before 2010, oranges of Tuyen Quang were consumed entirely in the local and Northern provinces. However, from 2010, the consumption of oranges began to expand to the Central and Southern provinces such as Da Nang and Ho Chi Minh City. Figure 1 shows that the percentage of output consumed in the markets varies with the trend of increasing market shares in the Central and Southern provinces during the years 2010 to 2017. By 2017, the market shares of local and Northern provinces only accounts for little more than 30%, while more than 60% of orange fruits are consumed in distant markets. This shows that

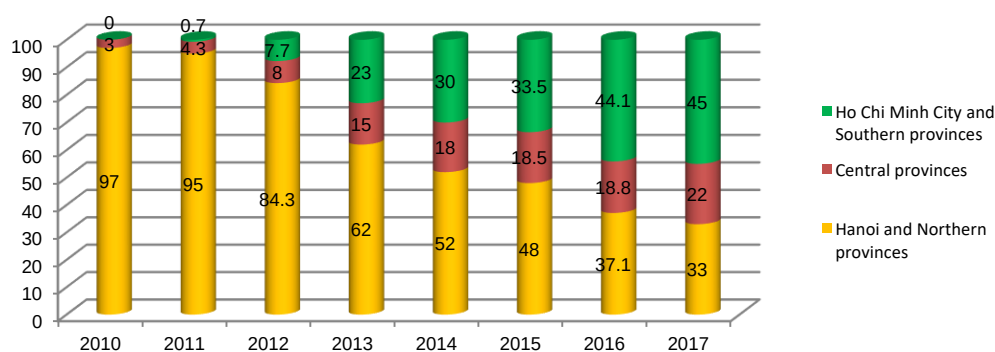


Figure 1. The market shares of orange fruit during 2010 - 2017 (%)

Source: Statistics from the reports of Ham Yen Fruit Center (2017).

consumers in the country are increasingly aware of Tuyen Quang's oranges. Expanding the consumer market will help solve the problem of surplus oranges and increase added value to the product. However, the data have also shown that oranges were entirely consumed in domestic markets, not exported.

The actors involved in the production and marketing of fresh orange fruit

Demographic characteristics of sampled respondents

Age distribution

According to Regnard (2006), the total accumulation of wealth is highly dependent on the age of an individual, where a direct relationship is experienced. Likewise, age determines individual maturity and ability to make rational decisions. Age structure can be used to facilitate an understanding about labor potential of a specific population. Table 3 shows that 59.5% of respondents were between 30 and 50 years of age. This is the age of optimum physical and mental contributions to the development of the orange industry, as well as the optimum age of a person's maturity and ability to make wise decisions. This age group was most common among traders such as input suppliers, collector, wholesalers, and retailers, and comprised 66.7%, 80.0%, 73.3%, and 73.3% of each group, respectively. The data also reveal that 33.3% of the workforce belongs to the age group of 51 and above (old age),

mainly distributed by the producer group (48.3%) and the state officer/expert group (53.3%). The surveyed producers were mainly household heads, who inherited the orange orchards and ancestral lands to grow the oranges. Workforce rejuvenation solutions for this group should also be studied in the development strategy of the orange industry in the coming years.

Education distribution

Hanushek (2013) studied cognitive skill and number of years of schooling to assess human resources for economic growth. The results showed that the average number of years of schooling has a positive effect on economic growth in developing countries. Hung (2016) also affirmed that the improvement of knowledge for human development and economic growth, and educational factors assessed through the index of adult literacy, have a positive and immediate impact to economic growth in Vietnam. Table 3 indicates that 73.3% of respondents had a high school education. This implies that the education level of the actors involved in the orange industry is very high. However, the surveyed grower group had the lowest level of education, with a rate of only 40% completing high school, and sadly the rate of non-schooling of this group was 11.7%. Measures should be taken to improve the educational level for the orange fruit producers.

Table 3. Demographic Characteristics of Respondents

Characteristics	Category	Total		Including (percent)						
		Frequency	%	Input suppliers (n = 15)	Producers (n = 60)	Collectors (n = 15)	Wholesalers (n = 15)	Retailers (n = 15)	State officers/Experts (n = 15)	Consumers (n = 60)
Age distribution	Under 30 (Young age)	14	7.2	6.7	3.3	20.0	13.3	6.7	0.0	8.3
	30 - 50 (Adult age)	116	59.5	66.7	48.3	80.0	73.3	73.3	46.7	60.0
	51 and above (Old age)	65	33.3	26.7	48.3	0.0	13.3	20.0	53.3	31.7
Education distribution	No schooling	7	3.6	0.0	11.7	0.0	0.0	0.0	0.0	0.0
	Primary schooling	12	6.2	0.0	20.0	0.0	0.0	0.0	0.0	0.0
	Secondary schooling	33	16.9	13.3	28.3	46.7	20.0	13.3	0.0	3.3
	High school	143	73.3	86.7	40.0	53.3	80.0	86.7	100.0	96.7
Gender distribution	Male	80	41.0	66.7	63.3	40.0	53.3	6.7	60.0	13.3
	Female	115	59.0	33.3	36.7	60.0	46.7	93.3	40.0	86.7

Source: Surveyed Data (2017).

Gender distribution

Women play an important part in the development of socio-economic factors in general and the household economy in particular (Nuong, 2013). According to statistical data collected by Tuyen Quang province officials, the structure of the population by sex was 49.68% male and 50.32% female; the structure of the labor force by sex was 49.68% male and 50.32% female (Tuyen Quang Statistic Department, 2016). However, the data in Table 3 show that the structure of respondents by sex were 41% male and 59% female. This indicates that women play a key role in the province's orange fruit industry. Depending on the nature of each job in the orange fruit supply chain, women accounted for a high proportion of the surveyed groups such as collectors (60%), retailers (93.3%), and consumers (86.7%). Adequate gender policies should be developed to promote the roles of women in the development of this sector.

Functions of actors in the fresh orange supply chain

There are different actors performing various functions in the fresh orange subsector.

On its way from soil to plate, the orange fruit passes through the hands of several actors. In the following sections, the actors and their functions will be explained.

Input suppliers

With respect to citrus fruit production constraints, it has been found that the greatest constraints relate to availability and affordability of key citrus inputs and seedling suppliers. Inputs supply includes such things as pest control products and machinery for cultivation of the fields, while agro seedlings supply includes such things as the supply of improved (budded) seedling trees (Makorere, 2014). The study surveyed 15 input suppliers for orange production, by site: Ham Yen district (5), Chiem Hoa district (5), and Yen Son district (5). The survey results determined that 80% of suppliers specialized in supply of inputs for oranges growers, while 20% of them are engaged in other jobs. However, only 73% of the suppliers have registered their business and licensed to operate. The rest are not registered businesses. This led to the lack of supervision of the functional agencies, input materials of unknown origin, tax evasion, and caused unfair competition in the input supply

market. Most suppliers have business difficulties. One hundred percent of the respondents were concerned about the risks of fire, explosions, or environmental pollution, as well as concerns about the safety of the people who are involved in orange fruit production, in particular, residents living in the area, and consumers of oranges, in general. In addition, difficulties in competition, a lack of market information, a lack of capital, and a lack of facilities and business premises, as well as constant changes in product categories lead to backlog; the old products cannot be sold and this causes losses. These are all issues that need attention and solutions to help the suppliers develop sustainable businesses.

Farmers

In Tuyen Quang province, orange fruit farmers are divided into three main farm sizes, namely small, medium, and large farmers. Similarly, Khoa (2010) classified orange farms

into three groups: small (under 1 ha), medium (1 ha - 2 ha), and large (2 ha and above). Accordingly, the farm size groups obtained using the above classifications are as shown below.

Table 4 displays that 38.3% of the surveyed orange fruit farms, out of 60 surveyed farms, were small farms, followed by medium farms at 35%, and large farms at 26.7%. These categories of orange fruit farm size distribution in the study area were based on the information obtained from questionnaires. The data indicate that orange farms in Tuyen Quang are smaller in size when compared to other citrus producers around the world. The reasons for small farms are equally divided by land policy and other barriers that make it difficult to accumulate land. This leads to small and fragmented land areas managed by small farmer households. It is, therefore, difficult to invest in intensive farming or mechanization in orange fruit production.

Table 4. Classification of farm size

Categorization	Farm size	Number of farms	Percentage (%)	Average area/farm
Small-scale farm	Under 1 ha	23	38.3	0.65
Medium-scale farm	1 ha to 2 ha	21	35.0	1.52
Large-scale farm	2 ha and above	16	26.7	2.7
Total	x	60	100	x

Source: Surveyed data (2017).

Table 5. Economic indicators of the orange farmers

No	Calculators	Unit	Calculated for 1 ha/year			
I	Production results		Small-scale farm	Medium-scale farm	Large-scale farm	Average
1	Average productivity	kg ha ⁻¹	18,300	19,230	21,530	19,487
2	Average selling price	VND kg ⁻¹	9,100	9,250	9,300	9,206
3	Gross of output (GO)	VND	166,530,000	177,877,500	200,229,000	179,488,025
4	Intermediate cost (IC)	VND	42,440,000	43,510,500	45,252,020	43,564,547
5	Cost of labor (CL)	VND	33,231,500	32,921,000	32,579,930	32,949,073
6	Total cost (TC)	VND	75,671,500	76,431,500	77,831,950	76,513,620
7	Value added (VA)	VND	124,090,000	134,367,000	154,976,980	135,923,478
8	Mixed income (MI)	VND	48,418,500	57,935,500	77,145,030	59,409,858
II	Economic efficiency					
1	GO/IC	times	4	4.09	4.42	4.11
2	VA/IC	times	2.92	3.09	3.42	3.11
3	MI/IC	times	1.14	1.33	1.70	1.36

Source: Calculated from survey data in 2017.

The calculation was made from the survey data collected in 2017 which collected information on economic indicators of the orange farmers (Table 5). The average yield of the surveyed households was 19.487 quintals ha⁻¹. With an average selling price of 9,206 VND kg⁻¹ ($\approx$ 0.41 USD kg⁻¹), turnover was 179.488 million VND ha⁻¹ ($\approx$ 8148.8 USD ha⁻¹). After deducting the costs, the households earned 76.5 million VND ha⁻¹ ($\approx$ 3473.1 USD ha⁻¹). This was a good result when compared to previous years (since favorable weather conditions led to high orange productivity), as well as compared to the production efficiency of other fruit trees in the region.

Comparisons between different farm size groups showed that the large-scale farm group (2 ha and above) had the highest economic efficiency because the large-scale group had the most favorable conditions for investments in intensive farming, applying advanced scientific and technical measures, and applying the VietGAP model for production. Therefore, they have higher productivity and better orange fruit quality, so they have higher selling prices and the best economic efficiency.

Collectors

The main activities of this group are cutting, loading oranges into baskets, and bearing the oranges down the mountains. The oranges are then transported (by motorbike, horse, buffalo, and cart, etc.) to the gathering points provided for long-distance traders or to wholesale markets. There are no packing or cold storage facilities for the fruit. The transportation process from farms to the market is crude. The collectors work seasonally depending on when the orange fruits are harvested (from September to February). They may be locals or from other provinces. The average trading volume was 250 kg/day. Trading prices were flexible from time to time. The difference between selling price and buying price was about 1,000 VND kg⁻¹ ($\approx$ 0.05 USD/kg). Their average income was about 200,000 VND/day ($\approx$ 9.1 USD/day). The loss rate was about 5%, mainly because of bumpy and sloping mountain roads. In the carrying of oranges, they must be lifted up and down several times, and by

rudimentary handmade tools, leading to orange fruit being easily scratched and crushed. Transaction forms were mainly oral (no contracting) and they usually offer products to wholesalers who are patrons. Orange fruits were collected and delivered immediately after being harvested, without pre-processing, preservation, or packaging, nor was there any use of chemicals on the orange fruits. Eighty percent of the surveyed collectors would like to receive information support and stabilization of the market to avoid price pressures. They should also be provided with appropriate means of collection and transportation to reduce labor costs and reduce the product loss rate.

Wholesalers

The number of wholesalers has increased over the last five years as orange production in the province has grown rapidly in terms of area, yield, and output. More than 90% of the orange output was collected, transported, and sold by the wholesalers in the Northern, Central, and Southern provinces of the country. However, wholesalers only trade in seasonal crops, and the rest of the year they have to trade other fruits or work in other jobs. Their purchase deals are mostly made by verbal contract. Forms of contract with growers or supermarkets and fruit shops are not popular. This leads to instability, business risk, and uncertainty about price and trading volume, which cannot ensure long-term stability. The rate of loss at this stage was the highest (10%), with a lack of pre-processing, preservation, refrigeration, or packaging, rough handling, and long distance transportation being the main causes of losses. The main recommendations of this survey group were to implement solutions in production, harvesting, preservation, and processing to minimize seasonal factors and prolong the business operations throughout the year. Facilities and transport infrastructure should be improved, and there is a need to develop effective means of transport, collection tools, and packaging to reduce transport costs and reduce product losses in their business.

Retailers

Orange fruit retailers operate in a variety of forms. Of the 20 surveyed retailers in this

study, they represented: supermarkets (1), trade fairs (1), fruit shops (5), street vendors (3), traditional markets (5), curbs (3), social networks (1), and retail at orchards (1). Modern forms of retailing such as supermarkets, trade fairs, shops, and social networks often provide consumers with fresh quality products. Although the selling price is higher than in other types of retail, these retailers are usually preferred by middle to high income consumers. In contrast, traditional forms of retailing such as street vendors, traditional markets, and curbs are the most common forms of service for low and middle-income consumers. In this case, the orange fruits were usually small and of poor form, poor quality, and with no clear origin but were sold at a cheaper price. Ninety percent of the volume was purchased from traders (wholesalers) at wholesale markets or delivered to retailers. The rest of the oranges were purchased directly from growers (buyers picked and transported the oranges themselves), by sellers who then brought the oranges to retail at traditional markets or the roadside in the province or surrounding areas. The average selling volume of this form was 50 kg/day/retailer. They bought oranges in the early morning and sold out during the day, due to a lack of facilities to store and preserve the oranges. The selling price of this form fluctuated sharply. It was high in the morning when oranges were fresh, or on full-moon days, holidays, and Tet (Lunar New Year), but

it dramatically dropped at the end of the day if oranges were still abundant. The average income of these respondents was about 120,000 VND/day ($\approx$ 5.45 USD/day). Bargaining was commonly applied by retailers. Retailing at an orchard was not popular due to the orange growing areas being far away from markets, but this form is being encouraged by the government and gardeners. There is a developing strategy of citrus production in combination with ecotourism, encouraging tourists to buy products at orchards which are the development orientation of this locality in the coming period. The rate of loss in this retail stage was relatively high (8%), mainly due to oranges becoming wilted or rotten because of no preservation or not being sold in time. Ninety percent of the surveyed retailers expect that the local government will support activities for introducing, promoting, and building the brand for the oranges that will make consumers more aware of the products. It is necessary to carry out activities of preservation, processing, packaging, marking, quality assurance, and traceability of products to help consumers choose products with peace of mind and not to be confused with the oranges from undesirable origins.

Consumers

The study surveyed opinions of 60 orange consumers by questionnaire. The aggregate of their opinions on "*Why do you consume oranges?*" is shown in Figure 2.

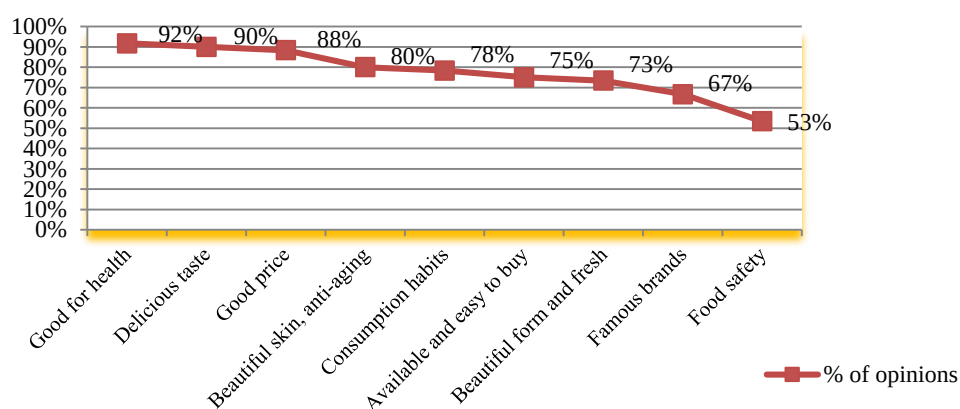


Figure 2. Percentage of consumer opinions on the criteria for buying oranges

Source: Surveyed data (2017).

Consumers have adopted various standards when they decide to buy oranges for consumption, according to the survey data. The standard that most consumers consider when deciding to buy oranges is that they perceive that the orange is very good for one's health (92% of opinions) and has a good taste (90% of opinions). In addition, other standards also accounted for over 50% of opinions (Figure 2). The results of this survey help the actors in the orange supply chain adjust their perceptions and actions to better meet consumers' requests. In addition to the value that the oranges bring as being good for one's health, such as providing beautiful skin and anti-aging abilities, and tasting delicious, the standards involved in production and marketing are also high requirements, including buying oranges at a good price, availability, and ease of buying, beautiful form of fruits, fresh fruits, famous orange brands, and food safety.

State officers and experts

The study surveyed the opinions of 15 experts and state officers involved or interested in the orange fruit sector in Tuyen Quang province. The results of the survey show that many government agencies and organizations at the national, provincial, district, and commune levels, as well as universities and research institutes have provided various support services, such as research, extension, market information, advertising, trade promotion, training, transfer of science and technology, new varieties research, development projects for orange production, and land use status assessment. Assessing the advantages and disadvantages in the production and marketing of orange fruit from Tuyen Quang province, most state officers and experts commented that the province has many advantages for the development of orange production such as having ideal land and climatic conditions; controlling diseases and pests over the past several years; increasing the area and output of oranges; having guidelines and policies issued by authorities for the development of concentrated orange production areas; promoting the experiences of orange growing households through many generations; and

employing a cheap labor force. However, production and marketing of orange fruit from the province are facing many difficulties and challenges. Eighty-seven percent of the experts commented that the situation of "hot" development, which is unplanned and spontaneous, leads to uncontrolled and excessive supply. One-hundred percent of the comments noted that the production process and technology are still manual, no application of advanced science and technology, and not mechanized in production. Seventy-three percent of the respondents commented that production has still coped with difficulties in irrigation water supply. Most of the orange areas are not irrigated and depended only on rainfall. Ninety-three percent of the respondents think that the variety supply is lacking and the quality of the orange variety is poor due to the fact that the majority of farmers self-extract and propagate so they do not guarantee the quality. Many hybrid orange trees produce undesirable fruits with many seeds, and the trees are susceptible to many diseases and die easily. Other opinions are summarized in the following section.

Opinions of the actors in production and marketing

The study surveyed 195 respondents who participated in the orange fruit supply chain. The opinions of respondents on the advantages and disadvantages of orange fruit production and marketing are summarized in Table 6.

From the results of analyzing the status of production and marketing of orange fruits, as well as synthesizing the opinions of actors participating in the orange supply chain, the study proposed solutions for developing oranges production and marketing in Tuyen Quang province (Figure 3).

In addition to the solutions for each stage in the supply chain, it is recommended that policymakers consider other solutions related to the whole orange supply chain, such as: protecting the ecological environment; developing measures to overcome seasonality; tracing the origin of products; developing linkages and encouraging the signing of

Table 6. Opinions of the respondents for production and marketing of orange fruits from Tuyen Quang province

No	Surveyed content	% of Opinions	No	Surveyed content	% of Opinions
1	Opinions on advantages and constraints in oranges production		3.1.5	Building nursery gardens	53
1.1	<i>Advantages</i>		3.2	<i>Investment resources</i>	
1.1.1	The size and acreage of land	80	3.2.1	Attract investors	93
1.1.2	Natural weather conditions	100	3.2.2	Loans support	87
1.1.3	Control of pests and diseases	73	3.2.3	Training qualified laborers	80
1.1.4	Orientation and policy for development	93	3.3	<i>Science and technology</i>	
1.1.5	Grower's experience	87	3.3.1	Developing technical procedures	73
1.1.6	Abundant laborforce	60	3.3.2	Research on production of new varieties with high yield and few seeds	80
1.2	<i>Constraints</i>		3.3.3	Research on harvesting, preservation, and processing	93
1.2.1	"Hot" development, not under planning	87	3.3.4	Researching produce of tools and materials	60
1.2.2	Poor farmer organizations	87	3.4	<i>Linkage between actors</i>	
1.2.3	Quality and supply resources of seedling trees	67	3.4.1	Developing linkages in input supply, production, and marketing	53
1.2.4	Limited working capital	60	3.4.2	Signing contracts for input supply, production, and marketing	60
1.2.5	Infrastructure	87	3.4.3	Building new model of cooperatives	40
1.2.6	Science and technology	53	3.4.4	Diversifying forms of business organizations	47
1.2.7	Irrigation	87	3.4.5	Improving performance of each actor in the supply chain	53
1.2.8	Seasonality	67	3.5	<i>Harvesting, preservation, and processing</i>	
1.2.9	Human capacity constraints	60	3.5.1	Supporting techniques and tools for harvesting	60
2	Opinions on advantages and constraints in oranges marketing		3.5.2	Building storage systems	67
2.1	<i>Advantages</i>		3.5.3	Establishment of processing plants	67
2.1.1	Domestic market of consumption	73	3.6	<i>Marketing</i>	
2.1.2	Price of oranges	60	3.6.1	Building wholesale markets	73
2.1.3	Brand of product	80	3.6.2	Trade promotion	73
2.1.4	Advertising and trade promotion	73	3.6.3	Advertising the products	73
2.1.5	Supporting policies	80	3.6.4	Expanding export markets	60
2.2	<i>Constraints</i>		3.6.5	Building trust of customers	87
2.2.1	Few marketing channels	80	3.7	<i>Quality management of product</i>	
2.2.2	Linkages between actors	73	3.7.1	Expanding the production model of VietGap	73
2.2.3	Trust of customers	53	3.7.2	Producing oranges by organic methods	80
2.2.4	High rate of loss	73	3.7.3	Insect control by IPM	67
2.2.5	Transportation and distribution	80	3.7.4	Tracing the origin of products	73
2.2.6	Preservation and processing	100	3.8	<i>Other opinions</i>	
2.2.7	Tools and packaging	87	3.8.1	Implementing solutions in a uniform way	53
2.2.8	Export market	100	3.8.2	Providing relevant information fully, and timely	53
2.2.9	Market information	73	3.8.3	Protecting the ecological environment	87
3	Proposed solutions to develop the oranges industry		3.8.4	Support for training of laborers	73
3.1	<i>Planning production areas</i>		3.8.5	Protecting consumers' health	93
3.1.1	Policy for concentrated land	80	3.8.6	Producing products by modern methods	33
3.1.2	Expanding oranges growing areas	73	3.8.7	Strict control of the use of agrochemicals	60
3.1.3	Improving transport infrastructure	67	3.8.8	Measures to overcome seasonality	47
3.1.4	Constructing irrigation	67	3.8.9	Others	

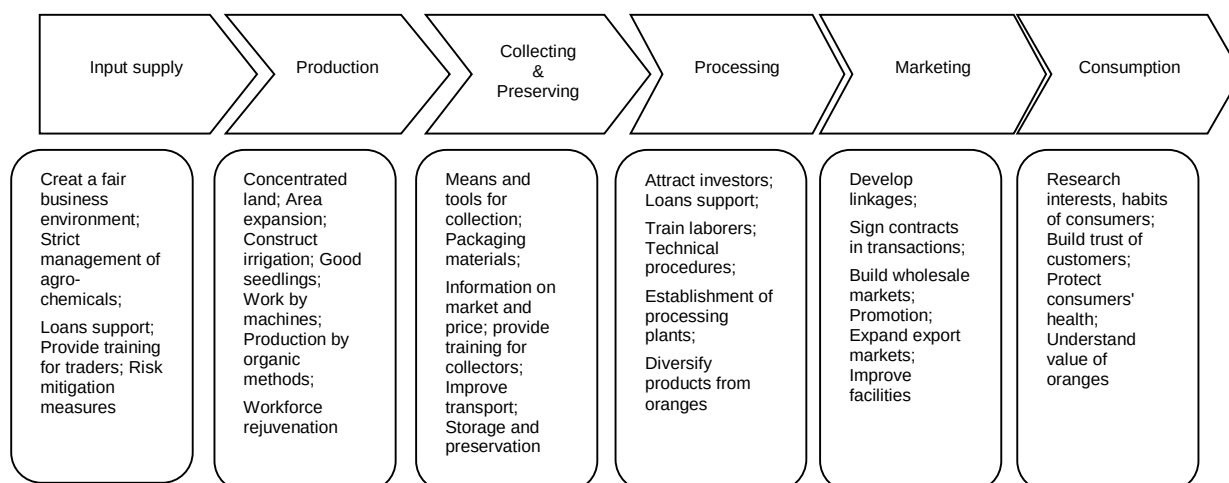


Figure 3. Solutions for developing oranges production and marketing in Tuyen Quang

contracts in economic transactions in input supply, production and marketing; and improving performance of each actor in the orange supply chain. The solutions should be implemented in a coordinated and effective way to develop orange production in Tuyen Quang province towards concentrated commodity production and sustainable development.

Conclusions

A basic description of orange fruit production and marketing in Tuyen Quang province was presented. Functions of actors involved in the orange fruit supply chain were observed to vary by stages. The results of the study showed that oranges are the dominant crop, by the total area, of fruit trees in this province, and there was a change in crop structure, with areas of other fruit trees being converted into orange tree plantings, of which the dominant orange variety grown was the "Sanh" orange, with a famous brand "Ham Yen Sanh orange". With the support of local authorities in marketing activities, the orange market has been expanded throughout the country. However, the orange fruits have been entirely consumed in domestic markets, and no oranges were exported. By analyzing the demographic characteristics of the actors with the aim of developing the production and marketing of orange fruits in the province, the study proposes some solutions such as:

rejuvenating the labor force in the production stage, improving the educational level of the farmers, and developing adequate gender policies to promote the role of women in the development of this sector. The calculation of economic indicators of different scale farm groups shows that the large-scale farm group (2 ha and above) had the highest economic efficiency, because they had favorable conditions for applying the VietGAP model, which is a production model that should be encouraged. The study surveyed actors participating in the supply chain of oranges from input supply and production, to marketing and consumption. Survey results showed that there were a number of problems in each stage. The study also synthesized the opinions of actors participating in the orange supply chain, thereby proposing solutions to develop better production and marketing of orange fruit from Tuyen Quang province.

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