Value Chain Analysis and Competitiveness Assessment of Da Xanh Pomelo Sector in Ben Tre, Vietnam

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Abstract

Food value chain analysis is a key and flexible methodology to enhance the values to farmers and end-consumers. Da Xanh pomelo is an important fruit sector of Ben Tre economy. The purpose of this study is to understand the value chain, to estimate the financial contribution, and to measure the competitiveness. This paper employs the theory of value chain approach for analyzing entities participating in planting, processing and commercializing Da Xanh pomelo, calculating added value, and comparing efficiency indicators. The result confirms economic contribution to Ben Tre, reasonable benefit distribution to the actors, and the pomelo value chain is more competitive than other sectors. The paper also explains how value chain analysis methodology assesses and promotes the competitiveness of an agricultural sector. The survey further identifies current problems of pestilent insects and potential supply surplus of the fruit.

Keywords: added value, competitiveness, Da Xanh pomelo, fruit, productivity, value chain

JEL code: Q13

1. Introduction

Ben Tre, located at the end-stream of Mekong River, is one of the 13 provinces that make up the Mekong Delta where is famous for rice and tropical fruits. Ben Tre is an agricultural province with the advantage of natural condition for the development of agricultural industry. This province has strengths for many agricultural products such as fruits, coconut, rice, shrimps and catfish (Khai et al., 2011). Of those principal products, Da Xanh pomelo is one of the best specialties.

Da Xanh pomelo sector provides ample opportunities of income increase for its consuming value and high price. Ben Tre is the biggest Da Xanh pomelo producer in Vietnam, where about 4,528 hectares of land is for Da Xanh pomelo cropping with over 38,650 ton of fruit in 2012 (Ben Tre Statistics Office, 2013). This fruit generates high income (VND276 million per hectare) for the farmers and economic added value (VND2,080 billion) for the province (2013 survey). However, the Da Xanh pomelo productivity (ton/ha) is relatively low in comparison with other pomelo breeds because of poor specialization, low density and outdated technology. Besides the problem of low productivity, small farm size and price fluctuation also cause farmers to unstable income. Ben Tre government has had strategy to develop this sector by providing assistance policies and programs, of which the Da Xanh pomelo 4000 ha project is the most effective. Moreover, in the plan of Vietnam Ministry of Agriculture and Rural Development, Da Xanh Pomelo is one of the top 12 strategic fruits in Southern area of Vietnam (Thu Nga, 2013). However, the absence of detailed studies, especially a quantitative analysis, on Da Xanh pomelo value chain has constrained the project and the development of sector. In order to obtain specific interventions for promotion of Da Xanh pomelo crop, this study has undertaken an in-depth analysis of value chain structure, entities activities, local and international market, financial efficiency, productivity and competitiveness.

The concept of value chain describes the full range of activities which are required to bring a product or service from conception, through the intermediary phrases of production and delivery to final consumers (Kaplinsky, 1999). Initially, the "filière" approach (filière means chain) was used to analyze contract farming and vertical integration in French agriculture in the 1960s and was applied in parallel to agricultural systems under the French colonial system (M4P, 2008). The "filière" framework focuses on how local production was linked to

processing, trading, exporting, and end consumption. However, the approach mainly concentrated on physical and quantitative technical relationship. In 1985, Porter developed two frameworks of value chain to assess how a company should position itself in the market and in the relationship with suppliers, buyers, and competitors to improve its competitive advantage. The Porter's first approach focuses on internal activities of a firm and second approach is devoted to direct suppliers and buyers. The concept also does not coincide with the meaning of physical transformation (Porter, 1985). Recently, value chain concept has been expanded to global scale. Gereffi et al. (1994) and Kaplinsky (1999) used the value chain framework to examine the ways in which firms or countries are globally integrated to and to assess the determinants of global income distribution. Value chain analysis is reasonably flexible and the analysis can help design projects or programs to provide support to a value chain, or set of value chains, in order to achieve a desired development outcome (M4P, 2008). A pro-poor approach analysis framework of value chain has been developed by M4P (2008) to make value chain work better for the poor. The first objective is to increase total amount and value which the poor in the chain sell, and the second is to increase the margin rate per product of the poor in comparison with other actors.

Kaplinsky and Morris (2001) emphasize that there is no "correct" way to conduct a value chain analysis. The approach depends on the research question and objective. However, there are four important aspects of agricultural value chain analysis: (i) mapping the actors and their activities in the value chain systematically; (ii) identifying the benefit distribution of actors in the value chain; (iii) examining the role of upgrading within the value chain; (iv) and highlighting the role of governance in the chain (M4P, 2008). Apart from value chain analysis, value chain upgrading for development is an important step. Firms or actors can adopt four trajectories including of process upgrading, product upgrading, functional upgrading, or chain upgrading (Kaplinsky & Morris, 2001). M4P (2008) suggests the options of demand-driven upgrading strategies with four factors of knowledge, skills, technology and supporting services.

It has been also argued that an efficient value chains would normally reduce the use of intermediaries in the chain, and strengthen value-added activities as result of better technology and inputs, farming procurement, upgraded infrastructure, improved price opportunities through demand-driven production, and secure food processing and exports (Miller & Jones, 2010).

Financial (or quantitative) analysis is one of the most important steps in value chain analysis. M4P (2008) approach emphasizes the importance of revenue, cost and profit. FAO (2005) and GIZ (2007) stress total value or revenue (Y), intermediate cost (IC), and added value (VA). In addition, FAO (2005) employs both market price and shadow price to analyze financial efficiency indicators such as economic growth, income distribution, and financial impact.

The concept of agricultural competitiveness also alludes to increase in incomes of farmers and concerned actors. OECD defines competitiveness as "ability to generate, while being and remaining exposed to international competition, relatively high factor income" (Hatzichronoglou, 1996). The European Commission uses the definition of "sustained rise in the standards of living of a nation or region and as low a level of involuntary unemployment as possible" (European Commission, 2009). Porter (1990) states that competitiveness is the productivity which is the value of the output produced by a unit of labor or capital. Recently, Fisher and Schornberg (2007) define and measure competitiveness as a function of profitability, productivity, and growth. In this paper, competitiveness is defined as the productivity of labor, capital or natural resources.

The following section describes methodology and data used in this study. Subsequently, the research result is presented in 7 subsections including of: (1) introduction of pomelo sector; (2) mapping the diagram of Da Xanh pomelo value chain; (3) value chain analysis; (4) benefit distribution, financial efficiency, and economic contribution; (5) assessing competitiveness; (6) productivity co-relation testing; (7) SWOT analysis and value chain upgrading. The last section provides policy implications for Da Xanh pomelo sector development, measuring framework conclusion, and suggestion for the future research.

2. Methodology

The main part of this study is value chain analysis which employs synthetic framework for value chain developed by M4P, GIZ (GTZ), and FAO based on theories of value chain and product line. In this study, the term "value chain" refers to all activities from producing pomelo, trading, processing and distributing to end customers. The value chain includes directly concerned actors such as farmers, intermediary traders, trader-processors, wholesalers and retailers, and indirectly concerned actors like input and service suppliers, transportation, authorities. Assessing agricultural competitiveness requires the economic efficiency indicators such as P/IC, VA/IC, NPr/IC, P/ha, VA/ha, NPr/ha, and INCOME/ha. This paper also employs Pearson and Spearman co-relation tools to analyze the relationship between productivity and other factors. Mann-Whitney is

used to test the productivity difference between the ages of pomelo farm. The study is conducted under following steps:

Step 1: Mapping the value chain

Step 2: Entities and operations statistical analysis

Step 3: Business relation and linkage analysis

Step 4: Financial and efficiency analysis

Step 5: Benefit distribution and gross contribution

Step 6: Assessing competitiveness

Step 7: Productivity co-relation testing

Step 8: SWOT analysis and upgrading strategies

Cost-profit and added value analysis methods are used to calculate indicators such as revenue, total cost, variable cost, fixed cost, profit, income, intermediate cost, added value, and others. The calculation method is explained in detail in Table 1.

Table 1. Financial indicators calculation methods

Indicators	**Calculation**
Revenue (P)	Output x Unit price
Total cost	Variable cost + Fixed cost
Fixed cost	Maintenance cost + Depreciation cost + Management cost + Tax + Interest
Variable cost	
• *Planters*	*Fertilizers cost + Pesticides cost + Worker wage + Power cost*
• *Intermediary traders*	*Input cost + Worker wage + Transportation cost + Power cost*
• *Trader-processor*	*Input cost + Worker wage + Transportation cost + Power cost*
• *Wholesalers*	*Input cost + Worker wage + Transportation cost + Power cost*
• *Retailers*	*Input cost + Worker wage + Transportation cost + Power cost*
Net Profit (NPr)	Revenue-Total cost
Intermediate cost (IC)	Input cost + material cost + fuel cost (*pay to intermediate goods suppliers*)
Added value (VA)	Revenue-Intermediate cost (*wage + interest + depreciation + direct tax + profit = pay to owners of production factors*)
Gross profit (GP)	VA-{Wage (*own wage + hired wage*) + Interest + Tax + Maintenance cost + Rent cost + Transportation cost + Outsource service cost}
Net Profit (NPr)	GP-Depreciation cost
Income	NPr + Own wage

The study was conducted in 3 districts as Mo Cay Bac, Chau Thanh, and Ben Tre town. These are the main Da Xanh pomelo production areas in Ben Tre province. The survey was also conducted in Ho Chi Minh City which is the biggest pomelo consuming market. The data were collected between September and November 2013 and numerical data were collated in 2012. The research employed the non-probability sampling, namely, convenience sampling, and focused group discussion. For the survey, based on the analysis framework, separated questionnaires were designed for all entities including of farmers, intermediary traders, trader-processors, wholesalers, and retailers. The questionnaires were pre-tested and modified based on the results of pre-testing. Questionnaire survey was mainly conducted to collect information about production, trading, linkage, and related information. Besides, focused group discussions and qualitative interview with experts were also conducted to get additional insights into the sector. The sample comprises 30 Da Xanh pomelo planters; 10 intermediary traders; 5 trader-processors; 5 wholesalers; and 10 retailers. The author also directly interviews 5 experts in the sector such as agricultural and rural development government officers, vice chairman of Da Xanh pomelo association, and agricultural economic researchers. The secondary data were collected from Ben Tre Statistics Office, Ben Tre Department of Agriculture and Rural Development, FAOSTAT, JETRO, CBI Market Survey, and information from 4000ha project.

3. Research Results

3.1 Pomelo Production and Trade

3.1.1 Vietnamese Pomelo Sector

Pomelo is a popular fruit grown in Vietnam from the North to the South. China also has a large area of pomelo but the quality is considered inferior to Vietnamese pomelo, and Chinese pomelo can be harvested in the main season from September to December only, whereas Vietnamese pomelo season spreads all the year, especially in the South (Wijk, 2011). There are many species of pomelo in Vietnam such as Da Xanh, Nam Roi, Tan Trieu, Dien, and so on. Da Xanh is the most delicious and expensive pomelo in Vietnam. Therefore, Da Xanh pomelo area is increasing quickly. In the past, Da Xanh pomelo was mainly grown in Ben Tre province (see Table 2). However, the Da Xanh pomelo area has been expanding in many other areas in Vietnam and this will cause supply increase and surplus in the near future.

Table 2. Da Xanh pomelo area and production in Ben Tre province

		Unit	2005	2009	2010	2011	2012
1	Total area	ha	3,004	4,340	4,422	4,144	4,528
2	Harvested areas	ha	1,233	2,789	2,963	2,988	3,142
3	Production	ton	15,827	32,211	33,921	35,997	38,650

Source: Ben Tre Statistics Office 2013

Da Xanh pomelo domestic market segment is medium to high income consumers, especially in the central urban areas like Ho Chi Minh and Hanoi city through retail distribution channels such as supermarkets, convenient store systems, fruit stores and traditional markets.

3.1.2 World Pomelo Market

Commercial pomelo and grapefruit production takes place in China, Israel, South Africa, USA, Vietnam and Thailand. China, Israel, South Africa and Thailand are believed to be the main producers of pomelo. United States and Mexico are main producers of grapefruit. Pomelo cultivation requires high temperatures and a low variation in day and night temperatures (CBI, 2009). The world pomelo (including grapefruit) production is 7.9 million tons in 2011 (FAO, 2013). China is the biggest producer, followed by the United States, South Africa, Mexico and Thailand. Vietnam pomelo production is 22sd rank (see Table 3).

Table 3. Pomelo (including grapefruit) world production and top producers (ton)

No.	Areas	2007	2008	2009	2010	2011
	World	6,831,332	7,144,847	7,126,698	7,099,516	7,893,318
1	China	2,352,786	2,606,145	2,768,306	2,884,820	3,610,932
2	United States	1,474,786	1,404,320	1,182,970	1,123,095	1,146,680
3	South Africa	388,657	340,927	406,628	343,055	415,679
4	Mexico	313,497	394,865	431,670	400,934	397,267
5	Thailand	308,079	320,122	305,500	294,949	378,979
22	Vietnam	23,200	24,000	24,481	25,538	26,115

Source: FAO 2013

Table 4. World pomelo (including grapefruit) export value (1000USD)

No.	Areas	2007	2008	2009	2010	2011
	World	831,849	826,008	815,051	890,666	894,205
1	United Stated	268,438	194,402	185,670	200,588	178,299
2	The Netherlands	102,212	112,704	115,037	141,363	131,553
3	South Africa	99,441	82,459	84,813	94,396	119,699
4	Turkey	52,778	81,776	88,261	101,909	109,924
5	China	51,121	70,673	85,192	89,142	86,428
21	Vietnam	693	900	1,152	2,066	4,461

Source: FAO 2013

The world pomelo export value is 894 million USD in 2011 (FAO 2013). The United States is the largest exporter. The Netherlands is the second exporter even that the country does not produce commercially much. South Africa, Turkey and China come after. Vietnam export value is 21st rank (see Table 4).

Table 5. World pomelo (including grapefruit) import value (1000USD)

No.	Areas	2007	2008	2009	2010	2011
	World	933.696	995.207	946.899	990.951	1.023.788
1	The Netherlands	136.088	145.092	160.894	188.199	184.011
2	Japan	196.739	180.197	180.445	186.645	177.021
3	Russia	56.767	61.013	61.934	87.316	119.999
4	France	91.585	90.422	78.122	78.991	72.564
5	Germany	70.058	93.608	83.341	74.634	68.266

Source: FAO 2013

The world import value is 1,023 million USD in 2011 (FAO 2013). The top importers are the Netherlands, Japan, Russia, France and Germany. Netherlands is the 1st importer but also the 2sd exporter. This means that most of the Netherlands pomelo import is for export (see Table 5).

3.1.3 European Union Market

The EU is the biggest fruit market in the world and its pomelo consuming market is very potential (CBI, 2009). In 2007, the total apparent consumption of pomelo (including grapefruit) in the EU was 457 thousand tons. Average consumption per person was 0.92 kg per year in EU. This is lower than the average levels in other main developed markets such as the USA and Japan. However, the consumption grew 6% annually from 2003 to 2007 (CBI, 2009). France, The Netherlands, Germany and England are the top pomelo consuming markets. The EU does not commercially produce pomelo and this makes the EU by far the largest importer of grapefruit and pomelo in the world. The main supply of pomelo to EU is from China and South Africa. The Netherlands is the biggest pomelo importer and distributor in the EU market. Supermarkets are the main distribution for many citrus fruits, including grapefruit and pomelo. In France, more than 70% of all grapefruits and pomelo are sold through supermarkets. Hypermarkets are the main outlet though supermarkets and especially discount supermarkets are gaining market share.

3.1.4 Japan Market

Japan is a developed and potential market for agri-food products, and fresh fruits are favorite food of the consumers. However, Japanese natural environment is not advantageous for cultivating many kinds of fruits including pomelo (JETRO, 2011). Japan is the pomelo (including grapefruit) second biggest importer in the world with the volume of 174 thousand tons from the United States, and other countries such as South Africa, Israel and Swaziland (Figure 1).
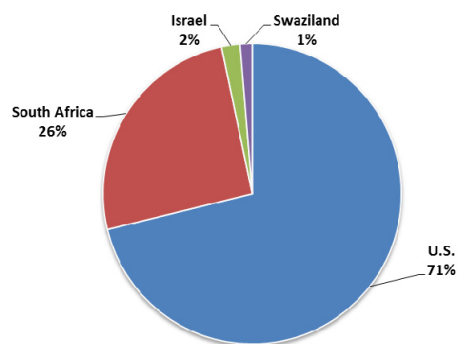

Figure 1. Suppliers of pomelo to Japan market in 2010 (JETRO 2011)

3.2 Mapping the Diagram of Da Xanh Pomelo Value Chain in Ben Tre

Below is a map of the Da Xanh pomelo value chain actors, activities and business relationship. Relationships

between actors are informal and based on family ties or friendships. A very low level of coordination exists between actors within and across different segments of the value chain. Most of relations between actors in value chain are usually spot-market and some are informal contract transaction. The value chain of Da Xanh pomelo in Ben Tre (Figure 2) relies on links between farmers, intermediary traders, trader-processors, wholesalers, and retailers; and other supporting actors who supply farming inputs, market information and technical services; commercial banks; agricultural authorities, Da Xanh pomelo fruit association; international and local researching organizations.

The core value chain of Da Xanh pomelo in Ben Tre starts with farming input suppliers to pomelo planters, the farming inputs include seed, fertilizer, pesticide, farm tools and machinery, and so on. Pomelo planters are the basic actor and create the most value in the chain. The actor sells mainly to intermediary traders and to trader-processors. Intermediary traders link farmers to trader-processors, wholesalers, and even retailers. Trader-processors are the biggest actor in the value chain, and supply to wholesalers, retailers and export markets. Wholesalers supply mostly to retailers and partly to restaurants. Retailers sell pomelo to end users. Besides the main stream, pomelo planters also sell to retailers, end-users. Intermediary traders sell to wholesalers and retailers. However, this paper focuses analyzing the main stream in the value chain only.
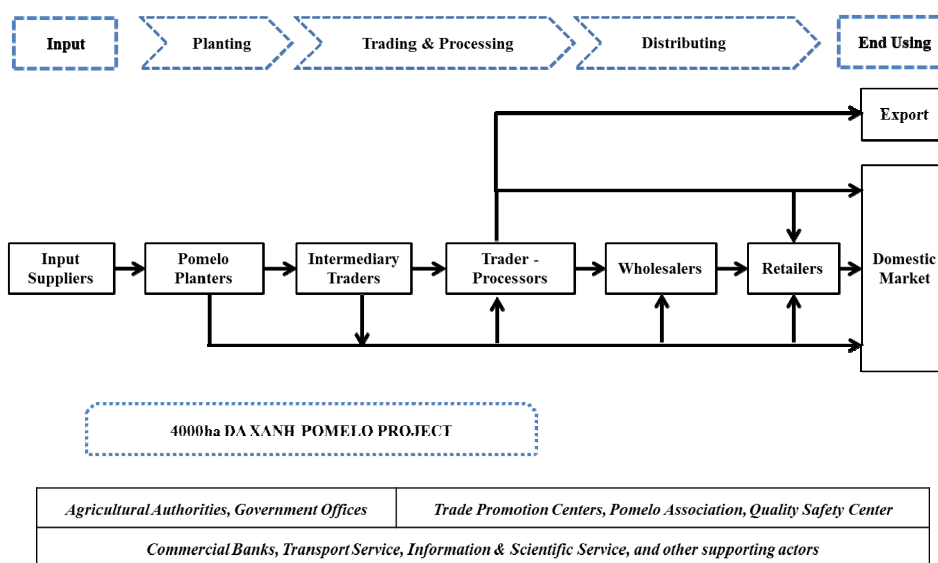

Figure 2. Da Xanh pomelo value chain in Ben Tre

3.3 Value Chain Analysis

3.3.1 Pomelo Planters

Pomelo planters purchase farming inputs such as fertilizer, pesticide, farm tools from suppliers. The actor employs local hired workers for hard works like digging ditches, planting, cutting grass or clearing farm; own labors do other simple works like spraying pesticide chemicals and fertilizing. If planters sell pomelo to intermediary traders, the purchasers do harvesting work. Farmers sell up to 53% of their production to intermediary traders, 20% of production to trader-processors, 13% of production to wholesalers, and 14% of production to other entities. The pomelo farmers gain good access to market information and therefore they get equal bargaining power with intermediary traders. Anyway, the selling price usually depends on the domestic pomelo market or trader-processors dictate.

The pomelo farmers usually own small farms of 0.31 ha/household or 0.11 ha/labor in average. Many of farmers intercrop their pomelo farms with coconut, banana and so on. The average yield obtained by surveyed planters is 11.5 ton/ha. The difference in the pomelo yield is very wide, the highest yield is 25.5 ton/ha and the lowest is 1.7 ton/ha. The yield depends on factors of farm specialization, density, tree maturity, plants care activities and others.

The price of Da Xanh pomelo is VND27.7 thousand for a kilogram in 2012. Pomelo farmers achieve the revenue of 318 million per ha per year. After subtracting the total cost, the planters get the profit of VND214 million per ha per year. If adding the profit and own wage together, a household has the income of VND276 million per ha

per year. The labor wage makes up 74% of total cost, including both own wage and hired wage. The fertilizer cost makes up 8.6% and the depreciation cost is 8.8%.

The sales turnover is VND27.7 million for a ton, intermediate cost is VND1.2 million for a ton, and added value is VND18.6 million/ton. The high indicators of P/IC, VA/IC, and NPr/IC show that planting and trading Da Xanh pomelo employ mostly local resources (like land, labor and capital) and do depend slightly on external resources (see Table 6).

3.3.2 Intermediary Traders

Intermediary traders have been acting in Vietnam agricultural sector for a long time. The actor may cause cost increase, but they are efficient and necessary in Vietnam small and divided farm condition. Intermediary traders have important role of linking farmers to markets. This study observed that intermediary traders have long-term and trusted relationship with pomelo planters. They understand the planters' farming activities, behavior and are willing to support to the farmers with money or labor. Each intermediary trader does business in a particular area and with certain farmers. Intermediary traders generally purchase pomelo from many farmers, grade and sell in bulk to trader-processors, wholesalers, and even retailers. The owners of intermediary traders are also direct workers and they employ other workers by transactions.

The pomelo purchasing cost makes up of 93.6% of total cost. Intermediary traders obtain the revenue of VND33.7 million for a ton. The intermediate cost is VND27.7 million for a ton and they generate the added value of VND5.9 million for a ton. Such indicators as P/IC, VA/IC and NPr/IC are lower than famer's indicators but higher than other trading actors. (see Table 6).

3.3.3 Traders-processors

Trader-processors purchase fruits from many planters and intermediary traders, grade, wash and clean, irradiate, package, store and then sell to wholesalers, retailers in domestic markets and export to foreign markets. The actor exports pomelo fruits to Europe, Japan, China and other regions. These are the only processing steps in the value chain and trader-processors must invest in machinery systems, tools, factory and cold storage. The actor achieves the certificate of Viet GAP and Global GAP. Trader-processors have a long-term supplying network and some of them have contract relation with farmers or co-operatives to keep the stable pomelo supply and quality. Trader-processors are generally specialized by product category, and control price changes throughout the day. There are not many trader-processors in Ben Tre pomelo sector and they are grown from intermediary traders. The organizational structure of this actor is more professional like a company with different function departments and management systems. Most of workers are hired and some of them are high-level educated. Family people take the management or the key positions.

Trader-processors have the largest business volume in the value chain. The investment capital is up to over VND20 billion and the production volume may reach over 2,000 ton per year. The sales turnover is VND38.7 million for a ton. The total cost is VND35.7 million per ton. Pomelo purchasing cost is VND35.4 million per ton (99.3%). The actor creates added value of VND4.6 million and obtain net profit of over VND3 million for a ton. (see Table 6).

3.3.4 Wholesalers

There are different types of wholesalers in the market such as fruits central markets, fruit trade and exporting companies, wholesales stores, and hypermarkets. Of which, fruit central market is the longest and most popular wholesalers. The fruit central market has important role of linking from farmers, traders and processors to the markets, especially for distant markets in Northern and Middle areas. Wholesalers purchase goods from intermediary traders and trader-processors, and sell to retailers, restaurants and even end-users. Wholesalers are also generally specialized by some product category. The actor keeps informal contacts with intermediary traders and trader-processors to control supply, requesting more if demand is high or avoiding surpluses. Because of cash constraints and insufficient storage space, especially cold storage, wholesalers try to sell all stocks by the end of each day causing volatility of market prices. There are two ways of transaction between wholesalers and suppliers: spot sales and discount sales. Spot sales are normal transaction of purchasing and payment. But many wholesalers obtain profit from discount for the products they sold. More specifically, they sell at market price and inform the suppliers that price, receive discount and return payment to the suppliers. This form of doing business is a long time ago in Vietnam but it causes suppliers many risks recently. The actor does business at night time mainly, from 10pm to 7am. The owners hire long-term workers without labor contracts.

Wholesalers get sales turnover VND 43.7 million for a ton. Intermediate cost is VND38.8 million per ton. They create the added value of VND4.9 million for a ton and get net profit of VND1.9 million for a ton (see Table 6).

3.3.5 Retailers

Retailers purchase products from farmers, intermediary traders, trader-processors, wholesalers, or even other retailers, and sell to consumers. Many retailers operate in the same wholesale markets. There are many forms of retailers such as small shops in street or traditional market, convenient stores, and supermarkets. Each form of retailers has different suppliers. Supermarkets and convenient stores purchase from contracted farmers, co-operatives, and trader-processors. Retail shops purchase from intermediary traders and wholesalers. This paper analyzes activities of retail shops purchasing from wholesalers only. This is the most traditional retail form and still popular in Vietnam fruit market. Retailers operate in small family business. The survey results indicate that most owners and workers in retail market are women. The employees are usually relatives and without labor contracts.

The actor obtains sales turnover of VND55.7 million for a ton. The intermediate cost is VND43.8 million per ton and retailers generate the added value of VND5.9 million for a ton. The purchasing and labor wage make up 95% of total cost (see Table 6).

3.4 Benefit Distribution, Financial Efficiency, and Economic Contribution

The analysis of benefit distribution within the value chain indicates that planters gain reasonable profit share (the highest rate of net profit in comparison with other actors). The actor also generates the most added value in the chain but they have small to medium size of farm and volume only. Intermediary traders and retailers obtain medium rate of profit and operate in medium to small size. Trader-processors and wholesalers get the lowest rate of profit but they can get big total profit based on large volume (see Figure 3).
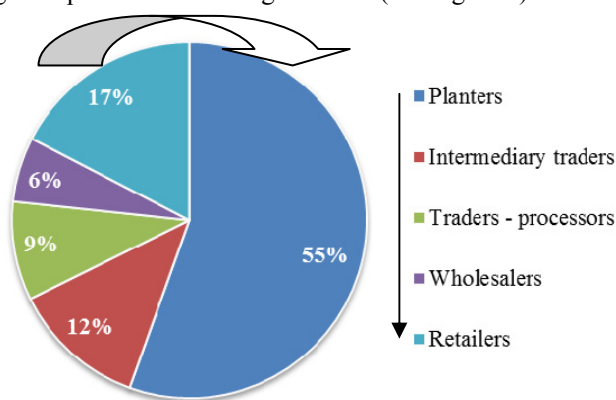

Figure 3. Benefit distribution of Da Xanh pomelo value chain in Ben Tre

Table 6. Financial efficiency and benefit distribution for 1 ton of pomelo in 2012

	Unit	Planters	Intermediary traders	Trader-processors	Wholesalers	Retailers	General chain
Revenue (P)	1.000 VND	27,700	33,700	38,700	43,700	55,700	55,700
Intermediate cost (IC)	1.000 VND	1,182	27,740	34,150	38,818	43,789	1,879
Added value (VA)	1.000 VND	6,518	5,960	4,550	4,882	11,911	53,821
% Added value	*%*	*49%*	*11%*	*8%*	*9%*	*22%*	
Net profit (NPr)	1.000 VND	8,652	4,119	3,013	1,986	5,856	33,625
% Net profit	*%*	*55%*	*12%*	*9%*	*6%*	*17%*	
P/IC indicator	Times	23.4	1.21	1.13	1.13	1.27	29.64
VA/IC indicator	Times	2.4	0.21	0.13	0.13	0.27	28.64
NPr/IC indicator	Times	5.8	0.15	0.09	0.05	0.13	17.89

(Source: Survey in 2013)

The high economic efficiency indicators of P/IC, VA/IC and NPr/IC of the general value chain show that Ben Tre pomelo sector employs mainly local resources (land, labor and capital) and do not rely on external resources (see Table 6). The main external cost of the pomelo value chain includes fertilizers, pesticides, farm tools and machinery.

Table 7. Gross financial contribution of pomelo sector in Ben Tre (VND) (2012)

	Unit	Planters	Intermediary traders	Trader-processors	Wholesalers	Retailers	General value chain
Revenue	Million	1,070,605	1,302,505	1,495,755	1,689,005	2,152,805	
Added value	Million	1,024,909	230,354	175,858	188,689	460,364	**2,080,174**
% VA	*%*	*49%*	*11%*	*8%*	*9%*	*22%*	
Net profit	Million	720,892	159,199	116,452	76,759	226,317	**1,299,620**
% net profit	*%*	*55%*	*12%*	*9%*	*6%*	*17%*	
Hired wage	Million	51,765	13,528	42,902	42,164	51,533	**201,891**
Own wage	Million	207,059	16,233	5,798	24,595	85,889	**339,574**
Other VA	Million	45,193	41,394	10,706	45,171	96,625	**239,089**

(Source: 2013 survey)

By examining total planting and harvesting pomelo area, yield and statistics of activities of pomelo actors, the paper estimates the gross pomelo contribution to Ben Tre economy and to related actors in the value chain. Total area of Da Xanh pomelo in Ben Tre is 4,528 ha, the harvested area is 3,142 ha and the pomelo production is 38,650 ton in 2012 (Ben Tre Statistics Office, 2013). Based on 2012 price and data gathered during the survey, Da Xanh pomelo value chain generated total added value of VND2,080 billion. Of this value, direct actors such as planters, intermediary traders, trader-processors, wholesalers and retailers earn the profit amount of VND1,299 billion, the own wage of VND399 billion, the hired wage of VND201 billion, and other added value for taxes, bank interest, depreciation of VND239 billion (see Table 7).

3.5 Assessing the Competitiveness of Da Xanh Pomelo Value Chain

The study employs the comparison of efficiency indicators to measure the competitiveness of value chains. More specially, this paper analyzes and compares Da Xanh pomelo value chain's economic indicators with Cassava value chain in South Middle Area (SMA) (Quoc et al., 2007), Coconut value chain in Ben Tre (Khai et al., 2013), and Daisy flower value chain in Hung Yen (Duong et al., 2013). Moreover, the above studies also employ a similar value chain analysis framework and calculation. Analysis indicators include P/IC, VA/IC, NPr/IC, and productivity such as P/ha, VA/ha, NPr/ha and INCOME/ha. The result shows that all indicators of Da Xanh pomelo are the highest or the value chain is the most competitive. Da Xanh pomelo sector employs more local resources and less external resources than other sectors. The value chain also generates the most value per ha to economy and income per ha to actors (see Table 8).

Table 8. Assessing the competitiveness of Da Xanh pomelo value chain in comparison with others

	P/IC	VA/IC	NPr/IC	P/ha (1000đ)	VA/ha (1000đ)	NPr/ha (1000đ)	INCOME/ha (1000đ)
Ben Tre pomelo	23.4	22.4	16.8	300,114	287,304	202,082	276,105
Ben Tre fresh coconut	10.3	9.3	6.7	68,204	61,608	45,679	59,750
Ben Tre mature coconut	12.9	11.9	9.8	64,479	59,466	49,003	50,253
SMA cassava	3.1	2.1	1.4	28,000	18,844	12,424	12,424
Hung Yen daisy flower	4.6	3.6	3.1	235,944	184,278	161,222	161,222

(Source: 2013 analysis)

3.6 Productivity Co-relation Testing

This paper tests the co-relation between Da Xanh pomelo farm productivity (ton per hectare) and factors of specialization, input cost, density, labor wage, owners' farming experience, pomelo farm size, and land size by normal Pearson correlation and Spearman correlation (for small sample size). Both correlations show that Da Xanh pomelo has strong and positive co-relation with specialization, input cost, labor wage and density. Farm productivity is positively but weakly co-related to owner's farming experience. Co-relations between productivity and pomelo farm size, land size are not statistically significant (see Table 9).

Table 9. Co-relation between productivity and other factors

	Productivity (ton/ha)	
	Pearson	**Spearman's rho**
Specialization	0.877^{***}	0.901^{***}
Density	0.861^{***}	0.811^{***}
Yearly input cost	0.919^{***}	0.720^{***}
Yearly labor wage	0.884^{***}	0.853^{***}
Owner's farming experience	0.765^{***}	0.694^{***}
Pomelo farm size	0.278^{ns}	0.111^{ns}
Land size	-0.239^{ns}	-0.245^{ns}

Note: ns. No Statistical Significance 10% (2-tailed).

***. Statistical Significance at 1% (2-tailed).

(Source: 2013 analysis)

Moreover, the Mann-Whitney testing (P-value = 0.005) of productivity difference between farm age groups indicates that the 5-12 year old farm group have higher productivity than less 5 year old farm group and more 12 year old farm group.

3.7 SWOT Analysis and Value Chain Upgrading Strategies Discussion

Da Xanh pomelo is one of the most luxurious fruits in local market because of its high and fresh quality, attractive appearance and delicious taste. Ben Tre arable land is the most suitable for cropping Da Xanh pomelo. The local market is potential for the fruit and especially the international market has been opening strongly. Moreover, there are some problems in Da Xanh pomelo sector such as pestilent insects and low-quality seed. Summarizing Da Xanh pomelo sector activity is presented in SWOT analysis box as following.

Table 10. Da Xanh pomelo SWOT analysis in Ben Tre, 2012

STRENGTHS (S)	**WEAKNESSES (W)**
1. High quality and delicious taste	1. Low-quality seed
2. Good look appearance and safety	2. Passive market developing
3. Good and suitable arable land	3. Small production scale and low specialization
4. High economic efficiency	4. High cost transportation
5. Developing linking models	5. Underdeveloped farming technology
OPPORTUNITIES (O)	**THREATS (T)**
1. High demand in local market	1. Expanding pestilent insects
2. Potential export market	2. Instability of agricultural market and price
3. Vietnam's participation in WTO and TPP	3. Quick increase in supply and competition
4. Strong support from the government and scientists	4. Strictness in quality and safety standards
5. Market trend in fruits and natural products	5. Serious climate change affect in Ben Tre

(Source: 2013 survey)

There are 4 upgrading strategies for Da Xanh pomelo sector based on the SWOT analysis:

Demand-driven product strategy: The modern and high class food market demands stringent standards of quality, safety, homogeneity, similarity in appearance and size. Da Xanh pomelo sector in Ben Tre has not satisfied all standards strictly because of low seed quality, pestilent insects, underdeveloped farming and processing technology. Demand-driven product strategy requires following actions: (i) researching and preserving high quality and homogeneous Da Xanh pomelo seed, producing the high quality seed in commercial volume for the market; (ii) expanding Viet GAP and Global GAP certified pomelo areas, training farmers to crop and take care of trees in right techniques and standards; (iii) standardizing harvesting, grading, transporting, packaging and storing processes; (iv) Dealing with pestilent insects by insecticide, covering and other methods in right safety standards

Sales and marketing strategy: Sales and marketing activities in Da Xanh pomelo sector are passive and depend on purchasers so far. This causes the sector low profit and slow development. In addition, the area of Da Xanh pomelo crop is increasing very quickly in Ben Tre and other provinces. It is forecasted that Da Xanh pomelo supply will increase quickly, this makes supply surplus and price reduction. It is essential to have sales and marketing upgrading actions which are to: (i) promote modern retail distribution systems such as hypermarkets, supermarkets, and convenient store chains with firm contracts; (ii) quickly penetrate foreign developed markets such as Japan and European Union based on internationally free trade trend; (iii) build reliable brand name and proactively look for new markets and clients.

Linkage strategy: Vertical and horizontal linkages are key tools to deal with weakness of small and separated farms, low specialization, agricultural market instability, to apply agricultural standards of Viet GAP and Global GAP, and to stabilize famers' output and enterprises' input. Promoting linkages in Da Xanh pomelo requires the actions of: (i) expanding 4000 ha Da Xanh pomelo project and broadening Viet GAP and Global GAP certified farms area; (ii) developing pomelo farm co-operatives with more experience and market information sharing activities; (iii) promoting linkages between trader-processors and co-operatives, farmers with firm purchasing contracts, financial and technical supports.

Crop planning strategy: Increasing productivity, avoiding supply surplus and guaranteeing quality require crop planning by: (i) promoting intensive and specializing cultivation in the best arable lands with Viet GAP or Global GAP standards; (ii) intercropping in the medium lands and preventing cultivation in bad land areas; (iii) controlling production areas and supply volume.

4. Conclusion

The analysis shows that Da Xanh pomelo sector in Ben Tre possesses high competitiveness in comparison with other agricultural sectors. The value chain generates great added value, high income, and contributes significantly to socioeconomic development of Ben Tre province. In 2012, Da Xanh pomelo sector produces 38,650 ton of fruits with revenue of VND2,152 billion, in which the added value is VND2,080 billion. Households obtain the average income of VND276 million for a hectare per year. The sustainable development for Da Xanh pomelo sector requires local authorities and related actors to have the strategies of upgrading market-driven products, sales and marketing activities, linkage models, and crop planning. Actions in the short term are to deal with pestilent insects, produce high quality Da Xanh pomelo seed. The medium-term actions are to develop linkage models, expand Viet GAP or Global GAP areas by 4000ha project. Actions in the long term are to penetrate foreign markets, plan and develop specialization and intensiveness pomelo cropping areas.

The paper employs the value chain financial indicators of P/IC, VA/IC, NPr/IC, P/ha, VA/ha and INCOME/ha to measure competitiveness. The result indicates that the value chain analysis approach may assess competitiveness of agricultural sectors or to compare the efficiency of different agricultural value chains. Co-relation testing shows that the pomelo productivity has the strong and positive co-relation with specialization, input cost, labor wage and density. However, the next research should employ more competitiveness measurements for more agricultural sectors, and also identify the determinants of competitiveness and productivity in agriculture.

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