The Supply Chain Analysis of Peanuts: A Case Study in Quang Nam Province of Vietnam

Thang Quyet Nguyen[#1] and Nguyen Tan Huynh*[2]

[#]*Faculty of Tourism & Hospitality Management, Ho Chi Minh City University of Technology (Hutech), , Vietnam*

[1]nq.thang@hutech.edu.vn

[*] *Faculty of Economics and Management, Dong Nai Technology University, , Vietnam.*

[2]huynhtannguyen@dntu.edu.vn

***Abstract*- This research was carried out to address the supply chain of peanut products in Quang Nam province of Vietnam, where production of peanuts plays a critical role in economic activities of local residents. To do so, the study randomly surveyed 170 peanut growers from three districts where have the largest cultivation areas of peanuts in Quang Nam province. Next, the research investigated some agencies that provided inputs and distributed outputs. All data obtained from the investigation was coded and then imported into SPSS software for analysis. It is found that: (1) supply chain of peanuts in Quang Nam province was relatively sophisticated and involved many stakeholders such as inputs suppliers, peanuts farmers, wholesalers, retailers and foreign importers; (2) inputs for production were provided from three sources such as 22.3% from local agencies, 35.9% from tier 2 agencies and 41.8% from tier 1 agencies, meanwhile almost volume of peanuts was bought directly to wholesalers (about 82.8%) with payment either on credit or in cash; and (3) sale price varied in huge range, especially for domestic consumption channel, and particularly foreign consumption of peanuts brought profit higher than domestic consumption. From these findings, we strongly recommended that the local authority should enact policies to encourage cultivators to access official credit sources, as well as promote the export performance of peanuts. Lastly, this is the first research in Quang Nam with respect to the analysis of the peanut supply chain, more studies should, hence, be undertaken to confirm these results for better policies.**

Keywords- *Peanut production, Supply chain for peanuts, Supply chain analysis, Stakeholders, Quang Nam province.*

1. Introduction

Through performing reform policy in agriculture, Quang Nam authority has been exchanging plenty of areas of ineffective annual crops into other more effective crops, mainly peanuts. As a result, hectares of peanut production have been increasing rapidly from 8,100 hectares in 2010 to more than 12,000 hectares in 2016 (average growth rate of 30% per year) [1]. Moreover, raising peanuts areas results in higher income for local citizens, from VND50 million per hectare to VND75.5 million per hectare [2]. In fact, peanut production help increase income nearly three times as much as rice production and more than 2.5 times in comparison to corn production [3].

Although peanut production is bringing out fairly high income for farmers, due to low competitiveness of agricultural products in general and peanuts in particularly makes crop planting face a lot of difficulties and challenges that must be solved in the next period, especially unstable market price and diseases [3, 4]. One of the reasons causes the problems above is ineffectiveness performance of supply chain of peanuts, the supply chain of the peanuts sector has not yet been mapped and the key stakeholders have not been clearly identified and characterized [3]. Therefore, the operation of the supply chain of the peanut industry in Quang Nam province is not well understood.

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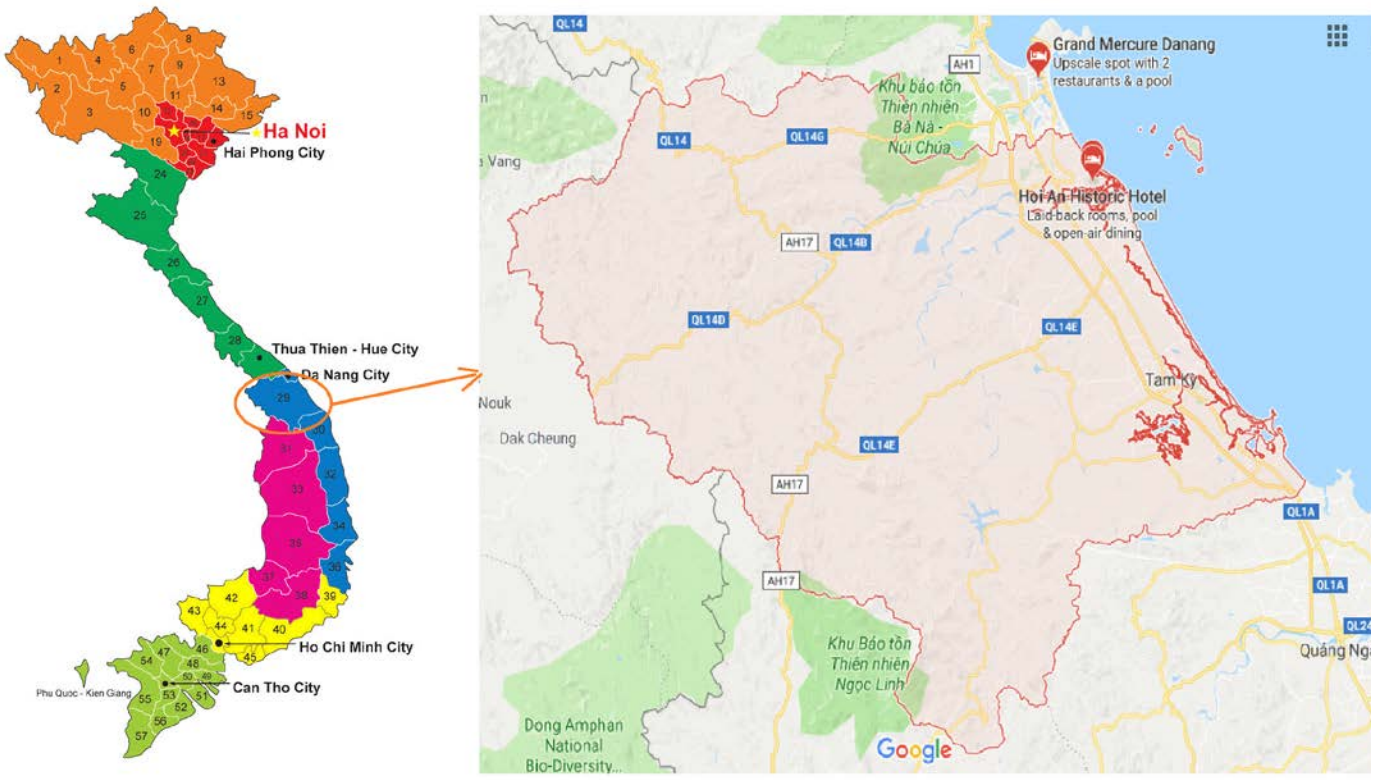

Figure 1. The location and map of Quang Nam province, Vietnam

This research proceeds as follows: Section 2 introduces literature reviews about the supply chain in the agricultural sector; next, section 3 presents the method used in this study consisting of sampling and survey methods, data analysis and data validation; section 4 displays results and discussion of the empirical research; and the last section of this study, the main conclusions are summarized, and the policy implications of the research work are presented.

2. Literature review

The supply chain is a set of activities required to bring goods and services from producing place to final place [5, 6]. The supply chain also involves in the creation and sale of a product [7], from the delivery of source materials from the suppliers to the manufacturers [8], through to its eventual delivery to the end user [9]. The supply chain segment with regard to get finished products from the manufacturers to the consumers is known as the distribution channel [7, 10]. Additionally, supply chain activities also involve the transformation of natural resources, raw materials, and components into finished products to deliver to end customers [11]. Furthermore, performance of the supply chain also includes input suppliers, producers, processors and buyers that we can call them as stakeholders [12-14]. Typically, there are five major flows in any supply chain namely product flow, financial flow, information flow, value flow and risk flow [15-17].

The agricultural supply chain consists of two components [18] called the *upstream flow* and the *downstream flow*. Some academic studies indicate that the upstream flow links to the movement of input factors that go from suppliers to farmers while the downstream flow relates to finished products that go through farmers to consumers [10, 19]. Upstream flow activities also include buying input factors for production whilst downstream activities comprise of transporting goods and services for customers [6]. The supply chain typically correlates more than one party, working together to satisfy the demands of a specific market [20, 21]. These parties, which might include individuals [22], companies or producer groups for example are referred to as "*actors*" [8].

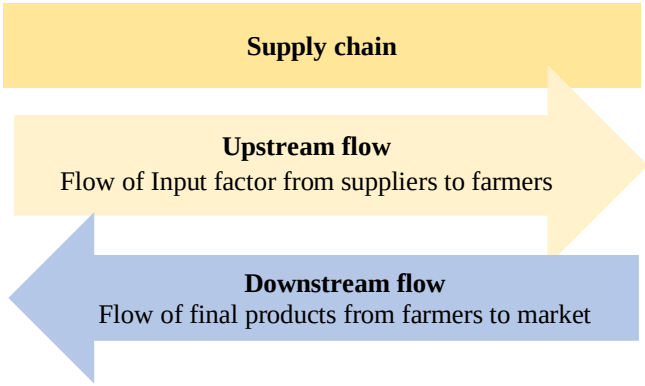

Figure 2. The components of an agricultural supply chain

In reality, the supply chain analysis has been proved as a useful way to evaluate performance of difference systems consisting of: (1) Identifying the key players as actors in the supply chain and analyzing the relationship among the players as well as understanding the relative importance of each stakeholder [8, 23]; (2) Analyzing the variability of the value of goods and services through each segment of the supply chain so as to clearly know the stakeholder, who gains the most benefits [24, 25]; (3) Addressing weaknesses and challenges in the performance of the supply chain so that local authority can suggest appropriate solutions to improve the supply chain performance [26].

Nowadays, many studies in the agricultural sector use the supply chain analysis method (SCA) to assess the effectiveness of distributing products. The previous researches show that the longer the supply chain was, the more rapid the sale price increased [20]; from producers to consumers should only go through maximum of three stakeholders [27]; the shorter supply chain of goods remained, the more optimal the production achieved [13, 19]. In the aquaculture feed sector, the research of El-Sayed et al. (2015) [28] shows that the supply chain analysis is an effective tool to identify and describe the core actors and stakeholders engaging in the chain. For cassava starch production in Thailand, the supply chain analysis is used to assess material use efficiency and loss in order to identify opportunities to enhance the resource use efficiency, decline loss as well as recover resource from production waste [29].

This research was conducted in 2017 via the project funded by Dong Nai Technology University. The overall purposes of this study can be summarized as follows: (1) To address the supply chain for peanut production in Quang Nam Province, Vietnam; (2) to describe the key players in the chain and analyze the linkage among them, and then identify the changes in sale price of peanuts throughout the supply chain; and (3) to suggest some useful solutions to improve the performance of the supply chain and maximize the sector's competitiveness and profitability.

3. Materials and methods

3.1. Sampling and survey methods

Two different kinds of the questionnaire were drafted, one for peanuts cultivators and the other for other members in the supply chain. For peanuts cultivators, this study was designed as a cross – sectional investigation, in which 170 households were randomly sampled by the cluster sampling scheme. The survey was conducted from January to April of 2017 by the questionnaire containing a wide array of questions relating to variables used in analyzing the supply chain of peanuts, such as yield of peanuts, seeds, fertilizers, sale price and cost of production. The households for the survey came from Thang Binh, Dien Ban and Duy Xuyen, these are three districts where have the largest cultivation areas of peanuts in Quang Nam province. The information about households' socio-economic characteristics including sex, age groups, educational backgrounds and marital status was also collected carefully.

Table 1. Socio – economic characteristics of households

Variable	Thang Binh	Duy Xuyen	Dai Loc
Total households investigated	50	60	60
Population in a family	5.34	4.23	6.35
Gender of interviewees			
Male	*35*	*41*	*37*
Female	*15*	*19*	*23*
Ages in years	44.89	39.27	42.56
Income (million/month per capita)	4.03	3.79	5.101
Education in years	7.22	9.41	8.95
Cultivation areas of peanuts in hectares	0.55	0.38	0.43

For other members in the supply chain, the questionnaire was designed to investigate randomly some stakeholders that took part in the supply chain of peanuts (Table 2). To collect information about the supply of all factors of production and distribution of peanuts, some necessary information that the survey collected, consisting of the kinds of production inputs, input prices, the sale quantity of peanuts, market prices, disadvantages and advantages in business operations.

Table 2. The list of the stakeholders was surveyed

Stakeholders investigated	Number	Province/city
Seed suppliers	3	Da Nang, Quang Ngai
Agency providing agricultural inputs	11	Quang Nam, Quang Ngai, Da Nang
Wholesalers	3	Da Nang, Quang Ngai, Quang Nam
Processing agencies	2	Quang Nam, Quang Ngai, Da Nang
Small collectors	5	Quang Nam
Wholesalers (exterior province)	2	Binh Dinh, Quang Ngai, Da Nang
Retailers	6	Da Nang, Quang Ngai

Secondary data was gathered from many sources, comprising the General Statistics Office of Vietnam (GSO), the Quang

Nam Statistical Office (QSO), the Quang Nam Department of Agriculture and Rural Development (QDARD), the Custom Statistics of Vietnam (VNCS) as well as related studies.

3.2. Data analysis

All data obtained from the investigation was coded, imported into SPSS software for analysis, primarily simple descriptive statistics of socio-economic characteristics (Table 1). The gathered information was then analyzed, collated, tabulated and sorted into different categories, and especially peanuts cultivators were classified according to cultivation areas. Moreover, in order to analyze efficiency of peanut supply chain, this research used accounting method referring to the basic rules [30] and guidelines under which businesses keep their financial records and prepare their financial reports [31], and statistical analysis method involving in collating and summarizing the changes of data over time [32]. Some financial indicators were used to assess the operation results of stakeholders in the supply chain, such as total revenue (TR), total cost (TC), total profit (π) and cost-profit ratio (π/C) [10, 14].

3.3. Data validation

To minimize bad answers, the chosen stakeholders were initially approached by phone, e-mail and even through reliable intermediaries. They were consulted about the study operation and were asked if they were willing to join the survey. If they agreed the survey, questionnaires would be finished through direct interviews, email responses and trusted intermediaries. Thanks to small sample sizes as well as simple and well-designed questionnaire, the survey gathered all the necessary information exactly and interviewees were willing to answer the questions precisely. As a result, the collected data did not need cleaning, meaning that the quality of information was so really high.

4. Results and discussion

4.1. Mapping the supply chain of peanuts in Quang Nam province

Fig. 3 showed that the supply chain of peanuts in Quang Nam province (Vietnam) was really quite complicated and involved many players: Seed suppliers, Agency providing agricultural inputs, Wholesalers, Processing agencies, Small collectors, Wholesalers (exterior province) and Retailers. Each player had a special task force to provide raw materials and to consume products. In the supply chain, peanuts farmers played a central role in producing and distributing goods for domestic and foreign markets. Based on material flows going through the peanuts producers, the supply chain of peanuts can be divided into two flows: the flow supplying input materials for production (Upstream flow) and the flow distributing goods for sales markets (Downstream flow) [10, 14].

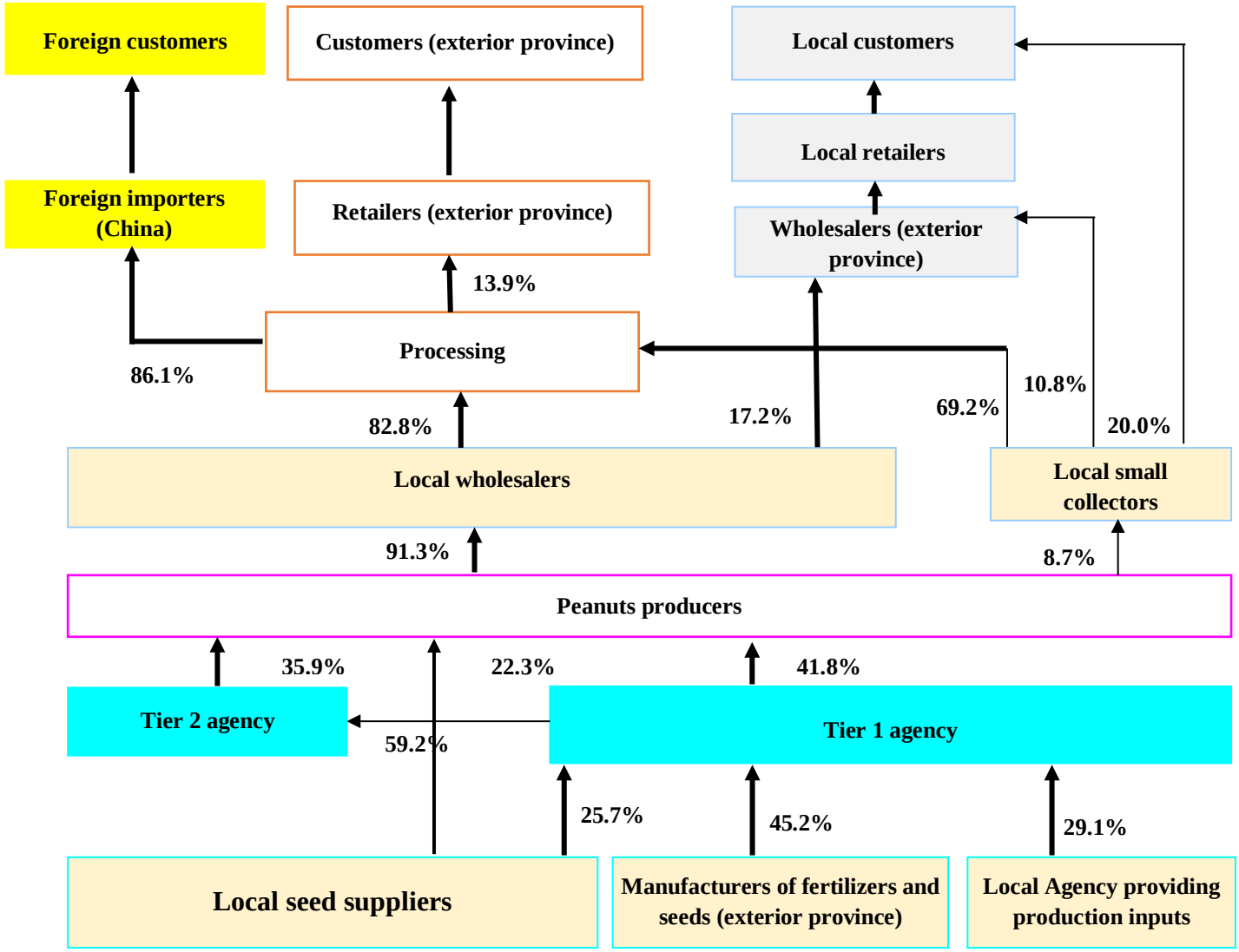

Figure 3. The overall supply chain of peanuts in Quang Nam province

4.2. The flow for input materials for production

This flow expressed the relationship between peanuts producers and input materials suppliers (Fig.4). The raw materials were used for production process, including seeds, fertilizers and agrochemicals (e.g. pesticides, herbicide and fungicide). The results showed that peanut cultivators bought input factors of production from three sources: 22.3% from Local seed suppliers, 35.9% from tier 2 agency, 41.8% from tier 1 agency. For intensive and semi-intensive farms, seeds were one of the most important inputs because they affected directly the quality of goods. Therefore, seeds for cultivation were often supplied by the trustworthy providers, mainly Son Hung JSC in Quang Ngai province, Linh Nga Limited Company in Da Nang and Hai Hoa Plant Seeds Distributor in Binh Dinh province. These suppliers have much experience of providing the crop seeds for over twenty years. For buying other inputs for production, peanut growers usually bought from tier-1 agency and tier-2 agency due to difficulties of transportation.

Except for seeds, the other inputs such as fertilizers and agrochemicals were provided by tier-1 agencies and tier-2 agencies with purchases paid either in cash or on credit because of difficulties of travelling. However, transaction by credit generally may cost the minimum of 10% - 30% higher than one in cash. This result was consistent with the study of Ahumada and Villalobos [20] and Bocher and Simtowe [33].

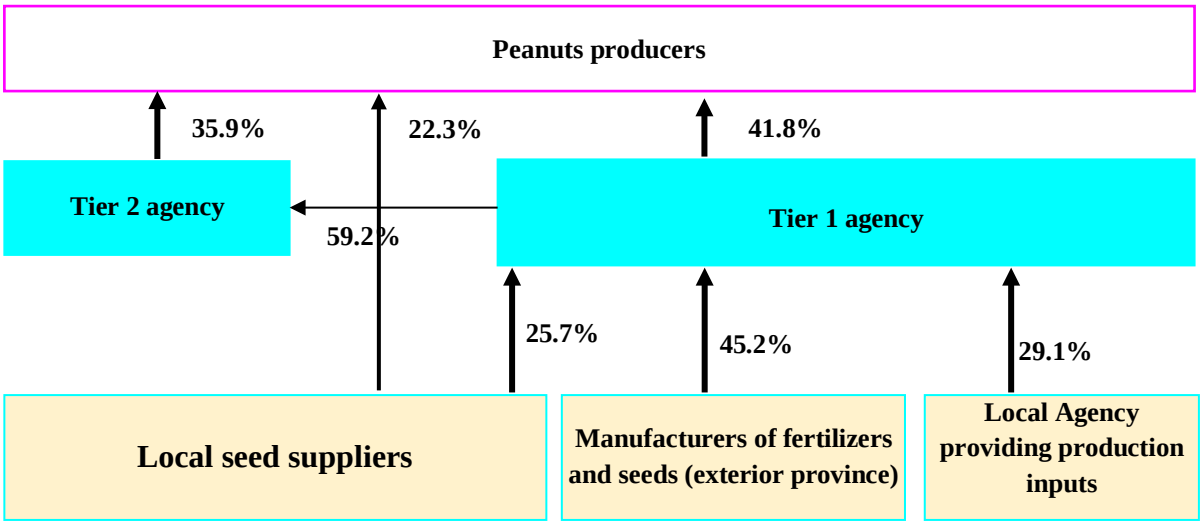

Figure 4. The upstream flow of the peanut supply chain

4.3. Consuming flow

After harvesting, peanuts were generally left in the windrows to dry for 2 or more days in the field, then threshed by a machine or by hand. Then farmers made contact with wholesalers or collectors to sell product. Fig. 5 illustrated the differences of the volume of peanuts bought by the stakeholders. The map indicated that around 91.3% of peanuts were directly sold to wholesalers in local, while the remaining only 8.7% of peanuts sold through intermediaries such as small collectors. Some small- scale peanuts growers purchased input material from wholesalers or collectors in credit (10%-17% higher cost) or pay about 40%-70% of cost in cash and charged the rest in credit when peanuts crops were harvested and sold. However, when peanuts cultivators bought input factors on credit, they may receive poor quality materials and had a little bargaining power to complain or object. This finding was suitable with study results of Mylan et al. [19] and Ahumada and Villalobos [20].

The critical point we had to notice that the peanuts were initially collected and further processed with aim of enhancing value of products. Over 85% of processing products (e.g. peanuts oil and peanut candy) were sold to foreign importers, especially China. This finding indicated that the production of peanuts in local mainly served to export. For this reason, the local authority should implement the proper policies to encourage export operations of peanuts. Some suggested actions may be applied as: (1) improve access to bank credit to reduce production cost [21], (2) enhance capacity for production of high quality seeds [34], (3) promote access to training to improve production skills for cultivators [26] and (4) reinforce the legal and policy environment [13].

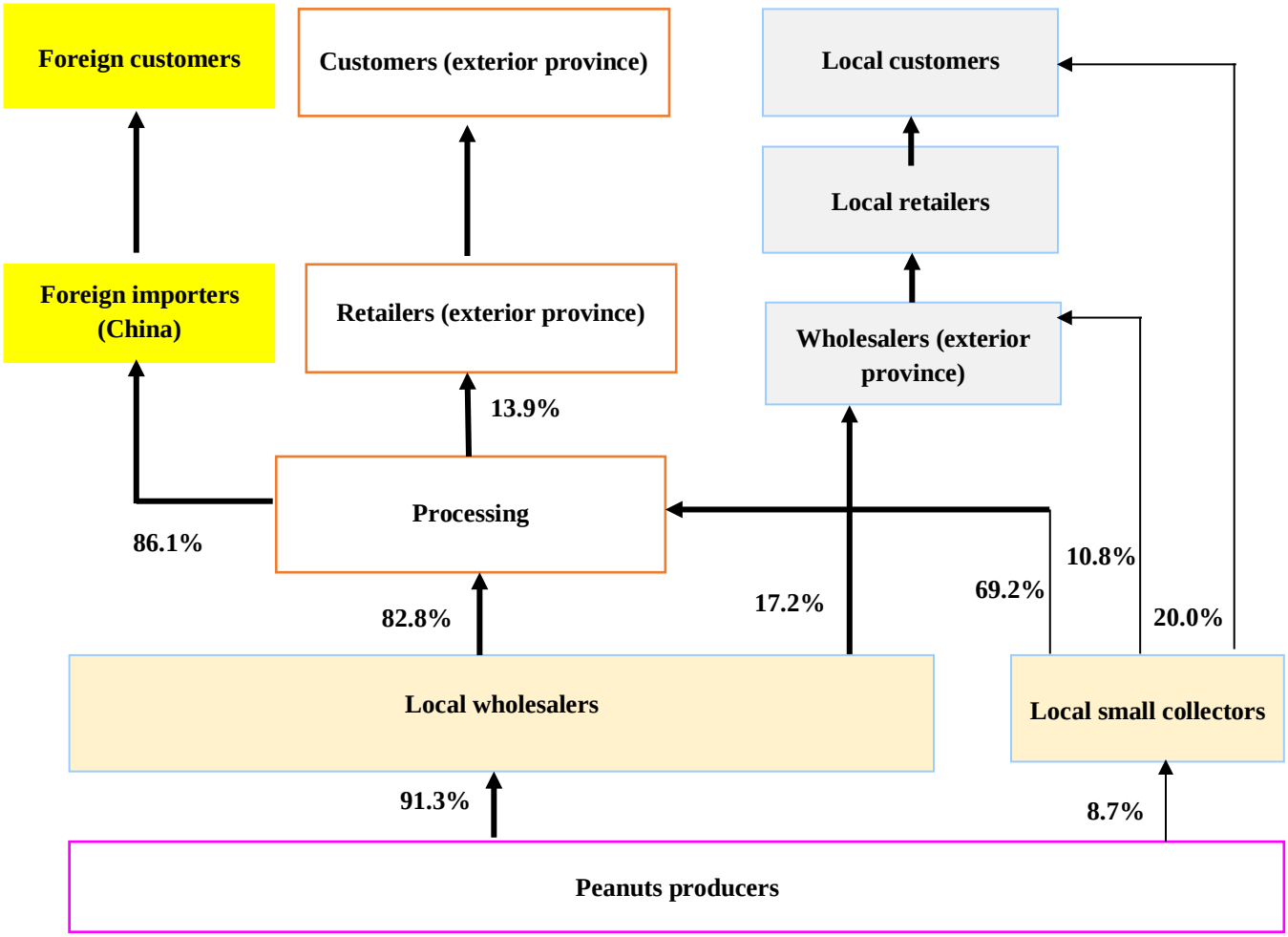

Figure 5. The downstream flow of the peanut supply chain

The channel of domestic consumption demonstrated that peanuts were chiefly sold in Da Nang city, Quang Binh province and Hue city while only a small minority of peanuts were sold at Northern market of Vietnam. In addition, processing products were primarily distributed through traditional markets, supermarkets and small-scale marts.

Quantity of peanuts consumed in Quang Nam province only accounted for pretty small percentages, from 5% to 7%. This kind of consumption was applied for the processing products that did not meet the export standards of foreign importers.

4.4. The results of financial performance of main stakeholders in the supply chain

4.4.1. Peanut growers

For peanut cultivation, commodity value was made via cultivation including buying production inputs, caring, watering, weeding, mulching, harvesting and selling products. To produce a ton of peanuts, farmers spent an average of $872.65 on production inputs (such as labor, depreciation, loan rate, agrochemical and marketing cost). Market price in 2017 was around $1031.39 made an average profit of $158.74 (Table 3). However, one of the most difficult problems in selling product was fluctuating of price, led to large variation of profit.

Table 3. The financial indicators of peanut cultivation

Unit: $/metric ton

	Semi-intensive	Intensive	Average
1. Revenue (Price)	1076.23	1121.08	1031.39
2. Yield per hectare	1.5	1.7	1.65
3. Production cost (C)	827.80	917.49	872.65
4. Profits (π)	248.43	203.59	158.74
5. π/C	0.3	0.22	0.18

Today, most farmers applied two systems in farming: Semi-intensive and intensive. As shown by Table 3, the intensive system had productivity of 5-15% higher than the semi-intensive. Nevertheless, profit for the intensive system was around 22% lower than that of the semi-intensive due to the

fact that production cost of the intensive system was so high. Besides, quality of product was so low and unstable, led variation of sale price and low profit. As a result, average sale price of peanuts in Vietnam was quite lower than that of some countries (Table 4) which means that peanut exports could be feasible.

Table 4. Peanuts price in some countries

	Oil content (%)	Price ($/metric ton)	Sources
Vietnam (shelled peanuts)	48.94	1031.39	Current study
Vietnam (2017)	N/A	1415.93	https://www.customs.gov.vn/
China	48.62	1435.7	Chan et al. [35]
Indonesia (local)	51.02	1345	Bocher and Simtowe [33]
Indonesia (exported)	48.91-51.98	1234.59-1458.25	Karmini et al. [36]
Laos (shelled peanuts)	49.26	1100	Bannor [37]
Myanmar	47.45-50.28	1410	http://www.commerce.gov.mm/data/
Cambodia	N/A	1615.72-1798.26	Zhang et al. [38]

4.4.2. Wholesalers

Wholesalers are firms or households that buy a large quantity of peanuts from peanut cultivators, then re-sell to retailers or processors [39]. They might be local citizens or come from other provinces. Nowadays, wholesalers also play an important role in distributing peanuts in local. Farmers, additionally, find somewhat difficult to sell products without wholesaler operations. Each wholesaler has a capacity to collect at least 200 tons each harvest season, and certainly they might buy all peanuts from farmers. In contrast, trade is depended on a few wholesalers who control price and supply sources, this leads to the fact that they might pay an unfair price to farmers in transaction.

Table 5. The financial indicators of wholesalers

Unit: $/metric ton

	Local wholesaler	Wholesaler (Exterior province)
1. Revenue (Price)	1321.47	1295.39
2. Trade cost (C)	1175.95	1185.78
3. Profits (π)	145.52	109.61
4. π/C	0.12	0.09

After collecting peanuts from farmers, merchandise was transported to a warehouse nearby. Trade with processors was conventionally signed by business contracts and paid via bank transfer just 2-3 days later. Total expenses wholesalers had to pay, included cost of goods, transportation, labor, storing, depreciation and marketing cost. This cost often accounted for nearly 75-90% of the total revenue. Except from cost of goods (70%), transportation accounted for highest percentage of trade cost (about 15%). Furthermore, distribution in other regions often spent at least 10-17% higher than that of local regions.

4.4.3. Processing mills

There are only a few processing operations in local with the main kinds of processing operations are shelling, oil extraction and peanut butter processing. In present, there are private 12 processing mills processing about 45-50 tons of peanuts for exports, nevertheless, most of the processors have small-scale size with an average investment of $100,000 – $200,000/mill. Around 5 of these were in industrial zones, particularly in Da Nang and Quang Ngai. Majority of these mills (80%) work one shift a day (8h), 15% work 2 shifts, while 5% work 3 shifts. The number of permanent jobs vary from 15-56 people/mill with an average of 30.06 jobs/mill. Female labors account for 10-15% of the total permanent jobs and the average number of temporary jobs are 15-25 jobs/mill. To process a ton of peanuts, millers spent an average cost of $1360.71, in which cost of raw material represented highest rate of 80% of total cost. Thus, profit margins of a final good was only $225.05 and economic efficiency was relatively low (17%) (Table 6).

Table 6. Business results of processors.

	Average	%
1. Revenue (Price)	1585.77	100.00
2. Cost of production (C)	1360.71	85.81
- Cost of raw peanuts	*1088.57*	*68.65*
- Other cost	*272.14*	*17.16*
3. Profits (π)	225.05	14.19
4. π/C	0.17	

4.4.4. Retailers

Retailers are businesses or people that sell goods to final consumers [21], as opposed to wholesalers or suppliers who normally sell their goods to another business [37]. Retailers play a major role in distributing and marketing peanuts directly to consumers. Now, peanuts are ordinarily distributed by some retailers to various final consumers in a variety of places like food stores, mini marts, grocery stores and traditional markets. Furthermore, peanuts are also transported by various means of transportation such as bicycles, tricycles and pickup truck to living areas and schools in order to retail more profitably. With operating liquidity of average $300-$900, retailers commonly

gather peanuts at center markets of 150-300kg at a time. Some take less quantity of peanuts, but along with other fruits from markets to retail for different consumers. Wholesalers usually transport peanuts to certain retailers as required. Most of the retailers feel satisfied with their work as business bring so high earnings with limited capital (Table 7). In addition, storing condition and transportation is so convenience decreasing decayed products. Moreover, retailing price of peanuts is rather stable because peanuts is preferred by a variety of consumers like housewives, students and workers.

Table 7. Business results of retailers

	Small-scale retailer	Medium-scale retailer
1. Revenue (Price)	1137.65	1245.98
2. Production cost (C)	913.46	1131.31
3. Profits (π)	224.19	114.67
4. π/C	0.25	0.10

4.5. The financial flow in the supply chain of peanuts

Financial flow represents transactions among players in the supply chain [40]. Through analyzing the financial flow in the supply chain, we can know operation results of each stakeholder and role of each player in the supply chain [39].

The peanut was chiefly distributed to the foreign market, and hence, this study divided consuming operation of peanuts into two core channels namely export channel and domestic consumption channel. The Table 8 demonstrated that peanut cultivators spent the highest amount of production cost, but achieved the lowest profits in the chain. One of reasons caused these phenomena was owing to the fairly significant variation in sales price of peanuts. The other reason was because of the very long supply chain, particularly for domestic consumption channel. As a result, quantity went through each stakeholder would increase in price from 4%-15%, even though 35%.

Table 8. Some financial indicators of the export channel and the domestic consumption channel

Unit: $/metric ton

	Peanuts cultivators	Wholesalers	Processing Mills	Retailers
I. Export channel				
1. Revenue (Price)	1031.39	1289.24	1423.32	-
2. Variation in sales price of peanuts (%)	100	125.00	138.00	-
3. Cost of production (C)	872.65	1141.70	693.27	-
4. Profits (π)	158.74	147.54	730.05	-
5. π/C	0.18	0.13	1.05	
II. Domestic consumption channel				
1. Revenue (Price)	979.82	1353.70	1494.49	1237.65
2. Variation in sales price of peanuts (%)	100	138.16	152.53	126.31
3. Cost of production (C)	872.65	1210.20	734.87	569.25
4. Profits (π)	107.17	143.50	759.62	668.40
5. π/C	0.12	0.12	1.03	1.17

(Note: 1$=22,300 VND)

The Table 8 also indicated that foreign consumption brought earnings for peanut cultivators nearly 50% higher than domestic consumption, implying the government should improve the legal environment to push export growth. Some studied illustrated that this solution was the most effective way to reduce poverty for local citizens [38]. The other research also found that if the export volume increased by 7%, then the local farmers' income would rise not less than 3% [6, 12, 19].

4.6. Critical factors and suggested actions

4.6.1. Critical factors

Some following problems were identified as critical factors affecting the performance of the supply chain of peanuts:

1. Cost of peanut production tend to increase these days and this leads to the decrease in profits of peanuts growers. Such high production cost of peanuts could be due to high cost of seeds, chemicals and fertilizers as well. Because of production custom, most farmers frequently purchase raw materials in high price from local retailing shops and from wholesalers. Moreover, trade is monopolized by a few big wholesalers who have the ability to control supplies and price. So many growers complained that there is fluctuation in availability and quality of production inputs.

2. Lack access to official bank credit. Most of the farmers say that they find so hard in accessing official credit from banks. Hence, they have to sell products to wholesalers or collectors who might offer this service. Some farmers complain that they are obliged to sell products with unfair price. Some processors, especially, small-scale processors have poor access to formal credit and financial support because there is no insurance system and no mortgage available. Additionally, commercial banks cannot provide loans without an exact evaluation of the debtors' financial ability. So, farmers and processors are, therefore, left with little access to credit. When they need money for storing raw materials for production, they have to make a payday loan with interest rate of approximately 0.5-1%/day. Therefore, farmers, wholesalers and processors should be granted credit services as entrepreneurs to enable them to build complete storage facilities and infrastructure systems that help them to access markets and run a credible business.

3. Limit access to training. The study show that educational level of farmers is relatively low with schooling of nearly 10 years (Table 1), and they don't receive any extension services from the authority. Over 97% farmers interviewed said that they have not yet received any training services, capacity building regarding to cultivation techniques, quality managements and market information forecast. As the study has showed that most farmers also limit basic knowledge about peanut care, peanut nutrition, cultivating practices, as a consequence, they usually mix production inputs inefficiently. That's why peanuts' yield is only so low with an average productivity of 1.65 ton/hectare whereas average yield in Viet Nam is about 4.5 tons/hectare. Without basic education, farmers cannot produce high quality commodity and might not have the capacity to use production inputs appropriately, leading to resource wastage as well as inefficiency of production. Around 75-82% millers and engineers claimed that training to improve production and managerial skills was really necessary, and they have no received capacity building from the Government or any institutions.

4. Unstable price of peanuts. As this research has shown that farmers absolutely do not have any relevant information on market requirements on variety and quality of products, and majority of the peanut growers actually do not know how to make a business plan or production plan. There are no also any central organizations or any producer cooperatives which could support them technically or financially. Hence, consumption of peanuts mainly depends on a few large wholesalers, so they always set unfair price in transaction with farmers.

5. The poor infrastructure system and facilities for post harvesting is slowing the growth of the peanut industry. Lack of the infrastructure and facilities is said as serious drawbacks that small-scale farmers and processing mills are encountering. The poor infrastructure and facilities for post harvesting or selling stages results in low quality products, which do not meet the domestic demand and export standards, and in consequence this leads to limitation of competitiveness and decrease in profit of stakeholders in the supply chain. Furthermore, some small-and medium-scale processing mills lack storing facilities to stock raw materials and finished products. So, they often have to hire storing facilities to tackle inadequacy of space. Expenses of hiring facilities normally accounts for 7-11% of total production cost.

6. **Export of peanuts mainly depend on the Chinese market**. The study results showed that nearly 90% processing products were exported to the Chinese market leading a lot of risks when Chinese partners stop importing products as what has happened for Vietnamese agricultural markets in recent year.

4.6.2. Suggested actions

1. Reduce production cost and expand the export market. To do so, farmers need applying new technologies in cultivation, particularly VietGap[1] standards that are applied for many agricultural products like vegetable and fruit. Through applying VietGap standards, farmers cannot only increase the yield of peanuts and reduce production cost, but also meet the export standards of foreign partners and improve quality of products. In addition, some solutions can be considered such as (1) improving the quality of seeds to maximize quality of products [12], (2) further promoting the development of the agricultural product processing industry to increase value

[1] VietGap is abbreviation of "Vietnamese Good Agricultural Practices"

addition of products [41], (2) diversifying export markets to reduce dependence on the Chinese market [2].

2. Improve access to official credit. The study showed that the players in the supply chain really need finance to improve operational capacity. Peanuts growers need capital to develop the infrastructure system and facilities and to buy production inputs while other members in the supply chain need money to upgrade technology, to invest fixed assets and to buy storing facilities. To do so, direct government intervention rather than reliance on the commercial banks seems to be the best appropriate approach for improving access to credit. The Government can apply this approach through Vietnam Bank for Social Policies (VBSB) and Vietnam Association of People's Credit Funds (VAPCF). These financial institutions should apply the loan process the most conveniently for clients to access formal credit. The loans' objectives should concentrate in improving business capacity and production ability, developing laboring skills. Hence, the study suggested to support the cultivators to access official credit sources.

3. Facilitate access to training. The peanut industry in Vietnam has developed more rapidly in last decade to meet growing demand of export markets. As this research has shown that all of players in the supply chain claimed they need more training to expand production capacity. While large processors normally have in-house support to improve operational capacity, wholesalers and smallholder farmers have not. For peanut cultivations, training should concentrate in enhancing production ability, cultivation techniques, plant care process and market information forecast to increase yield and economic efficiency of production. For some processors, training operation will be required on product quality management, storage procedure, equipment maintenances, and business management to process the highest quality products for export demand and to increase the efficiency of raw material usage. Meanwhile, wholesalers should be trained on product storage procedure, contamination control and market information in both domestic and foreign markets with aim of improving the profit.

4. Upgrade infrastructure and facilities. Poor infrastructure in local is currently listed as one of the main challenges of the growth and development of the peanut industry in local nowadays. The lack of adequate roads which pose a lot of difficulties for farmers in transporting inputs and in producing. This couples with poor storage facilities lead to post-harvest losses. According to the Quang Nam Department of Agriculture and Rural Development (QNDARD) prediction that nearly one-twelfth of peanuts quantity lose during harvesting and transportation. Some solutions can be considered: (1) Build drainage systems for each cultivated area to supply enough water for crop in dry season and avoid the spread of diseases, (2) Widen and refurbish 30 kilometers of road traffic to help to transport more easily and reduce business cost and quality improvement, (3) Encourage all economic sectors to engage in building storage systems, transportation and developing modern technology. To carry out these solutions, the Government need investment via operations of Community Development Funds (CDF) and Vietnam Bank for Social Policies (VBSB).

5. Strengthen legal environment in producing and trading peanuts. Although Quang Nam Department of Agriculture and Rural Development (QNDARD) governs production operations of peanut production and Quang Nam Department of Industry and Trade (QDIT) controls trading operations and market price, there are still so many serious weaknesses in the legal corridor and application and enforcement in peanut industry. These should set and enforce quality standards in the peanut sector. Moreover, regulatory authorities should pass suitable policies to support peanut growers and other members of the chain working cooperatively for better production and better trading as well as providing safe peanuts for consumers.

5. Conclusion

Nowadays, peanut production in Quang Nam province plays an important role in improving local residents' income and enhancing the standard of living. Nonetheless, sale price of peanuts was fairly unstable. As a result, it affected significantly peanut growers' benefit. The reason caused this situation resulted from inefficiency of the supply chain of peanuts. This research aimed to analyze the supply chain of peanuts in Quang Nam province to know that how value of products changed throughout distribution channels. Several conclusions were drawn from the statistical analysis of the results as follows:

The supply chain of peanuts was quite sophisticated and involved a lot of stakeholders of the chain. Each stakeholder also played such a necessary role in producing and distributing products to final consumers. Based on material flows going through the peanut producers, the supply chain of peanuts was divided into two main flows, including the upstream flow and the downstream flow.

The upstream flow indicated that inputs for production were provided from three sources: 22.3% from local seed suppliers, 35.9% from tier 2 agencies and 41.8% from tier 1 agencies. For intensive and semi-intensive farms, they often bought seeds from the trusted providers to ensure the quality of goods. These transactions could be performed either on credit or in cash. If the transaction was done on credit would then increase in cost of inputs, and even the peanut cultivators might receive poor quality inputs.

The downstream flow showed that almost volume of peanuts was distributed directly to wholesalers (about 82.8%). The other finding was that majority of peanuts was collected and further processed and was then exported to the foreign consumers (largely China), meaning that peanut production in local was chiefly for export. The domestic consumption of peanuts accounted for a relatively small ratio of quantity. Generally, this domestic channel of distribution was applied to commercial goods that did not meet the export standards of consumers oversea.

Furthermore, when analyzing the financial performance of each stakeholder the study found that selling price varied in huge range, especially for domestic consumption channels. This circumstance affected negatively peanut cultivations. The sharply variation of sale price was owing to the supply of chain being very long. Besides, the results showed that foreign consumption of peanuts brought profit higher than domestic consumption of peanuts. This evidence enforced the public policies support for the export performance of peanuts.

Besides achievements the peanut sector brings to stakeholders in the supply chain, there are a lot of critical factors challenging peanut production in local: (1) Cost of peanut production tend to increase these days, leading to decrease in profits of peanuts growers, (2) Lack access to bank credit, (3) Limit access to training, (4) Unstable price of peanuts, (5) Poor infrastructure and facilities for post harvesting is slowing development of peanut production, (6) Export of peanuts mainly depends on the Chinese market. To solve these problems, some suggested actions: (1) Reduce production cost and expand the export market, (2) Improve access to official credit, (3) Facilitate access to training, (4) Upgrade infrastructure and facilities, (5) Strengthen legal environment in producing and trading peanuts.

Although this study demonstrated reasonable results, we need to recognize that the results were computed from a relatively small sample. Although small sample sizes have been used to effect [42], we should be aware that the larger the sample size is, generally the more robust the conclusions [43, 44]. The other limitation is that this is the first research correlating to the analysis of the supply chain of peanuts in Quang Nam province, hence, more studies with alternative methods should be conducted to confirm the results of this study for better policies.

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