

CURRENT SITUATION OF STAKEHOLDERS' CHARACTERISTICS IN CHU-MANGO SUPPLY CHAIN

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ABSTRACT

The paper approached value chain analysis methodology to identify the flow of information and activities between direct and indirect actors at every channel in the supply chain. A simple random technique was used to select 750 sampling observations for the Chu-mango value analysis. The findings indicated 71% of farmers sell their products to collectors, and 18.8% of mango volume is sold to wholesalers. A further 9.2% sell to cooperatives, and a tiny minority (1%) is sold to local retailers. The main role of cooperative and farmer group share farming techniques is to control agrochemical use in the production process of VietGAP, GlobalGAP, traceability code, and providing information on market opportunities to members. Most of collector transacts with farmers and wholesalers are not contractual agreements that are based on a good business relationship and a responsibility to comply with the supply. Wholesaler is pivotal trader in both the output and input partners of actors in the value chain at the regional and national levels. The wholesaler also plays the role of a fresh mango exporter to the Chinese market. The transaction takes place in cash for channel 2, bank transfer for channel 3, and both for channel 4. Processing firms play an essential role in the consumption of Chu-mango grades 3 and 4 of farmers and create value-added products for consumers. However, the percentage of Chu-mango in exporting enterprises only accounts for a modest proportion of companies' business operations. Most of fresh mango export enterprises must invest in cool sorting systems, packing factories, and vapor heat treatment factories to ensure the tested fresh fruit before exporting. Markets for mango are very promising when Vietnam joins trade agreements such as comprehensive and progressive agreement for the trans-Pacific partnership (CPTPP), the European Union Vietnam free trade agreement (EVFTA), and the Asean economic community (AEC). Most import taxes of partners are zero for Vietnamese mangoes and mango products.

Keywords: current, channel, stakeholder, characteristics.

1 INTRODUCTION

Agri-supply chains are economic systems that distribute benefits and apportion risks among participants. Thus, supply chains enforce internal mechanisms and develop chain-wide incentives to ensure the timely performance of production and delivery commitments. They are linked and interconnected by virtue of shared information and reciprocal scheduling, product quality assurances, and transaction volume commitments.

In agriculture, value chain analysis (VCA) implies managing the relationships between the businesses responsible for the efficient production and supply of products from the farm level to consumers to meet consumers' requirements reliably in terms of quantity, quality, and price. In practice, this often includes the management of both horizontal and vertical alliances and the relationships and processes between firms. Another highlight aspect of the value chain is rural–urban linkages that are crucial to the living conditions of people in rural areas.

Mango has emerged as a major fruit for domestic consumption and international export. Chu-mango is a well-known variety in the local and foreign markets. Although there are many varieties of mango in the Mekong Delta (MD), Hoaloc-mango and Chu-mango are two delicious mango varieties that are widely known consumers. Chu-mango has an elongated



shape, an average weight of 300 to 450 g a sweet taste, lots of water, thick flesh, yellow color, and pleasant aroma. Chu-mango is an important fruit in Vietnam and is popularly used as a vitamin supply source. It is not only used as fresh fruits but can also be used in processing products as well. According to Laura [1] the main stakeholders of the mango value chain are growers, cooperatives, middlemen, wholesalers, processing companies, retailers, exporters, and final consumers. Main purpose of the study provides an overview of stakeholders' characteristics and discusses the importance of each actor characteristics in Chu-mango supply chain in MD. Finally, the paper presents the author's conclusions derived from the performed research.

2 MATERIALS AND METHODS

2.1 Data collection

Data collection was carried out in multiple stages. First, we discussed agricultural extension workers at the province level (four discussion groups, four people/group), and district level (four discussion groups, four people/group) to choose mango villages for investigation. Second, the study had four discussion groups of farmers (six people per group) in four provinces to determine the essential factors of mango cultivation before designing the questionnaire. Third, the study conducted a trial survey with 40 sampling observations (10 observations in each province). Finally, a simple random technique was used to select 750 sampling observations for the Chu-mango value analysis (main actors and supporters). In 2018, the study collected 526 sampling observations of farmer actors. In 2019, the study continued to investigate 137 sampling observations, including five cooperatives/farmer groups (in-depth interviews and questionnaires), 30 collectors (questionnaires), 30 wholesalers (questionnaires), 12 enterprises (in-depth interviews and questionnaires), 45 local retailers (questionnaires) and 15 supermarket/fruit shops (in-depth interviews and questionnaires). In addition, the study collected 31 sampling observations of supporters (16 transporters, 10 agro-input dealers, four central markets, and an agency of phytosanitary inspection 2 for import and export). The process of data collection of all actors in Chu-mango value chain was collected by face-to-face interview. The number of sampling observations of main actors and supporters is illustrated in Table 1.

2.2 Conceptual framework

Nowadays, the concept of collective economics reflects the collaboration and alliances of stakeholders to become increasingly popular. It refers to the relationship between input providers, producers, collectors, distributors, wholesalers, retailers, and final customers. It focuses on the linkage between upstream and downstream partners. Hence, it is called a supply chain [2]. Bozarth and Handfield [3] contend that supply chain efficiency can be obtained through the active management of all business activities within the supply chain. The management of product, information, and finance flows plays an important role in maintaining minimum costs and profitability as much as possible (supply chain management). Traditional marketing is a model of customer orientation. Customers play a key role in their business strategies.

In contemporary conditions, different concepts of cooperation and correlations between economic operators have been developed. This is called a supply chain. They refer to entire economic flows, from the raw material producer, across all levels of production and



Table 1: The number of sampling observations.

	Observations	Data collection	Year
Main actors	663		
1. Farmer - An Giang: 78 - Tien Giang: 98 - Vinh Long: 150 - Dong Thap: 200	526	Questionnaire	2018
2. Cooperative/farmer group	5	In-depth interview Questionnaire	2019
3. Collector	30	Questionnaire	2019
4. Wholesaler	30	Questionnaire	2019
5. Local retailer	45	Questionnaire	2019
6. Enterprise	12	In-depth interview Questionnaire	2019
7. Supermarket, fruit shop	15	Questionnaire	2019
Supporters	87		
Agricultural department, center for trade promotion (provincial level)	16 (4 staffs/group)	Group discussion	2018
Local authorities (district, commune level)	16 (4 staffs/group)	Group discussion	2018
Farmer group (community level)	24 (6 farmers/group)	Group discussion	2018
Transporter	16	In-depth interview	2019
Agro-input dealers	10	In-depth interview	2019
Central market of fruit and food	4	In-depth interview	2019
Agency of Phytosanitary Inspection 2	1	In-depth interview	2019
Total	750		

distribution and finally to consumption. This means that relationships need to be built not only with clients but also with key suppliers and middlemen when producing and delivering goods or services. It consists of both upstream and downstream partners. Suppliers, intermediaries, and intermediaries' clients are included and delivery value networks are created for customers and other stakeholders to achieve a sustainable competitive advantage [4].

“Supply chain management (SCM) is the integrated planning, implementation, coordination, and control of all business processes and activities necessary to produce and deliver, as efficiently as possible, products that satisfy market requirements” [5].

The marketing channel is defined as the expansion of SCM to understand the demands of each client and segment in every specific channel [6]. This creates delivery value networks, not only vertical alliance stakeholders, but also horizontal collaboration of the same agents.

In this study, approach methodology is applied to determine relationships and how actors interact and transact with each other (Fig. 1). This way shows the flow of information and activities between direct and indirect actors at every channel in the supply chain. It helps to illustrate characteristics of stakeholders. Descriptive statistics were used to describe the characteristics of main actor of Chu-mango distribution system, calculate value percentage of each actor of mapping in value chain. The descriptive statistics are presented in tables by using frequency, percentage, mean, standard deviation [8]–[11].

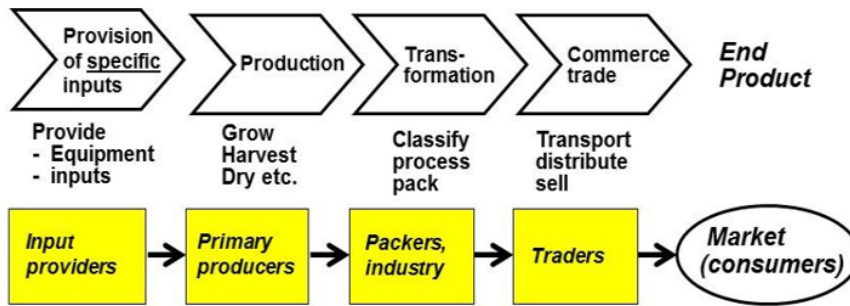


Figure 1: Supply chain map [7].

3 RESULTS AND DISCUSSION

The Chu-mango value chain map illustrates how Chu-mango products are contributed via various marketing channels from farms in the MD region to domestic and foreign consumers. The diagram shows that several actors participated in the flow of the Chu-mango supply chain. The percentage of marketing channels is the share of Chu-mango volume produced by responding growers with a total volume of Chu mango in the MD region of approximately 115,700 tons.

The distribution system of the Chu-mango value chain includes two main channels. The export channels (marketing channels 1, 2, and 3) and domestic channels (marketing channels 4 and 5).

Channel 1	Farmer	→	Cooperative	→	Export Enterprise
Channel 2	Farmer	→	Cooperative	→	Wholesaler → Processing Firm
Channel 3	Farmer	→	Collector	→	Wholesaler (China)
Channel 4	Farmer	→	Collector	→	Wholesaler → Supermarket
Channel 5	Farmer	→	Collector	→	Local retailer

3.1 Chu-mango farmers' characteristics

Table 2 provides more detailed information about the characteristics of mango households in the MD. The vast majority of household heads (94.8%) were male, while a very small number (5.2%) were female. Based on different age groups of household heads, the maximum range is the age group of above 56 years (40.1%), followed by the age group of 46–55 years, 35.2%). The minimum range is the age group under 30 years (0.7%). In general, mango farming does not attract young people in rural areas. For the educational levels of farmers, the maximum level of the farmers was secondary school (45.3%), followed by primary school

(approximately one in three). The level of high school is about a fifth, while a small number is college level (2.2%). In general, farming experience of the household head focuses on the group over 10 years, accounting for nearly 80%. This allows growers to build suitable farming plans based on their experiences in regularly extreme weather and climate change circumstances that directly affect mango production efficiency.

Table 2: Demographic profile of farmer. (Source: Field Survey Data, 2018.)

Demographic variables	Frequency N = 267	Percentage %
Gender distribution		
Male	253	94.8
Female	14	5.2
Age distribution		
≤ 30 years	2	0.7
31–45 years	64	24.0
46–55 years	94	35.2
≥ 56 years	107	40.1
Educational status		
Primary school	85	31.8
Secondary school	121	45.3
High school	55	20.6
College/university	6	2.2
Farming experience		
≤ 5 years	9	3.4
6–10 years	50	18.7
11–15 years	55	20.6
16–20 years	105	39.3
>20 years	48	18.0
Mango area		
< 0.2 ha	13	4.9
0.2–0.5 ha	132	49.4
0.51–0.7 ha	52	19.5
0.7–1.0 ha	42	15.7
> 1.0 ha	28	10.5
Density		
≤ 200 mango trees/ha	207	77.5
201–350 mango trees/ha	44	16.5
> 350 mango trees/ha	16	6.0
Farming type		
Intensive farming (only Chu-mango)	213	79.8
Intercropping with other fruits	54	20.2
Credit (loan)		
Yes	44	16.5
No	223	83.5

The results in Table 2 indicate that most mango growers are smallholders. For example, the group of less than 0.51 ha is the highest percentage in all groups, occupying 54.3%, followed by the 0.51–0.7 ha group at around a fifth and 0.71–1.0 ha group at 15.7%. Only 10.5% consists of a group of over 1.0 ha. In addition, 77.5% of growers’ design orchards with a density of approximately 200 mango trees per hectare under irrigation through water channels. Noticeably, a significant proportion 79.8% of growers chose intensive farming type compared to only 20.2% of growers selected intercropping with other fruits.

Regarding credit access, 83.5% of respondents did not borrow from credit organizations. In fact, farmers’ main purpose access credit to purchase agro-inputs for the next crop. At the same time, agro-input dealers allow growers to get agro-inputs serving production, and payment takes place in ending crops with an interest rate of 1.2–2.0%/month. Thus, their credit demand in production is significantly reduced. In addition, 16.5% of growers borrowed from the Vietnamese Bank for Agriculture and Rural Development, and the Vietnam Bank for Social Policies, with an interest rate of 1.0% per month. This credit is used to buy fertilizers, pesticides, production tools, and hired labor costs.

Mango farmers, who are key actors in the mango supply chain, are the weakest links in the chain system. The given map of the Chu-mango value chain (Fig. 2) shows that 71% of farmers sell their products to collectors, and 18.8% of mango volume is sold to wholesalers. A further 9.2% sell to cooperatives, and a tiny minority 1% is sold to local retailers. At present, most farmers have applied off-season flowering stimulation techniques to spread production around the year and avoid the occurrence of seasonal glut harvest and falling sale prices. The main activities of mango cultivation include pruning and creating a canopy, irrigating, fertilizing, spraying pesticides, wrapping fruit, and harvesting. These activities are carried out by family and hired labor. There are professional teams in locals that meet the requirements of all farming techniques from mango gardeners. Harvesting is decided by the household head based on the fruit color and size, as well as the mature fruit from the trees,

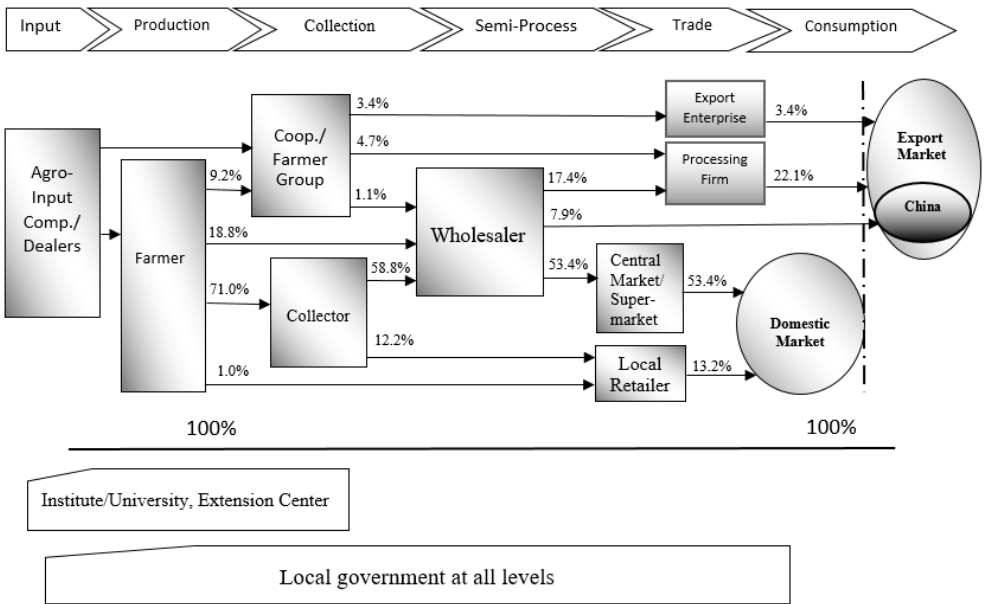


Figure 2: Distribution system of Chu-mango in the Mekong Delta.

harvested by using sticks with a hook and small bag attached to the end. Mango is often harvested in the morning and packed by households in bamboo and plastic baskets, padded with paper. Farmers can sell their mangoes at the orchard or transport some of their mangoes themselves to collectors and wholesalers by motorbikes or small lorries. Mangoes are sold immediately on the same day that they are harvested.

Mango cultivation is a small-scale farmer. It is illustrated in Table 3 with average farm size approximately 0.4 ha. Although the mango farming area is small-scale, the MD is considered a mango production center in Vietnam due to favorable conditions such as soil, water source, and tropical climate. Mango productivity in the MD region is the highest in all regions, especially Chu-mango, with over 10 tons/season.

Table 3: Area, productivity, and selling price of Chu-mango growers. (Source: *Field Survey Data, 2018.*)

Seasons	Area (ha)	Productivity (ton/ha)	Selling price (USD/ton)			
			Normal	Grade 2	Grade 3	Grade 4
Season 1	0.39	11.21	786.32	987.66	494.69	260.71
Season 2	0.41	10.32	779.09	1,023.18	526.35	256.52
Season 3	0.45	10.66	615.57	915.11	508.85	244.74

Overall, the selling price of Chu-mango in the off-season (seasons 1 and 2) was higher than that of the natural season (season 3). Growers can choose two ways to sell their mangoes, either normal mango (non-classification) or mango classified. At the household level, Chu-mango is usually divided into three grades (grades 2, 3, and 4, with rates of 58%, 35%, and 7%, respectively). Growers usually sell classifying types when they estimate their mangoes to obtain over 60% of grade 2. This brings about a selling price better than the normal mango type (non-classification). At the export enterprise and wholesaler level, Chu-mango grade 2 continues to be classified as grade 1, with a rate of 40% of grade 1. Mango grade 1 must meet the sanitary and phytosanitary requirements of importers with both extrinsic and intrinsic attribute indicators. In this case, the household level does not have sufficient professional capacity to classify. In short, the normal Chu-mango is divided into four grades comprising: 23% of grade 1, 35% of grade 2, 35% of grade 3, and 7% of grade 4.

3.2 Chu-mango cooperatives' characteristics

Cooperative and farmer groups play an important role in linking chains among farmer-cooperative companies. It is considered a bridge between mango growers and export enterprises. The main role of cooperative and farmer groups is to implement and monitor mango farming processes to achieve grade 1 mango exports. These cooperative and farmer groups usually evaluate farmers' farming processes by diary and field tests. In addition, members of the cooperative and farmer groups are trained and shared mango cultivation techniques such as tree-pruning techniques, efficient agrochemical application, flowering stimulation, and fruit wrapping towards safe and high-quality products to meet market requirements.

Importantly, cooperative and farmer groups that have received support both finance and technique from the provincial government or non-government to cover the costs of GlobalGAP, VietGAP certification, and traceability code. This is one of the crucial factors to appeal to exporting companies to establish linkages with cooperative and farmer groups. For example, the total mango area of VietGAP certification is 320.41 ha from nine

cooperatives and 31 farmer groups in Dong Thap province, and this number in Vinh Long province is 87.69 ha mango with VietGAP certification from three cooperatives and 22 ha GlobalGAP certification of Quoi An cooperative. However, the validity of these certifications only ranges from two to four years. Thus, the renewal or re-certification cost of GAP certification is a challenge for cooperative and farmer groups. It is very expensive (USD 9,000 for new certified costs and USD 6,000 for re-certification of about 15–25 ha), while funds from local government and NGOs for this activity are limited.

In other aspects, cooperative and farmer groups still cultivate mango orchards following the process of GlobalGAP and VietGAP without certification. Alternatively, they get traceability code with cheaper cost (1,000 USD/code) and are responsible for sanitary and phytosanitary standards with partner enterprises. The total area of the traceability code of Chu-mango was over 500 ha in the study area. This is the result of collaboration between cooperative and farmer groups and companies from production to consumption toward advanced markets in the world.

The main role of cooperative and farmer group share farming techniques is to control agrochemical use in the production process of VietGAP, GlobalGAP, traceability code, and providing information on market opportunities to members. Moreover, cooperative and farmer groups are often supported by VietGAP, GlobalGAP, and traceability code certification costs by local government and non-government organizations (NGOs). They are trained farming technique by extension center and agro-input companies. It is given priority to become input suppliers for export enterprises. One of the main purposes of participating in cooperative and farmer groups is to establish a strong horizon linkage. In fact, the role of cooperatives in the value chain is as a collector rather than a business organization. However, cooperatives face several challenges such as lack of capital, market access, governance capacity, technology (production, semi-processing, storage, etc.), professional labor, and negotiation and business skills, etc. Lack of trust between cooperative members and the management board, between cooperative with company. Big differences in selling price agreements, in share on information, benefits, and risks. To be more effective, the cooperative needs to restructure the operational organization, boost governance capacity, increase negotiation and business skills, attract young staff (who may apply new technology, e-commerce, etc.), and collect capital in production and investment. This requires stronger support from both the Vietnamese government and NGOs to improve cooperatives' capacity in the long term.

3.3 Collector's characteristics

A collector, a small trader, purchases mangoes from growers. They are important actors in the Chu-mango value chain. They help small-scale farmers connect to the market. In particular, the remote places that are rural transport have poor access to the market. The main vehicles for mango delivery of collectors are motorbikes and minivans (300 kg to 1.2 tons) depending on the local infrastructure. Approximately 71% of growers' mango volumes are distributed by collectors. They either buy farmers' mangoes after harvest (harvesting farmers), or purchase fruit-bearing trees (harvesting collector). Usually, the collector visits mango orchards three to seven days before the harvest to inspect fruit quality from a few trees and set up the price. They then sell to wholesalers (58.8%) in the central markets of the MD region (My Hiep, An Huu) and Ho Chi Minh City (Hoc Mon, Binh Dien, Thu Duc), who in turn sell to retailers (12.2%) in local markets in the MD. Most of their transactions with farmers and wholesalers are not contractual agreements that are based on a good business relationship and a responsibility to comply with the supply. All payments for merchandise



are carried out in cash. Price decisions are based on the extrinsic attributes of mango, such as fruit size, maturity, color, weight, etc., rather than the quality measurement of intrinsic attributes and agrochemical residues.

3.4 Wholesaler's characteristics

At present, the wholesaler plays the backbone role of the Chu-mango supply chain, with 78.7% of the total mango volume. They are pivotal traders in both the output and input partners of actors in the value chain at the regional and national levels. They purchase approximately 1.1%, 18.8%, and 53.4% of mango volume from the cooperative, farmer, and collector, respectively, while they also provide 17.4%, 7.9%, and 53.4% of mango volume to the processor, Chinese market, and central market and supermarket, respectively (Fig. 2). The wholesaler also plays the role of a fresh mango exporter to the Chinese market in marketing channel 3. My Hiep and An Huu are two of the biggest central markets of fruit in the MD, which have over 200 fruit wholesalers within a 20 km radius. Here, mangoes are delivered to domestic consumers and the Chinese market. The transaction takes place in cash for channel 2, bank transfer for channel 3, and both for channel 4. All mangoes are classified before selling, mango grades 3 and 4 for channel 2, and mango grade 2 for channels 3 and 4.

Trucks are the main vehicles transporting mangoes to the central market and China. If the journey goes to Dang Nang, Ha Noi, and China, heavy trucks will be installed in a cooling system with an electronic chip to control the temperature. In the MD, produce takes 3 h to reach Ho Chi Minh city, 16–18 hours to Da Nang city (the middle of Vietnam), 48–52 hours to Ha Noi city (the north of Vietnam), and 60–72 hours to border gate between Vietnam and China. In channel 3, transactions take place either in Vietnamese territory or in the Chinese domain. If it is transacted in the Chinese domain, the charge of custom cost will be 260–350 USD/container (25–30 tons).

3.5 Retail system characteristics

The retail system is divided into two levels: large-scale retailers in big cities (channel 4) and local retailers (channel 5).

Local retailers are small-scale sellers and buy directly from collectors (12.2%) and farmers (1.0%) who bring mangoes to their retailing point. They purchase normal Chu-mango (non-classification), after which they classify it into grades 2, 3, and 4 before selling to consumers. In this way, they ensure better profits from a higher selling price. Merchant activities occur in open-air markets and street vendors. The local retailer usually merchandizes daily from 15–50 mangoes kg/day (after 3 to 5 days without a cooling system). In addition, they also sell diverse tropical fruits. The fruit loss for the local retailer is high about 15–20%, stems from anthracnose, over-ripe fruit, and transportation damage.

For the large-scale retailer, this is the leading trader of the supply chain; approximately 53.4% of the Chu-mango volume is provided to the domestic market via this actor. Mango must be classified as grade 2 at the wholesaler before transporting it to them. Chu-mango in channel 4 meets the requirements of certification of GlobalGAP or VietGAP, traceability code, and without a banned list of pesticides. Its distributed systems are mainly fruit malls (Vinmart plus, Tuong Vy, South Fruit, Klever fruit, Fruitstore, NQ fruit), supermarkets (Coopmart, Lotte, Big C, Mega market, AEON, Bach Hoa Xanh, etc.), and central markets in big cities (Hoc Mon, Thu Duc, and Binh Dien in HCM city, Hoa Cuong in Da Nang city, Long Bien in Ha Noi city). There is a difference in the selling volume of Chu-mango fruits between supermarkets/malls and the central markets. More specifically, the supermarkets or



mall are around 100 to 350 kg per day, and the central markets are about 200 to 600 kg per day. We thank the wholesaler for careful classification that the fruit loss is about 5 to 10% by over-ripe fruit and transportation damage. Maintaining Chu-mango on the fruit shelf in the mall or supermarket is 12 to 20 days with a cooling system, while it is only 5 to 10 days in the central markets without a cooling system.

3.6 The characteristics of export enterprise and processing firm

The study carried out a survey of 12 export companies. In general, export companies transact many kinds of fruits and vegetables, and the scale of these companies in Vietnam is mainly small and medium enterprises (SMEs), in which most processing companies are medium-scale, exporting companies of fresh fruit are small-scale. Moreover, there are a few enterprises that trade both fresh and processed products. The findings indicated that companies exported various varieties of mangoes, of which Chu-mango is the most common variety for exporting fresh and processed products.

The findings of processing firms show the processing firms are medium-scale companies with a large demand for raw fruits and vegetables from 20,000 tons to 120,000 tons per year. Chu-mango is an important input material contribution to the export value of companies. The contribution percentages of raw Chu-mango compared to total raw input materials were 4.6%, 7.1%, 10%, and 20% in Thuan Phong, Hung Phat, Phu Thinh, and Long Uyen companies, respectively. In the Long Uyen Company, Chu-mango is considered the main material source for manufacturing the company. Processing firms play an essential role in the consumption of Chu-mango grades 3 and 4 of farmers and create value-added products for consumers. However, the percentage of Chu-mango in exporting enterprises only accounts for a modest proportion of companies' business operations.

The investigated results of exporting enterprises provide information on the business operations of fresh fruit export enterprises. To meet export requirements, most export enterprises must invest in cool sorting systems, packing factories, and vapor heat treatment factories to ensure the tested fresh fruit before exporting. The scale of these enterprises is small and focuses on exporting dragon fruit rather than other fruits. Its contribution to mango export activities was modest. For instance, the export proportions of Chu-mango are 1%, 2.4%, 3.0%, and 5.0% in the Cattuong, Hoang Phat, Yasaka, and Goodlife companies, respectively.

Overall, exporting fresh fruit often confronts strictly phytosanitary inspection from importing countries as well as control importing quotas. However, markets for mango are very promising when Vietnam joins trade agreements such as comprehensive and progressive agreement for the trans-Pacific partnership (CPTPP), the European Union Vietnam free trade agreement (EVFTA), and the Asean economic community (AEC). Most import taxes of partners are zero for Vietnamese mangoes and mango products.

3.7 Agro-input dealers' characteristics

Mango growers in the MD approach from two providers, one from directly salesmen teams of agrochemical companies, and one from local agro-input dealers. Generally, the input sources of agrochemical dealers are diverse owing to the provision of various companies. At present, agro-input dealers are still the main providers of agrochemicals (pesticides, fungicides, fertilizers) for farmers. Agro-input dealers coordinate regularly to agrochemical companies to organize workshops on how to use appropriate agro-inputs to guarantee successful production crops. In fact, agro-input dealers benefit from both the commission



rate from companies and profit from selling products for farmers. They benefit sales on commission depending on companies' sale policy (Table 4).

Table 4: Commission rate following companies, turnover condition. (Source: Field Survey Data, 2019 (KIP).)

No.	Turnover requirement	Commission rate (%)
1	Small company, turnover each season	
1.1	4,500–6,500 USD	12.0
1.2	9,000–13,000 USD	15.0
1.3	17,500–22,000 USD	20.0
2.2	Big company, turnover per year	
2.1	2.21 million USD	9.0
2.2	4.42 million USD	13.5
3	Promotion from small company for payment term	
3.1	07 days	6.0
3.2	30 days	3.0
3.3	60 days	1.5

The results in Table 4 provide information on agrochemical supply sources for agro-input dealers. Overall, agro-input dealers gain commission rates at different levels. The commission from big companies is usually less than that from small companies, while turnover quotas are higher. One of the main causes is that their products are well-known and trade easily. Additionally, big companies are foreign enterprises or companies with strong financial potential, so the payment term is ending year instead of each season as small companies. To be able to compete, small companies must provide a more attractive commission rate and various promotion programs for both dealers and farmers. However, they face the risks of low quality and counterfeit products from small companies. The number of regular customers of agro-input dealers is approximately 150–200 growers who are local and neighborhood farmers. The results indicate that approximately 55% of farmers buy input materials by cash immediately, and 45% of farmers pay in each ending crop with an interest rate of 1.2–2.0% per month. In addition, agro-input dealers are responsible for business tax approximately 100–200 USD/year.

3.8 Transporter's characteristics

Although the transporter is only a supporting actor in the value chain, it contributes vitally to market connections in limited rural transportation conditions. They not only transport agricultural products internal to the MD, but also travel it to spread Vietnam and Chinese border gates. At present, Vietnam does not yet have a speed railway system to connect the national agricultural products center with other regions of Vietnam. Most fresh fruits and vegetables are transported by trucks on road traffic networks. In this study, 28 drivers were interviewed to collect information on fresh fruit transport, including 16 local drivers and 12 drivers for fresh fruit transport to other regions.

In particular, the study conducted an in-depth interview in Mai Truc Company Limited, a popular transport company in Vietnam. The company has a large and powerful truck system with approximately 550 heavy trucks (weight 25–30 tons) for professional transport of agricultural products from the MD to northern Vietnam and Chinese border gates. In the MD, fresh fruit and vegetables take 3 hours to reach Ho Chi Minh city, 16–18 hours to Da Nang

city (the middle Vietnam), 48–52 hours to Ha Noi city (northern Vietnam), and 60–72 hours to the border gate between Vietnam and China. Except for transportation in the southern region, all heavy trucks are installed cooling systems with electronic chips at different temperatures. Every truck has two drivers who get USD 300–350 each driver with a journey of about 5–7 days. If the goods are decomposed by temperature fluctuations, the drivers of the journey will take responsibility for compensation. The company also pays commission for brokers who help find goods for transportation (commission about 8 USD/ton). In addition, the company must pay a BOT fee (build–operate–transfer) of toll stations approximately 350 USD/journey about 30 product tons, and cost for dockers 5.5 USD/ton. Table 5 presents transport charges for fresh fruits and vegetables from the MD to northern Vietnam.

Table 5: Transport charges for fresh fruit and vegetables. (Source: Field Survey Data, 2019.)

No.	Type of products	Charge (USD/ton)
1.	Mango, papaya	88.4
2.	Melon, guava, mangosteen	132.6
3.	Citrus, pomelo	150.3
4.	Coconut, jackfruit	101.7
5.	Durian	154.7
6.	Other fruits	97.3
7.	Vegetables	110.5

4 CONCLUSIONS

The Chu-mango distribution system has eight main actors (farmer, cooperative, collector, wholesaler, export enterprise, processing firm, supermarket/fruit shop, and local retailer) and the five main marketing channels (the three export channels and two domestic channels) to supply to five market segments with different selling prices and quality.

The ending traders of each marketing channel (export enterprise in channel 1, processing firm in channel 2, wholesaler in channel 3, supermarket/shop fruit in channel 4, and local retailer in channel 5) are considered as nuclear actors of revenue growth in the value chain.

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