Market Access through Competency Based Education and Training in Horticulture (MACBETH)

ANNEX 2

OVERVIEW AND SITUATION OF VEGETABLE PRODUCTION IN VIETNAM - CASE STUDY OF SWEET POTATO & PURPLE ONION

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I. INTRODUCTION

Vegetable and fruit production plays an important role on the agriculture of many countries in the world. Vegetable and fruit sector is also an important production sector of Vietnamese agriculture. Vietnam enjoys numerous favorable conditions for vegetable and fruit production in which climate and ground are suitable with tropic, subtropical vegetables and fruits and some temperate vegetables and fruits.

Vietnamese vegetable and fruit production in recent years has marked significant progress in both terms of scale and product structure. Various kinds of special vegetables and fruits with high quality have been developed and brought high yield thanks to the sector's application of advanced cultivation techniques, etc.

Vietnamese vegetable and fruit sector has gained satisfactory achievements in domestic consumption and export. Plentiful processed products such as tinned and condensed fruits and vegetables have been highly appreciated by domestic and oversea customers. Especially, some new products such as purre, frozen vegetables and fruits have been consumed in America and Japan, etc. In 1995, vegetable and fruit export of Vietnam only was USD 56.1 million, however, by 2007 it reached over USD 300 million, a 6 time increase compared to 1995, made up 0.63% in the total export value of Vietnam in 2007. The results and effects which vegetables and fruits bring about are still limited and have not been corresponding with the big potential of the country.

II. THE SITUATION OF VEGETABLE PRODUCTION IN VIETNAM

2.1 General

In different regions of country, the growth rate of vegetable production was very divers depending on climatical condition and the dynamic of local demand. The vegetable is cultivated mostly in Red river and Mekong river delta. At Red river delta, in 2002, the total area of cultivated vegetable is 138.500 ha, representing 26,91% of vegetable total area of country. In Mekong river delta, the vegetable area is 108.400 ha representing 21.06% of country vegetable area. Vegetable area has slowly been diminishing now due to urbanization, especially in sub-area of Hanoi and Ho Chi Minh cities.

In recent years, the vegetable production in Vietnam is increasing in term of quantity and in term of quality demand. The objectives of Vietnam vegetable branch will increase the cultivated area from 450 000 ha at 2000 up to 600000 ha at 2005, will diversify the vegetable kinds. The objective orientation emphasizes on the hygienic and sanitary quality of majority of produced vegetables. The prognostic of consumed quantity per cap in 2005 is 80 kg and 100 kg in 2010.

Table 1. Area, yield, production of all kinds of vegetable in Vietnam

			Vegetables Primary + (Total)				
			2007	2008	2009	2010	2011
Area Harvested (Ha)	**Ha**	**Viet Nam**	690,747.00	690,620.00	787,890.00	818,008.00	835,918.00
Production (tonnes)	**tonnes**	**Viet Nam**	8,040,419.00	7,724,503.00	9,064,089.00	8,975,530.00	10,320,928.00
Yield (Hg/Ha)	**Hg/Ha**	**Viet Nam**	116,401.79	111,848.82	115,042.57	109,724.23	123,468.19

Source: FAOSTAT, 2012

Table 2. Area, Yield and Production of Vegetables per regions in 2005

S/No	Regions	Area (1000ha)	Yield (ton/ha)	Production (1000 tons)
	Nation	**635.1**	**15.18**	**9,640.30**
1	Red River Delta	158.6	17.99	2,852.80
2	North Mountainous and Midland	91.1	11.06	1,008.00
3	North Central Coast	68.5	9.78	670.20
4	South Central Coast	44	14.01	616.40
5	Central Highland	49	20.17	988.20
6	Eastern Mekong Delta	59.6	12.95	772.1
7	Mekong Delta	164.3	16.63	2,732.60

Source: MARD

Table 3. Area, Yield and Production of Vegetables per regions in 2007, 2008 and 2009

No	**Regions**	**2007**		**2008**		**2009**	
		Area (ha)	Yield (tons)	Area (ha)	Yield (tons)	Area (ha)	Yield (tons)
	Nation	**706 479**	**11.084.65 5**	**722 580**	**11.510.70 0**	**735 335**	**11 885 067**
I	**North Area**	**335.835**	**4 889 834**	**339 534**	**5 002 330**	**330 578**	**4 956 667**
1	Red River Delta	160 747	2 996 443	156 144	2 961 669	142 505	2 832 753
2	Northeast	82 543	947 143	85 948	1 018 904	89 359	1 084 037
3	Northwest	15 563	179 419	16 681	195 605	18 093	211 852
4	North Central Coast	76 982	766 829	80 761	826 152	80 620	828 024
II	**South Area**	**370 644**	**6 194 730**	**383 046**	**6 510 387**	**404 757**	**6 928 400**
1	South Central Coast	47 427	708 316	46 646	695 107	49 459	713 473
2	Central High Land	61 956	1 274 728	67 075	1 482 361	74 299	1 635 944
3	Eastern Mekong Delta	69 723	892 631	70 923	940 225	73 094	1 014 715
4	Mekong Delta	191 538	3 319 055	198 402	3 392 694	207 905	3 564 268

Source: MARD 2006-2010

2.2 Vegetable production in Mekong Delta

Mekong Delta is a large and flat land area, with 3.96 million hectares of farmland and nearly 18 million residents (about 22% of the national population). In fact, Mekong Delta typically

represents for an agricultural production and aquaculture district, with 2.60 million hectares (65% of the Mekong Delta area), providing half of national food production and contributing importantly in the overall economic development in the region. There are two modes of production: self-sufficient, self-support and production of goods, including vegetables and goods in two areas

- ***Vegetable-growing area***: concentrated in cities and industrial areas, mainly provide products for the non-agricultural population, thus requiring extensive variety and high level of product safety. The coefficient of land use is high (4-8 crops/year), level of intensification of farmers is relatively high, but they has still been using too many pesticides and chemical fertilizers.

- ***Rotational vegetable area***: this is a region with large acreage and yield, rotational vegetable crops are planted to rice, grow well on alkaline soils fairly within stable trends. The coefficient of land use is low (2-4 crops/year). Therefore the Mekong Delta is easily made of planning vegetables planting on rice land conversion, has great potential in expanding the area of vegetables into raw material zone for processing and export.

- Vegetable production trending to high-tech agriculture was initially formed as UPVC roof fixed mobility to limit the impact of adverse weather elements or growing vegetables without soil (hydroponic techniques).

Situation of safe vegetable production in Mekong Delta (Pham Van Du et al., 2008):

In 2007, the total area of safe vegetables was 8439 ha (3.6% of vegetable growing area in the Mekong Delta), including leafy vegetables with 4451 ha (green field cabbage, frequency cells, spinach, lettuce, watercress, cheek, spinach, cabbage, spinach, cabbages, white cotton, cotton reform and spices), vegetables, fruit with 3835 ha (cucumber, melon, beans, melons, tomatoes, beanscorn, pumpkin, etc.) and root vegatable with 131 hectares (radish, taro, sweet potato, cassava, ginger, etc.); average yield of 23.05 tons/ ha and production of 206,991 tons.

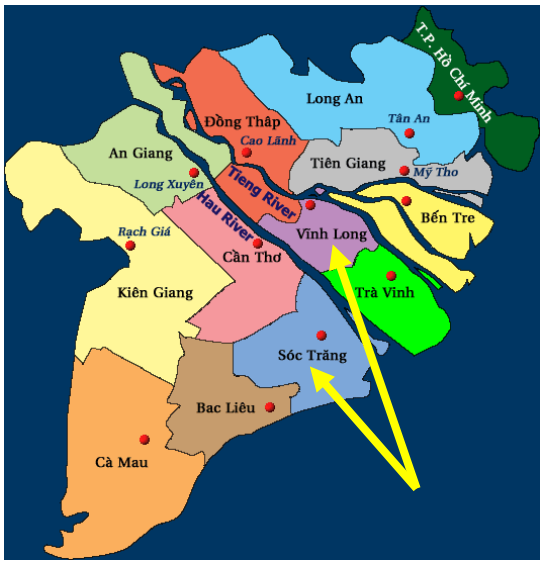

Figure 1. Map of Mekong Delta in Vietnam

III. MARKETING

3.1 Domestic marketing situation

Vegetable plays very important role in Vietnamese's diet. It is the second most important foodstuff after rice. Currently, national production is mainly for domestic consumption. According to FAO, domestic consumption shares from 85% to 90% of total national production.

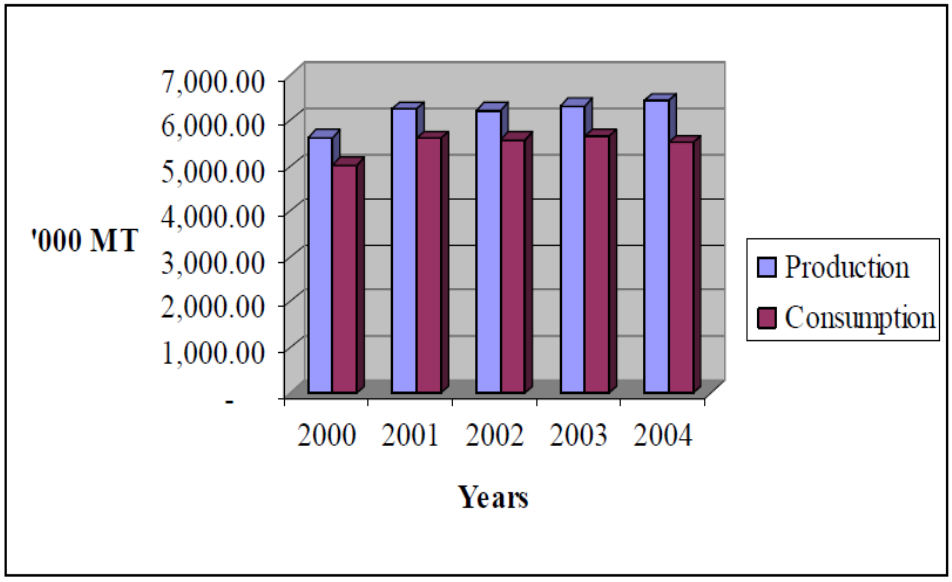

Figure 2. Production and Consumption (*Source : FAOSTAT, 2005*)

Table 4. Regional preference to major vegetable species

Product	Hanoi HCMC	Other cities	Towns	North Moun.	Red River	North Central	South Central	High land	South Eastern	Mek. Delta
Bean	64	64	52	54	62	57	50	65	62	38
Kangkong	97	99	96	91	98	98	90	79	94	94
Kohlrabi	42	69	45	91	96	68	19	59	12	3
Cabbage	94	92	90	90	94	70	47	78	79	78
Tomatoe	98	99	95	85	94	78	76	79	89	87
Other species	94	93	91	81	84	91	98	97	98	97

Source : IPRI, 2002

Average daily per capita consumption is about 182.95 gram in 2004, according to FAO, still lower the standard of 200gr per day. However, vegetable consumption patterns differ amongst regions. Kangkong is preferred in both the South and the North but Kohlrabi is most preferred in the Red River Delta (96%) but not in Mekong Delta (3%).

3.2 Situation of vegetable consumption

- Vietnam has about 60 fruit and vegetable processing enterprises with a total capacity of 290,000 tonnes/year, in which SOEs accounted for about 50%, 16% state-owned enterprises and foreign-invested enterprises 34%, in addition, thousands of households being as small-scale fruit and vegetable processing.

- Currently vegetables are mainly used for domestic consumption, processed vegetable products account an insignificant proportion; in 2005, value of fruit and vegetable exports reached $ 235 million, of which the majority is from the fruit processing. Varieties of vegetable products for export is very limited, only certain types such as tomatoes, cucumbers, sweet corn, vegetables, corn, peppers, watermelons in dry, jars, canned, salted, condensed , frozen and some fresh form.

- Domestic consumption hasn't been so much and erratic price depends on the amount of supplying products while low level of consumption can affect the sustainability in agricultural production.

- Vegetable products become commodities after harvesting and they are easily damaged while most of the large-scale commodity production areas haven't got pre-processing and temporary storage places.

3.3 Structure of fresh vegetable marketing system

The major actors in general circulation and distribution of fresh vegetables in Vietnam are producers, collectors, wholesalers, retailers and export organizations. Each marketing actors can take over one or more functions such as transportation and distribution.

Collectors are villagers and even vegetable producers. At harvest time, the producers may sell their own products or they engage in marketing activities to increase their families' income. They can collect vegetables from producers who often live in the same villages or communes to retail on market places or directly to the final consumers.

Wholesalers can be divided into 3 types: wholesale traders, wholesale producers and wholesale collectors. Wholesale traders (big wholesalers) serve as intermediaries between collectors and retailers. At present, these actors are still small and un/underspecialized. They mainly trade on fruits and vegetables trading only a subsidiary activity that mainly focuses on luxury vegetables.

There are two groups of retailers; fixed retailer in markets and another on street. In general, among 7 selling categories for vegetables from producers, wholesale in market was most common one for farmers. 56.28% of farm households surveyed had 64.6% of vegetable volume sold through the wholesales

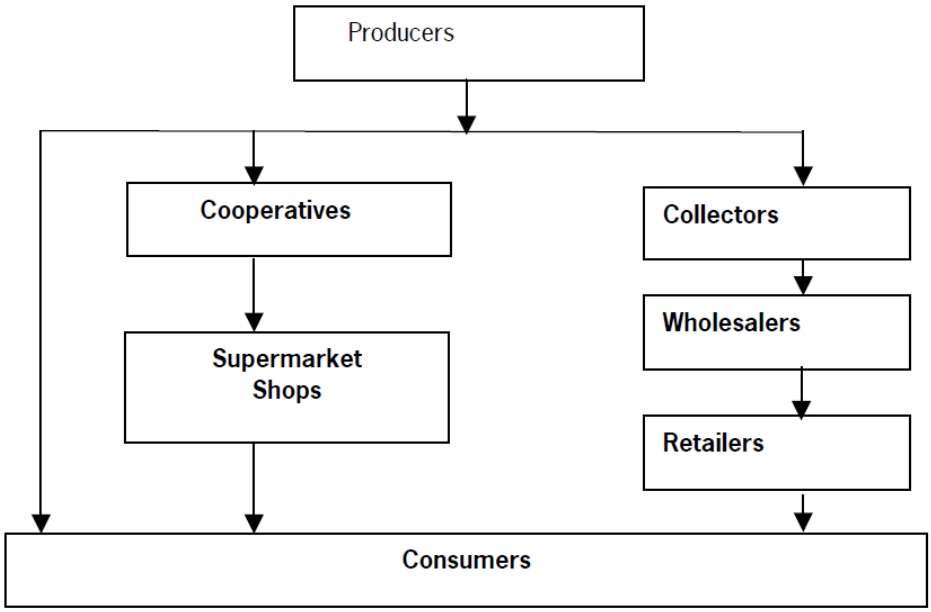

Figure 3. Marketing Channels of Fresh Vegetables

The second popular marketing channel is retail on market places. The number of households and the quantity of fresh vegetables sold by retail accounted for 29.31% and 24.1%, respectively. Recently there is no vegetable producers sell their products to processing and exportation units. 88.37% of total vegetable producers shipped by themselves about 90.92% of total volume of fresh vegetable to markets while only 12% of vegetable producers sell their products at farm gate or their field. In terms of marketing channels, the vegetable volume sold through direct and indirect channels with 26.32 and 73.68%, respectively.

3.4 Challenges and constraints for production and marketing on vegetables

3.4.1 Production aspect:

• Vegetable yield and production efficiency are low. The increase of vegetable output is mainly influenced by the increase of vegetable areas (3.9% of total area, but vegetables gross value just accounts for 3% of gross value in agriculture)

• Scattered and small scaled by effects of urbanization pressure.

• Technique of vegetable production. Producers are facing many problems as diseases and pests attacks, lack of water supply as well as poor quality of vegetable seeds.

• The greatest challenges in the production development are how to solve the contradiction between immediate economic benefit of producers and food safety.

• Low capital investment for safe vegetables production such as water supply, compost processing system and hydroponics vegetable cultivation to manage fertilizer applications.

• Poor facilities for post-harvest.

3.4.2 Marketing aspect:

• The fresh vegetable marketing system of Hanoi was simple and spontaneous. First of all, a net of outlets/stores for buying and selling fresh vegetables in the urban areas as well as new services/businesses in rural areas such as transportation mean, packaging, contracting and wholesale, should be better organized. A series of problems should be tackled, such as improving knowledge of farmers about agricultural marketing and price policies, capital support (to build wholesale and retail market and stores), upgrading the transportation system of rural areas, increasing the purchase power, and improving vegetable quality.

• Lack of formal wholesale market system with its suitable laws and regulations.

• Lack of adequate studies on vegetable marketing and markets.

3.5 Fresh vegetable marketing in Ho Chi Minh city

According to Department of Industry and Commerce of Ho Chi Minh city, distribution network of agricultural products of Ho Chi Minh City include three wholesale markets of agricultural products: Thu Duc, Binh Dien and Hoc Mon; 238 retail markets, most of markets have vegetable sold which are located in all districts, 78 supermarkets and hundreds of vegetable stores.

Provided vegetable sources are mainly from Lam Dong (70%), from suburban district like Cu Chi, Hoc Mon ... and some provinces in Mekong Delta like An Giang, Tien Giang,...

Currently, the traditional market plays main role in providing vegetables for most of economical customers. It is easy for consumers to buy vegetables at reasonable prices. However, the quality control, food safety and hygiene management is very difficult to be controlled in the traditional markets except for Thu Duc, Binh Dien, Hoc Mon (Ho Chi Minh city), the southern wholesale markets, Dich Vongwholesale market (Hanoi) in which organized quality control, hygiene and safety management at markets and sanctions violations. The organization of safe vegetable distribution network with high quality has been paid attention more, however the consumers have difficulty to approach safe vegetable because of non-widespread distribution..

IV. EXPORTING

4.1 Vegetable exporting value

Fruit and vegetable export in Vietnam began in 1957, firstly to China. From 196 to 1975, export increased slowly due to the war. From 1976 fruit and vegetable export tended to increase to the Soviet Union and Eastern European countries, reaching a peak in the period 1981-1985 before plummetting in the 1990s by traditional market changes. Vietnam's fruit and vegetable export prices are generally lower than in other countries and since 2004, this commodity tended to increase relatively stable.

According to the statistical figures from Vietnam Customs, Vietnam export turnover in the first – seven months – 2012 reached 405.6 million of dollars, 13.8% higher than the same period in

2011. However, the export growth had a decrease from this point to only 55.52 million od dollars in July – 2012.

Table 5. Vegetable export turnover in Vietnam in 2005 - 2012

Year	2005	2006	2007	2008	2009	2010	2011	First 7 months/2012
Export turnover	235	259	305,6	396	438	460.2	622.5	405.6
Higher than the previous year (%)	31.3	10.2	18	29.6	10.6	5.1	35.3	13.8

Unit: million of dollars; Source: Vietnam Customs, 2012

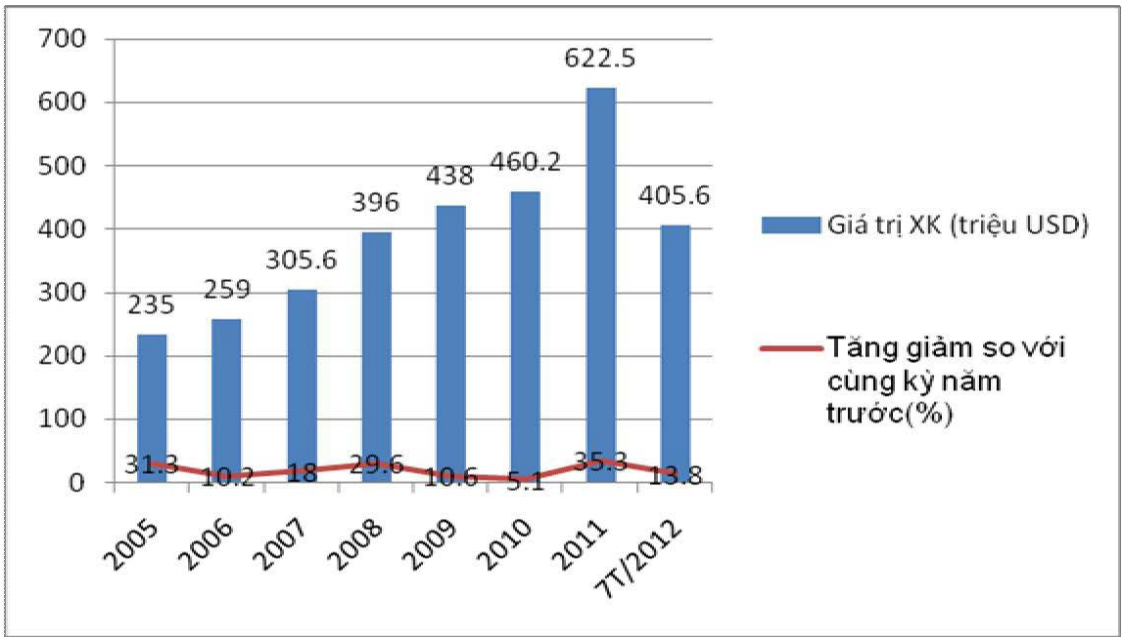

Figure 4. Growth of Vietnam vegetable export in 2005 - 2012

Source: Vietnam Customs, 2012

4.2 Main export markets

China has still been the largest market for vegetable export with the turnover of 109 million of dollars in the first seven – months of 2012, accounted for 26.8% of total vegetable turnover in Vietnam and 16.97% higher than the previous year.

Nextly, the second biggest market is Japan with export turnover of 30.3 million of dollars, occupied 7.4% of total vegetable export turnover and 19.53% higher than 2011. The next vegetable export markets include USA (5.2%), Indonesia (5%), Russia (4.3%), Taiwan (3.3%), South Korea (3.1%), Netherlands (3%), Thailand (2.8%) and Singapore (2.8%).

Vegetable export in Vietnam had the highest growth to 35.3% in 2011 and the turnover reached at 622.5 million of dollars. However, in 2012, this development had a plummet and

Vietnam could lose some important markets in EU because of breaking the legislation of food safety and hygiene.

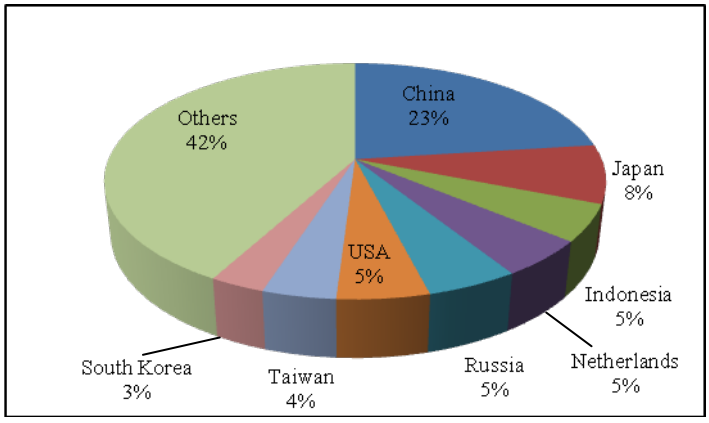

Figure 5. Vegetable export from Vietnam to other countries in 2011

Source: Vietnam Customs, 2012

Table 6. Vegetable export markets in the first seven-months in 2012

Unit: million of dollars

No	Market	Value	Density (%)	Increase/Decrease as compared the previous preiod
	Total export value	**405,6**	**100,0**	13,8
1	China	109,0	26,8	16,97
2	Japan	30,3	7,4	19,53
3	USA	21,1	5,2	34,32
4	Indonesia	20,5	5,0	-27,14
5	Russia	17,5	4,3	-7,01
6	Taiwan	13,6	3,3	21,89
7	South Korea	12,8	3,1	-2,55
8	Netherlands	12,4	3,0	-33,39
9	Thailand	11,4	2,8	43,76
10	Singapore	11,4	2,8	23,72
11	Malaysia	8,6	2,1	30,08
12	Canada	6,5	1,6	18,69
13	Germany	4,7	1,1	-23,83
14	Australia	4,6	1,1	-14,47
15	France	4,2	1,0	-19,7
16	UAE	3,8	0,9	20,11
17	Hongkong	3,5	0,8	-4,68
18	Cambodia	2,4	0,6	2,43
19	Italia	2,4	0,6	-51,53
20	England	2,3	0,5	34,61
21	Ukraina	1,2	0,3	139,9
22	Kuwait	1,1	0,3	26,76

Source: FAOSTAT, 2012

4.3 Vertical linkages in production and distribution of exported vegetables

A decade ago, the fruit and vegetable sector of Vietnam experienced tremendous changes in terms of production and processing. Production of citrus, lychee, longan and rambutan

increased over 10% annually. Gross output of vegetables and soybeans went up 7.6% annually in the 1990's. Exported turnover of Vietnam fruit and vegetable accelerated from US$ 50 million (1990's) to US$ 300 million in 2001 (IFPRI 2002).

4.3.1 Linkages in provision of exported vegetable varieties

To control vegetable quality, the Bac Giang Foodstuff Export Joint Stock Company (BAVECO) and others provided vegetable varieties to producers in advance, through a written contract. BAVECO and others took the responsibility of controlling the quality of vegetables purchased from seed companies. On the other hand, producers were also able to obtain varieties directly from seed companies (Figure 1). Volume and categories of vegetables being supplied to farmers varied according to seasons and planted areas. Producers were allowed to pay after harvest.

Varieties of processed vegetables (baby cucumbers, Japanese cucumbers, baby tomatoes, sweet maize, etc.) were purchased by processing companies located in Bac Giang province and other provinces (Hai Duong, Hung Yen, Ha Nam).

To control vegetable quality, processing companies provided varieties to producers in a signed written contract. Processing companies transported varieties to villages and distributed to farmers. Quality of varieties was examined by processing companies before supplying to farmers. Farmers paid after harvest. Along with providing varieties, processing companies built production areas, provided technique assistance and purchase vegetables. Several companies provided varieties to farmers in Luc Nam district were Bac Giang Export Foodstuff Joint Stock Company (Luc Ngan district, Bac Giang province), Hai Duong Fruit and Vegetable Processing and Export Company and others. The head of a village represented its farmers in signing contracts with processing; this signing was notarized by the Commune's People Committee

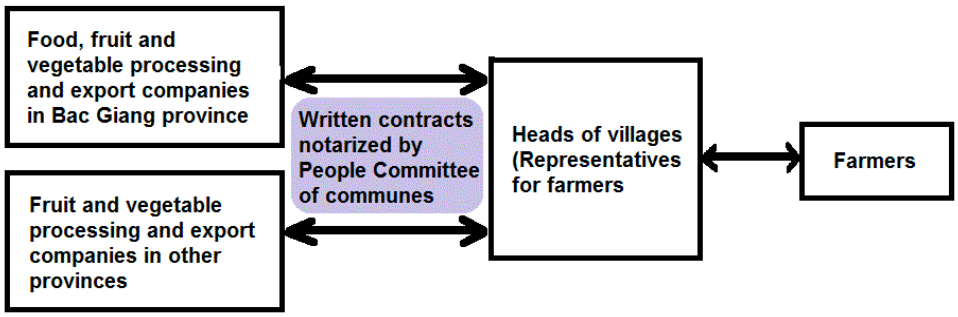

Figure 6. Contracts signed between companies and farmers

4.3.2 Linkages in distribution of exported vegetables

There are three distribution channels linking farmers with export markets.

1) Channel 1: Farmers --- Cooperatives --- Food and Vegetable Processing Companies --- Export Markets

After a harvest, farmers conveyed vegetables to cooperatives to sell to processing companies. Most farmers were a cooperative's members. In this case, the cooperative represented farmers in signing a written contract with processing companies. Categories, volumes, qualities and prices of vegetables were stated in the contract. Cooperatives have responsibilities in controlling the volume and quality of vegetables provided to processing companies. Vegetables then can be exported directly or through Vietnam National Vegetable, Fruit and Agricultural Products Corporation (VEGETEXCO).

2) Channel 2: Farmers --- Local Traders --- Food and Vegetable Processing Companies --- Export Markets

Local traders purchased vegetables off the farmers directly from the field. Then, vegetables were sold to processing companies in other provinces (outside of Bac Giang province). However, a low volume of vegetables was purchased via this channel because processing companies applied this method only when there was a temporary shortage of supply. A contract between local traders and companies was verbally signed in this case. Processing companies always concerned about quality of vegetables acquiring via this channel.

3) Channel 3: Farmers --- The head of Village --- BAVECO/Others --- Export Markets

The majority of vegetables were purchased throughout this chain. After a harvest, vegetables were transported by farmers to the procurement site in the village. Here, the head of the village represented the village's farmers to sell vegetables to processing companies. The purchase was notarized by the Commune's People Committee. Then, processing companies processed vegetables and exported directly or via the VEGETEXCO to abroad markets. Formal contracts (written contracts), signed between farmers and processing companies, were notarized by Commune's People Committee. A contract covered different issues such as volume of vegetables, prices and harvest schedules. However, the contract did not refer to sharing values, risks and decision rights.

Rights and obligations of partners in the contract framework were not clearly stated to settle conflicts; and both farmers and processing companies would break the singed contract if doing so generated a financial gain for them. This channel was used by BAVECO in purchasing of vegetables in Dong Phu and Dong Hung communes.

V. THE VEGETABLE SUPPLY CHAIN IN MEKONG DELTA

5.1 The vegetable supply chain in Mekong Delta

Mekong Delta not only provides vegetables for the provinces in the region, but also Ho Chi Minh City (peppers, cucumber, watermelon, pumpkin, eggplant, etc.), Hanoi (watermelon, melon pear), Cambodia and China (watermelon). An Giang also provides vegetables for the Cambodian market, mainly green onion and cabbage, also melon, cucumber, red pepper, ginger. Long An and Tien Giang mainly exports watermelon and melon pears to China.

In the vegetable value chain of Mekong Delta, farmers are main distributor to other objects in the supply chain who play a very important role. A number of farmers engaged in local safe vegetable cooperative while most of them grow and sell vegetables outside.

Traders buy vegetables in the Mekong Delta, mainly small and medium-sized, mostly traders sell products locally and to neighboring provinces and Ho Chi Minh City. However the cooperative punches his role without specific planning and allocation for growers of vegetables.

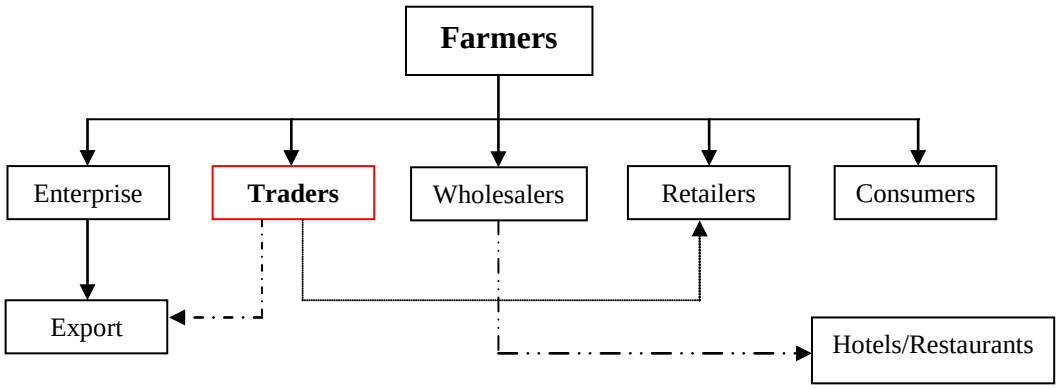

Figure 7. Vegetable supply chain in Mekong Delta

Source: Tran Thi Ba, 2009

The farmers in vegetable-growing areas of the large cities understand relatively the requirements and regulations on safe vegetables. However, to implement stringent regulations, they must be assured of output due to the high cost of safe vegetables, lots of investment (greenhouse, fertilizers, etc.) but little of purchase, as well as no specialized stores selling safe vegetables for product consumption (Ho Chi Minh City) or bulk exports (Dalat). As a result, vegetable safety are produced in low yield, mainly for regional supermarkets in the area (Metro, Coopmart, Citimart) or shops organized by local agricultural authority.

Currently the Mekong Delta farmers are planting many kinds of leafy vegetables, herbs (basil, cilantro coriander, green field cabbage, basil plants, lettuce, spinach, etc.) on the reserved land and others (watermelon, cucumber, melon, pumpkin, squash, tomato, lung, peppers, beans, etc.) which are in rotation with rice crop (2 rice, 1 vegetable). Each year, the average farmers rotate on the same area from 2 to 5 types of vegetables (seasonal), each separated by approximately 1 month (leafy), 2-3 months (vegetables, fruits). Vegetable growing season is winter - spring (November to February), the most unfavorable is passive months (September - November) with a lot of rain. An average profit can be achieved at 2-3 million VND/1,000 m^2/crop.

5.1.2 Planting Procedure

Vegetables have different planting prodcedures on method, protection or harvest time…, however, in general, the procedure can be described as below:

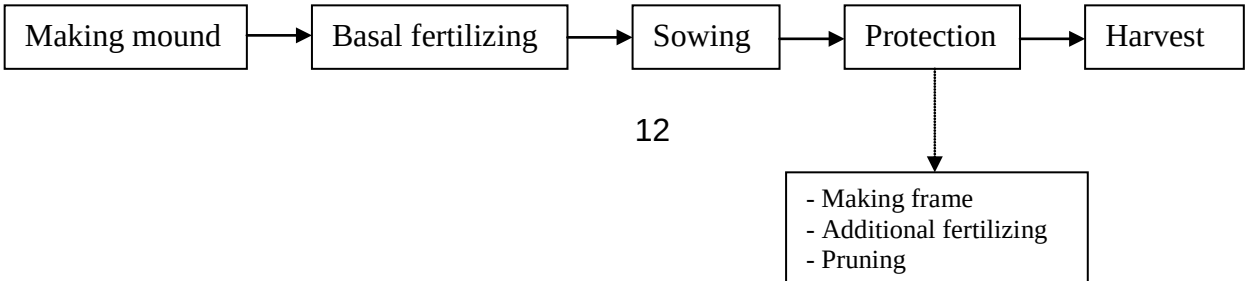

Figure 8. Vegetable planting procedure in Mekong Delta

5.1.3 Harvesting procedure

Each kind of vegetable also has specific harvesting procedure, depending on consumption methods (kg or whole garden) and consumers (farmers or traders), however, it is still not complicated as below:

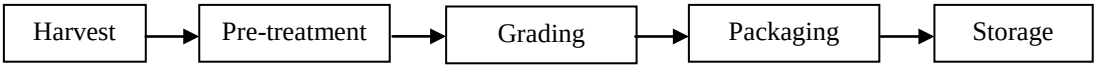

Figure 9. Vegetable harvesting procedure in Mekong Delta

Leafy vegetables are harvested, put into crates and then being pre-treated. The pre-treatment includes: in the field, cutting roots, release young and tender leaves, rearranging (depending on the type of vegetable), washing, and binding them in the mess. For tomatoes, cucumber, picking into baskets, then reselecting and packaging. On process, leafy vegetables have relatively high losses of about 20% (by original, odd old leaves, etc.) and 55 for cucumbers, beans…

In summary, the main difficulty of vegetable production is a large amount of post-harvest loss, the price of vegetables is not stable, the traders buy products at very low price and bad weather usually causes difficulties for farmers to harvest vegetables.

5.1.4 Consumption

“Bulk sale” or selling the whole product in the garden is the most common method in marketing of the farmers in Mekong Delta. The farmers will tell the traders the amount of vegetable can be harvested on that day. If the traders deal with the agreement, the farmers will harvest and arrange the vegetable into baskets or plastic bags. This is the most favourite selling method of the farmers because all the products can be bought even of unequal quality.

5.1.5 Customers and transaction

The main customers of farmers are local traders, mainly veteran familiar, professional traders. In addition, the farmers also sell to foreign traders, but usually require a deposit before. The only thing that most farmers are not happy about traders due to forced prices when the market prices fluctuate, even if they agreed upon (by mouth). A small amount of vegetable are sold to local retail dealer or retail farmers vegetables in local market, but the price is not high.

There are also local cooperatives for consumption of safe vegetables, they mainly sell vegetables to supermarkets (Metro, Co-opmart, Vinatex, etc.). However, the supermarkets

usually have small orders while the farmers produce more, leading to oversupply. Therefore, a large amount of safe vegetable will be sold to external retail sales at lower prices.

5.1.6 Brand name, trademark

So far no vegetable product has their own brand name in Mekong Delta. The cooperative sell the vegetables to supermarkets which still bearing the supermarkets' brand . It is also difficult for the safe vegetable farmers in the Mekong Delta. They are eager to own certified brand to be able to control product prices, widen promotion and have the consumer trust. Regarding to exports, until now the farmers do not directly export vegetables, only a small amount of quota are exported through traders to neighboring countries such as Cambodia, China

5.1.7 Contract and payment

Verbal contracts are often made with familiar traders (based on reputation) while written contracts are done with foreign traders (through contract or deposit). Traders pay the farmers on time in about 5-6 days after purchasing or the completion of harvest. The cooperative pay the farmers in a half of month and 1 month later, but the cooperative can advance them, depending on the needs of each farmer.

5.1.8 Cost and profits

Hand labour cost during producing is very high (because of hard terrain for using machines), the farmers invest for each crop (average 1000 m^2/1 crop) in 2 months) at least 2,500,000 VND. The profits of each kind of vegetable is approximately 2,500,000 – 5,000,000 VND/1000 m^2.

5.2 Factors affecting the coordination in production, processing and distribution of vegetables

5.2.1 Internal factors

a) The producers' demands on the distribution of vegetables

Farmers produced fruits and vegetables and made a distribution in their local markets. The fluctuation in prices of fruits and vegetables affected their income: a higher productivity translated into lower prices and vice versa. It was difficult for farmers to find a market for their products. Farmers' benefits could improve through an enforcement of market access. Farmers needed assistance from firms and local authorities in distributing their fruits and vegetables. Therefore, demands in distribution of products affected linkages between farmers and processing companies.

b) The companies' demands on processing materials

Companies needed materials (fruits and vegetables) for processing and exporting. Hence, the development of production material zones was necessary. To do so, companies coordinated with local authorities and farmers to establish vegetable production zones. Companies always would like to have stable material sources to maintain and expand their production. However

and so far, it did not look like production material zones in Dong Phu and Dong Hung communes, Luc Nam district would receive an efficient investment in the long-term.

c) Policies offered by processing and export companies

To create successful linkages between farmers and companies, policies related to variety supply, technical assistance and pricing were needed. For example, regulation on the supply of vegetable varieties facilitated the monitoring of product quality. Varieties affected productivity, shape and quality of vegetables. Farmers had a lot of experience in cultivation of vegetables; but experiences alone would not be enough when it came to vegetables for processing and export. Therefore, farmers needed technical support from scientists and companies' technical staff. On the other hand, pricing should be clearly defined and adjustable to reflect the market prices.

d) Capacity of the processing and export companies in finding markets

The market was an important factor in the business of fruits and vegetables. Linkages were maintained as long as firms had markets for products. Linkages between farmers and companies depended so much on contracts signed between companies and other partners. In term of marketing chains of fruits and vegetables, operations of all actors depended so much on the final actors (processing/export firms). Marketing chains of fruits and vegetables would be interrupted if the final actors could not sign contracts. Therefore, companies needed to concentrate on looking for new contracts. In another word, the Government, Ministry of Industry and Commerce, Ministry of Agriculture and Rural Development and Business Associations needed to assist companies in diagnose new markets.

e) Storage capacity and the ability to process vegetables of the producers

Farmers found challenges in storing and processing vegetables. Most vegetables were stored and processed simply by traditional methods. Storage costs went up when farmers reserved vegetables for a long period. Hence, most of them tried to sell vegetables as soon as possible after harvest. In this case, processing companies played important roles in purchasing and processing a huge volume of vegetables because farmers would receive low prices if they sold their vegetables in the open market and to local traders.

5.2.2 External factors

a) Increasing consumption demands on vegetables in domestic and international markets

In the period of 1980-2004, the fruit and vegetable market became one of the fastest growing areas in the agricultural market. Global fruit and vegetable consumption increased by an average of 4.5% per annum between 1990 and 2004. This was higher than the world population growth rate, meaning the global per capita consumption of fruits and vegetables also increased. According to World Health Organization, to help prevent chronic diseases, consumption of fruits and vegetables should be at least 400g per day per capita (Directorate-General For Agriculture and Rural Development, European Commission, 2007).

Vietnam current population was of 86.4 million with a predicted growth rate of 1.3%/year between 2005 and 2010, in which 27% of the population lived in urban areas (UNFPA, 2007). In Vietnam, most rural households grew vegetables. In 1998, about 85% of rural households grew fruits and vegetables. Kangkong, leafy greens and bananas were most frequently grown; on average, a household grew 3.4 categories of fruits and vegetables (IFPRI, 2002).

The increase of population in the world and Vietnam in the recent years led to a rise in the consumption of fruits and vegetables per capita. That provided a tremendous opportunity for the producers, the processors and the exporters of fruits and vegetables. Moreover, the recovery of the world economy positively affected the import and export of fruits and vegetables. Therefore, developing the vertical linkages among producers, input suppliers and processing and export companies would be necessary to satisfy the consumption demands.

b) The importers' requirement on vegetable quality

The requirement in quality, shape and volume of vegetables of importers did have influences on the domestic producers, processors and exporters. Therefore, the processing and export companies should collaborate with the technical staff of the District Department of Agriculture and Rural Development and District Centre of Agricultural Extension to assist producers in the

implementation of proper production practices and quality management systems such as GAP, HACCP, etc...

c) Roles of the local authorities

Local authorities (villages and communes) had important roles in promoting linkages between farmers and processing companies. Heads of villages were the representatives for farmers in signing contracts with companies. Contracts signed between farmers and companies were notarized by the Commune's People Committees before coming into effect. Clearly, local authorities were a bridge linking farmers and processing companies.

B. SWEET POTATO PRODUCTION

I. INTRODUCTION

The sweet potatoes in Vietnam have many varieties with 3 main sources of origin including China, the U.S.A and Japan, but the variety with high commodity which have been planted in large areas such as Kien Giang, Vinh Long, Dak Nong and Lam Dong provinces, are originating from Japan. Although it is not a high-yield plant, but the farmers in some areas have become richer from sweet potatoes as Dak Nong, Vinh Long.

In Vinh Long, sweet potatoes are mainly produced in the Tan Thanh, Thanh Trung, Tan Binh, Thanh Dong.... On the other hand, the farmers in Binh Tan are fearless to bring the sweet potatoes instead winter-spring rice crop, "rice + sweet production model" can help the farmers increase profits 4-5 times with intensive rice (3crops/year). The farmers enable to achieve an income of 100 million VND / ha / year.

II. PRODUCTION

2.1 Production

Sweet potato is an important crop in all four researched districts, although there is a clear variation among the districts. Sweet potato is important in Binh Tan where an average of 0.9 ha was planted, and less so in Giong Rieng and Chau Thanh with 0.65 and 0.5 ha respectively. In Thu Duc, the average area was small at 0.24 ha/respondent.

The Mekong Delta districts show cropping intensities of equal value varying from 1.7 in Giong Rieng to 1.9 in Chau Thanh. Thu Duc, located closer to Ho Chi Minh City, is significantly higher with a cropping intensity of 2.5.

Table 7. Variation among districts of sweet potato and rice production

District	Giong Rieng	Chau Thanh	Binh Minh	Thu Duc
Total ha sweet potato	58.5	34.5	9.0	8.9
Average/hh	0.65	0.5	0.9	0.24
Total ha rice	1.63	60.3	15.0	23.4
Average/hh	1.81	0.85	1.5	0.63
(Household)	90	71	100	37

In general, crop rotation in the four districts shows variation though sweet potato is planted throughout January and harvested in the course of April. So it seems that sweet potato is a dry season crop. However, in Giong Rieng, sweet potato is planted from November to March,a four month planting period. In the area of Binh Minh, sweet potato is planted from January to mid-February, while in Chau Thanh it is planted closer to the wet season, in April. There is even a July planting in Chau Thanh.

This variation in cropping period may be related to water availability, which could differ between areas. The staggered production of sweet potato could also be connected with price stability and it is therefore important to know which factors have caused the staggered planting times.

Table 8. Varieties by district

District	Giong Rieng	Chau Thanh	Binh Tan	Thu Duc
Variety	Tau Nghen	Disongngoc	Tau Nghen	NN4
		Khoai Me	Cu Lan Nui	Hung Loc A
		Hong Dao	Bido	Lang Bi
		Tau Yang		

As shown in the appendix, varieties seem to be specific to planting periods in most of the districts. This is a rather surprising phenomena and if true, it indicates a rather thoughtful approach by the farmers. Regarding this matter, further confirmation of the technical properties of the varieties is necessary.

Primary problems in production are reported to be root diseases (Binh Minh and Chau Thanh), input shortage (Giong Rieng) and shortage of irrigation water (all). In the socio-economic

sphere, unsteady prices are given as a disincentive for sweet potato. Major pests are reported to be Eucepesposfacius, which causes losses of up to 25%. Moreover, branch death root diseases Cylasformicaras is reported to cause losses of 10 – 20%. More detailed information is given in diseases in sweet potato.

Not surprisingly, the Mekong Delta districts report similar proportions of soil type in which sweet potato is grown. Approximately 30% consists of sandy soils, 40% is alluvial soil and 30% is clay. In contrast, all Thu Duc soils are sandy.

A rather surprising phenomena is the relatively high input levels used for sweet potato (Table 5). In view of the very recent changes towards non-intervention in the market and trade of inputs for early 1989, one would expect low input rates because of problems in their availability. However, the information given in Appendix section 1 – inputs per ha for sweet potato by districts – covers a large variety of inputs. Comparison with previous years could prove to be interesting.

Table 9. Fertilizer per ha (in Kg)

District	Giong Rieng	Chau Thanh	Binh Minh	Thu Duc
UREA	367	121	250	140
DAP	75	79	250	
NPK	49	52		
Phosphorous	56	16		20
Animal Manure				3,700

One observes relatively high fertilizer rates and striking differences among the districts. While it seems likely that supply opportunity and availability has influenced the high rate of animal manure dressing in Thu Duc, the other variations are somewhat strange.

Table 10. Average yield by district

District	Giong Rieng	Chau Thanh	Binh Minh	Thu Duc
(t/ha)	14.7	14.5	18	9.6

On the whole, yields vary from 4 to 30t/ha. At this stage it is not yet possible to discern any correlation between levels of productivity and input levels. It seems likely however, that the high yields in Binh Minh may be related to a high input of fertilizers.

In conclusion, it can be observed that relatively high levels of inputs are being used for sweet potato while productivity varies slightly among districts. Given the farmers proven willingness to invest in production of sweet potato, it seems quite likely that productivity can be increased considerably.

2.2 The Market System

Figure 10 presents an impression of the marketing system for sweet potato. First and foremost, it should be clear that transport in the Mekong Delta takes place over water. Boasts vary in carrying capacity from 8 to 20 tonnes, and use outboard motors. They transport bulk goods from assembly points to the major market of Ho Chi Minh City. It should be kept in mind that this section is tentative, based on a little field information.

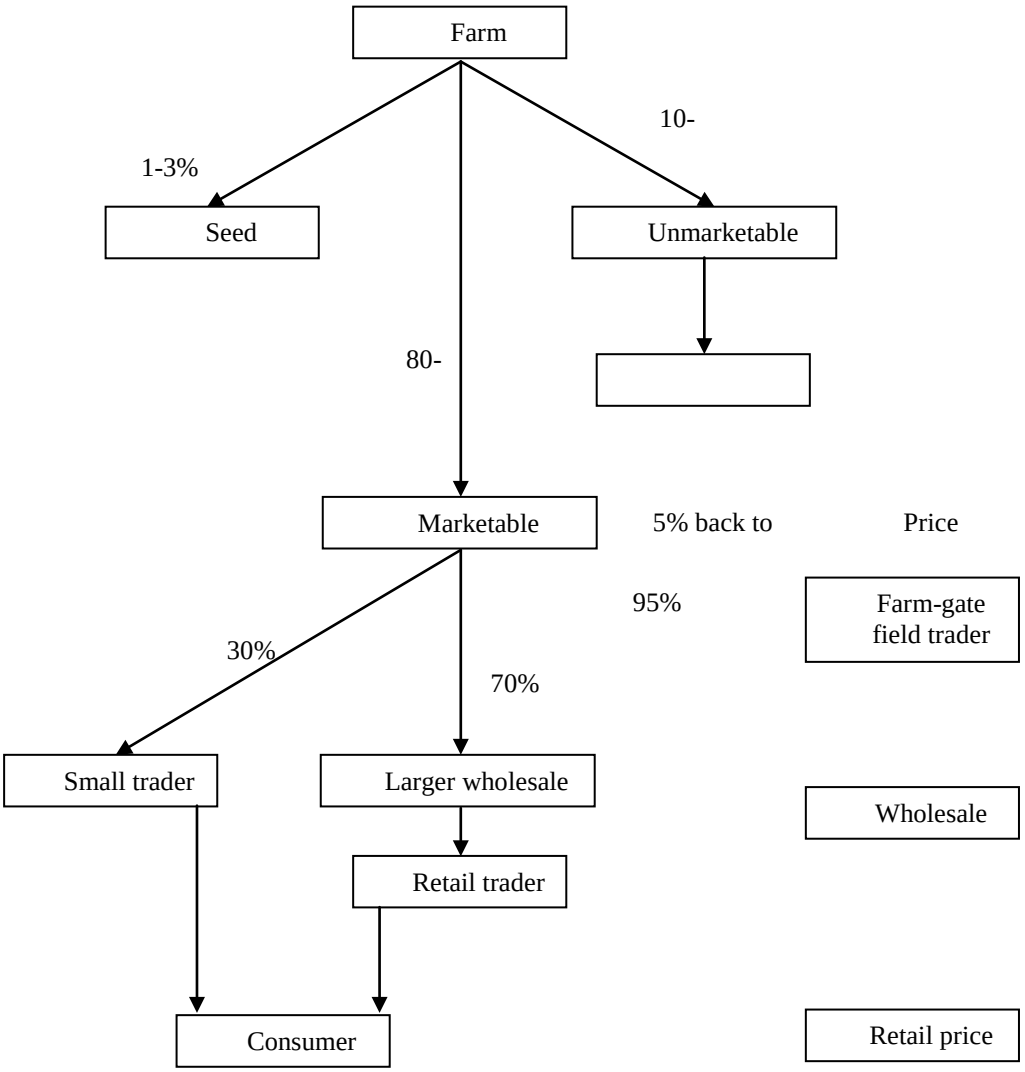

Figure 10. Market channels of sweet potato

It takes between 12 to 18 hours to cover the distance between the Mekong Delta districts and Ho Chi Minh City.

The sequence of activities after harvesting is usually as follows: farmers harvest sweet potato in May and transport it along small canals to assembly places at the riverside, where cleaning and grading into three quality classes is conducted. These activities are conducted by lager groups of farmers on a cash-wage basis. The farmer pays after he has received money from the trader. There are three grades of sweet potato.

Table 11. Grades and prices of sweet potato

Major indicator: *size*	Grade 1	Grade 2	Grade 3
Price of May 1989/Dong	180-250	130-200	100-180
Proportion of production	20-30%	± 50%	20-30%

2.3 Marketing in Thu Duc

The district of Thu Duc belongs to Ho Chi Minh City and is located approximately 15 km from the city centre. In Thu Duc there are several industrial, trade and construction companies. There is a textile factory, cement factory, and a lamp factor, as well as several repair facilities. Trading companies are occupied with buying and selling of industrial and agricultural produce, because of the favourable location and good infrastructure. Livestock production, primarily beef, is of importance. As a consequence food crops are important as animal feed. The primary food crops are rice, vegetables, and crops for animal feed. Sweet potato is relatively unimportant. The different infrastructure and its vicinity to Ho Chi Minh City have created a different market structure and infrastructure as compared to the three other districts. Farmers prefer to market produce themselves and do so using bicycles or by renting tricycles. This way, farmers take the marketing margin minus the cost of transport and the rent of a stall. They often sell all their produce to a retailer who has a stall in the Ho Chi Minh City vegetables market. There are also some sales inside Thu Duc at the local vegetable market, plus a ready market for animal feed.

Based on the foregoing sections on marketing in the Mekong Delta and the Thu Duc districts, it appears that the market structure is efficient, especially in the Mekong Delta. The margin accruing to farmers of 60-70% is quite high. More information is necessary however on transportation costs from the farm to the assembly market, and the labour and costs required for cleaning. As well, a more in-depth view will be necessary of the retail market in HCMC, which is planted in the second phase studies.

III. PRODUCTIVITY

Sowing area so far is 9,225 ha, an increase of 87 percent as compared with the same period in 2011 (mainly in some districts like Binh Tan: 8,247ha, Binh Minh: 749ha and Tam Binh: 125ha).

The selling price now: Japanese purple sweet potato: 160,000 VND/quintal – 180,000 VND/quintal (60 kgs); milky white sweet potato: 120,000 VND/quintal – 130,000 VND/quintal; Giay sweet potato: 360,000 VND/quintal and pumkin sweet potato: 200,000 VND/quintal – 220,000 VND/quintal. The average price of Japanese purple sweet potato fluctuated from 2,667 VND/quintal – 3,157 VND/quintal while the cost of producing was 3,665 VND/quintal, thus the farmers lost 508 VND/kg of sweet potato.

As regard to purchasing methods, the traders buy the sweet potatoes directly at the field, then they sell to Chinese traders with higher/lower price depending on each crop. This year, the

price has been plummeting which can influence the farmers. According to a demonstration of local authority, the Chinese traders don't owe the farmers because they don't buy directly from the field. However, Chinese traders owe local Vietnamese traders (Thành Đông, Tân Thành commune, Bình Tân district) totally 1,22 billion of VND.

The main reason for lower prices of sweet potatoes in recent times comes from the subjective and objective conditions. In 2011, the Japanese Purple sweet potato price increase which bring high benefits for producers, thus in the first five months of 2012 the farmers continue to rise sweet potato production on seasonal planning area 2 rice – 1vegetable or 1 rice - 2 vegetable leading to the price fluctuations decrease. The input costs has risen, especially labor cost increased 2 times, which push higher production prices of sweet potato (about 3,600 VND/ kg). At the same time, trading activities between local traders and the Chinese traders are only through simple records and there is no contract, so it is difficult to solve problems when there is a dispute.

Table 12. Area, production and yield of sweet potato in Vietnam in 2007 - 2011

			Sweet potatoes				
			2007	2008	2009	2010	2011
Area Harvested (Ha)	**Ha**	**Viet Nam**	175,500.00	162,600.00	146,600.00	150,800.00	148,500.00
Production (tonnes)	**tonnes**	**Viet Nam**	1,437,600.00	1,325,600.00	1,211,300.00	1,318,500.00	1,390,600.00
Yield (Hg/Ha)	**Hg/Ha**	**Viet Nam**	81,914.53	81,525.22	82,626.19	87,433.69	93,643.10

Source: FAOSTAT, 2012

Table 13. Area of sweet potato divided in region and year

Unit: 1,000 ha

	2008	2009	2010	Sơ bộ 2011
Nation	1.325,6	1.211,3	1.318,5	1.390,6
Red River Delta	291,8	195,1	247,0	241,9
Ho Chi Minh city	0,2	0,2	0,3	0,3
Mekong Delta	243,1	279,4	307,1	410,5
Long An	0,6	0,3	0,5	1,2
Tiền Giang	3,8	3,5	3,3	3,0
Bến Tre	1,7	2,8	2,0	2,3
Trà Vinh	23,1	29,6	28,8	28,7
Vĩnh Long	142,8	148,8	170,7	248,7
Đồng Tháp	11,6	30,0	24,0	39,3
An Giang	4,4	2,1	3,7	6,5
Kiên Giang	13,4	19,4	28,9	35,5
Cần Thơ	0,7	0,4	0,5	2,1
Hậu Giang	15,0	10,5	9,7	6,9
Sóc Trăng	21,9	27,8	30,7	32,0
Bạc Liêu	3,3	3,3	3,4	3,4
Cà Mau	0,8	0,9	0,9	0,9

Source: IFRI, 2012

IV. PROBLEM

There are major pests like mouse, insects and diseases (including weevils, grubs, stem borers, and root rot).

C. ONION PRODUCTION

I. INTRODUCTION

Vinh Chau District has favorable conditions not only for marine economic development, aromatic rice development but also for red onions. Red onions have been grown in sandy soil in this area for over a hundred years, the onion breeds are well kept by the local residents so the quality and aroma is unique and preserved. Every year, Vinh Chau's farmers produce around 4,000 hectares of red onions with the yield of over 80 thousand tons. Despite the constantly fluctuating market, residents in the coastal area of Vinh Chau still maintain the traditional plants – red onions. To maintain the quality of red onions in Vinh Chau, people produce onions in a closed procedure from soil cultivation to the careful selection of breeds to make them develop well. Grown in specific weather conditions, the red onions have a specific shade of red, equal segments and special taste. Customers always think of Vinh Chau red onions as having a pungent odor and a specific taste that cannot be found elsewhere. Vinh Chau red onions are now considered a brand name, which encourages farmers in the production. Despite the occasional price reduction of red due to the import of other kinds of onions, local residents in Vinh Chau keep growing their red onions and improve the productivity, quality and reputation.

Though red onions have greatly improved Vinh Chau residents' standard of living, they still have to face many difficulties due to the unstable prices of this produce. Yet, the local residents still feel it secure to grow red onions because of the great demand for them, especially from Japan and Indonesia.

II. PRODUCTION

Red onions can be grown in many types of soil but they have to be high, dry, spongy and nutritious. If the soil is near the saltwater source, the onions should be watered with freshwater. In addition, onions cannot be grown in waterlogged conditions, so they should be planted when the rainy season is over to avoid rotten bulbs. Soil treatment: plough the soil 1 month in advance then scatter limes 3- 5 days before ploughing beds. If it is clay soil, it is necessary to mix the sand on top of the bed well. Bed preparation: beds can be 20- 30 cm high, 0.7- 0.9 m wide and the distance between 2 beds is 20- 30 cm. Beds need to be even, slightly watered and covered with a thin layer of straw before growing and sprayed with herbicides like Ronstar, Dual (Vietnam Vegetable Information Page, 2007).

Soil in which red onions are grown is sandy soil. The results in the application of organic fertilizers with red onions show that 7 and 10 tons of sugar cane refuse fertilizers treated with Trichoderma fungi (BBM – Trico), together with fewer inorganic fertilizers, will increase the

organic matters in the soil, the protein supple from mineralization, the soil respiration, the exchange of Calcium, water-holding capacity and remarkably decrease the soil density. Growth characteristics like height, root length, bulb weight and quality improve. The proportion of onions being infected with Collectotrichum sp. Fungi is low (< 1%) in onions with BBM- Trico, compared to those without BBM- Trico (5%). These results show the reduction of damage caused by fungi in the soil. In addition, the balanced use of microorganism organic fertilizers improves the quality of onions in storage. The difference in the loss rates is remarkable, compared to onions grown with inorganic fertilizers (Dang Thi Cuc, 2007).

III. PRODUCTIVITY

Vinh Chau town has the largest onion production area in Mekong Delta, the annual supply for domestic and foreign markets can reach hundred thousand tons. Onion growing area in Vinh Chau increased significantly, about five thousand hectares last year to more than seven thousand hectares this year. My Xuyen district, Tran De, Cu Lao Dung (Soc Trang) also expanded the onion area leading to overloading. The farmers rely on businesses and dealers in consumption.

According to the agricultural statistics of Vinh Chau town, in the onion crop in 2012, the farmers planted more than 9,000 ha, an increase of nearly 3,000 ha as compared with the year 2011 due to excessively high onion prices last year at 20,000 VND / kg.

Vĩnh Châu là nguồn cung cấp sản phẩm hành tươi cho TPHCM, các tỉnh khác trong khu vực ĐBSCL và sản phẩm hành của Vĩnh Châu còn được xuất khẩu đi nhiều nước như Indonesia, Malaysia, Thái Lan, Philippines, Ấn Độ...

Table 14. Area, production and yield of onion in Vietnam in 2007 - 2011

			Onions, dry				
			2007	2008	2009	2010	2011
Area Harvested (Ha)	**Ha**	**Viet Nam**	86,234.00	86,815.00	91,692.00	96,661.00	88,598.00
Production (tonnes)	**tonnes**	**Viet Nam**	275,932.00	294,927.00	315,262.00	338,908.00	318,108.00
Yield (Hg/Ha)	**Hg/Ha**	**Viet Nam**	31,998.05	33,971.89	34,382.72	35,061.50	35,904.65

Source: FAOSTAT, 2012

Table 15. Export value of onion in Vietnam in 2007 - 2010

			Onions, dry			
			2007	2008	2009	2010
Export Quantity (tonnes)	**tonnes**	**Viet Nam**	1,279.00	658.00	1,317.00	776.00

Export Value (1000 US$)	**1000 US$**	**Viet Nam**	396.00	310.00	410.00	333.00
Import Quantity (tonnes)	**tonnes**	**Viet Nam**	67,952.00	97,011.00	129,087.00	131,890.00
Import Value (1000 US$)	**1000 US$**	**Viet Nam**	10,763.00	22,402.00	35,078.00	51,819.0

Source: FAOSTAT, 2012

IV. PROBLEM

The cultivation of red onions in Vinh Chau in recent years has been declining with unstable productivity and low quality as it is difficult to store and preserve onions after harvest. The main reasons are the expansion, intensive farming, especially the abuse of chemical fertilizers and pesticides. Common pathogens include *Delia platura, Spodoptera litura Fab., Spodotepra exigua Hubn, Erwinia sp. Alternaria sp., Collectotrichum sp…* have caused considerable damage to the productivity and quality of the onions. In the world, there have been several researches on solutions to control pests, for example: to prevent, instead of growing onions for many harvests in a row, farmers should rotate onions with other crops, bury dead plants after harvest, scatter pepper or ginger around places where flies can lay eggs. Moreover, the Neem's resin can also be used to prevent flies from laying eggs. can be prevented by harvesting when onions have been fully matured and by avoiding scratches when harvesting and packaging. The storage must be well-ventilated so as to avoid humidity cumulated on the surface. Onions should be stored at a temperature of 0oC and in a humidity of 65- 70%. Farmers should plough better, expand the time between harvests, treat seeds, rotate crops, clean up trash and dead plants to ensure ventilation, apply fungicides to prevent by Alernaria porri. To reduce the risk of (by Colletotrichum circinans), farmers should shorten harvest time and avoid drying in the rain in harvest and storage time (Monique Hunziker *et al*., 2009).

In Vinh Chau, a general method for pest control has not been applied and farmers tend to abuse chemical pesticides so commercial onions are still of low quality. Therefore, the post-harvest preservation process is costly but ineffective and it affects the economic value and the health of both the farmers and the consumers. Since our economy is being integrated with the global economy, clean and safe production is a criterion we should aim at to allow Vinh Chau's red onions to be exported to bigger markets like Europe and North America.

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