

Draft report

**case study on environmental requirements,
Market access and competitiveness
in horticultural sector**

Submitted to



*United Nations Conference on Trade and
Development*

Prepared



Research institute of Fruits and Vegetables

August 2004

Acknowledgement

This research was accomplished with the support of United Nations Conference on Trade and Development (UNCTAD) and assistance of the Research Institute of Fruits and Vegetables, and the state functional offices concerned in combination with interview reply by fruit, vegetable, flower producers at various localities as well as horticultural processors, exporters.

This report was implemented by Vietnam Consultant Group including: Mr. Nguyen Dinh Hung (leading author), Mr. Hoang Bang An and Ms. Nguyen Thi Tan Loc.

UNCTAD and authors would like to express their great thanks for the financial support and information supply, comments from organizations and individuals.

Thank you very much!

Foreword

International trading forums is concentrating on exciting discussion of product quality and environment. Trend of combining environmental requirements with trading policy is becoming more popular which greatly affects export activities in general and horticultural sector in particular, especially in developing countries where high rate of population lives on agriculture as Vietnam.

In the effort of international integration, Vietnam has signed several international conventions, including the multilateral convention on environment. On the other hand, Vietnam is now in the negotiation process of entering WTO. Therefore, Vietnam is requested to have harmonious combination between trading policy and environment to meet international market requirements.

In order to meet the above-mentioned requirement, The United Nations Conference on Trade and Development (UNCTAD) in combination with the Research Institute of Fruits and Vegetables (RIFAV) - Ministry of Agriculture and Rural Development (MARD) of Vietnam have carried out a case study on environmental requirement, market access and competitiveness in horticultural sector in Vietnam. The objective of this research is to supply an overall picture of horticultural sector in Vietnam and 1) to identify environmental requirements of some main export markets; (2) to assess producers' awareness in term of environmental requirements and efficiency of this information management; setting up regulations. The research results will be used as background for reference or to establish the project on "Setting up capacity for improvement of policy establishment and discussion of key problems in trade and environment" or for other activities .

Report structure includes 3 parts:

Part I: Introduction

Part II: Results

Part III: Conclusion and recommendations

Despite of making our great effort, this report still has some unavoidable mistakes due to difficulties in limited manpower resource as well limited time in discussion/interview with functional organizations and not being able to conduct in the whole country but only in the North of Vietnam. UNCTAD and the consultant group would like to have comments from readers and colleagues.

Part I – Introduction

1. project justification

Vietnam is situated from 8^o30 to 23^oN where the natural conditions as climate and geography are diverse stretching from subtropics in the North to tropics in the South. The diverse soil and climatic conditions facilitate Vietnam to grow various agricultural crop species, especially fruit, vegetable and flower ones that can be grown year round in the whole country. This is an available advantage for Vietnam. Horticultural products can meet domestic demands and partly for export to some temperate countries in Northern Asia, Northern America, Europe, etc, where there is a long winter, snow.

Nowadays, approaching advanced technologies facilitates producers to have great progress in horticultural sector (in comparison with 90 decade of 20th century: area, yield, productivity of fruits, vegetables and flowers have increased continuously; structure of species is more and more diverse; export turnover of fruits, vegetables and flowers is also increasing which however occupied lower percentage in total export turnover of agricultural sector, in spite of that, vegetable and fruit productivity is placed after rice; few number of export markets with turnover of more than US\$ 10 million/year has been exploited, lots of markets are at investigating level.

In Vietnam, there are actually 85% of rural households involved in vegetable, fruit and flower production (International Food Policy Research Institute, 2002) which are at household scale. Household income mainly depends on horticultural production. Therefore, horticultural products have not matched potential and advantages not effectively exploited yet, whereas, other countries who have the same conditions as Vietnam as Malaysia, Thailand, have high export turnover of vegetable, fruit and flower. Number of export markets with turnover of more than US\$ 10 million/year is few, lots of markets are at investigating level. To be aware of importance of vegetable, fruit and flower production, the Ministry of Agriculture and Rural Development of Vietnam has submitted to the Government for approval of programme on Development of vegetables, fruits and flowers in period of 1999-2010” in September 1999 which was aimed at meeting domestic demands of vegetables (8 million tons), fruits (6 million tons) and raising export value of US\$ 1 billion in 2010. To reach this objective, it requires producers and processors to have certain knowledge in requirements of imported markets, especially environment and health when they export horticultural products. This is to facilitate to penetrate and sustain markets, especially the ones which have strong competition in the international market.

On the other hand, Vietnam has advantageous opportunity to export vegetable, fruit and flower products because as forecasted by FAO, vegetable, fruit and flower annual demands in the world will be increasing at higher rate than productivity increase; whereas average consumption demand increases 3,6%/year, the productivity of vegetable, fruit and flower increases only 2,8%/year.

UNCTAD is one of the organization who are very interested in environment in import and export and they regard discussion of environment in trades as a price factor. This organization is paying attention to *environmental requirements, market access and export market competition of horticultural products in Vietnam*. This is the background for research on "Setting up potential on improvement of policy establishment and discussion of key problems in trade and environment"

2 Project objective

a. To sketch a scene of horticulture in Vietnam and export market of fruits, vegetables and flowers;

b. To identify requirements of environment, health of some key export markets of above mentioned Vietnamese products;

c. To assess awareness levels by producers, especially small and medium business about environment and health. To analyze efficiency and effect levels in information management of horticultural product export in Vietnam;

3. To identify current modified methods, to describe activities to be used to meet environmental and healthy demands of export market;

4. To determine basis of breaking approaches and necessity to establish regulations.

3. Project activities

- Horticultural products (vegetable, fruit, flower) in Vietnam.
- Duration : 90 days

Part II- Results

1. General information of horticultural sector in Vietnam

Vietnam is a traditional agricultural country where 80% of population are actively involved in agricultural production. Agricultural production in Vietnam is almost at household scale. Local farmers have established cultivated custom and accumulated production experiences, especially flower, vegetable and fruit cultivation which plays an important role in horticulture in Vietnam. These commodities are highly valuable and multi-labour required, especially small -scale producers also have competitive advantages in vegetable, fruit and flower cultivation. Therefore, development of fruits, vegetables and flowers facilitate producer to increase income, to have opportunity to be involved in market, then to gradually improve living standards and to partly contribute to programme on transferring cropping systems, programme on national nutrition activities, and to increase export turnover.

1.1. Situation of vegetable, fruit and flower production in Vietnam

1.1.1. Vegetable production

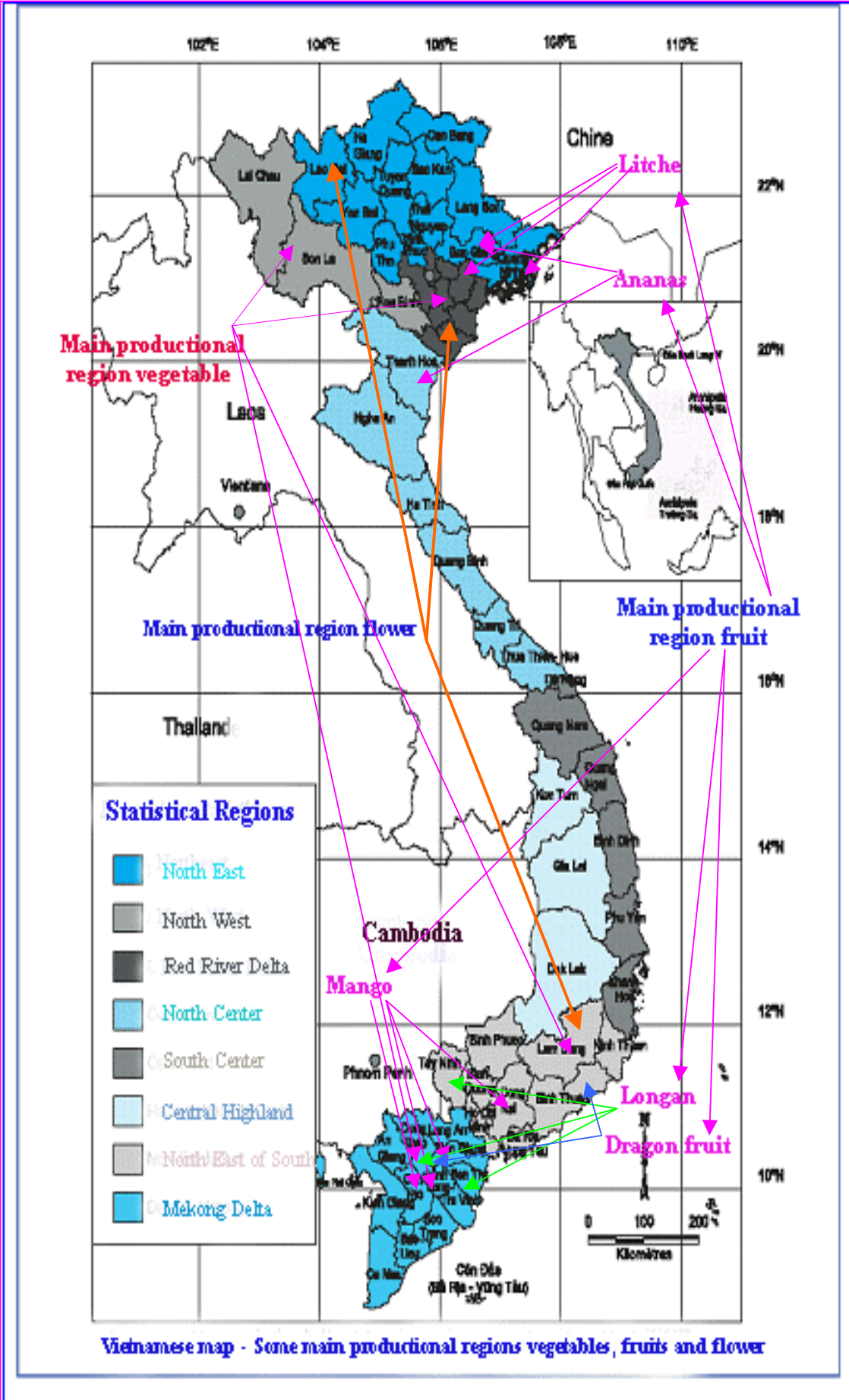
Vegetable production in Vietnam is characterized by large number of rural households (85)% involved. This means that there are 10.2 million people involved in vegetable production. According to surveyed and analyzed results obtained in project on “Development of post harvest and industrial-agricultural activities - a strategy for improvement of rural living standard in Vietnam” showed that approximately 70% of the poorest rural households are producing vegetables, which is decreasing to 59% for the richest household group [Vegetable Training Manual, 2002].

Vegetable species is quite abundant including more than 70 kinds of available vegetable crops of which 40 ones are considered as the main ones.

+ Vegetable area: Vegetable area in Vietnam has been continuously increasing for 10 years that is presented in figure 1.

Figure 1 showed that vegetable area in 2002 and 2003 increased 17,163 ha, equivalent to 3.06%/year. This increase is due to increase of vegetable growing area in the North and the South, but increasing rate in the North was higher than that in the South since farmers in the North grow 3rd season after 2nd early rice season.

In order to see more clearly this fluctuation, Table 1 showed the fluctuation of vegetable area by regions and by years.



Vietnamese map - Some main production regions vegetables, fruits and flower

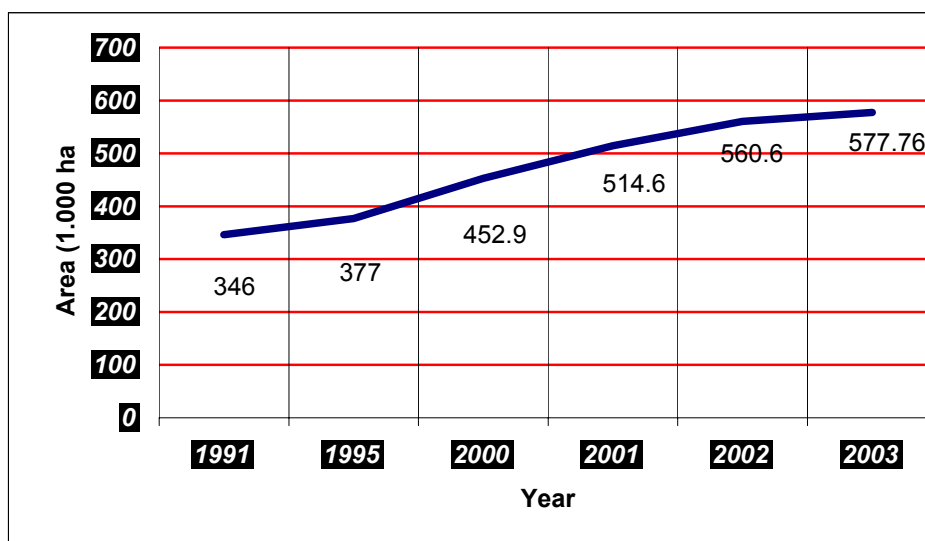


Figure 1: Fluctuation of vegetable area in Vietnam from 1991 to 2003
Source: Statistical Department

Table 1: Vegetable area by regions

Unit: 1.000 ha

Region	Year					
	1998	1999	2000	2001	2002	2003
Whole country	411,659	459,100	452,900	514,600	560,600	577,763
<i>North</i>	234,409	240,100	245,500	269,700	281,400	296,312
Red River Delta	112,736	111,700	110,400	138,500	141,500	148.718
Northeast	63,308	66,000	70,700	61,300	67,100	70.927
Northwest	7,405	9,700	9,700	10,100	11,600	12.453
North Central Coast	50,933	52,700	54,700	59,800	61,200	64.214
<i>South</i>	177,250	219,000	207,400	244,900	279,200	281.451
South Central Coast	29,028	30,900	32,200	34,900	37,600	37.653
Central highland	24,115	25,1	31,2	35,400	42,100	41.813
Of which: - Lamdong	13,787	15,1	18,9	22.100	23.800	25.388
Southeast	57,724	79,3	67,300	66,200	69,000	60.103
Mekong River Delta	80,170	98,8	95,600	108,400	130,500	141.882

[Source: Statistical Department, 1999, 2000, 2001, 2002 and 2003]

The above data proved that the Red River Delta and Mekong River Delta are the two main vegetable production area in Vietnam.

+ Vegetable yield: Vegetable yield has increased with the increase of advanced technologies for vegetable production. Nowadays, vegetable yield is one of the criteria that is more expected by scientists and producers than expanding area. This is a appropriate trend for the orientation of the whole world.

Below table reflects change of vegetable yield by regions and years.

Table 2: Average yield of vegetables by regions

Unit: Quintal/ha

Region	Year					
	1998	1999	2000	2001	2002	2003
Whole country	127.2	126.2	131.4	131.7	133.5	141.6
<i>North</i>	<i>121.7</i>	<i>127.2</i>	<i>123.3</i>	<i>128.3</i>	<i>131.3</i>	<i>133.1</i>
Red River Delta	148.4	159.4	152.3	158.5	162.8	165.2
Northeast	109.1	114.4	112.8	107.9	108.9	109.2
Northwest	86.0	94.4	96.9	95.3	102.2	110.6
North Central Coast	83.3	81.2	83.2	84.7	88.7	89.5
<i>South</i>	<i>134.6</i>	<i>125.0</i>	<i>141.0</i>	<i>135.4</i>	<i>137.5</i>	<i>150.7</i>
South Central Coast	106.2	109.0	113.2	115.3	122.1	123.7
Central highland	106.6	117.1	117.2	187.6	174.7	195.1
Of which: - Lamdong	210.8	217.5	228.8	233.2	232.9	242.7
Southeast	149.3	117.7	152.1	97.3	100.0	124.2
Mekong River Delta	137.9	136.7	146.6	148.2	146.0	155.9

[Source: Statistical Department, 1999, 2000, 2001, 2002, 2003 and 2004]

Vegetable average yield in whole country has significantly increased, the yield in 2002 increased 0.49% compared with 5 years before, which produced in large area to create large amount of products. North Central Coast region used to produce low yielding vegetables in the past, and it has increased 0.65% for the past 5 years. Some intensive vegetable regions in Lamdong - Central highland have created evident increase of yield which is, however, not stable. Whereas, in the Red River Delta and Central Coast, vegetable yield stably increases year by years.

+ Vegetable productivity: In period of 1998-2003, total vegetable productivity had increased from 5.236 million tons to 8.18 million tons, with average rate of 8.88%/year. For the past 10 years, there have been increase of not only yield, productivity, abundant species, but also higher rate of superior and safe vegetables that contribute to ensure

benefit triangle for producers, traders and consumers and to establish some specialized production areas of some main vegetable kinds as follows:

- Cabbage growing areas: Dalat, Hanoi, Haiphong, Haiduong, Hungyen
- Tomato growing areas : Dalat, Hanoi, Haiphong, Hatay, Hungyen
- Cucumber growing areas: Dalat, Hanoi, Hungyen, Hanam, Namdinh
- Chili growing areas: Quangbinh, Quangtri, ThuathienHue, Quangnam,

Danang, Thaibinh, Bacninh, Bacgiang

Some results of vegetable production in whole country and by regions are presented in table 3.

Table 3: Vegetable productivity by regions

Unit: 1.000 tons

Region	Year					
	1998	1999	2000	2001	2002	2003
Whole country	5,236.88	5,729.20	5,952.10	6,776.60	7,484.80	8,183.82
North	2,851.76	3,054.5	3,027.90	3,459.7	3,695.1	3,943.44
Red River Delta	1,673.06	1,780.3	1,681.60	2,195.5	2,303.6	2,456.85
Northeast	690.64	754.80	797.30	661.4	730.4	774.27
Northwest	63.69	91.60	94.00	96.3	118.5	137.689
North Central Coast	424.37	427.80	455.00	506.5	542.6	574.64
South	2,385.12	2,737.7	2,924.20	3,316.9	3,789.7	4,240.37
South Central Coast	308.22	336.7	364.5	402.4	459.1	465.71
Central highland	400.736	445.6	576.5	664.1	735.5	815.62
Of which: - Lamdong	290.636	328.5	432.4	515.4	554.2	616.11
Southeast	861.63	933.4	1,023.3	644.4	689.8	746.5
Mekong River Delta	1,105.17	1,350.5	1,392.3	1,606.0	1,905.3	2,212.54

Source: Statistical Department, 1999, 2000, 2001, 2002 and 2004

In recent years, vegetable production has matched the market orientation then vegetable crops which have big potential markets have been concentrated on such as tomato, baby corn, cucumber. According to the statistical data in 2002, these 4 vegetable area reached 38,176 ha occupied 14.7% of total vegetable area and 14% of total vegetable productivity and export of this amount of vegetable doesnot affect domestic consumption demand [Judgement by economist]. Table 4 illustrate this.

Table 4 : Area, yield and productivity of tomato, and cucumber in 2001-2002

Vegetable species	Tomato			Cucumber		
	Area (ha)	Yield (Quintal/ha)	Productivity (tons)	Area (ha)	Yield (Quintal/ha)	Productivity (tons)
2001	11,492	156.40	179.755	10,208	160.90	164.279
2002	18,868	165.45	312.178	11,819	169.16	199.936

Source: Statistical Department 2002, 2003

1.1.2. Fruit production

In recent years, fruit production has strongly developed, especially since the programme on development of fruit, vegetable and flower in period of 1999-2010 was approved. Up to 2003, fruit production area in whole country reached 602,252 ha with productivity of 5.695 million tons. In comparison with 2000, yield, productivity and capita consumption increased 68.8%, 11.66%, 70-75 kg/ year, respectively.

The biggest specialized concentrated fruit region in Vietnam is in the South, followed by the Red River Delta. Tropical, subtropical and some temperate fruit species are being mainly grown in Vietnam. Some concentrated production regions for following fruit species have been established:

- Orange, mandarin: Hagiang 20,000 tons, Nghean: 26,000 tons, Dongthap: 22,500 tons, Cantho 105,000 tons, Tiengiang: 79,200 tons, Bentre: 75,000 tons, Bentre: 75,000 tons, Vinhlong: 36,000 tons

- Pummelo: Tiengiang: 35,000 tons, Vinhlong: 36,000 tons, Hatinh: 5,000 tons, Hatay: 8,200 tons

- Pineapple: Ninhbinh: 35,000 tons, Nghean: 22,500 tons, Quangnam: 22,000 tons, Kiengiang: 99,337 tons, Tiengiang: 98,250 tons,

- Mango: Tiengiang: 44,300 tons, Vinhlong: 30,000 tons, Dongnai: 23,000 tons, Dongthap: 8,000 tons, Cantho: 18,000 tons, Khanhhoa: 10.000 tons,

- Longan: Bentre:134,000 tons, Tiengiang: 124,300 tons, Tayninh: 22,000 tons, Dongthap: 36,000 tons, Sonla: 14,000 tons, Hungyen: 12,800 tons,

- Lychee: Bac Giang: 58.000 tons (Year 2004 about 120.000 tons), Hai D--ng: 30.000 tons.....,

- Rambutant: Dongnai: 69,000 tons, Bentre: 48,000 tons,

- Coconut: Bentre: 220,000 tons, Travinhh: 120,000 tons, Vinhlong: 90,000 tons,

-Dragon fruit: Binhthuan: 86,900 tons, Tiengiang: 20,000 tons.

Although area and productivity of fruit, vegetable and flower have increased, productivity is still insufficient and yield is low at regions which concentrated on producing materials for processing industry.

1.1.3. Flower and ornamental tree production

Vietnam has advantage in climatic diversification where flowers can be grown year-round. However, flower and ornamental tree area in Vietnam is small and disperse. Land for flower and ornamental tree cultivation is concentrated in peri-urban areas of big cities as: Hanoi, Dalat (Lamdong), HCM city, Haiphong, ... Flower and ornamental area and its value is increasing year by year.

Table 5: Situation of flower and ornamental tree production by regions

Region	Year					
	2001		2002		2003	
	Area (ha)	Value (million VND)	Area (ha)	Value (million VND)	Area (ha)	Value (million VND)
Whole country	8,512	320,284.10	9,430	482,606.94	12,054	572,738.
		0				0

North	5,465	192,955.50	6,061	216,411.3	7,804	297,061.0
Red River Delta	5,196	184,975.57	5,721	196,489.1	7,119	261,414.0
Northeast	107	5,576.630	168	17,686.0	506	34,757.0
Northwest	32	351.0	33	402.5	10	18.0
North Central Coast	130	2,052.3	139	1,833.7	174	872.0
South	3,047	127,328.58	3,369	266,188.63	4,245	275,677.0
South Central Coast	558	39,652.282	564	34,528.159	431	16,982.0
Central highland	1,345	50,168.2	1,583	193,850.2	1,801	204,775.0
Of which:	1,254	49,820.0	1,467	193,500.0	1,728	197,250.0
Lamdong						
Southeast	1,016	32,790.134	1,013	33,033.47	1,581	38,846.0
Mekong River Delta	128	4,717.972	209	4,776.806	432	15,074.0

Source: Statistical Department 2002, 2003 and 2004

Flower species grown in Vietnam is quite abundant, but chrysanthemum, rose and gladiolus have the biggest area.

Flower production area concentrates in Red River delta and Dalat - Lamdong. Flower production is developed, area of flower species in 2002 accounts 60.66% of total flower area in whole country, of which exportable flowers as chrysanthemum occupied 52.29%, gladiolus occupied 39.13% of total area of these flower species in whole country.

Table 6: Situation of flower and ornamental tree development in Red River Delta

Year	Ornamental tree		Chrysanthemum		Gladiolus	
	Area (ha)	Value (million VND)	Area (ha)	Value (million VND)	Area (ha)	Value (million VND)
2001	5,196	184,975.5	751	31,000.0	153	5,747.0

2002	5,721	196,489.1	776	30,188.0	162	5,407.0
2003	7,119	261,414.0	941	40,342.0	194	4,571.0

Source: Statistical Department 2002, 2002 and 2004

Dalat - Lamdong is famous for flower production in Vietnam where it is considered as land of flower species. Flower and ornamental tree area in Lamdong occupies most of that of Central Highland and Sapa and this area is increasing and being expanded continuously with average rate in 3 years of 12.6% of which average area increase rate of chrysanthemum, gladiolus is 6.33%, 6.67%, respectively. Main flower species grown in Lamdong is rose, chrysanthemum, orchid, ...

Table 7: Situation of flower and ornamental tree development in Lamdong

Year	Ornamental tree		Chrysanthemum		Gladiolus	
	Area (ha)	Value (million VND)	Area (ha)	Value (million VND)	Area (ha)	Value (million VND)
2001	1,254	49,820.0	358	83,071.0	145	52,000.0
2002	1,467	193,500.0	362	84,000.0	148	52,500.0
2003	1,728	197,250.0	426	87,600.0	174	50,400.0

Source: Statistical Department, 2002, 2003 and 2004

1.2. Situation of vegetable, fruit and flower storage and processing

Being with study on cultural practices is study on storage and processing technologies for fruits, vegetables and flowers.

- Storage: Depending on product storage scale, cool or chemical storage is applied. Each storage method has different advantages and disadvantages; however, chemical one is currently more acceptable due to high cost cool storage and not being able to apply popularly.

- Processing: Processing of fruit and vegetable have been known for long time, but processing applied modern technological procedures is a new industry in Vietnam. Presently, lots of private businesses, corporations, foreign companies have invested for this field in different scales and types. Some data reflected the development of this sector.

In 1999, there were 12 factories and 48 workshops actively involved in processing of fruits and vegetables, with total capacity of 150,000 tons of products/year. Up to end of 2003, 12 projects with capacity of 53,000 tons of products/year were invested to increase total capacity to about 290,000 tons/year of which state business processed 143,747 tons/year occupied 50%; non-state business processed 48,650 tons/year, occupied 16%; Corporations processed 101,180 tons/year, occupied 34%. While only Vegetable, Fruit and Agricultural Product Corporation had processing capacity of >100,000 tons/year, occupied 34% of total processing capacity in whole country. However, most of processing factories and workshops lack materials which cause low operating efficiency.

Apart from products processed by big processing factories and workshops, private processors have significantly contributed to keeping fresh products by drying. Those dried products are longan, lychee, banana, jackfruit, ... These private processors are at the localities where above mentioned crops are produced. Owners for these private businesses used to be Vietnamese. In 2004, trading foreigners are allowed to stay in localities for long time to do semi-processing in drying form as lychee in Bacgiang, Quangninh,...

2. Domestic and foreign markets for vegetables, fruits, and flowers of Vietnam

This item mentions not only foreign markets for Vietnamese horticultural products but also consumption of these products in domestic market because 90% of total horticultural products are consumed in domestic market.

2.1. Domestic market

- Vegetable products: In addition to vegetable separately produced and consumed by local people, vegetable amount produced in peri-urban areas of big cities and specialized production areas are transported to people in big cities, towns, industrial zones to meet very big demand there.

In recent years, vegetable quantity is increasing to sufficiently meet domestic demand. For example, in 2003, vegetable consumption per capita per year was 102 kg that was higher than proposed objective of 80 kg/capita/year in 2005). If this space is used for export, it will be a significant number. However, from May to September when vegetables are insufficient, vegetables imported from China are consumed in big cities, towns, industrial zones,.... But the problem is that custom office cannot control all of these

vegetables that means these vegetables are not legally imported to Vietnam through border gates, then we do not know origin of these products.

- Fruit products: Similarly, fruit productivity and its domestic demand is increasing year by year. Fruits are domestically consumed as fresh, drying, jam, syrup (apricot, lemon,...), and according to surveyed results by CIRAD and Social Institute in 2002 showed that 25% of questioned people confirmed that fruits are always available for their meals. Especially, in Vietnam, on 1st and 15th of lunar month, lunar new year festival, mid-autumn day,... are much consumed. However, fruits should be imported from China in off seasons because fruit harvesting is concentrated in specific duration, while storage technologies have not been able to easily apply in large scale. Table 8 reflects this situation. (The exact statistical data on imported or exported fruit quantity between Vietnam and China, because many of them are illegally imported or exported which an not be controlled).

Table 8: Vegetable and fruit exchange between Vietnam and China in Tanthanh border gate in 2001

Unit: ton

	Vegetable	Fruit	Total
Imported to Vietnam	46,900	70,542	117,442
Exported to China	316	64,987	65,303

Source: Report on vegetable and vegetable inspection by Zone III Plant Protection Department

- Flower and Ornamental tree: Although Vietnam is an developing country, demand of flower and ornamental tree is higher and higher due to improved living standard, especially in big cities. Flowers, which are popularly used based on daily fresh flower consumption, are rose, chrysanthemum, gladiolus, lyly, madonna lily, ...

2.2. Export of vegetables, fruits and flowers

In fact, export of fruits and vegetables are difficult to separate. Therefore, this item will reflect both of them in common.

- Export of fresh and processed vegetables and fruits have experienced 2 big periods with different characteristics in terms of subsidization, export organization, product quality requirements,...

+ Period before 1990: Export markets of fruits and vegetables of Vietnam were Soviet Union and East European countries. Domestic businesses were mainly concentrating on production organization, product gathering and dilivery, but they did not worry about seeking export markets. Moreover, those export markets required quality at

medium level. According to Cooperative programme on production and export of vegetables and fruits to Soviet Union, this trading sector was supported lots of important materials serving production and export activities (Soviet Union Ship group was responsible for transporting cargos with subsidized price).

+ Period of 1991 – 2003 : After 1990, Soviet union and East European markets were changed, thus, vegetable and fruit export of Vietnam sharply declined from 1991-1994 (from US\$ 52.3 million to US\$ 20.8 million). It is the period when processing businesses had the most difficulties because export agencies were not supported and facilitated as before. They had to look for export markets, maintain relationship with customers in new type, then vegetable and fruit export turnover had gradually recovered and increased in recent years (1999, 2000), reach high peak in 2001, and then decreased

Table 9: Export turnover of fruits and vegetables of Vietnam from 1990 to 2003

Year	F & V Export turnover (mil.R/USD)	Year	F & V Export turnover (mil.R/USD)
1990	52.3	1997	68.2
1991	33.2	1998	53.0
1992	32.3	1999	104.9
1993	23.6	2000	213.126
1994	20.8	2001	329.972
1995	56.1	2002	218.521
1996	102.8	2003	151.47

Source: Statistical Book and Custom Office

A question is 'Why did the export turnover of Vietnam decrease?'. There are several explanations, but the main reason is the quality of fruit and vegetable products, which was less competitive. On the other hand, procedures for stored and processed products at export markets, especially requirements of environment and health were not well perceived by producers as well processors in Vietnam. Therefore, big and stable customers have not been established.

After the lost of traditional export markets as Soviet Union and East Europe, number of export markets is less. In recent years, vegetable, spice and fruit products of Vietnam are available in 50 countries. However, some export markets are only at investigating level with small export turnover, Number of export markets with turnover of more than US\$ 10 million/year is few.

Table 10: Export turnover of fruit and vegetable of Vietnam in some countries

Unit: Value: 1.000 USD; Structure: %

Country	2000		2001		2002		2003	
	Value	Structure	Value	Structure	Value	Structure	Value	Structure
Total	213,126	100,00	329,972	100,00	218,521	100,00	182,554	100,00
1. China	120,510	56,54	142,010	43,28	121,529	55,61	67,068	36.74
2. Taiwan	20,841	9,78	23,319	7,07	20,897	9,56	21,584	11.82
3. South Korea	13,691	6,42	20,194	6,12	7,783	3,56	9,660	5.29
4. Japan	11,729	5,50	14,527	4,40	14,527	6,65	16,710	9.15
5. Russia	4,654	2,18	5,030	1,52	8,506	3,89	8,293	4.54
6. Hong kong	3,316	1,56	4,334	1,31	4,581	2,10	3,699	2.03
7. USA	2,178	1,02	1,971	0,60	5,318	2,43	8,073	4.42
8. Laos	2,086	0,98	1,626	0,49	4,405	2,02	4.300	2.36
9. Singapore	1,226	0,57	1,696	0,51	3,410	1,56	4.454	2.44
10. France	2,089	0,98	2,183	0,66	2,833	1,30	3,341	1.83
11. Australia	1,368	0,64	2,042	0,62	2,051	0,94	2,709	1.48
12. Malaysia	1,392	0,65	1,373	0,42	1,767	0,81	2,953	1.62
13. UK	871	0,41	1,041	0,32	1,447	0,66	1,812	0.99
14. Germany	1,844	0,87	1,733	0,53	1,792	0,82	2,634	1.44
15. Indonesia	1,374	0,64	2,188	0,66	1,450	0,66	3,519	1.93
16. Others

Source: Custom Office

The data showed that in addition to good news of bringing Vietnamese products to some “fastidious” markets as Japan, USA, Australia, etc, the export turnover in Chinese markets have decreased, while China is a traditional as well neighboring customer.

Presently, vegetable kinds for export are quite abundant in fresh and processed form. Exported fresh vegetables and fruits as cabbage, tomato, cauliflower, hot pepper, Thieu lychee, dragon fruit, durian, ... ; or exported processed products from common bean, cucumber, spice, pineapple, ... are packaged in jars, tins, boxes. However, each product with big quantity of hundreds thousand tons has not been established. This means that exported species, structure isn't synchronous in fruit and vegetable production in Vietnam

- Flower: As mentioned above, flower demands in Vietnam have increased in recent years that promote flower and ornamental tree development. Apart from meeting domestic demand, flowers are also used for export. According to surveyed results by the Research Institute of Fruits and Vegetables flower export value was VND 3.6 billion, VND 5.2 billion and VND 7 billion in 1999, 2000, 2001, respectively (VND 15,500 = US\$ 1). Main exported flower species is chrysanthemum and rose but at low level compared with its potential due to high quantity but low quality, not having good varieties to prolong harvesting season to regularly supply to market.

In Vietnam, there are some corporations involved in flower production with 100% foreign invested capital such as Hadfarm Corporation (the Netherlands) have been successful in flower cultivation for export. This is a prospective demonstration in Vietnam with 30% lower production cost than that in the Netherlands. Apart from that, some Vietnamese companies have also well-implemented many projects for the purpose of strengthening flower export.

In short, Vietnam is in front of the WTO, Vietnamese agricultural trade, especially horticultural products, have advantages in expanding export markets. However, there are also lots of disadvantages that causes export turnover not to increase.

2.3. Market competition

✓ ***Main and strong competitors in horticultural sector of Vietnam are China and Thailand.***

- China:

+ China is the biggest country in vegetable and fruit production in the world. After cereals, vegetable and fruit productivity is 2nd and 3rd placed.

+ China exports many similar vegetable and fruit products as Vietnam, for example, cabbage, tomato, asparagus, tropical fruits, ... and China has advantage in infrastructure, variety quality, advanced technologies. 1/3 of exported vegetables and fruits in the world are from China.

+ Chinese production price is cheaper that that of Vietnam, that make exported price cheaper (equivalent to 80% of Vietnamese exported price), although Japanese traders assesses that vegetable quality in Dalat is better than that in China and South Korea, and as good as that in Thailand.

+ China have approached more export markets than Vietnam. In fact, Chinese export turnover reaches more than US\$ 3 billion/year from 1999.

+ Annual import turnover is equivalent to 10% of export one and even some imported products are re-exported to 3rd country for benefit.

+ Annually, China exports large amount of vegetable, fruits and statistical data do not reflect total quantity because some are exchanged in illegal way.

- Thailand:

Similarly to China, Thailand has more advantages in production, storage, processing, and scientific studies of fruits, flowers and vegetables than Vietnam

+ Production: they have better quality of variety accessions, more developed infrastructure, more advanced technologies, better awareness by producers. These are good basics for environmental protection, ...

+ Storage and processing: Good quality of input products, high technologies in harvesting, storage and processing, attractive packaging,...

✓ ***In addition, Vietnam is seriously suffered by competitiveness in international markets due to participating in AFTA and to prepare to enter WTO, and when Vietnamese and United States convention is effective***

On the other hand, more and more improved living standard for Vietnamese people makes them require higher quality of fruit and vegetable products and thus they are ready to importing higher quality products from other countries, even higher prices than domestic products. Hence, domestic production not only faced foreign markets but also competes with domestic one.

2.4. Market strategy

- To diversify products to meet demand of 80 million Vietnamese people should be paid the most attention to for the purpose of limiting imported products to Vietnam, protecting producers and increasing national revenue. Domestic demand of fresh fruit, vegetables by 2010 is estimated at 5.7- 6.7 million tons. [Minh Duc, Rural Economic Newspaper].

- To strengthen fruit, vegetable and flower export by stably maintaining traditional markets (China, Russia,..) and releasing these products to potential markets (Laos,

Cambodia, ...) and high income markets (Japan, USA, EU, .. should be done to raise export turnover of US\$ 1 billion by 2010.

3. ENVIRONMENTAL AND HEALTH REQUIREMENTS OF SOME KEY EXPORT MARKETS

First of all, it is confirmable that food in general and vegetable, fruit, and flower products in particular exchanged in international markets are under control of SPS as well as TBT and environmental requirements of markets. The common standards in the world are HACCP* and SPS³¹. Apart from that, depending on different “stern” levels in different markets, there are other enclosing requirements. For example, European Union have applied rapid warning system for any product that have impact on human health; Apart from that, European Union also use economic tools to limit or encourage to import products related to environment in European Union markets as tax, environmental fee, or decreasing import tax for environmental friendly products.

Followings are environmental requirements of some key export markets of Vietnam:

3.1. China

- This has been a traditional export market for Vietnam and nowadays it is still a potential market for export and transiting fresh and processed vegetable, fruit products for Vietnam because (1) Low transport cost; (2) “Easy” quarantine and environmental requirements, especially more convenient export via border than legal way.

- In the past, the environmental requirements for vegetable, fruit and flower products in this market were not too high. Some commodities that could not be exported to “fastidious” markets could be exported to this market. However, product quality and environmental requirements have set up since China entered WTO, especially Vietnamese exported products to China have required C/O (Certificate of Origin) since early 2004 that makes difficulties in export to this market and export turnover of Vietnam raised in the 6 first months of 2004 reached only US\$ 9,006 thousand which was less than that from Japanese market (US\$ 9,501 thousand) and Taiwan (US\$ 9,060 thousand).

* Hazard Analysis and Critical Control Point is a standard system to recognize, determine and control hazard in manufacturing, production and utilization of foodstuff and identify its control methods which is acknowledged by CODEX to be one of the most important international standards.

3.2. Japan

Japan is currently an open market with large - scale and population of 127.5 million [Statistical Yearbook, 2004] leading a high living standard. This is a big potential but “fastidious” market of vegetable, fruit products, especially requirements of food hygiene standard, quality, marks. Annually, Japan consumes about 16 million tons of fruits and vegetables and this country have to export from several countries as USA, Australia, South Africa, Thailand .. .

- First requirement of this market is that “all of imported vegetable products in Japanese market should meet all items of Plant Protection Law and Food Hygiene Regulations”, it is needed to stick export national labels according to the Japanese Agricultural Standard -JAS and vμ permit issued by Japanese Ministry of Health and Welfare.

- Ecomark is applied for all domestic and exported products. To have Ecomark, products should meet at least one of the following standards: Using that product does not or few pollute environment; Using that product brings benefit to environment; product waste after using does not few damage environment; That product contributes to environmental protection.

- Standard of pesticide residues is applied to more than 130 products.
- Standards of food additives.
- Quarantine methods at border gates.

Abidance of the above standards is very complicated because either Japanese laboratory has the right to issue those certificates or they can be issued by foreign quarantine Offices provided abidance of Japanese quarantine procedures. These procedures for certificate issues are generally costly and affect delivery time of foreign exporters. Apart from that, Japan also applies plant protection regulations and fresh fruit and vegetable hygiene. Import procedures for fresh and raw commodities usually take time and unclear. Technical standards for imported products (as pesticide residues, disintegration of pesticide and food additives) are usually higher than those of other countries as European Union, USA, ...

3. 3. European Union market, for example Australian market

³ Regulations on sanitation, quarantine of plants and animals.

European Union is an important trading partner who is considered as the 2nd biggest export market of Vietnam after ASEAN. However, Vietnamese products exported to European Union market in general and Australian one in particular should meet environmental high requirements. Followings are some common regulations applied to food products including fruits and vegetables.

- Standards of hygiene and plant and animal quarantine (SPS),

- Technical standards (TBT),

- Eco-labeling is an obligated requirement to prove product friendship to environment.

- Environmental standards: EMAS (programme on management and control of biology applied in 1995); ISO 14 000 (October 1996). These two standards are based on standards of product quality management ISO 9000.

- Packaging, labeling products should abide labeling requirements (It is seriously applied in Australia, who does not accept any defects).

- Commodity standard: European standards.

In Australian, in special case, it is applicable of import risk analysis (IRA) with continuously irregular investigating time within 18 months.

3. 4. USA

According to research results of programme on “Trading issues of environments in bilateral agreement between Vietnam and USA by National Committee of international economic cooperation”, agricultural products including fruits and vegetables are the key commodity group which are affected by requirements and standards of environment.

- Environmental requirements are related to commodity and service import to USA including documents at state level. Some main documents related to fruit, vegetable and flower import as 1) Law on substances needed to be checked; 2) Law on appropriate packages and labels; 3) Law on food quality protection... These documents are implemented by Environmental Protection Department (US – EPA) ^φ.

- Regulations related to environment for imported commodities includes:

- + Regulation on packaging,
- + Regulation on eco-labeling,
- + Requirements on product standard,
- + Requirements on production and processing methods (PPMs),
- + Requirements on food quality control (Obligation),
- + Requirements on safety in consumption,
- + Regulations on epidemics,
- + Regulation on nutrient content.,

Apart from that, professional regulations are related to plant life cycle (Food and Medicine Department; Ministry of Agriculture); Pesticides (Ministry of Environment).

Being the same as EU market, USA also applies economic methods to manage, modify imported commodities to this market such as tax, environmental fee, and decreasing import tax for friendly commodities to environment.

That is the common principle; it is depending on kinds of import products. For example, for fresh vegetable and fruit products of Vietnam, it is needed to collaborate with US importers (US partners) to gather and supply APHIS with following information:

1. Scientific name (species and variety) to determine product origin.
-

2. Detailed description of delivered product parts (base-stem, stem, fruit, leaf, seed, ... since different pests and diseases damage different parts of trees.

3. Name of the tree growing country and name of the country from which commodities are delivered to USA since different countries exist different pests and diseases.

4. Description of locality where that tree is grown since some diseases are unavailable in some localities in a country. At the regions/localities, which are considered as no occurrence of pest and diseases, can be acceptable.

5. Name and address of any cooperative or companies or organizations that growers are involved in since APHIS would rather to preliminarily accept cargoes via prestige of an than an individual,

6. Estimation of total weight (kg), and total number of cargoes to be annually delivered and cargoes to be delivered to USA.

7. Estimation of harvesting months and delivery months.

8. Planning destination ports in USA and geographical region to distribute and consume commodities.

9. Transportation means: by air or by sea.

10. Description of packaging methods, kinds of packages, containers to be used for transporting imported cargoes to USA that facilitates examination. Some packages and containers should be sterilized before importing to USA.

If APHIS technically accepts, they will issue and approve Federal Register Proposal and Issue import permit for any traders in USA who want to import fruit and vegetable commodities from Vietnam.

For processing products, the only procedure to be controlled is quality examination by Food and medicine Management Agencies - Ministry of Health, instead of APHIS.

Recently, according to the Law on US Agricultural Security (or can be called Agricultural Law 2002) signed by US President and issued on 13 May 2002, some agricultural products as vegetables, fruits, meat, and seafood retailed consumed is required to have origin labeling which will take effect on 30 September 2004. This law makes increase cost for domestic producers and consumers, according to the US Ministry of Agriculture estimation, this total cost is up to hundreds of billion US dollars/year.

Table 11: Summary on environmental requirements in some key export markets of Vietnam

Market	Environmental barrier	
	General	Particular in each market
1. China	HACCP, SPS	Product Origin
2. Japan	HACCP, SPS	JAS, Ecomark
3. EU/Australia	HACCP, SPS	TBT, ISO 14000, ecological mark
4. USA	HACCP, SPS	Law on anti-bio-terrorism, ecological mark, TBT, . . .

4. AWARENESS OF DOMESTIC PRODUCERS, SMALL AND MEDIUM PROCESSORS ON ENVIRONMENTS AND HEALTH FOR HORTICULTURAL EXPORT PRODUCTS.

4.1. Awareness of producers on environment and health

From end of 1980s, Government of Vietnam has agreed to implement international economic integration via innovated and open policies. To strengthen integration activities, Ministry of Politics issued decision number 07-NQ/TW dated on 27 November 2001 concerning international economic integration, of which the objective is to “actively integrate international economy for the purpose of expanding markets, attracting more invested capital, technologies, management knowledge to strengthen industrialization and modernization in the socialist - orientation with the fragment: rich people, strong country, equal, democratic and civilized society. On the other hand, due to the specific characteristics of Vietnam with 70% of labor force living on agriculture and their produced agricultural products mostly meet domestic demand and partly for export. Annually agricultural export value accounts for 30% of total export value. Therefore, propagating and implementing activities of guidelines and policies have facilitated local people to be aware of creating more commodities to partly contribute to increasing export turnover. To be accepted in the international markets, the local producers should have knowledge in producing environmental conditions, quality requirements in import markets.

In order to assess producers' awareness of environment in import market in terms of horticultural products in general and vegetable, flower and fruit products in particular.

We have directly and indirectly interviewed households at different producing scales at some locations as follows:

-Peri-urban vegetable production areas in Hanoi, Haiphong, and Hochiminh city, Vinhphuc, Thaibinh, Haiduong and Hungyen.

-Fruit production areas in Haiduong, Bacgiang (longan and lychee), pineapple in Bacgiang.

-Flower and ornamental tree production in peri-urban areas of Hanoi, Hungyen, Thaibinh, Bacninh, Dalat and interviewees were at different ages: elderly people, middle age, youth; different economic levels, different educated levels. Because of limited budget and duration, we have conducted investigation mainly in the North, information in South was provided by collecting secondary data.

Followings reflect producers' awareness:

+ According elderly people: Long time ago, local producers applied traditional procedures as: manure and organic pest and disease management which is safe to producers, consumers, no pollution to environment.

+ Together the social development, agricultural production have obtained great achievement: Agricultural Production Value of 25.0% GDP. Apart from main crop (rice), other horticultural crops are also cultivated for domestic demand and export. Also, utilization of high yielding varieties in combination with application of cultural practices and biotechnologies have increased yield to meet quantity demand. To obtain that great achievement, local farmers have used chemical fertilizers, pesticides, growth regulators ... For a long time, especially after 1990s, lots of mercantile producers did not properly apply regulations of pesticide utilization, which led not to guarantee hygiene quality of fruit, vegetable and flower products. Some results on analysis of horticultural products expressed warning situation in Khanhhoa: 728 vegetable samples were analyzed and 24.7% was over maximum residue limit (MRL); Hanoi: vegetable and fruit samples were analyzed and 40 – 60% was over maximum residue limit (MRL)... and number of food poisoning people due to eating non-hygiene fruit, vegetable, is more and more increasing, even leading to death. Consumers are very concerned about this and one of the self - protecting methods they have done is to limit to eat highly poisoned vegetables as cucumber, cabbage, legumes... As a result, producers cannot consume their products. This is a warning ring for producers in utilization of chemicals in agricultural production. They are clearly aware of effect of pesticides, growth regulators chemical fertilizers on

themselves due to directly contacting, polluting environment and leading high residues in products and affecting community health.

+ The dangers of affecting human health, polluting environment, decreasing safe products have made producers actively involved in activities, pilot projects on environmental safety; trainings on Integrated Pest Management (IPM) and to be released in large scale in whole country, firstly prioritized concentrated agricultural areas. Up to now, large number of farmers has been trained in IPM on rice, vegetable, fruit and flower (some farmers have been trained 5 times on different crops). Especially, they are trained in IPM based on plant life cycle (3 months for cabbage,...) and these techniques are popularly and properly applied in production. Besides, each species has a specific procedure issued by Ministry/Provincial Department of Agriculture and Rural Development. For example, safe vegetable production procedure is issued by Ministry of Science and Technology in combination with Provincial Departments of Agriculture and Rural Development in Vinhphuc, Haiphong, Hochiminh city ... especially the organic agricultural production (for vegetable and fruit crops). Apart from that, in combination with multiplying some production demonstrations transferred by research institutes or universities, local farmers have gradually changed cultivated custom, limited pesticides and chemical fertilizers, knew how and when to use those chemicals for each crop including vegetable to create safe, organic products.

+ Assessment of awareness of local people in specialized vegetable and fruit production areas should be summarized as follows: (1) To properly apply new cultural practices combined with traditional ones; properly design seasons to avoid high peak of pest and disease development, pick insects by hand, herbaceous substances; design intercropping or multi cropping systems in the field. (2) To use new varieties that are resistant/tolerant to pests and disease with high yield, proper rate of N, P, K application (3) To use bio products in safe vegetable production (4) To apply IPM procedure in production under local crossing observation. (5) To strictly abide 4 regulations in safe vegetable production: no utilization of fresh urine; no utilization of waste water; no utilization of too much chemical fertilizers, no utilization of agricultural chemicals within 10 days before harvesting.

+ A significant success obtained is that most (80%) of interviewees are aware of dangers of contacting pesticides and having protecting methods as wearing masks, wearing raincoats, spraying in the same direction as wind, no throwing pesticide jars, bottles away.

We owed to the Government support this achievement via executing sectors, international organizations as FAO, DANIDA, ADDA, CIDSE, CIRAD . . . in forms of direct and indirect training, field visit, and assistance from many information channels.

+ Up to now, producers are able to be responsible for their products by contracting with middleman or traders as supermarkets, shops, restaurants, hotels, canteens at universities and offices or with processors as Agricultural Food Processing Company, Agricultural Food Import Export Corporation, FINTEC Agricultural Food Processing Company, Vegetable and Fruit Import Export Company I in Hanoi... Nowadays, producers try to produce good quality products not only to meet domestic demands but also international standards. This is partly due to their better/improved awareness in environment and product quality; partly due to higher and higher quality and environmental requirements by consumers.

+ Some people with higher awareness can discriminate that current agricultural production with effect of integration and international standardization in term of environment is the biggest trading barrier. Producers are the ones who firstly receive this unfavorable effect. However, they also know some positive effect on Vietnam economy (by farmers who are involved in social work). Followings are comment review:

- In the current situation, environmental issue is paid attention to by the whole world, especially consumers who require safer and safer products and the ones in developed countries who prefer organic products in spite of much higher prices than normal ones. This influences Vietnam and makes us recognize our weak points, to step by step harmonize requirements of export markets and then to integrate in international market. The fact proved that products manufactured based on standards as ISO 14000, HACCP... are more easily accepted and favored by customers.
- Meeting demands of export markets is a challenge for Vietnam. However, if it overcomes, reputation and prestige of Vietnamese business will be improved for international importers and consumers that facilitate international negotiation in terms of agreements of trade and environment.

To have an overall assessment of producers' awareness, we interviewed managers of some small, medium and large processing enterprises where their products are for export. All of the interviewees supposed that environmental and health requirement is a pressing problem that is related to existence and development of their enterprises. However, identification of appropriate solutions to meet their available export markets and to meet international standards is much difficult due to their lack of budget to do this, lack

of well-trained professional staff, difficulty in approaching information sources, difficulty in covering expenses of establishing and certifying their separate standard and regulations on environment. Besides, small and medium processing enterprises lack infrastructure, facilities that do not meet environmental requirement. On the other hand, they are not able to control input factors with competitive prices as well raw materials are not guaranteed to be produced according to the standards and regulations of environment. Moreover, small and medium enterprises are not able to cover expenditures for testing, examination and verification.

Despite of above various constraints, processing enterprises all have determination to overcome limitations by guaranteeing hygiene of water resource, planning and guaranteeing input raw materials, clean and ventilated working place, limiting enter of insects, equipping labor safety for workers.

In short, with the warning situation of using too much chemical in horticultural production to pollute environment, not guarantee of product quality to make consumers concerned about,, there have been series of programmes, projects and demonstrations with different organization support which facilitate farmers to change traditional cultivated habits to new and proper ones based on the regulations of not abusing agricultural chemicals, actively releasing new and economically and environmentally effective demonstrations into large scale production in order to have good quality products that meets environmental requirements of export markets. However, either because those activities were conducted in large scale, there was not uniformity and application to each village, or because some participants did not strictly abide regulations in production, thus product quality were unequal in safety; or due to spontaneous production, quantity of products were not concentrated, product sizes were not uniform. In some cases, the products could meet standards, but production polluted environment, then could not meet markets that apply standard of social morality; or during processing, workers carelessly mix tools and hairs in products, which were reflected by partners, etc .

4.2. Information management mechanism

Responsibilities of organizations related to horticultural sector are as follows:

4.2.1. State role

There exist some mangament agencies related to horticultural sector in Vietnam as Ministry of Commerce (Import and Export Department; Trading Promotion Department);

Ministry of Agriculture and Rural development (Department of Science and Technologies) and CODEX Office Committee in Vietnam.

Role of Ministry of Commerce

- To establish law and normative acts in terms of trade in which there are mechanisms, policies of import and export of trading commodities and services.
- To give guidance in international economic - trading integration and cooperation.
- To make decision or to submit to the Government in terms of establishment or disbandment of Vietnamese counsellor in foreign countries.

- To assist in orientation of main export products and markets, to combine with the Ministry of Agriculture and Rural Development to outline export plan for agricultural products in general and horticultural products in whole country in particular period by period.

- To issue certificate of export and import commodities; To guide, examine implementation of regulations on circulation of import, export commodities and trading services.

- To give guidance foreign market activities; trading promotion; trading activities of Vietnamese individuals and organizations in foreign countries according to law, regulations; and activities of officially trading affair, trading promotion organizations, showroom or centres in foreign countries (establishing and organizing implementation of policies involved in markets ; reviewing and assessing situation, proposing forthcoming activities in terms of foreign market activities and responsibility of officially trading affair in foreign countries).

Then, Ministry of Commerce regularly updates information of environmental requirement standards of export markets. This information is processed and disseminated in different forms as workshops, meetings, media (Information centres, trading magazines, trading newspapers, etc..

Role of Ministry of Agriculture and Rural Development

Similarly, This ministry has lots of functions but The Department of Science and Technology is relating to new and newly issued environmental standard requirements in export markets. This department's responsibilities are:

- To update information of production trends to meet consumption demands in the world as well to meet environmental standard requirements of some countries who import Vietnamese horticultural products, to propose solutions, to establish standards based on

the harmonization of their requirements and meeting ability of domestic production, and to test proposed standards.

- To disseminate environmental standards of products for each producer, processor and exporter ; and to facilitate them to have good products which meet export standards.

Role of Vietnam Food Standardization Committee

Department of Quality Measure - Ministry of Science and Technology is the permanent office of Vietnam Food Standardization Committee (abbreviated as Codex Vietnam) who is responsible for coordinating, collaborating activities through Codex Vietnam. This organization has some functions related to horticultural sector as follows:

- To consult the Government to establish, disseminate and apply domestic food standards,

- To participate food standardization activities with international and regional organizations,

- To combine their activities with International Food Standardization Committee

- To propose food management policies in Vietnam.

Concretising the above functions, this committee is responsible for:

- Researching and proposing development trends of food standardization.

- Initiating to the Government or responsible organizations to establish and issue laws, normative acts, programmes related to food quality.

- Studying documents of International Codex (CAC) to be used for establishing Vietnam standards and other regulations and for abiding international standards, regulations in food as Vietnam ones,

- Cooperating with standardization programmes of FAO/WTO and other international and regional organizations related to food standards,

- Organizing deflagrates to participate in workshops of CAC.

Codex committee Vietnam has more than 100 food experts in different aspects and organized and managed by Quality standard Centre - Department of Quality Measure. These experts are divided into 17 technical units and 5 technical sub-units who are responsible different work. Relating to horticulture, there are food hygiene unit, food additive unit, pesticide residue unit, vegetable, fruit and processed product unit, sampling and analysing unit, and unit of import, export food examination and certification..

Role of Research Institute of Fruits and Vegetables (RIFAV)^o

- To research on vegetable, fruit and flowers, especially concentrate on some fruit species in the North of Vietnam as citrus, lychee, longan, persimmon and pineapple.

- To research on variety improvement; off-season vegetable production methods, pest and disease management methods; economics of vegetable, fruit, flower and their market.

- To research on post harvest technology of fruits and vegetables. Post harvest storage technologies of fresh fruit and vegetable for export purpose are paid the most attention to.

- There are several international cooperative programmes between RIFAV and international organizations, countries that promote the better and better research and development of fruit, vegetable and flower.

Role of Southern Fruit Research Institute (SOFRI)

- To specialize in fruit crop research in Southern Vietnam. SOFRI researches on many kinds of fruit species; but concentrated on longan, pineapple, citrus, mango and durian

- SOFRI have obtained many successes in variety development with high yield, good quality (free disease variety), cultural practices.

- Besides, SOFRI also researches on post harvest and markets which although are not much concentrated on.

Role of Post Harvest Technology Institute (the one that was integrated with Agricultural Electric and Mechanic Institute)

- To manufacture equipment for storage and processing of agricultural products including vegetable, fruits, (concentrating on dried lychee, processed plum in Northern Vietnam); To identify solutions to prolong shelf life of fresh products and to identify solutions to control fruit fly (dragon) in Southern Vietnam for domestic consumption and export purposes.

- To disseminate new technologies in order to diversify products, decrease post harvest losses, to partly contribute to expanding markets and to increase income for producers and processors.

Role of plant protection sector

In addition to Plant Protection Department that has staff net from higher (central) to lower (local) levels, there is also National Plant Protection Institute. These two organizations are involved in plant protection activities to minimally decrease risk of pest

and disease damage for agricultural products, to protect producers' and consumers health. Their activities are concretized as follows:

- To prevent penetration of pests and diseases into plants; to minimally decrease hazard of producers and consumers' health.

- To control imported commodities to guarantee safety for consumers and no infection to domestic other crops

- To control exported commodities to meet requirements of safety for consumers and protection of environment in export markets.

The plant protection plays more important role in vegetable and fruit sector. Because these crops are easily attacked by pests and diseases that make producers use more pesticides and therefore integrated pest management (IPM) methods is more needed. Especially at the current situation when Vietnam is participating in international economic integration, plant protection sector should participate in international trading negotiation which plays an important role because it is actively involved in SPS. Playing the most important role is the Plant Protection Department – Ministry of Agriculture and Rural Development who has 3,0000 plant protection staff of which 2,000 ones are working in borders with neighboring countries of Vietnam.

Apart from that, seed companies who supply with vegetable, fruit and flower varieties also play certain roles in indirect effect on environmental requirements (which are not mentioned here)

Role of Horticultural Association of Vietnam

- To disseminate role, significance of horticultural development in each period to assist farmers to cover bare hilly land, to improve miscellaneous gardens, and to concentrate on growing highly economic crops.

- To assist farmers to have new technologies in selection, propagation, cultivation, of new kinds of fruit, vegetable, flower and ornamental trees with high yield, good quality for domestic demand and export.

- To provide information related to production development, processing, and consumption of agricultural product in general and horticultural product in particular. Especially, recently the Association in combination with organizations (Ministry of Commerce, Ministry of Agriculture and Rural development) have discussed and identified solutions to increase export turnover in this field.

Role of Fruit Association

This association is responsible for assisting producers to have information of new fruit species, and especially information of domestic and foreign markets.

The activities of this association are concentrated in Southern Vietnam where large areas of fruit cultivation are available.

Role of Farmer Association

This association is responsible to help producers in agricultural field in general (not only horticulturist). The most significant activity made by this association is to facilitate farmer to be actively involved in agricultural extension to improve their awareness in advanced technologies in production and to support invested capital in various fund sources.

Vietnam trading and Industrial Office

- To supply information of markets and to assist selling and buying commodities
- To assist to improve skills for negotiation of ceiling and floor prices
- To collaborate for purchase of products

Some processors and exporters are involved in this association and they benefit from getting information of markets and this association facilitates then to have contract.

In short, The Government have paid lots of attentions to variety management, strengthening production investment via national programmes, plant protection activities, establishment of product quality standards which is harmonious to standards of other export countries. However, there remain some constraints as follows:

- Due to lack of invested capital in specialized studies, some scientific programmes have not been highly valuable.
- The collaboration among organizations is not highly effective, in many cases, it is crossed.
- Investment for trading promotion, export market expansion have not been paid much attention to.
- Strategy for strengthening domestic food safety and competition of export products of vegetables, fruits and flowers have not been strictly done due to not well controlling pesticide utilization in production, storage of vegetables and fruits.
- The investment for research and development to expand export markets, establishment of institutions/regulations and the investment production development and strengthening infrastructure as stores and processing factories have not been balanced.

4.3. Route of Information for export markets access

The Vietnamese Government encourages different economic sectors to be involved in economic activities, especially agricultural product export ones which have been most prioritised since 1999 when the Government have made important changes in horticultural sector by approving programme on “Development of fruits, vegetables and flowers in period of 1999-2010” with the objective of raising export turnover of US\$ 1 billion in 2010. Therefore, responsible offices of (1) Ministry of Commerce (Officially trading Offices based in foreign countries, Import-Export Department, Trading Promotion

Department. . .) are the important contacting ones; and (2) Ministry of Agriculture and Rural Development (Import - Export Department, Department of Science and Technology) facilitates producers, processors, exporters involved in horticultural product export to access export markets; on the other hand, those agencies also actively access export markets themselves. It is to assess that although either they actively access export markets or via middle man, it is obvious that the Government plays a quite active role in supplying information, supporting business to access foreign markets.

However, for each business, market access and export - import contracting types are differed depending on customers. Market information (environmental requirements) is provided via following prioritised channels:

- (1) by Government,
- (2) by media,
- (3) via internet (the same number as by media)
- (4) based on relationship with organizations, individuals inside and outside country.

Remark: In some cases, exporters use all of the above channels, they are placed in large market exporters. The following figure is generalized the route of Information for export markets access by exporters

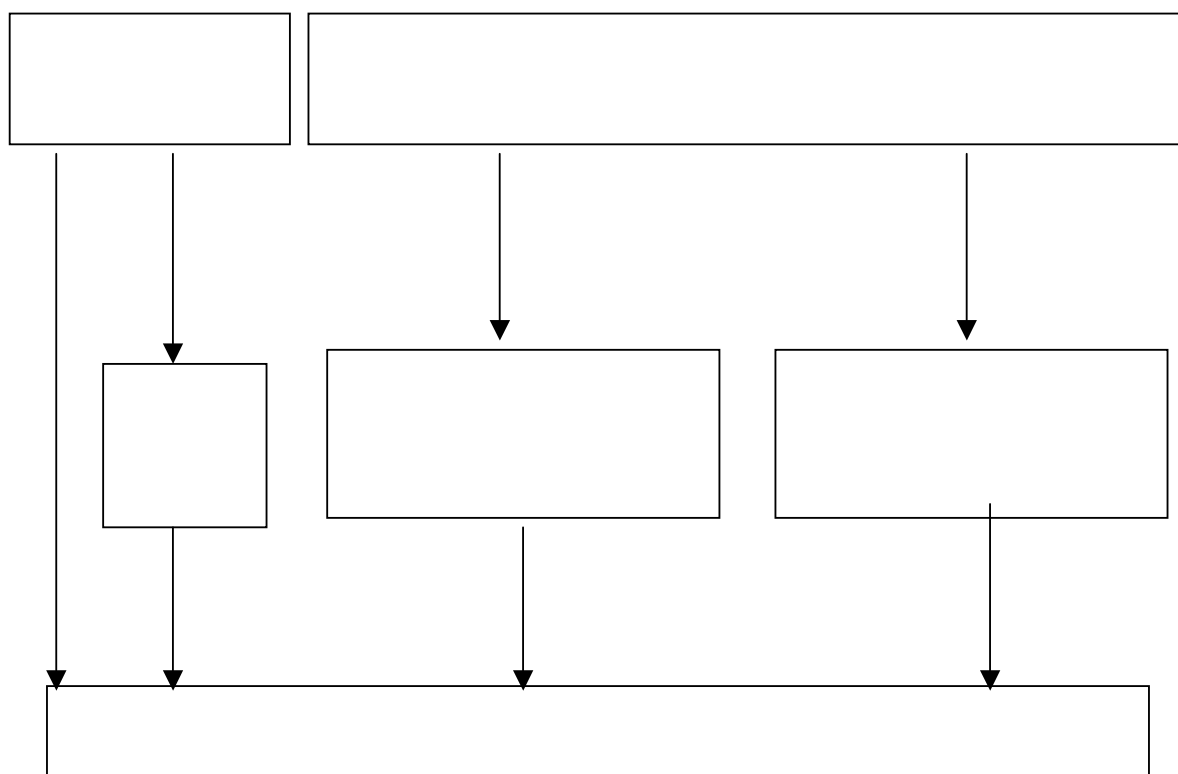


Figure 1: Generalization of route of Information for export markets access

5. CURRENT ADJUSTMENT APPROACH

Vietnam determines that the most important objective in economic policy is to integrate with international economy. Over years, Vietnam have tried to become member of ASEAN and APEC. Vietnam is also a member of MEAs and in the process of negotiation to be a member of WTO. Therefore, trade and environment currently play an import role in this matter.

By reflecting what have been mentioned above, it is partly expressed what was, have been and is being done by the Vietnam Government in order to meet requirements of environment and health, to improve environmental quality in two sides: market access and guarantee of sustainable export growth. The adjustment access are concentrated on following issues:

(1) Application of remote precaution method. HACCP standard is required for producers, processors, and exporters.

(2) Limiting and strengthening state management in terms of utilization of agricultural chemicals and storage chemicals of vegetables, fruits as well as the utilization of additives in food processing

(3) Investing in research and development of agricultural chemicals which have no or few damage on environment but are effectively used in production as well pest and disease management.

(4) Application of new technologies to production, storage, processing of horticultural products.

Explanation for current adjustment approach in Vietnamese situation is as follows:

➤ The adjustment approach No 1: it requires producers, processors to have export products which meets quality standard in export markets if they want their products to be exported, although it is a high requirement for Vietnamese enterprises. Reaching this requirement means that enterprises in Vietnam overcome current constraints, especially the one related to environment. Export strategy is concentrated on organic vegetable, fruit products and potential products are available in mountainous regions where traditional cultivated methods, no abusing agricultural chemicals are applied. Support of varieties facilitates producers to produce good quality with their own trademark, of which 5 crops are protected by the Ministry of Agriculture and rural Development as Doanhung pummelo, Cat Hoa Loc mango,...

➤ The adjustment approach No 2: is established based on strategy of combining control methods of supply resource, research, testing, and training to improve farmers' knowledge.

- Control of supply resource: It is a difficult issue, but if it is paid more attention to properly do this channel, it not only meets requirement of environment in import market, but also protects consumers' health of domestic people.

- Research: It is needed to do specialized research on IPM methods on vegetables, fruits and flowers in order to both manage pests and diseases, maintain natural enemy source, and guarantee foodstuff security. This strategy is based on experience in application of IPM methods on rice production.

- Testing: it is one type of examining quality of fruit, vegetable products by sample analysis in laboratory in order to assist farmers who want to have stable output (contract of product consumption,...) with high value. Therefore, they are willing to strictly abide all regulations to have good quality products. In the past, testing was very difficult to do due to much higher cost of sample analysis than income obtained from fruit and vegetable products. Currently, cost for a sample analysis is VND 180,000 ≈ US\$ 12 and it is possible to examine nitrate, heavy metal content, pesticide residue (carbonate and organophosphate) and pathogen microorganisms and the result will be available after 3 hours of analysis. Rapid Assay Method is only applied to examination of pesticide residue (carbonate and organophosphate), and its result is immediately obtained, cost for a sample is VND 15.000 ≈ US\$ 1.

- Improvement of awareness for farmers: According to surveyed results and assessments made by plant protection staff in localities, most of farmers had good awareness that hazards of pesticide utilization on producers' human health, polluting environments and effect on product quality which led them not to have stable output. According to them, If IPM method was not applied, number of pesticide spray and pesticide cost for a fruit/vegetable season would be much higher than regulation because insects were tolerant to available pesticides and it was needed to spray many times to control them. And because of using various pesticides, they couldn't exactly remember how many days before harvesting is allowable for spray of each pesticide. Therefore, identifying solutions to assist all of direct horticulturists to improve their awareness and to be clearly aware of benefit from limiting utilization of pesticides is highly significant which need to be conducted as soon as possible.

➤ The adjustment approach No 3: Even being inherited scientific achievements from developed countries it takes time to do testing in Vietnamese conditions,

➤ The adjustment approach No 4: This is a proper trend to developed countries and when new technological procedures are applied, utilization of pesticides in production, storage and processing of fruits, vegetables and flowers will decrease, additives will not negatively affect human health and environment. However, big investment should be required to follow this trend. Therefore, this strategy can be done when economic potential of Vietnam is improved.

Based on the above analysis of adjustment approach and specific situation in Vietnam, activities of trend No. 1 is used and implemented to meet environmental standards of export markets.

6. STANDARDS AND REGULATIONS OF HORTICULTURAL PRODUCTS

6.1. Standards

Similarly to other countries, Vietnam has admitted that standardization is considered as the most efficient tool of integration process and it has determined that standardization will become an efficient tool to increase product competition, to protect domestic markets as well as consumers' rights; and that it will be the basic foundation to manage, supervise, inspect, examine foodstuff quality, sanitation.

When establishing and issuing standards of foodstuff products in general, and horticultural products in particular, it is needed to be based on some following issues:

- Requirements of environmental standards in export markets in the world, for example, standards issued by FAO or WTO... for each product (fresh and processed vegetable, fruit)

- Standards issued by Codex based on negotiation/discussion among participating countries

- Situation of production, storage and processing in Vietnam.

- Current adjustment approach of Vietnam: production is oriented in organic, safe trends to reduce pesticide utilization and no pollution of environment.

In the past, standards were established before 1992, however, Vietnam Standards (TCVN) have been modified due to new market requirements. To meet requirements of

management, research and production, the Ministry of Health issued decision No. 867/1998/QĐ-BYT on 4 April 1998 in term of approving list of sanitation standards for foods and foodstuff of which there were

21 TCVN about foodstuff packaging,

20 TCVN about foodstuff additives,

105 TCVN about foodstuff,

155 TCVN about technical regulations of foodstuff products.

In the list of TCVN, it issued TCVN for fruti, vegetable products in terms of allowable heavy metal content, maximum microorganism limit, maximum pesticide residue limit. Annex 1 extracts some examples for fresh vegetables and fruits.

Apart from that, the rest standards in the list are standards for testing method.

During implementation, TCVN didn't meet requirements, then the Ministry of Health issued additional decision, for example decision No. 3742 ...

Besides, Department of Science and Technology - Ministry of Agriculture and Rural Development issued standards of seedlings/planting materials, seeds, technical procedures and testing methods of fruits and vegetables.

6.2. Some acts, regulations related to quality, trade and environment in horticultural sector

Discussion of standards for quality of fresh horticultural products (related factor to environmental quality) is a very complicated topic because product quality is affected by environmental factors as soil, water, air, input as N, P, K fertilizers, pesticides, growth regulators). For processed products, quality is influenced by not only environmental factors while processing but also product composition and origin of those substances. It is necessary to exactly determine role and necessity of issues on standardization, trade, and environment. Hence, some legal regulations on trades related to environment or those on environment, trading regulations related to horticultural sector. Annex 2 includes list of related documents are issued.

And National Assembly Standing Committee, Section IX approved Law on Foodstuff sanitation and safety on 26 July 2003 and the President signed decree to proclaim this law on 7 August 2003. This is a historical mark to express interest of communist party as well people Foodstuff sanitation and safety.

7. ANALYSIS AND NECESSITY OF ESTABLISHING REGULATIONS

7.1. Analysis on effectiveness of information management

As structured in item II- 4.2, it clearly reflected the fact of gathering and disseminating new information and preparing environmental requirements in export markets gathered and disseminated by various organizations. As functioned, most of the organizations under the Ministry of Commerce are responsible for that. However, due to different functions and responsibilities of sectors and in combination with Governmental policy to encourage export turnover increase, each division, is however, able to gather information in this way or another; or Vietnam Codex Committee - Department of Quality Measures who regularly exchange information with foreign organizations and then it can be adjusted and disseminated businesses, or Import - Export Department and Department of Science and Technology - Ministry of Agriculture and Rural Development. On the other hand, the Government highly appreciates the activeness made by businesses in looking for markets and in directly contracting with partners... thus information is disseminated to businesses by various channels. This is an advantage for businesses to have multi-sided information so that they have more opportunity options.

It is also to notice that ASEAN Working Mission Meeting on Codex held in Cebu – Philippines on 13 – 16/04/04 appointed Vietnam as the focal point in fresh fruit and vegetable at international Codex committee.

7.2. Necessity of establishing regulations

- The discussions among leaders of functional organizations involved in product quality, sanitation and environmental requirements (Department of Quality Measures, Vietnam Codex Committee , Department of Science and Technology, etc) came to the the same assessments that:

+ In current situation of Vietnam, standardization of product quality in general, and foodstuff in particular (including horticultural products) is the most efficient tool for integration process;

+ It is urgently necessary to standardize environmental quality, because tariff barrier was previously considered the national trading protected tool. However, it is also a fender to be firstly demolished in integration process. For Vietnam, it is needed to seriously carry out cooperative commitments signed. Therefore, in the future, standardization will become an efficient tool to partly contribute to improveing

competitiveness in local and export markets, protecting local and international consumers' rights.

+ On the other hand, standardization system is the foundation to facilitate better management, supervision, inspection, examination of product quality of producers, processors, exporters and distributors.

- According to opinions of stakeholder in processing or export enterprises, big processing enterprises and companies have to meet export markets in term of product types (international requirements) other than abiding regulations on sectorial standard (national standard).

- Due to fluctuation of producing, processing horticultural products, it is necessary to regularly supervise and examine.

Because of the above-mentioned basic reasons, it is needed to establish regulations for all participatory factors (direct and indirect) applied to processes of from production to product distribution (producers, processors, marketing man, as well Governmental trading negotiators) in order to improve competitiveness of horticultural products in the world.

Part III - conclusion and recommendations

1. Conclusion

The case study on environmental requirements, market access and market competitiveness in horticultural sector have shown an overall picture of

- Development process of production and consumption types of horticultural products of which there has been a big change in commodity oriented cropping system, and with the objective of increasing income per area unit and guaranteeing sustainable development

- Environmental and health requirements in key export markets for Vietnamese horticultural products have been established which are actually considered as commercial barriers of horticultural products, especially to access markets in developed countries.

- Severe competitiveness is not only at domestic, regional level but also at international one.

- Better change of awareness of producers' on environmental requirements that have not, however, been synchronously among regions in whole country.

- Efficiency/effectiveness of information management on environmental requirements of key export markets. Some organizations' participation at the same time in gathering and disseminating new information on environmental requirements have facilitated processing enterprises, exporters to have multi-sided information.

- Current adjustment approach have limited utilization of agricultural chemicals and strengthened chemical and additives management in processing of horticultural products to meet current environmental requirements; and further applying advanced technologies to production, storage and processing of horticultural products is considered as long term approach.

- Necessity of establishing regulations: national and international environmental requirements should be conducted harmoniously

The overall picture indicated that, apart from the advantages in natural conditions and abundant labor force, the horticultural sector in Vietnam had lots of disadvantages and constraints which need to be promptly solved, especially food quality and environment despite the recently improved awareness by producers; change of the conventional cultivating habit in some regions; increased production multiplication/expansion in provinces. However, it is necessary to emphasize on supervision and management, otherwise the "obtained achievements" will be unable to develop because producers regards yield as the most important objective regardless of quality and environmental

sustainability, which means that overdue agricultural chemicals will be used to lead unsure product quality and polluted environment.

2. RECOMMENDATIONS

In order to facilitate horticultural sector to determine their position in agricultural sector and their equal development in the near future to some regional countries as Thailand, China, etc., it is needed to have support from the Government and effort from business as well as from foreign organizations through international cooperation for the purpose of improve management capacity, experience exchange in trading negotiation.

Specifically, the Vietnam Government and enterprises should do the following solutions:

➤ For the Government :

(1) To strengthen education and awareness; This is a responsibility not only of functional organizations but also enterprises and individuals. Because environmental protection and maintenance can be done only when individual awareness is improved. This solution is firstly prioritised because this is the most constraint in adding policies on environmental protection and in improving product quality .

(2) To properly invest in scientific research ; This is to solve pressing issues of foodstuff sanitation control as supervising situation of harmful chemical utilization in production, processing, storage of foodstuff products..

(3) To strengthen efficiency of policy, law system on environment which is currently established quite systematically, however, there is a lack of specific situation and uneasy application. Hence, there is a need to have regulations, specific and detailed guidances for the issued documents/acts and to additionally establish direct documents/acts, guidances to implement multilateral trading policies.

(4) To gradually accomplish establishment of national standards : It is a necessary action as soon as possible. A completed standard system will facilitate better examination, supervision of enterprises and individuals if they properly abide regulations, policies on environmental protection in local and international markets.

(5) To support small and medium businesses where excessive labor forces in localities are employed and product value, high growth rate is created. However, these businesses have big difficulties in capital, technologies and information. In the current situation of competitiveness and integration, their most difficulty is concentrated on information channel.

(6) To invest and innovate technology: This solution can be combined with a part of 2nd solution. This solution is considered as the most pressing requirement because new technologies will contribute to meeting product quality in international competition condition. However, the Government is unable to fully invest but it is able to support in forms of investment encouragement, increase of export turnover, or establishment of high technology zones in order to apply more scientific results.

(7) To improve international negotiation capacity : This is a very important issue because our benefit is depending on participation in adjustment of international trading regulations and environment. Especially, in the process of negotiation to enter WTO, the Government is facilitating businesses to have opportunity to collaborate, regularly exchange with organizations involved in negotiation. However, awareness of role of Governmental support haven't been known by all of the businesses.

➤ ***For businesses/enterprises***

Producers, traders need to have solutions in order to improve competitive capacity in international markets. Some solutions are recommended as follows:

(1) To establish long term trading strategy: In this current situation when Vietnamese businesses suffer strong competitiveness, it is needed to establish their own strategy in which impact of standard as well environmental regulations should be included, then estimated budget for this expenditure should be also calculated.

(2) To train manpower resources and to improve awareness for workers. The higher awareness it is, the more serious abundance of regulations by workers there is, especially for processing enterprises. Training good manpower resources to meet strict requirements on contracted production procedures and to be suitable for advanced technological conditions are needed. Investment for this solution allows innovation of technologies.

(3) To invest technological innovation: This is a constraint for businesses, especially small enterprises. However, to have sustainable position in international market, it is necessary to innovate technologies and to apply quality management standard system according to ISO 9000, ISO 14000, HACCP . . .

Annex 1: some Vietnamese standards for fresh fruits and vegetables

Table 13: Pathogen microorganisms in fresh fruits and vegetables

Food Stuff Group	Pathogen microorganism	Limited by G.A.P
Fresh or frozen vegetables and fruits	Coli Forms (cells/1gram)	10
	Escherichia coli	Limited by G.A.P*
	Staphilococcus aureus	Limited by G.A.P*
	Clostridium perfringens	Limited by G.A.P*
	Salmonella (no presence in 25 products)	0

(According to decision No 867/1998/ Q§- BYT by Ministry of Health dated on 4/4/1998 in term of issuing hygiene standard list for food stuff and food products)

* G.A.P – Good Agricultural Practice

Table 14: Maximum Heavy Metal Content Limit in vegetable and fruit species

No	Element	Limit in mg/kg fresh vegetable and fruit (ppm)
1	Asen (As)	1
2	Lead (Pb)	2
3	Copper (Cu)	30
4	Tin (Sn)	40
5	Zinc (Zn)	40
6	Quick silver (Hg)	0,05
7	Cadimi (Cd)	1
8	Antimon (Sb0)	1

(According to decision No 867/1998/ Q§- BYT by Ministry of Health dated on 4/4/1998 in term of issuing hygiene standard list for agricultural food stuff and food products)

Table 15: Maximum Residue Limit of some pesticides on tomato
(mg/kg fresh fruit)

No	Common name	Maximum Residue Limit (mg/kg)
1	Acephate	0,5
2	Amitaz	0,5
3	Benalaxyl	0,5
4	Cacbary	5,0
5	Carbofuran	0,1
6	Clofenvin phos	0,1
7	Cholorathalomil	5,0
8	Cyfluthrin	0,5
9	Sypermethin	0,5
10	Cyromane	0,5
11	Triforine	0,1
12	Tolyfluanid	1,0
13	Methyl	5,0
14	Thiabendazole	2
15	Quintozene	0,1
16	Propoxur	0,05
17	Propamocarb	2,0
18	Pirimiphos	1,0
19	Primicarb	1,0

(According to decision No 867/1998/ QŞ- BYT by Ministry of Health dated on 4/4/1998 in term of issuing hygiene standard list for food stuff and food products)

Table16 : Maximum Residue Limit of some pesticides on vegetable legumes

No	Code (CAC)	Pesticide		ADI (mg)	Maximum Residue Limit (mg/kg)
		Common name	Chemical name		
1	2	3	4	5	6
1	8	Carbaryl	1-naphthyl methycarbarmate	0,01	5
2	17	Chlorpyrifos-Methyl	0,0- diethyl 0-3,5,6- trichloro- 2-pyridylphosphorothioate	0,01	0,2
3	90	Chlorpyrifos-methyl	0,0- dimethyl 0-3,5,6- trichloro-2-pyridylphosphorothioate	0,01	0,1
4	135	Deltamethrin	(S)- α - Cyano-3-phenoxybenzyl (1R, 3R)-3-(γ)-2,2-Dimethylcyclopropanecarboxylate	0,01	0,1
5	27	Dimethoate	0,0- dimethyl-S-methylcarbamoymethyl phosphorodithioate	0,01	0,5
6	149	Ethoprophos	0-ethyl S, S-Dipropyl phosphorodithioate	0,0003	0,2
7	37	Fenitrothion	0,0- dimethyl 0-4-nitro-m-totyl phosphorodithioate	0,005	0,5
8	119	Fenvalerate	(RS)- α -cyano-3 phenoxybelzyl (RS-2-(4-chlorophenyl))-3-methylbutyrate	0,02	1
9	49	Malathion	Diethy(dimethoxyphosphinothioylthi) Succinate	0,02	0,5
10	51	Methidathion	S-2,3- dihydro – 5 – methoxy-2 –oxo-1,3,4- thiodiazol-3-ylmethylyo, o-dimethyl phosphorodithioate	0,001	0,4
11	94	Methomyl	S-methylN- (mythylcarbarmoyloxy thioacetimidate)	0,03	5
12	55	Omethoate	0,0- dimethyl S- methylcarbarmoyloxy phosphorodithioate		0,2
13	120	Permethrin	3-phenoxybenzyl(1RS, 3RS, 1 RS, 3 RS)-3-(2,2- dichlorovinyl)-2,2-dimethylcyclopropane carboxylate	0,005	0,1

1	2	3	4	5	6
14	113	Propargite	2- (4-tert- butyphenoxy)cyclohexyl prop-2- Ynylsulphite	0,15	30
15	75	Propoxur	2- Isopropoxyphenyl methycarbamate	0,02	1
16	64	Quintozene	Pentachloronitrobenzene	0,007	0,01
17	154	Thiodicarb	3,7,9,13-tetramethyl-5,11- dioxo-2,8,14-trithia-4,7,6,9,12- diene-6,10- dione	0,03	5
18	76	Thiometon	S-2-Ethythioethyl 0,0- dimethyl phosphorodithioate	0,003	0,5
19	133	Triadimefon	1-(4-chlorophenoxy)-3,3-dimethyl-1- (1H-1,2,4- triazol-1-yl)butanone	0,03	0,2
20	143	Triazophos	0,0- diethyl 0-1-phenyl- 1H- 1,2,4 – triazol-3-yl phosphorodithioate	0,001	0,2
21	116	Triforine	N,N'- [piperazine-1,4- dilyl bis (Trichloromethly) methylene]diformamide	0,02	1
22	159	Vinclozolin	(RS)-3-(3,5- dichloropheny)-methyl-5-vinyl-1,3- oxazolidine-2,4- = dioen	0,07	2

Note: ADI (mg/kg body weight): Acceptable Daily

(Extracted from list of Maximum Residue Limit of 144 pesticides on vegetables, according to decision No. 867/1998/QŞ-BYT by Ministry of Health).

**Annex 2: List of legal regulations
of trading related to environment**

1. Decree No. 130/CT-TTg on 27 March 1993 by Prime Minister in term of management and protection of rare animals and plants.
2. Law of Environmental Protection (1994)
3. Decree No. 175/CP on 18 October 1994 in term of guidance of implementing Law of Environmental Protection.
4. Regulation on State Examination for quality of export commodities (*Issued enclosed Decision No. 2578/QD-TSC on 28 October 1996 by Minister of Science, Technology and Environment*)
5. Trading Law issued on 10 May 1997
6. Decision No. 287/NN-BVTV/QD on 25 February 1997 by Minister of Agriculture and Rural Development in term of issuing temporary regulations on State Examination Procedures for imported and exported pesticide quality.
7. Decision No. 297/NN-BVTV/QD on 27 February 1997 by the Minister of Agriculture and Rural Development in term of issuing list of allowable, limited and banned pesticides in agriculture in Vietnam
8. Instruction No. 29/1998/CT-TTg on 25 August 1998 in term of strengthening management of pesticides and polluted and disintegrated organic matters.
9. Regulation on of State Examination for imported and exported pesticide quality.
(Issued enclosed Decision No. 1091/QD- BKHCNMT on 22 June 1996 by Minister of Science, Technology and Environment)
10. Decision No. 155/1999/QD-TTg on 16/7/1999 in term of issuing regulations on dangerous waste management.
11. Decree No. 57/1998/CP on 31 July 1998 in tern of detailed regulations of implementing trading Law, of which the Prime Minister stipulated provisory restricted export or products.
12. Law on Plant Quarantine Protection(No. 36/2001/PL-UBTVQH10 on 25 July 2001)

13. Decision No. 46/2001/QD-TTg on 4 April 2001 by the Prime Minister in term of Management of product import, export in period 1001-2005.

14. Decision No. 58/2001/QD/BNN-KNKL on 23 May 2001 by Minister of Agriculture and Rural Development in term of issuing list of rare plants and animals which are not allowed to be exported, list of plants and animals.

15. Regulation on foodstuff security in trading using additives (*Issued enclosed Decision No. 928/2002/QD - BYT on 21 March 2002 by Ministry of Health*)

16. Decree No. 11/2002/ND-CP on 22 January 2002 by the Government in term of management of import, export and transit of wild animals and plants

17. Decree No. 58/2002/ND-CP on 3 June 2002 by the Government in term of issuing rules of plant protection, plant quarantine and pesticide management.

18. Decision No. 35/2002/ QD-BKHCMNT on 25 June 2002 by Minister of Science, Technology and Environment in term of promulgating list of Vietnam standards in obligated applied environment

19. Regulations on quality examination, pesticide residue, pesticide testing for registration in Vietnam (*Issued enclosed Decision No. 50/2003/QD-BNN on 25 March 2003 by Ministry of Agriculture and Rural Development*).

20. Law of foodstuff sanitation and safety issued on 19 August 2003.

**Annex 3: List of lawful acts of environment
related trading regulations**

1. Law of Environmental Protection (1993)
2. Decision No. 287 -NN-BVTV/QD on 25 February 1997 by Ministry of Agriculture and Rural Development in term of issuing temporary regulations of State Examination Procedures for imported and exported pesticide quality.
3. Decision No. 297 -NN-BVTV/QD on 17 February 1997 by Ministry of Agriculture and Rural Development in term of issuing list of allowable, limited and banned pesticides in agriculture in Vietnam.
4. Decision No. 993-NN/BVTV/QD on 28 October 1995 by Ministry of Agriculture and Food Stuff Industry in term of allowing official registration and additional registration of allowable and limited pesticides in agriculture in Vietnam.
5. Decision No. 229-NN/BVTV/QD on 22 December 1995 by Ministry of Agriculture and Rural Development in term of permitting official registration of allowable pesticides in agriculture in Vietnam.
6. Regulation No. 367-BVTV/QD on 19 June 1996 by Director of Plant Protection Department in term of using limited pesticide list in Vietnam.
7. Decision No. 287/NN-BVTV/QD on 25 February 1997 by Ministry of Agriculture and Rural Development in term of issuing temporary regulations of quality control procedures for imported and exported pesticides.
8. Decision No. 297/NN-BVTV/QD 27 February 1997 by Ministry of Agriculture and Rural Development applying to allowable, limited and banned pesticides.
9. Decree No. 29 /1998/CT-TTg on 28 August 1998 by Prime Minister in term of strengthening management of pesticides and polluted and disintegrated organic matters.
10. Decision No. 193/1998/QD/BNN-BVTV on 2 December 1998 by Ministry of Agriculture and Rural Development in term of issuing regulations of

quality and pesticide residue control and practical assessment of available pesticides in Vietnam.

11. Decision No. 1654/1999/QD-BYT on 29 May 1999 by Ministry of Health in term issuing regulations of pesticide management.

12. Decision No. 155/1999/QD-TTg on 16 July 1999 by Prime Minister in term of issuing regulations of dangerous waste management.

13. Decision No. 46/2001/QD-TTg on 4 April 2001 by Prime Minister in term of management of imported -exported products in period of 2001-2005.

14. Decision No. 82/2002/QD-TTg by Prime Minister in term of Establishing Environmental Protection Fund.

15. Decision No. 64/2003/QD-TTg on 22 April 2003 by Prime Minister in term of approving "Workplan of thorough treatment of serious environmental polluting enterprises".

16. Decree No. 67/2003/ND-CP on 13 June 2003 by Government in term of environmental protection for wastewater.

17. Decree No. 113/2003 on 07 October 2003 by Government in term of issuing management, production and trading of fertilizers. This decree consists of 7 chapters, 28 articles, which were taken effect 15 days after signed date.

18. Decision No. 256/2003/QD-TTg on 02 December 2003 by Prime Minister in term of approving National Environmental Protection Strategy to 2010 and orientation to 2020.

19. Decision No 33/2003/QD-BKHCHN by Minister of Science and Technology in term of issuing Vietnamese standards.

20. Joint Circular Letter No. 125/2003/TTLT-BTC-BTNMT on 18 December 2003 in term of Guidance of implementing Decree No. 67/2003/ND-CP on 13 June 2003 by Government in term of environmental protection for waste water.