DELTA Project – Mekong Delta: research report n°3

Agricultural diversification in the Mekong River delta:

Raised beds management, marketing and dynamics

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/Vietnam / Mekong / water management/ raised beds / diversification / acid soil / fruit production / marketing channel /

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Abbreviations used

CLRRI: Cuu Long Rice Research Institute

CT: Can Tho

CTU: Can Tho University

MRD: Mekong River Delta

SOFRI: Southern Fruit Research Institute

VND: Vietnamese Dong

VND 1 USD = 14,000 VND (value in 2000)

Units used

VND: Vietnamese Dong 1 USD = 14,000 VND (value in 2000)

Cong: 1/10 hectare : 1000 m^2

*Cong*A: 1/7 hectare : 1428 m^2

Mm^3 Million m^3

cms m^3/s (discharge)

Introduction

The Mekong River Delta is associated with rice cultivation. However, mostly because of the growing population density and the declining profitability of rice, agricultural diversification now appears as a hallmark of agrarian transformations in the last 20 years.

To accommodate field crops or even orchards in low lands and clay soils generally demands investment in land transformation. Raised bed systems are typical features of lowland environments and can be found in Mexico, Oceania, or in Southeast Asia, to name a few examples. They are constructed by digging parallel ditches and using the earth to constitute alternated ridges, or beds, on which orchards, vegetable or field crops will be planted.

This report is concerned with the development of fruit production on raised bed systems and covers the following range of topics:

1. *Raised beds techniques and soil management*

2. *Raised bed systems and water management*

3. *The marketing channel of longan and some vegetables (case study)*

4. *The organisation of the fruit commodity chain and the dynamics of diversification*

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Part I

Factors determining the geometry of raised beds for fruit trees and upland crops in the Mekong Delta

Le Quang Minh

1 Abstract

A survey was conducted in the shallow to medium flooding areas in the Mekong delta, where farmers often build raised beds (RB) to grow short-duration upland crops and fruit trees. The study is to identify factors – such as flood depth, crop types, soil types and irrigation methods – that determine the RB geometric characteristics; namely width, height of the raised beds and depth and width of ditches. These dimensions strongly influence the cost of their agricultural production. Evidence shows that in fruit tree orchards, the main factors to determine RB height is the flood depth, while width is governed by crop types, ditch width by flood depth, and ditch depth by the soil type. The width of upland crop RB is much larger than that of fruit trees in alluvial soil. While in acid sulphate soil, RB width for upland crops is narrower. Due to the high acidity of lower soil layers, farmers in acid sulphate areas have a tendency to use only top soils to construct their RB. Consequently, the depth of ditches in these soils is shallower than that in alluvial soils.

2 Introduction

Farmers in South east Asia construct raised beds -- i.e. by piling up soil materials excavated from adjacent lateral ditches to form ridges 0.3 to 0.6 m higher than the original ground surface to avoid flooding in the rainy season – in order to grow upland crops.

In the Mekong delta (MD), farmers build raised beds (RB) with 2 main purposes: (1) to avoid upland crops submersion during the rainy and flooded season and (2) to enhance the drainage and leaching of toxic elements from the root zone (Dent, 1986; Sarwani *et al.*, 1993; Tri *et al.,* 1993; Xuan, 1993).

Studies on leaching effects of constructing RB have been carried out in large number. Results of the studies indicate that macropore geometry and bypass flow, typical in RB, strongly affect salt movement and leaching of fertilizers, pesticides, and other contaminants in soils with "natural" macropore systems which are formed by shrinkage upon drying, by plant roots, and by soil fauna (Chichester and Smith, 1978; Thomas and Phillips, 1979; Bouma et al., 1981; Dekker and Bouma, 1984; Smaling and Bouma, 1992; Booltink et al., 1993). Upland crops supply an important extra source of income to farmers the Mekong Delta (Sen 1987, Tri et al. 1993, Xuan 1993, Durang 1994).

Little efforts have been paid to the geometric characteristics of the RB itself. In what ways farmers make decision regarding the dimension of their RB has not had clear answers. This information can be used to analyse cost- benefit of the cropping systems on RBs.

The objective of this survey is to study the natural factors (social and economical factors excluded), that influence farmers' decisions in constructing their RB.

3 Methodology

1. A survey in the regions, where RB is a common practice, was carried out in the dry season 1999 (February – April). Two factors, which can strongly influence to farmers' decision, were identified and used for selection process. They are: flood depth (divided into 2 main groups: shallow and medium) and soil types (alluvial and acid sulphate soil).

Surveys were carried out in 4 locations and two kind of crops: (1) short-duration upland crop like maize, sugar cane, pineapple, etc. and (2) fruit trees like mango, longan, orange, etc.

2. Site selection

Table 1 shows the factors used to select the survey sites. Each factor was grouped by some common characteristics within the factor.

TABLE 1. FACTORS AND GROUPS USED IN SELECTION SURVEY SITES

Factor	**Group**	**Location**	
Flood depth	Shallow	Thot Not	40 km from Can Tho* to the North
	Medium	O Mon	20 km from Can Tho to the North
Soil types	Alluvial	Cho Lach	40 km from Can Tho to the SE
	Acid sulphate	Hoa An	30 km from Can Tho to the South

* Can Tho city is located at the center of the Mekong delta

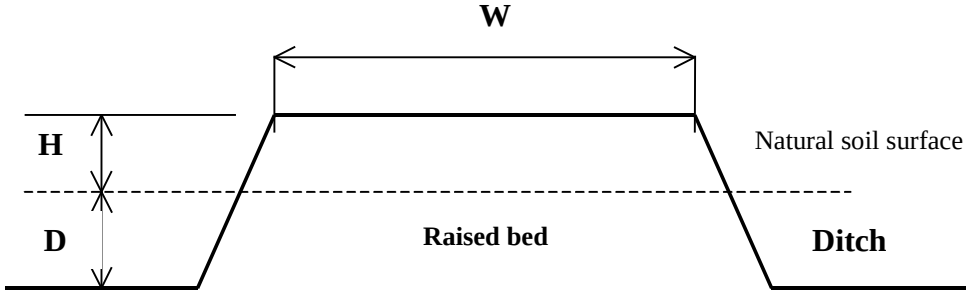
3. Acid sulphate soil

Hoa An is a location selected by its typical acid sulphate soils (Table 1), which is classified as Typic Sulfaquepts (Soil Survey Staff 1975). A dark top soil (0-40 cm) with high organic matter content is found on top of a Jarosite layer (0-120 cm). Ground water table is at 120 cm, where a dark soft soil with high pyrite content is found (Tin 1985). Because of high pyrite content, pH of this layer often drops sharply (from around 6 to 4 or 3) when exposed to air (Breemen and Pons 1978).

4. Survey

In each group, 6 sites were selected for the survey: (1) crop type, (2) reference flood depth farmers used to build their RB, (3) geometric characteristics; namely width and height of the RB, depth and width of the ditches (Figure 1). Soil dug from ditches was used to pile up the RB, therefore, next to the RB, one can always find parallel ditches with the same length. The lengths of RB are mostly determined by the size of farmers' field and are not influenced by natural or economical conditions (Minh, 1999).

FIGURE 1. SCHEMATIC SKETCH OF RAISED BEDS (W: WIDTH, H: HEIGHT AND D: DEPTH OF THE DRAINS).



Irrigation methods are also one subject of the survey.

4 Results and discussions

The geometric characteristics of RB are shown in Table 2.

RB width

With few exceptions, widths of RB are determined by crop types. There are 2 different groups of RB width:

- *Narrow* RB (from 4 to 8 m) are very common in fruit tree orchards. The type of fruit trees; like mango, orange, longan, etc. does not dictate the RB width. To collect sufficient amount of soil materials for constructing a rather high RB for fruit trees, farmers have to dig ditches at close distance. As the consequence, the width of RB is shorter.

- *Wide* RB (from 10 to 30 m) are often found in short duration upland crops like maize, sugar cane, etc. In the alluvial soil areas, upland crop farmers pay more attention to the ditch for irrigation and drainage. RB is, actually, the "by-product" of the drains. The RB width mainly depends on 2 different irrigation methods, which are very common in the area. Farmers often use (1) long handle bucket to pour water from ditches to RB and (2) plastic tube, with a pump, to spray water to the crops. The width of RB with bucket irrigation is narrower than those with nylon tubes spraying. This can help explain the wide RS type often found in upland crop areas and low height of the RB of the upland crop.

TABLE 2. FACTORS DETERMINE THE COMMON SIZE (IN METER) OF THE RB IN MD

Crop type	Flood depth	Soil types	Raised bed		Ditch	
			Width	Height	Width	Depth
Fruit tree	Shallow	Alluvial	4 – 8	0.2 – 0.5	1 – 2	1.0 – 1.5
		Acid	ns			
	Medium	Alluvial	4 – 8	0.7 – 1.0	4 – 6	1.0 – 1.5
		Acid	ns			
Upland crop	Shallow	Alluvial	10 – 30	0.0 – 0.1	0.3 – 0.6	0.2 – 0.5
		Acid	4 – 6	0.2 – 0.5	4 – 6	0.4 – 0.8
	Medium	Alluvial	10 – 20	0.2 – 0.5	0.3 – 0.6	0.5 – 1.4
		Acid	4 – 6	0.4 – 0.8	4 – 6	0.4 – 1.0

ns: not suitable

RB height

The height of RB is the most important factor for farmers growing fruit tree in flooding areas. Fruit trees can hardly be found in deep flooding areas. Only in the shallow to medium flooding areas fruit orchards are concentrated. In these areas, farmers often use the height of the "historic" flood as reference for the heights of their RB (mostly the flood in 1978). In the shallow flooding areas, the heights are in the range of 0.2 to 0.5 m. In the medium flooding areas, these figures are from 0.7 to 1.0 m; with some exception of 1.5 m. The RB with this height is very costly to construct, effective land surface (for growing crop) is limited due to large areas of ditches.

Ditch width

There are 3 different widths of the parallel ditches in MD.

- Large width of 4 to 6 m can be found in the medium flooded and in acid sulphate soil areas. In medium flooded area, large ditches supply more soil materials to construct high RB. In acid sulphate soils, wider ditches (4 -6 m) used to compensate shallow depth (0.4 – 1.0 m). Farmers in this area tend to avoid using acidic materials at deep layer, which is often found at 1.2 – 1.5 m

- Medium width of 2 – 4 m most be found in the shallow flooded areas, where the RB does have to be high, consequently, less soil materials needed.

- Narrow width of 0.3-0.5 m is often found in upland crops in shallow flooded areas.

5 Conclusions

1. Framers' decisions on the dimensions of their RBs are based on flood depth for the RB height, crop types and irrigation methods for the RB width.

2. The geometry of the ditches depends on the RB height, crop types, and soil types.

3. Further study with more detailed surveys on social and economical aspects are necessary. From this study, the evidence shows that in some cases these aspects either are boundary conditions in construction RB or are compromising factors to the variations of the dimensions.

Part II

Land and water management in raised beds systems: a case study in O Mon

Marie-Pierre Trocherie

Sebastien Becue

Tran Van Hung

François Molle

Nguyen Hieu Trung

6 Introduction

Water management is a crucial factor to the success of fruit farming in the Mekong delta. Due to varied conditions in topography and water regime, farmers have established different types of raised beds with different water management techniques in order to adapt their cultivation to nature. Therefore, an investigation in the diversity of crops, land and water management in the raised bed system is an important step towards understanding where and how raised beds systems can expand.

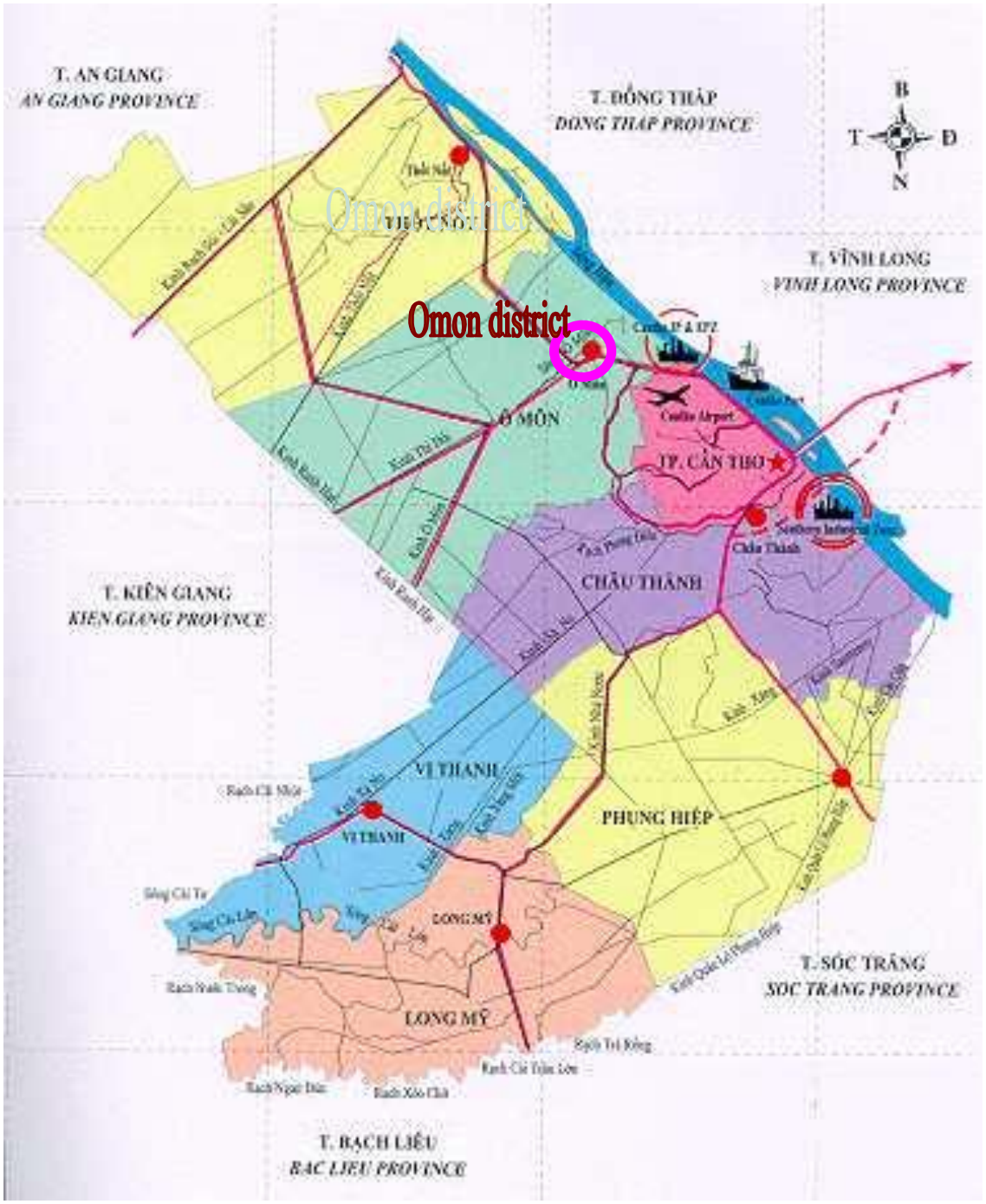
Can Tho province have about 2,500,000 ha of agriculture land, in which raised bed amount to approximately 33,000 ha. In the 1993-1996 period the area of citrus plants increased fivefold, from 3,400 ha in1993 to 16,526 ha in 1996 (Can Tho province's statistic, 1996), and the area of citrus plants is expected to reach 50,000 ha soon because of the high profit they generate compared with other crops.

Omon district, Can Tho province, was selected for carrying out the research. The surveys were conducted in Thoi Long and Long Dinh hamlets with the objective to understand the natural conditions (topology, soil and water) and farm management activities of farmers in the raised bed area.

In parallel with these surveys, an experiment site have been established in a plot of Thoi Long hamlet for measuring water management parameters, such as the fluxes of water in and out of the system, as well as the crop management activities such as pesticide and fertilizer use in the raised beds. A computerised model of the water balance of the plot, including the tidal regime, rainfall and the different operations that control inflows and outflows of water (by gravity or through pumping) was developed.

Figure 1 shows the studies areas in Omon district, Can Tho province.

FIGURE 1. STUDY AREA



7 Constructing raised beds

7.1 Land use evolution

There are many type of fruits in the Mekong delta. The table below presents some main fruit crops with time distributions.

TABLE 1. FRUIT PRODUCTION CALENDAR IN SOUTH VIETNAM

	Variety of fruits	Months											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Citrus												
2	Longan												
3	Mango												
4	Pineapple												
5	Pitaya												
6	Mangousteen												
7	Star apple												
8	Durian												
9	Sapote												
10	Rambutan												
11	Anona												
12	Papaya												
13	Langsat												
14	Jack fruit												
15	Jujube												
16	Guava												
17	Banana												
18	Barbados												

Legend	Season of crop	
	Peak of crop	

Table 2 presents the distribution of orchard in Can Tho province in 1996

TABLE 2. DISTRIBUTION OF ORCHARD IN CAN THO PROVINCE IN 1996

District	Ha of orchard	District	ha of orchard
Chau Thanh	11 930	Can Tho	3 210
Ô Môn	5 690	Thot Not	2 239
Phung Hiep	4 877	Vi Thanh	1 408
Long My	3 653		

Table 3 shows the area, yield and production of fruit crops in 2000 and the estimated potential for 2010 of Can Tho province.

TABLE 3. THE POTENTIAL AREA, YIELD AND PRODUCTION OF FRUIT CROPS OF CAN THO PROVINCE

	Variety of fruits	Year 2000			Potential (year 2010)		
		Area (ha)	Yield (Mt/ha)	Crop (tons)	Area (ha)	Yield (Mt/ha)	Crop (tons)
1	**Citrus**	40 000	10-15	400 000	45 000	12-16	450 000
2	**Longan**	50 000	07-15	480 000	60 000	07-17	900 000
3	**Mango**	32 000	12-16	350 000	40 000	12-16	460 000
4	**Pineapple**	22 000	12-17	310 000	23 000	12-17	325 000
5	**Pitaya**	8 000	12-15	85 000	8 500	12-15	90 000
6	**Mangousteen**	600	05-10	4 500	650	05-10	5 500
7	**Starapple**	1 300	10-16	17 000	1 300	10-16	17 500
8	**Durian**	5 000	10-15	25 000	6 000	10-15	60 000
9	**Sapote**	4 500	12-14	60 000	4 500	12-14	65 000
10	**Rambutan**	9 000	18-20	154 000	9 500	18-20	180 000
11	**Anona**	7 000	05-07	45 000	8 000	05-07	48 000
12	**Papaya**	500	20-30	13 000	500	20-30	13 000
13	**Langsat**	50	10-13	600	50	10-13	600
14	**Jack fruit**	1 000	15-20	17 000	1 000	15-20	17 000
15	**Jujube**	1 000	15-20	18 000	1 000	15-20	18 000
16	**Guava**	1 500	25-50	55 000	1 600	25-50	60 000
17	**Banana**	20 000	15-20	350 000	20 000	15-20	350 000

The area of orchards in Can Tho province doubled during the 1992-1995 period, especially the area of citrus plants increased fivefold (Table 4). The raised bed systems in Omon have been constructed much earlier than those in the surrounding districts. The first beds in Thoi Long village were constructed in 1930. The beds made before 1991 were a private initiative; recently the local agricultural office developed a plan for raised beds in order to boost the production of crops destined to Chinese markets.

TABLE 4. THE INCREASE OF CITRUS IN CAN THO PROVINCE FROM 1992 TO 1995

	1992	1993	1994	1995	% growth
Citrus (ha)	4 000	10 000	14 000	15 000	375
others (ha)	14 000	14 000	11 000	11 000	78.6
% citrus	22.2	41.7	56.0	57.7	35.5

Figure 3 and 4 show the shift in land use before and after 1996. This change consisted in either replacing rice fields with fruit plantations, in the case of recent beds construction, or replacing old plantations already on beds, in other cases.

The longan and orange areas have increased greatly, while sugar cane and rice fields have declined. Tangerine areas are also decreasing. Many crops such as bamboo, lemon and coconut tend to disappear, whereas mancau, sabo and rambutan are on the rise.

FIGURE 2. THE DISTRIBUTION OF FRUIT PLANTS OF THOI LONG HAMLET IN 1996.

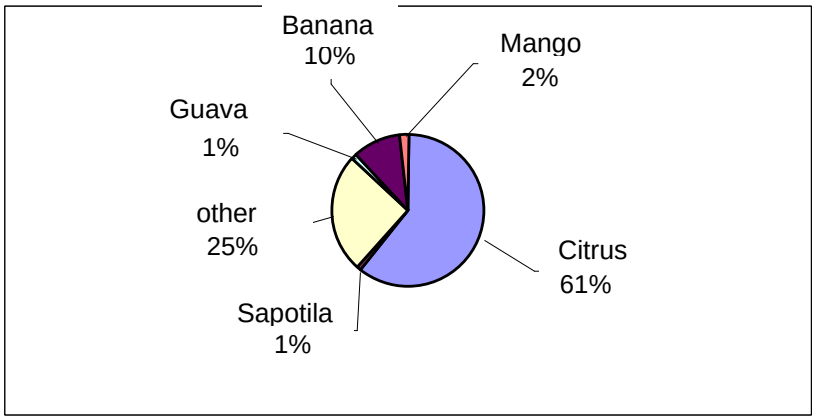


FIGURE 3: PREVIOUS CROPS REPARTITION IN % OF GARDENS SURFACE

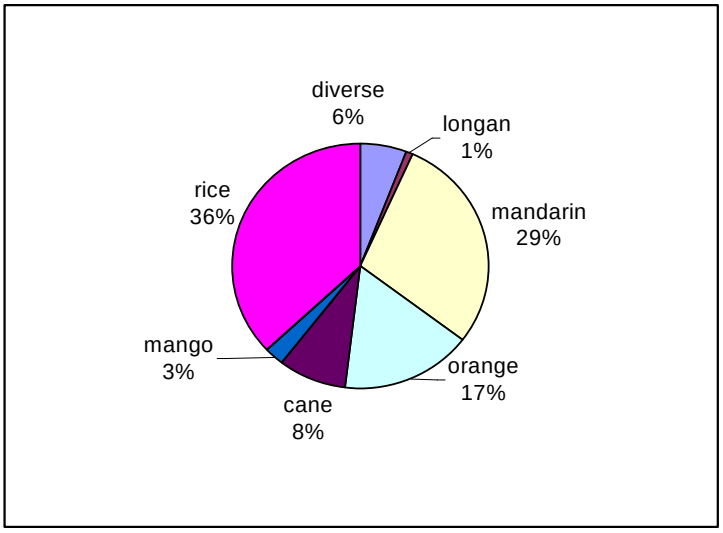
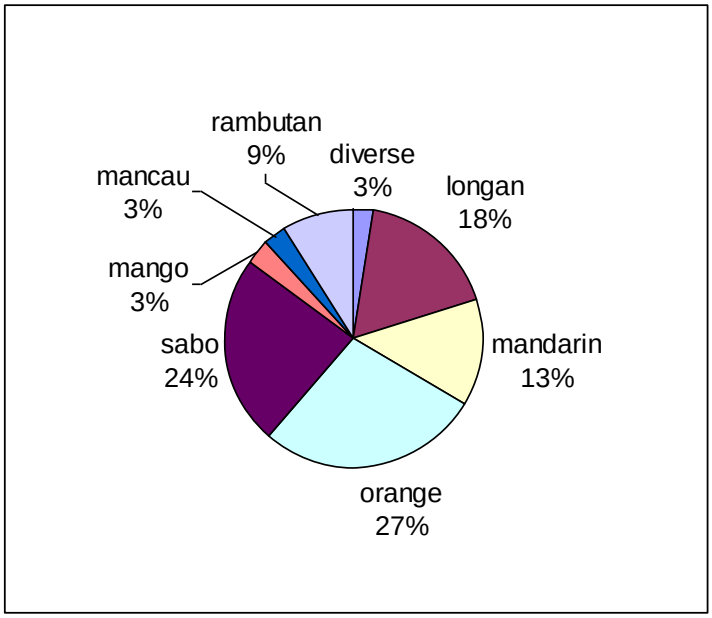


FIGURE 4: ACTUAL CROPS REPARTITION



The main reason for this evolution, as showed in Table 5, is the higher income that fruits provide compared to the income derived from rice and sugar cane. The evolution of fruit plantations (Table 6) is governed by diseases or environmental constraints that make some of them unsuitable for gardens or unprofitable for farmers, and by market considerations.

TABLE 5: REASON FOR CROPS CHANGE (IN PERCENTAGE OF FARMERS, ALL CROPS CONSIDERED).

Reason for change	Frequency (% of farmers)
1. Diseases on previous crops	14
2. Profit increase	59
3. Replacing old crops	2
4. Diversification (income security)	3
5. Unsuitable climate for previous crops	22
TOTAL	100

TABLE 6: PERCENTAGE OF FARMERS WHO CHANGED THEIR CROPS

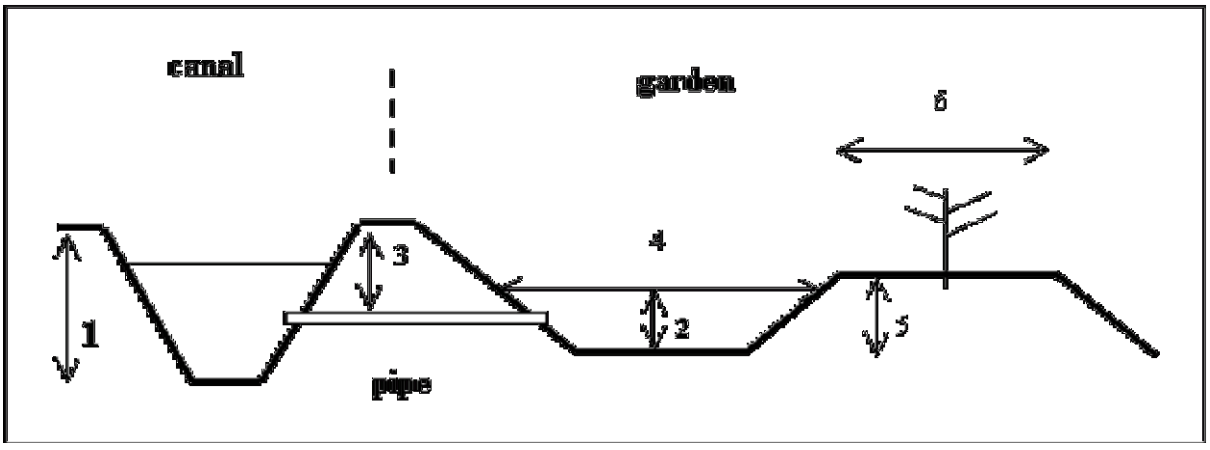
Crops	Reasons for change				
	1	2	3	4	5
Bamboo, bananas		100%			
Longan				100%	
Tangerine	33%	6%	6%	6%	50%
Orange	40%	20%			
Rice		100%			

The principal reason for the shift from rice to orchards is the difference in income. The income from rice with yield about 14 to 15 tons/ha (3 seasons) is about 3 to 5 millions Vnd/ha, while the income from fruits like mango, longan, rambotan and pitaya with a yield between 7 to 10 tons/ha is 14 to 40 millions Vnd/ha. However, the above figures do not include all the costs and fruit trees only yield full production after a few years.

7.2 Bed construction methods

In order to construct their orchard, farmers have to have a good understanding of the hydrologic condition of their lands. The height of their beds is usually set up equal to or higher than the flooding level. In areas where the flood level is highly uncertain, farmers usually make dikes around their orchards. The cross section of a raised bed system is presented in Figure 5.

FIGURE 5: CROSS SECTION OF A RAISED BED SYSTEM



The average dimensions of a cross section of an orchard are as follows.

TABLE 7: PARAMETERS OF ORCHARD CROSS-SECTION.

Description	Parameters of orchard
1 Height of the dike	2 m
2. Water depth	0.9 m
3. Depth of pipe	1.2 m
4. Ditch width (water)	3.5 m
5. Height of the bed	1.4 m
6. Width of the bed	6 m
7. Pipe diameter	0.3 m

7.2.1 Land transformation

Most raised beds in the study area were made out of former rice fields. Two types of transformations can be found. The first method is a gradual transformation, with farmers first raising mounds of earth in the rice fields, on which a seedling is planted. Every year, farmers add earth onto the mounds and gradually form the beds. The ditches are also progressively deepened and finally the rice field disappear (Figure 6). The second method is a direct full transformation. Vegetables are grown around the small trees to provide additional income.

FIGURE 6 : GRADUAL TRANSFORMATION

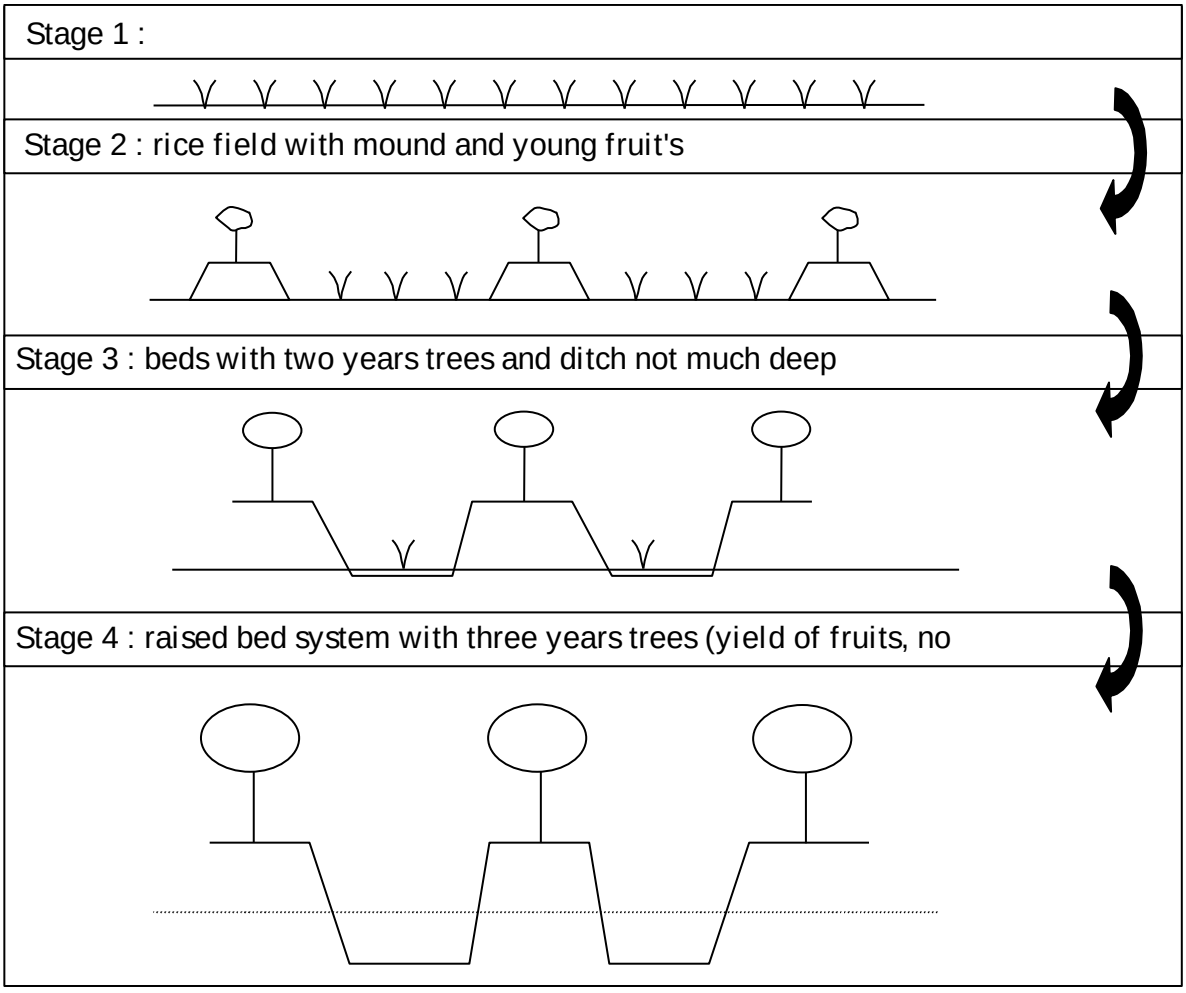
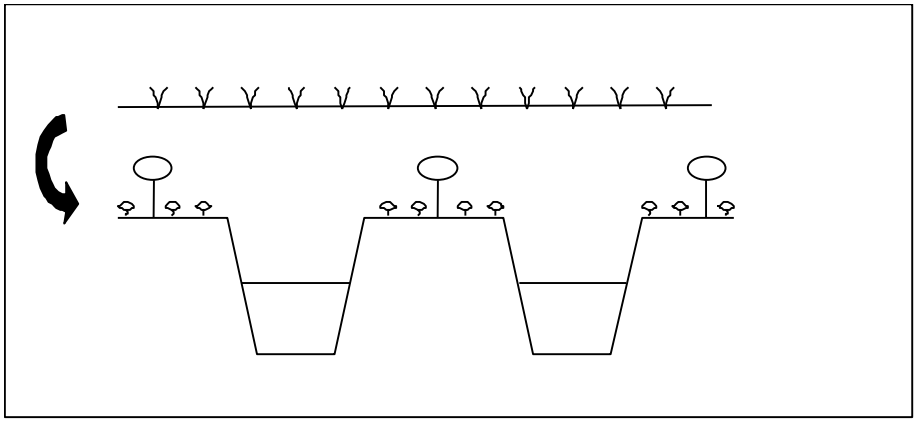


FIGURE 7: DIRECT TRANSFORMATION



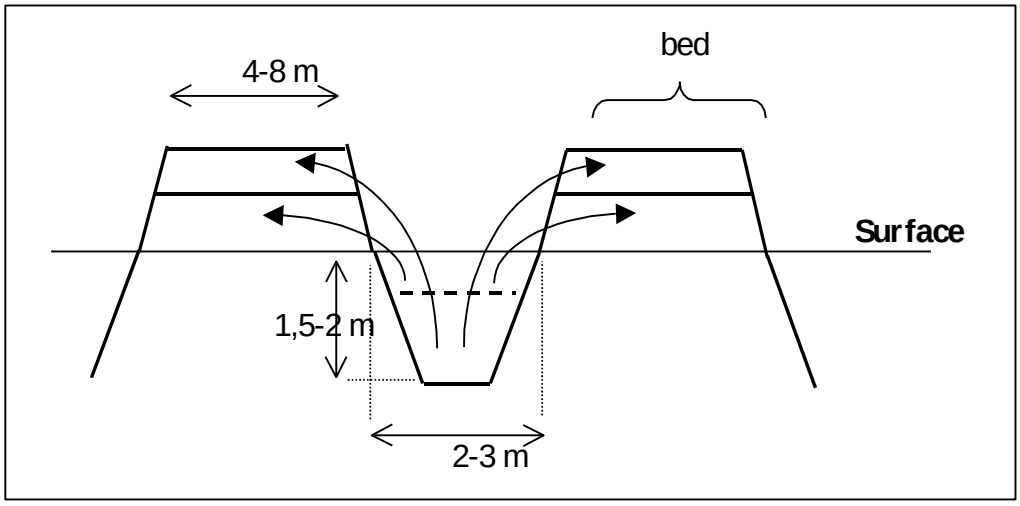
7.2.2 Bed formation

According to the available capital and topography, soil type, and water regime of the land, farmers use one of the three following techniques:

7.2.2.1 Simple bed

Beds are formed by simply digging ditches and raising lateral beds with the earth, as shown in Figure 8. Farmers who don't have sufficient capital prefer to apply this technique because it requires less labour. The cost is estimated of 5,500,000 Vnd/ha.

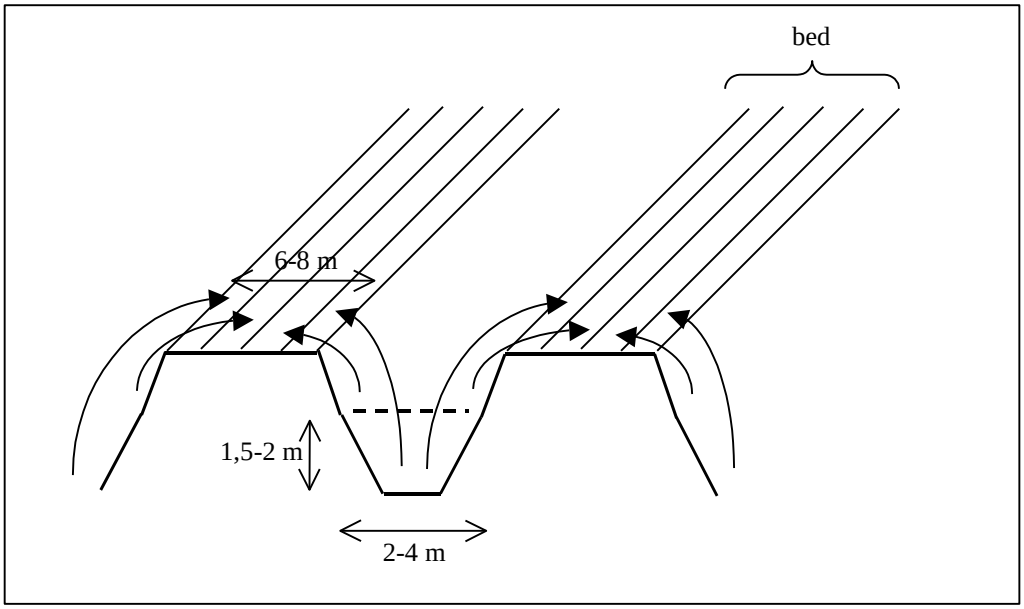
FIGURE 8:TECHNIQUE TO BUILD SIMPLE



7.2.2.2 Layered bed

In the areas where acid soil occur in the lower layer, the topsoil is filled in the middle of the bed, and the soil from lower layers, which is more acid, is filled on both sides of the bed (figure 9). Trees are not planted immediately; the beds are let fallowed during about one year until the soil texture of the beds is improved and the toxicity in the beds is reduced.

FIGURE 9. SPLIT BED

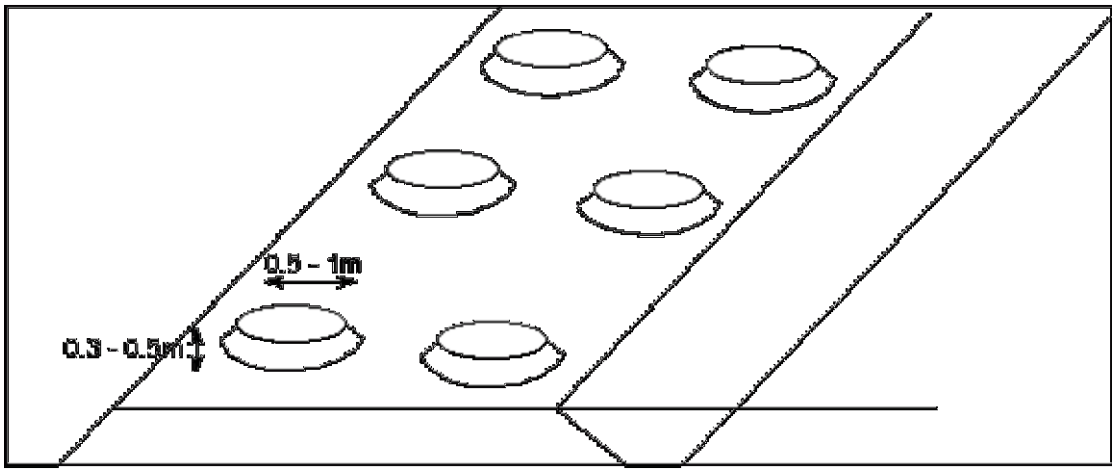


7.2.2.3 Earth mounds

In lowland areas, where in the rainy season waterlogging can rot the roots of fruit trees, farmers have to build mounds on the raised beds. Surface soil is used to form the mounds because of its higher organic matter content; sometimes the mud from canal is also used to form the mounds. However, in this case, the mounds have to be dried for 6 to 8 months. The dimensions of a mound are from 0,5 to 1 m in diameter and 30 to 50 cm in height. After one year, the mounds are strengthened by the alluvial mud which comes from the canal clean out.

At the same time, farmers build dikes around the raised bed system for protecting the orchard from the wind and floodwater in the rainy season, and for managing the water flows into and out of the raised beds. The dike level depends on the flood level.

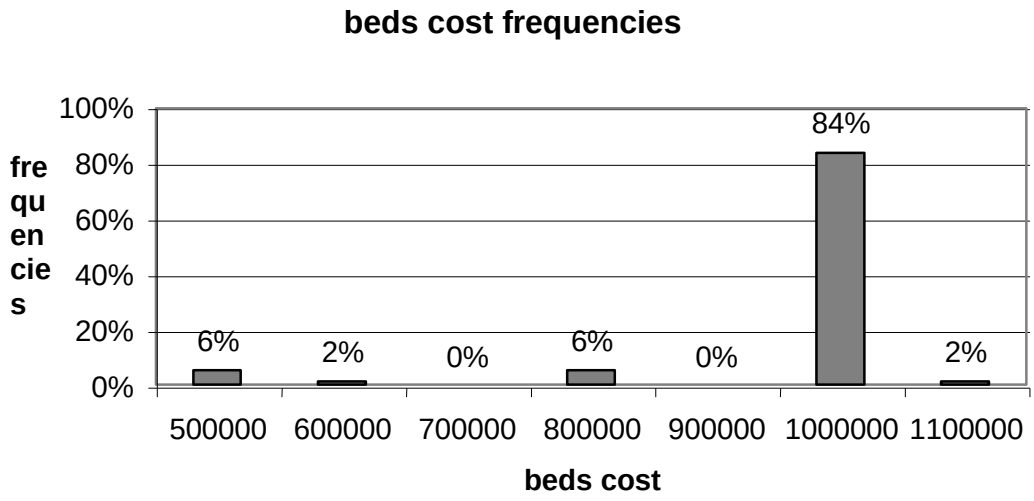
FIGURE 10: EARTH MOUNDS



7.2.3 Bed construction cost

The cost of bed construction was expected to be a function of topography and soil type. However, the interviews in Thoi Long hamlet did not point to any significant variation in beds construction costs. The reasons given by the interviewees were that the topography and the soil nature of Thoi Long is too homogenous to induce cost variations (Figure 11). (The intervention of technicians in the interviews may have also introduced a bias). The study in Long Dinh showed that the bed construction cost is governed by the type of transformation. For a gradual transformation, the cost varies from 3 to 4 million Vnd/ha, while for a direct transformation, the cost to build simple beds is around 5.5 million Vnd/ha, and the cost to build layered beds is in the 6.5 - 7.0 million Vnd/ha bracket.

FIGURE 11: BEDS COST FREQUENCY (% OF FARMS) IN VND

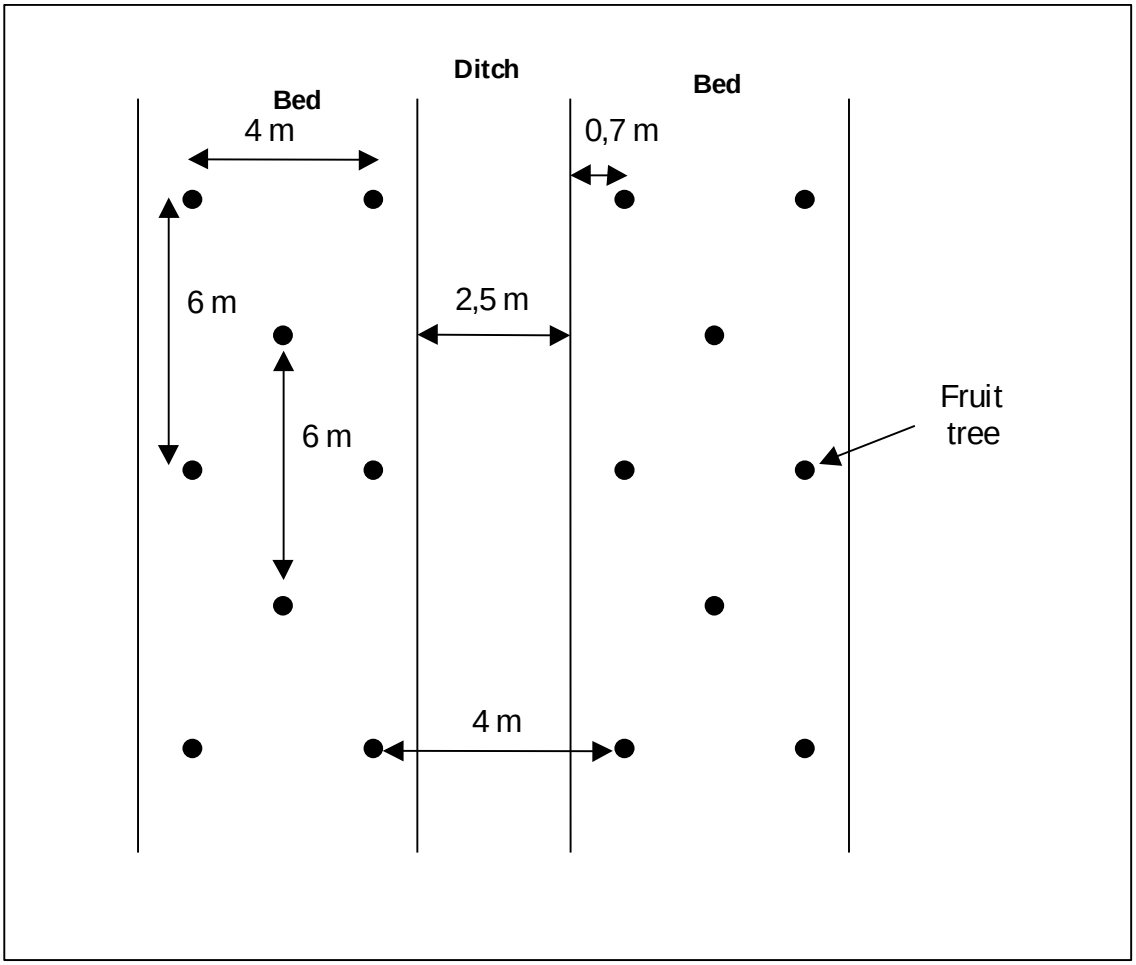


7.3 Tree patterns in raised beds

Two main types of tree density can be observed according to the capital available. Farmers either plant 200 to 300 trees/ha or 300 to 400 trees/ha. The first case can give production 4 to 5 years after planting and the yield is stable due to the low density of trees. The second case requires more investment and gives production after only 2 to 3 years but the yield will be reduced due to the high density of trees. When the trees are too high (6-7 years old), farmers have to cut the trees of the middle line in the raised beds. The maximum of income from orchards occurs between the fourth and the seventh year.

A four meter spacing pattern of young Thai mango trees is advocated by the fruit research centre (Figure 12). The number of trees per hectare in this model is 375.

FIGURE 12. PATTERN FOR YOUNG THAI MANGO TREES, 4 METERS SPACING



8 Water management in raised beds systems

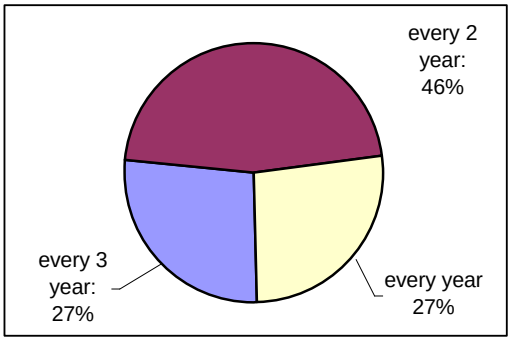
8.1 Raised beds location

Raised beds gardens are mostly located along the main rivers where land is high enough to allow farmers to control the flood easily (elevation from 0.8 m to 1.4 m) and they are concentrated nearby dwellings. The elevation of Thoi Long hamlet varies from 0.6 m (rice fields low lands) to 1.7 m (roads and houses).

8.2 Gardens elevation and dredging

In order to extract sediments and fertilise the gardens, farmers regularly dry up their canals. The topography map shows that raised beds are on average 0.1 m higher than the adjacent rice fields. Figure 13 shows that 46% of the farmers drain their canals every 2 years, and that this value is also the mean frequency.

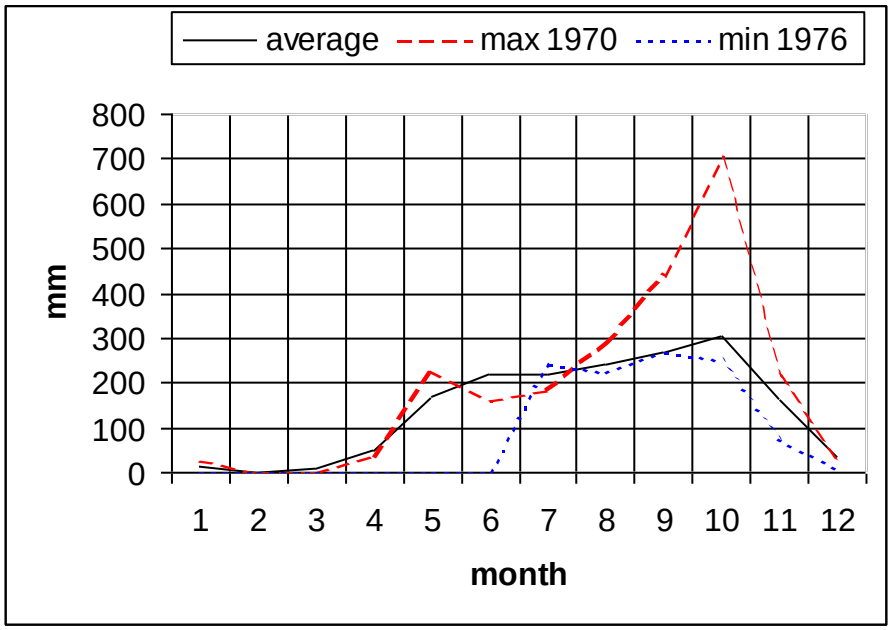
FIGURE 13. CANAL DREDGING FREQUENCY



8.3 Pumping in and out and inlet closures

Figure 14 shows the annual average rainfall of Can Tho province. The year 1976 had the smallest total rainfall (1065 mm), while 1970 had the highest total rainfall (2360 mm). Within a year, the rainy season begins at the end April of and ends at the end of November, while rainfall is maximum in October.

FIGURE 14. ANNUAL AVERAGE, MAXIMUM AND MINIMUM RAINFALL OF CAN THO PROVINCE



8.3.1 Dry season

February and March are the driest months of the year. During this period, rivers can dry up in some places. There is 0.9 m mean amplitude between low and high tides in the river.

A total of 50% of the farmers pump water from the river into their canals during the dry season (January, February, March, April), up to 15 days/month, that is 2 to 30 hours /month.

Only 27% of the farmers use flap gates as a canal inlet closure system. This system allows water to flow into the ditches at high tide (when the water level in the river is higher than that

in the plot) and closes itself at low tide, keeping water in the ditches for irrigation use. 75% of the farmers who use flap gates also pump water during dry season.

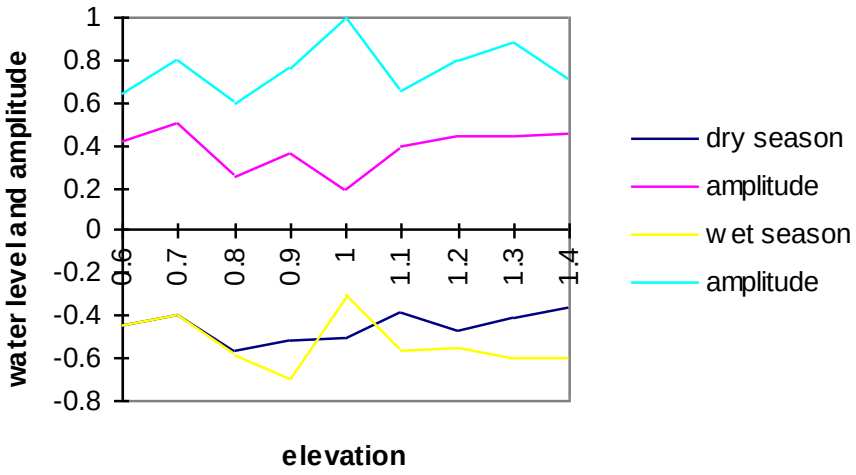
8.3.2 Wet season

September and October are the wettest months in which the risk of flooding is particularly high. As a consequence, farmers spend much time pumping water out of their plots during this period. During those two months most farmers obstruct their plot inlet using wooden boards (50% of the farmers) or rice stems (27%). The others use flap gates (27%).

As for pumping, 76% of the farmers used diesel motors, 21% used gasoline motors and the remaining 3% used electric motors.

During the wet season, farmers maintain the water level in the ditches lower than in the dry season (Figure 15) to prevent floodwater.

FIGURE 15. MEAN WATER LEVELS IN DITCHES AND AMPLITUDE OF VARIATION IN THOI LONG HAMLET



The study in Thoi Long showed no significant correlation between elevation and the water level that farmers maintain in canals (Table 8):

TABLE 8. CORRELATION BETWEEN ELEVATION AND WATER LEVELS

	Correlation Coefficient between water level in canals and elevation	RSQ
Dry season	0.44	0.19
Wet season	-0.37	0.14

There is also no direct relation between the total time of pumping out operations and the mean water level in the ditches (correlation coefficient =-0.47; RSQ = 0.22). We may also take into account the elevation and the power of the pump motor (Table 9):

TABLE 9. RELATION BETWEEN PUMP POWER AND PUMPING OUT TIME ACCORDING TO ELEVATION

Elevation	Number of values available	Correlation coefficient pump out time/pump power	RSQ
0.8	8	0.754	0.57
0.9	11	0.21	0.04
1.1	5	0.963	0.93
1.2	19	0.16	0.025
1.3	4	-0.71	0.5
1.4	5	0.9	0.8

Relations between the time of pumping out and the power of the pump could be identified only for elevations of 0.8 m, 1.1 m and 1.4 m. But for these elevations, only a few data were available.

8.4 Flood and tide regime along the Hau river

FIGURE 16. HYDROLOGICAL STATIONS.

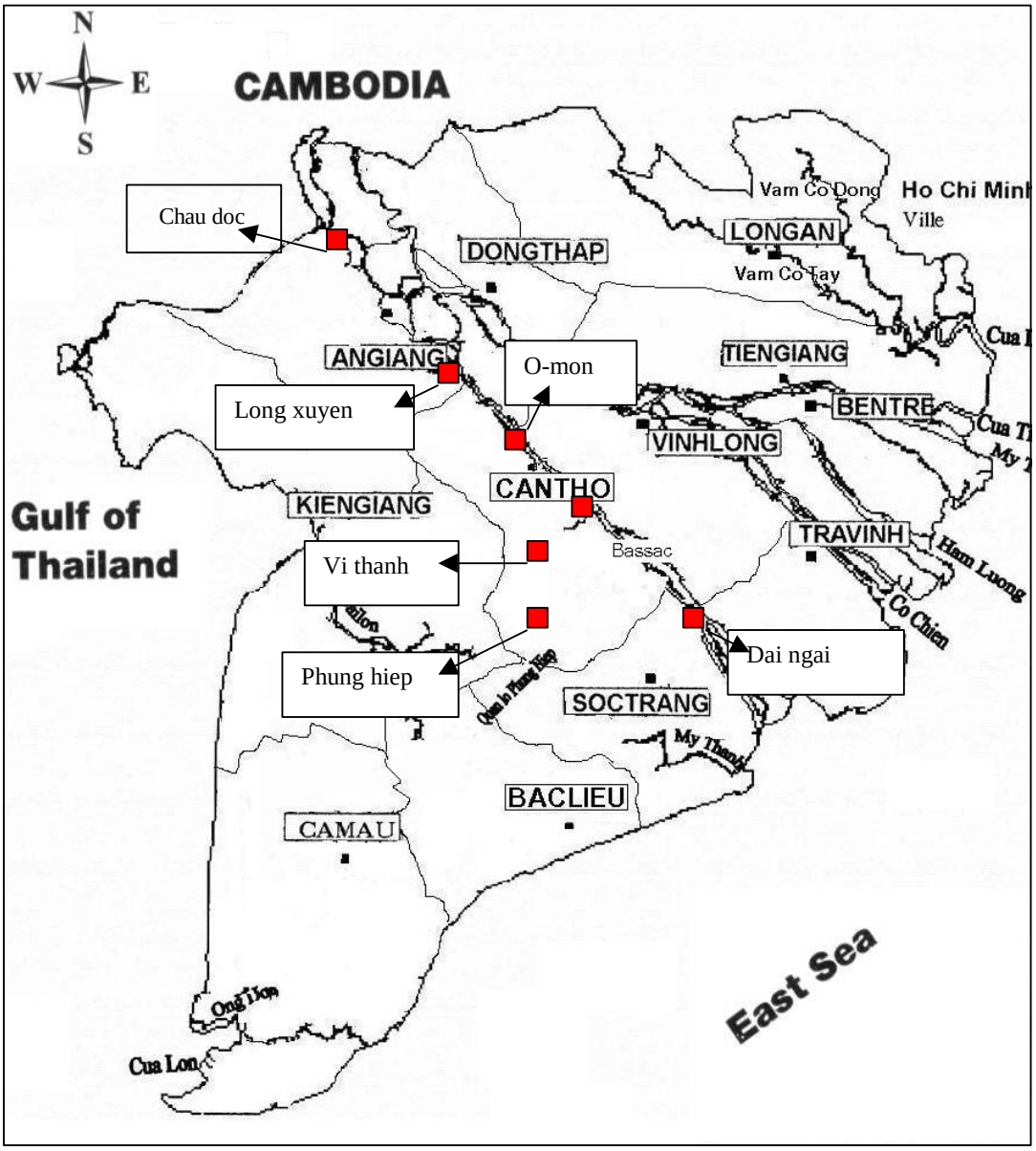
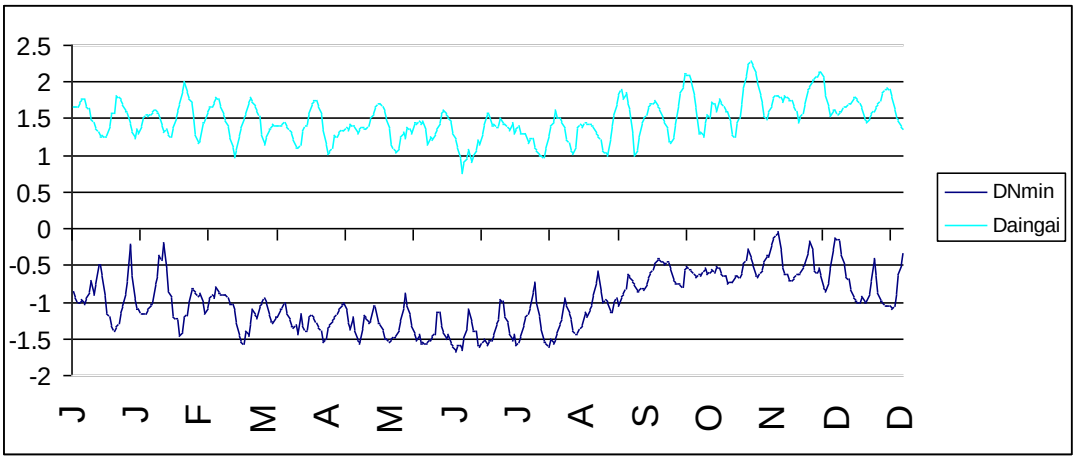


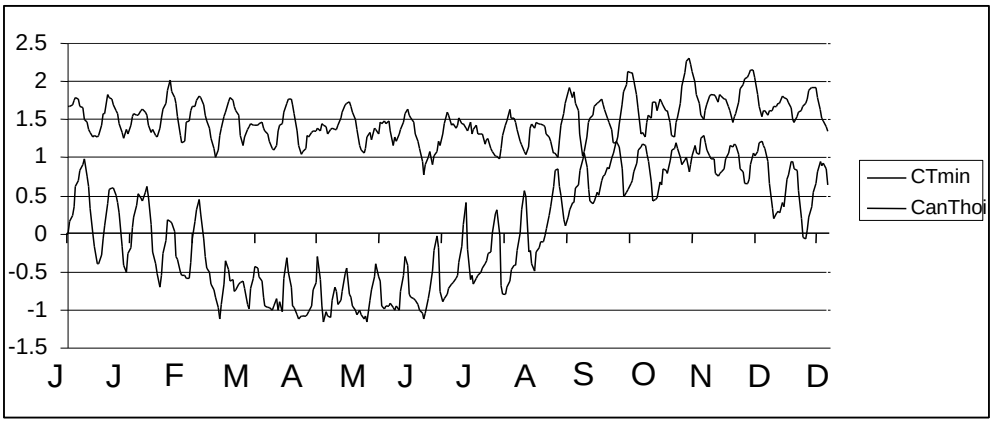
Figure 17 shows the hydrological stations which data were used in the study. The highest tide and lowest tide, at Dai Ngai, Can Tho, Long Xuyen and Chau Doc station (along the Hau river) in 1984 is shown in Figure 17, 18, 19, 20, and their comparison appears in Figure 21.

FIGURE 17. TIDE AT DAI NGAI STATION



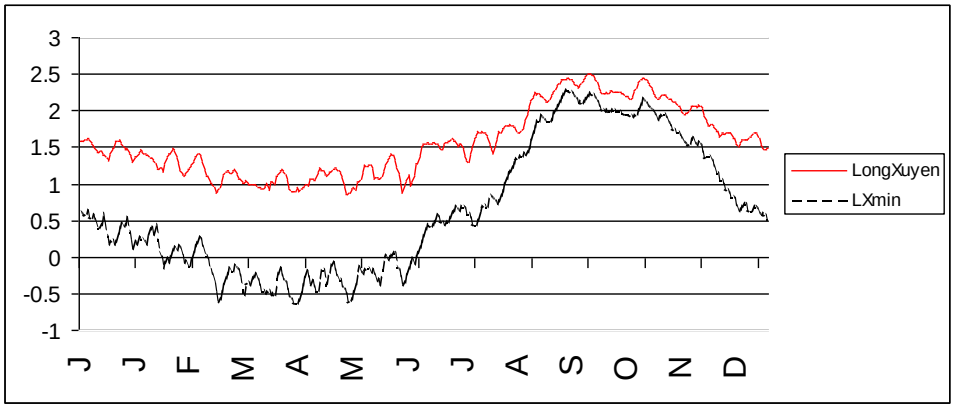
Dai Ngai is located near the estuary; however, it is still affected by floods from September to December.

FIGURE 18.TIDE AT CAN THO STATION.



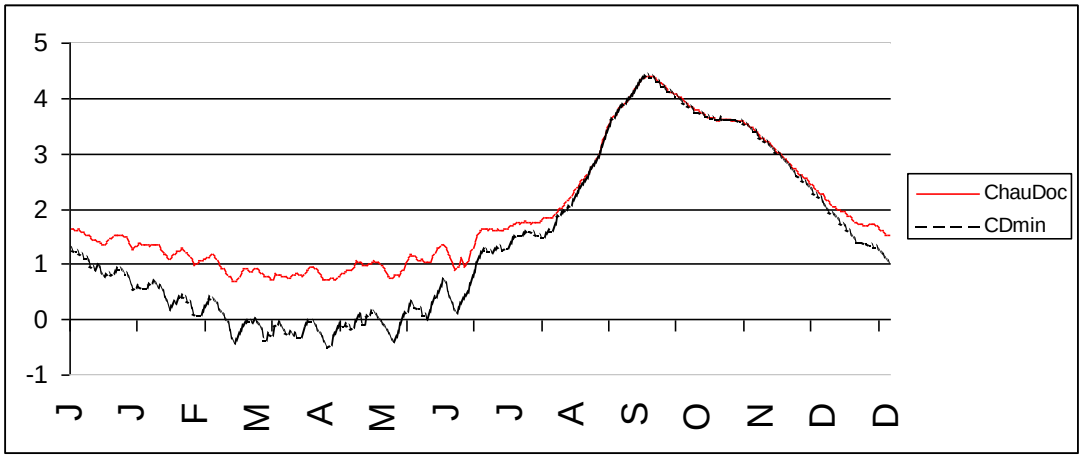
The flood in Can Tho is rather strong but with small amplitude and causes difficulties for gravity drainage.

FIGURE 19. TIDE AT LONG XUYEN STATION



Long Xuyen is affected by flooding between August and November and the tidal effect is almost non existent. The tide affects the area between February and May, even though it rather far from sea (about 100 km).

FIGURE 20. TIDE IN CHAU DOC STATION



Chau Doc is strongly affected by flood during July to December, and is still affected by tide during February to May.

FIGURE 21. COMPARISON THE TIDE AT DAI NGAI, CAN THO, LONG XUYEN, CHAU DOC STATION.

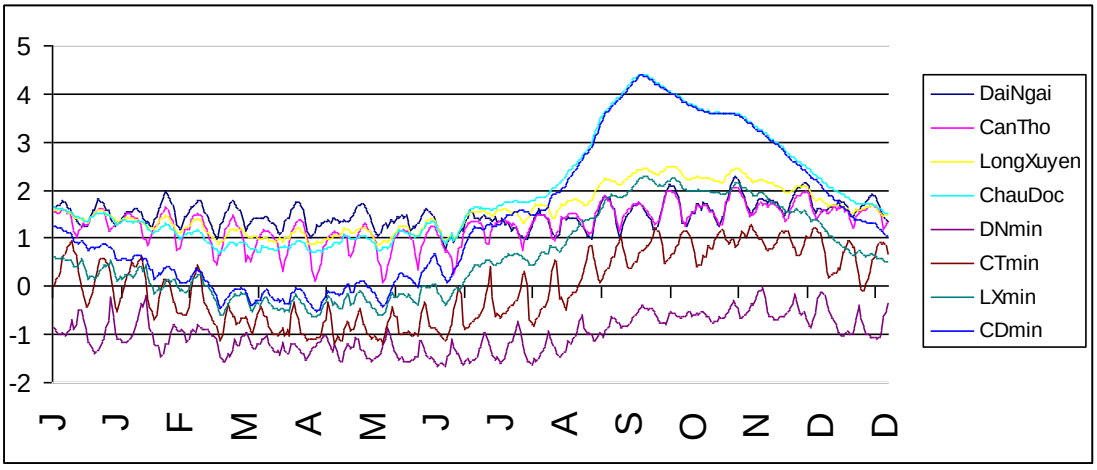


TABLE 10. COMPARISON THE TIDE ALONG HAU RIVER

Station	1	2	3	4	5	6	Distant
Dai ngai	2.29	-1.67	3.96	0.24	3.27	1.52	0
Can Tho	2.06	-1.18	3.24	0.64	2.33	0.08	45 km
Long xuyen	2.5	-0.63	3.13	1.1	1.62	0.15	98 km
Chau doc	4.4	-0.52	4.92	1.7	1.25	0	148 km

Table 10 shows that:

1. The highest tide (usually happening during the flood season) is at Chau doc station. It indicates that the flood season does not influence the tide (the graph shows that the highest and lowest tides coincide).

2. The lowest tide (usually occurring in the dry season) declines from Tan Chau towards the sea. This shows that the influence of the tide goes up very far in the dry season.

3. The tide amplitude in the dry season decreases along the stream by 2 m over a distance of 150 km.

Figure 22 shows that the stations are about 50 km far away from one to another and are not phased. The highest tides are delayed by more than 1 hour and the high tides are decreased by 20 cm respectively.

FIGURE 22. COMPARISON OF TIDES AT DIFFERENT STATIONS

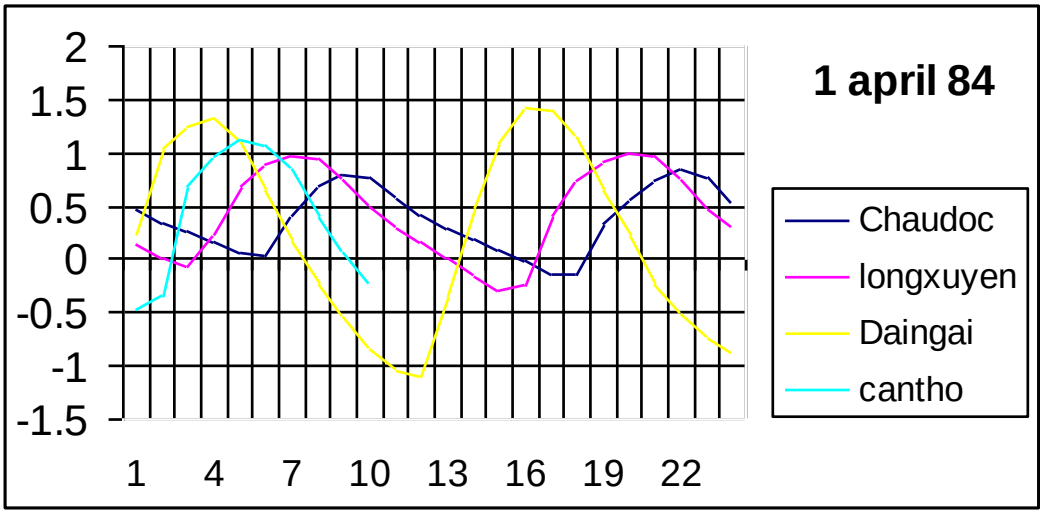


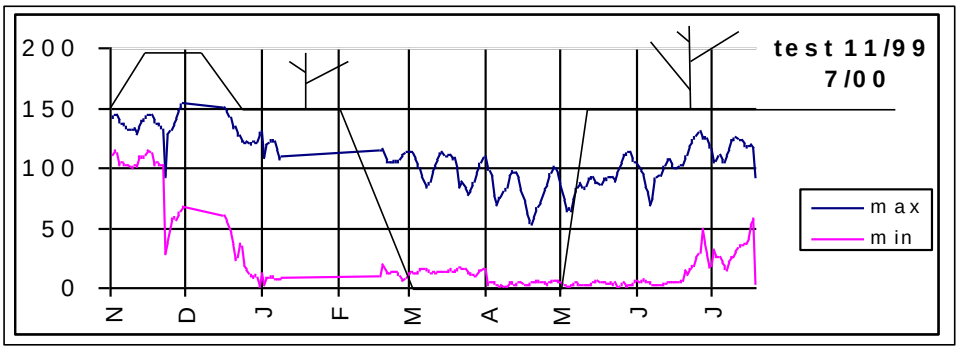
TABLE 11. COMPARISON OF HIGHEST TIDE HEIGHT

Stations	Hour	Highest tides (m)	decrease
Dai ngai	6	1.32	
Can Tho	7	1.12	0.2
Long xuyen	9	0.98	0.14
Chau doc	11	0.79	0.19

8.4.1 The tide at Can Tho and at the monitoring sites

Figure 23 shows the tidal movement observed at the canal outside of the orchard from November 1999 to July 2000.

FIGURE 23. COMPARISON OF TIDE FLUCTUATIONS AT THE PLOT STUDIED.



In November, the highest tide was as high as the top of the beds but lower than the top of the surrounding dikes. In addition, the lowest tide was rather high, about 40 cm below the top of the beds. Therefore, if there was any rain during that period, water would need to be pumped out.

In other months, the highest tide was only 50 cm below the top of the beds, while the lowest tide went down to more than 150 cm below the top of the beds. That made the gardener easy to maintain the water level in his orchard by simply controlling the opening/closing of the drain. The analysis of tide data at O Mon, Vi Thanh, and Phung Hiep stations showed that gravity irrigation and drainage could be applied easily in those areas (figure 24, 25, and 26).

In case of heavy rainfall during the flood season, the gardener must pump the water out. However, during dry season, the gardeners rarely had to pump water into their orchards.

FIGURE 24. COMPARISON OF TIDE LEVEL AND ORCHARD CONSTRUCTION IN O MON.

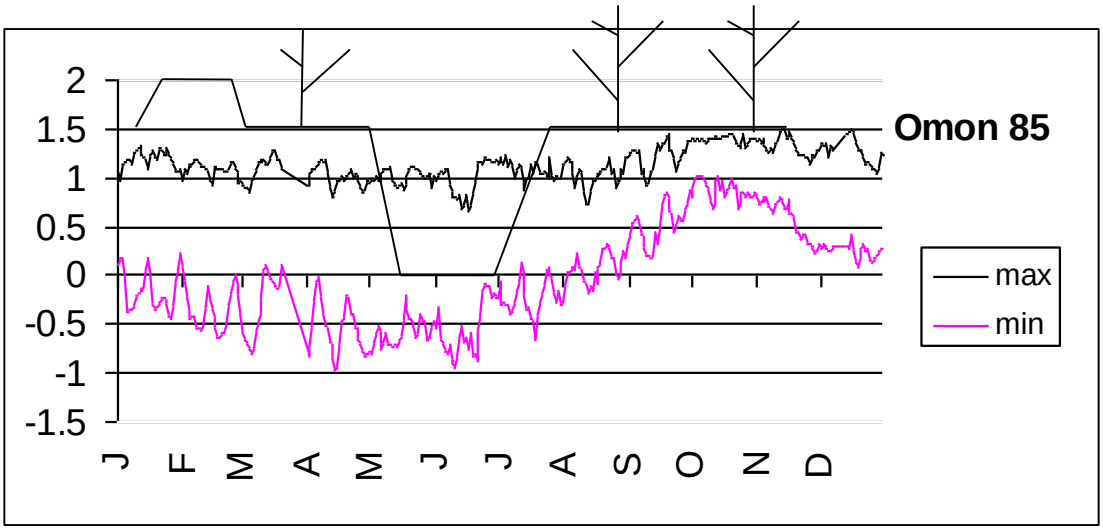


FIGURE 25. COMPARISON OF TIDE LEVEL AND ORCHARD CONSTRUCTION IN VI THANH.

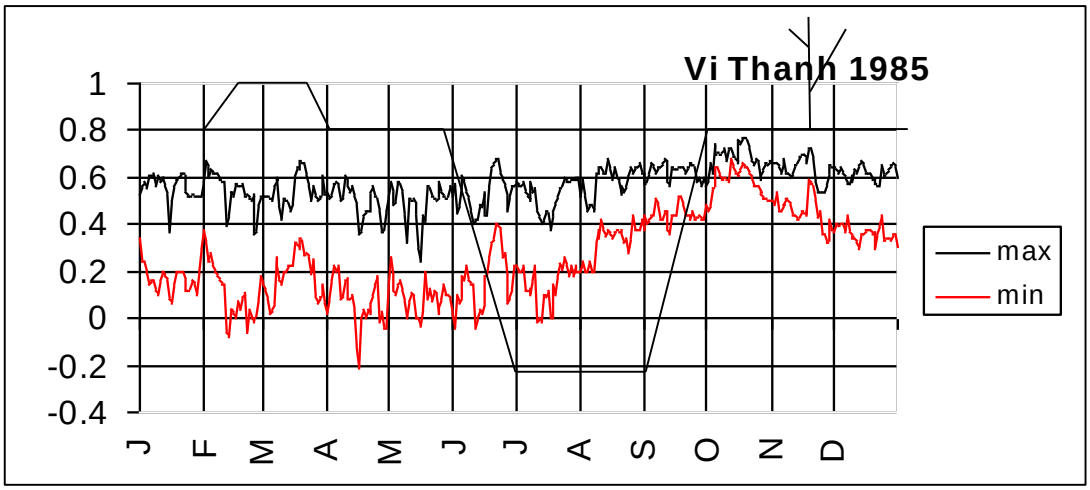
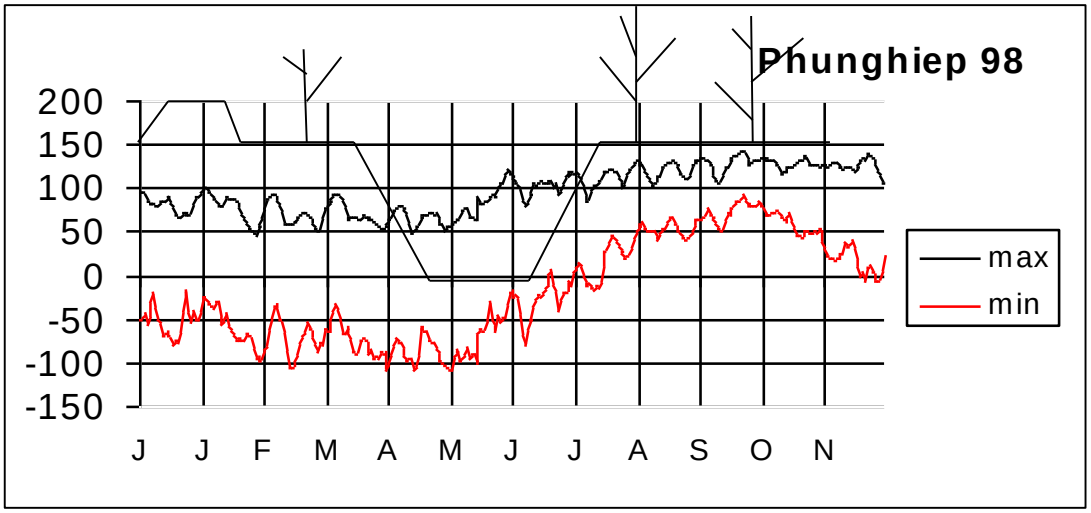


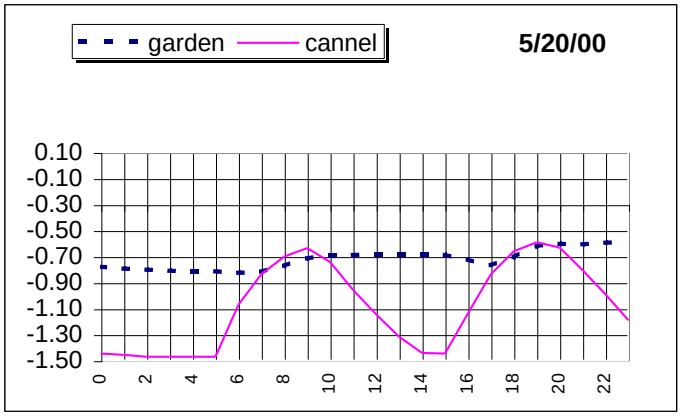
FIGURE 26. COMPARISON OF TIDE LEVEL AND ORCHARD CONSTRUCTION IN PHUNG HIEP.



8.4.2 Gravity irrigation for the orchards

Figure 27 shows that in the dry season, farmers can take water by gravity into the internal ditches trough pipes when the water level is high enough; the pipes are then closed when the water level decreases.

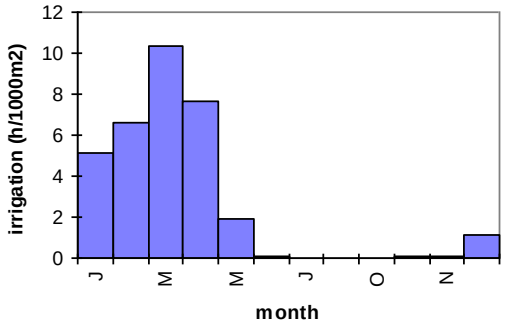
FIGURE 28. CHANGES IN WATER LEVEL IN THE ORCHARD DUE TO AUTOMATIC OPENING/CLOSING OF THE DRAIN



8.4.3 Crops irrigation and equipment

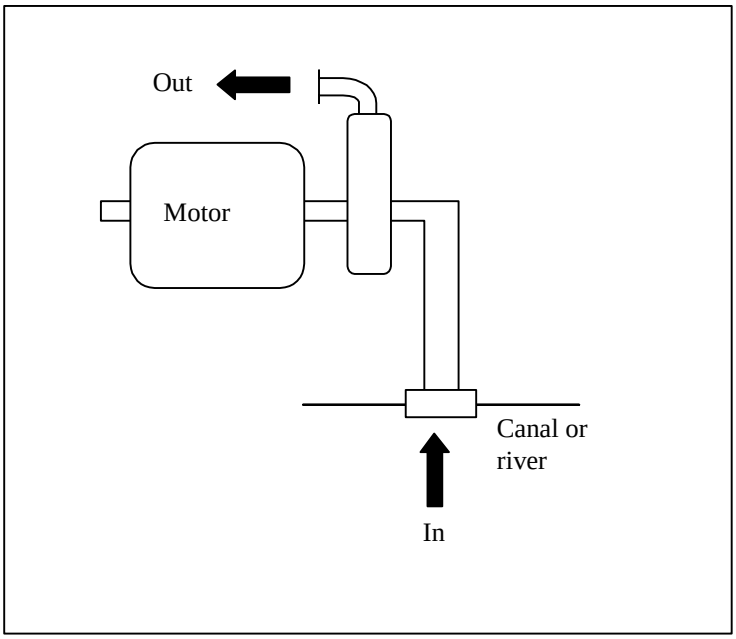
Figure 29 shows the average time spent by farmers to irrigate their gardens. 70% of farmers use boats and sprayers, 28% of farmers use motors and hoses, and only 2% use buckets.

FIGURE 29. AVERAGE TIME FOR IRRIGATION (H/1000M2)



In the South-Eastern part of Ho Chi Minh City, farmers use pump with a hose (figure 30) to irrigate the fruit trees, 2 to 3 times per month, and 3 to 4 months per year according to the tree age. It must bring 20 litres for a young tree and 50 to 100 litres for a 5 years old tree. Only some rich farmers own a sprinkler irrigation system. Electric motors or tractor motors are used.

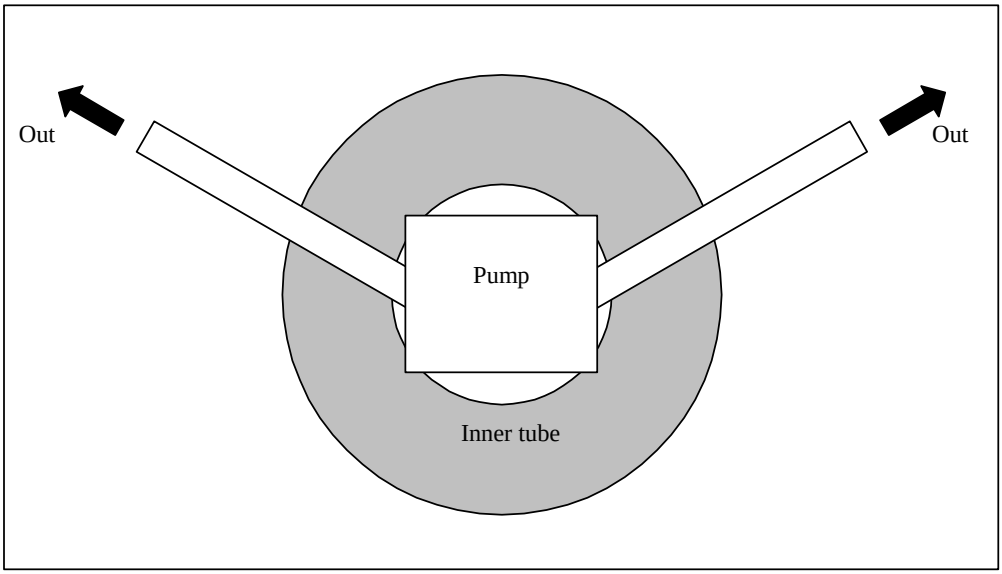
FIGURE 30. TRADITIONAL PUMP



In the Mekong delta, farmers use the same type of pumps but the method is different. In fact, the land surface is higher and the gardens are smaller, so tractors can not be used except in some provinces like Tra Vinh. The pumps are less powerful, from 3 to 5 horsepower in general.

The farmers couple the pump with a little raft, so that the pump can be moved along the ditches in the garden for spraying the trees around (Figure 31).

FIGURE 31. PUMP ASSOCIATED WITH A "INNER TUBE RAFT"



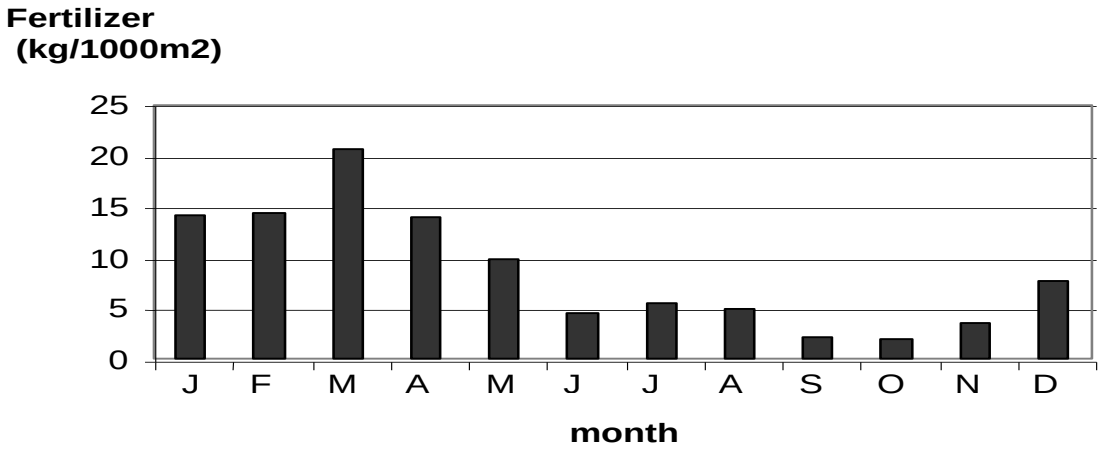
The studies carried out by the research centre showed that this equipment is effective for one hectare of fruit garden. But the investment is out of the reach of many farmers (only a half in the Mekong delta).

A new complete pumping set with a Mitchubishi 3,5 hp motor cost about 3,5 million Vnd. However, farmers can bargain and get an older one for 2,5 million Vnd. Most farmers own equipment acquired in such a way.

9 Inputs management and costs

Figure 32 and 33 show the average quantity of fertilisers which farmers use and the mean cost of pesticides per month. Treatments are mainly applied during the dry season.

FIGURE 32. AVERAGE QUANTITY OF FERTILIZER USED BY FARMERS



1. FIGURE 33. AVERAGE COST OF PESTICIDES OVER A YEAR.

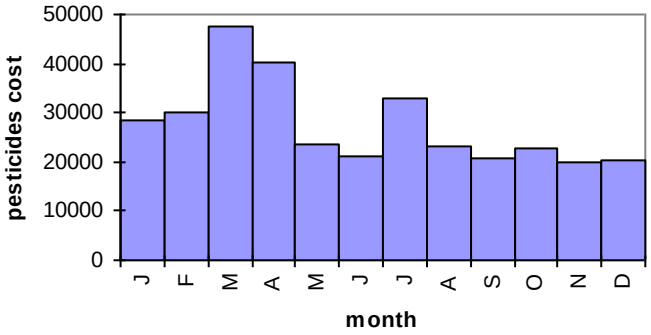
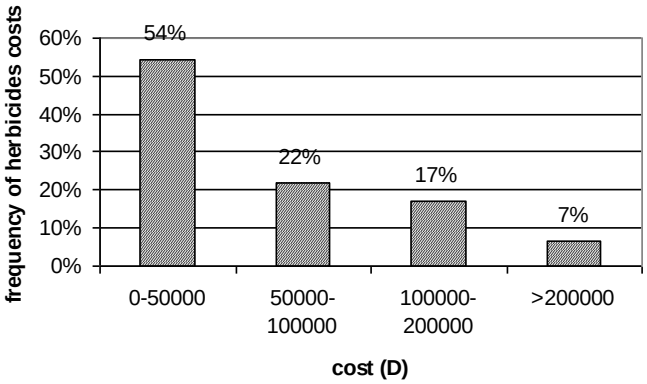


Figure 34 shows that over a year, 54 % of the farmers spend less than 50.000 Vnd for buying herbicides: most of them prefer using hand work.

FIGURE 34. FREQUENCY OF HERBICIDES COSTS AMONG FARMERS



10 Development of a water management model

A model representing a plot and all the flows of water (rainfall, inflow, outflows) was developed under Excel and Visual Basic. It simulates the water balance of the plot and records the operation that are needed for water management. These operations depend upon the hydrograph of the water level outside the plot, on the plot topography and on the rules that govern the water level in the ditches. A higher plot with a low tidal effect, for example, will need much pumping in, while lower plots will need more pumping out.

The purpose of this model is to calculate the:

- Time of pumping water in and out of the raised bed system
- The volume of pumped water in and out of the raised bed system
- Total volume and percentage of water that is irrigated or drained; by gravity or by pumping.

In the model, the following data have to be input:

- The total area of the raised bed.
- The land/water area of the raised bed (plot geometry).
- The size of the pipe.
- Type of fruit tree with the required hmax, hmin levels with their duration.
- Tide regime.
- Rainfall

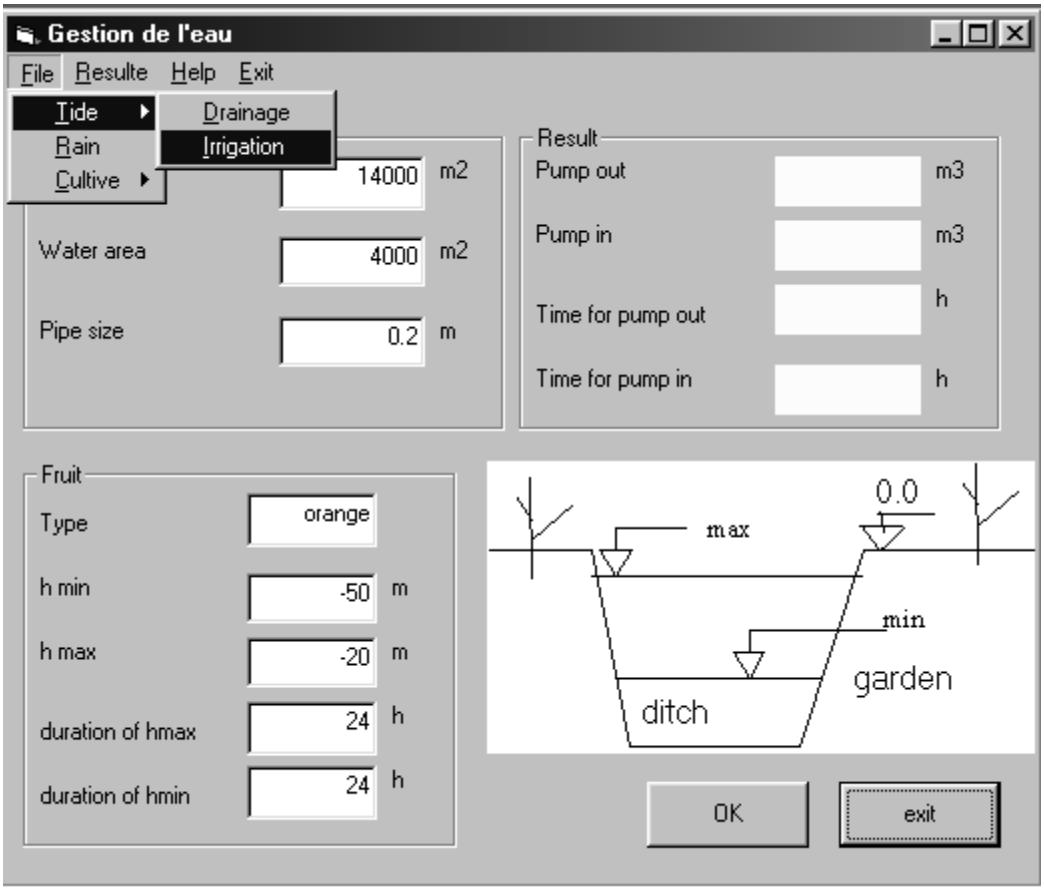
The surveys show that the farmers daily supervise the water level in the ditches and that they tolerate a difference in water height of more or less 10 cm with regard to the required level (0,7 m).

The interface of the model is presented in Figure 35.

For each day, the program compute rainfall, seepage, infiltration, evaporation, evapotranspiration of trees, and calculate the new water level in the ditch. This water is to be maintained close to an optimal value Ho and is allowed to fluctuate between Hmin and Hmax. When the water level gets over Hmax, then an operation of drainage is triggered. This operation is carried out by gravity if the fluctuation of the water level outside the plot allows it, and by pumping in the opposite case. If needed farmers will drain both by gravity at low tide and pumping at high tide. If the water level drops under Hmin, similar operations aimed at filling the plot up to the Ho level are triggered, by gravity, or by pumping if this is not possible.

In case the pipe (gravity) or pump (pumping) capacity is not sufficient to get the water level back in the Hmin-Hmax bracket, and index of stress is computed (and cumulated until the situation is back to normal). If the number of days under Hmin or over Hmax is higher than certain limits, then yield reduction is considered to occur.

FIGURE 35. MODEL INTERFACE



Testing the model

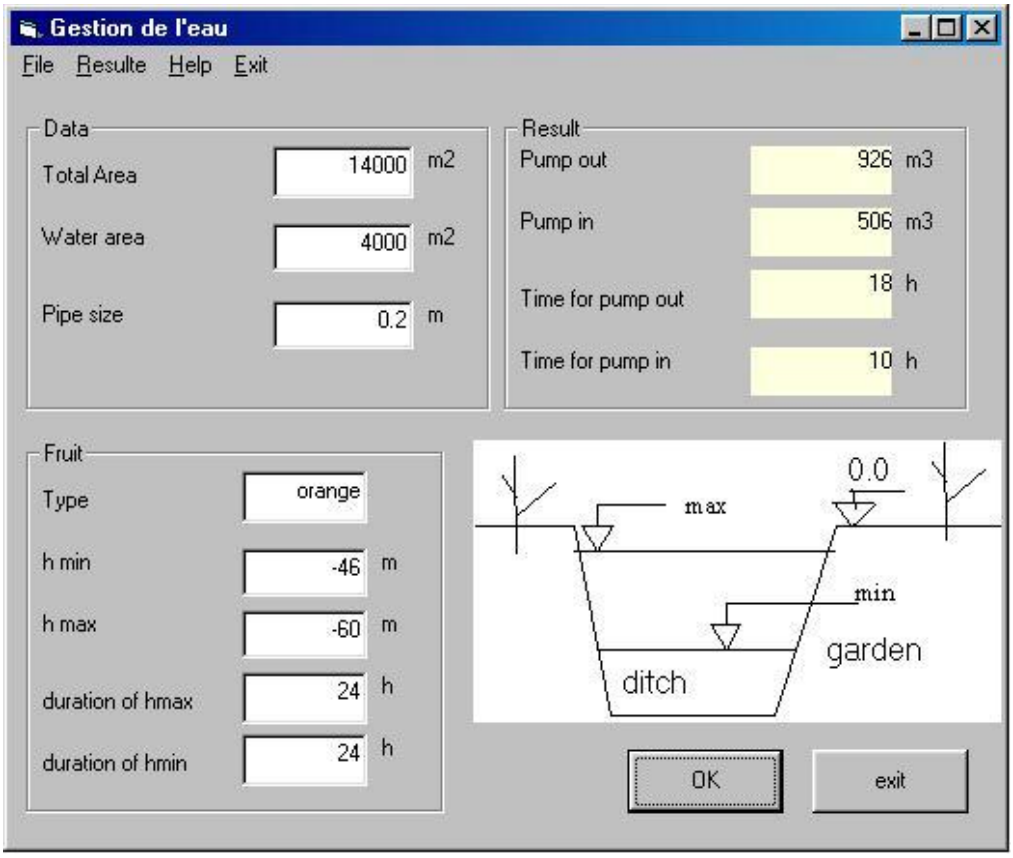
Data have been collected in the experimental site in Omon to test the model. The time to pump out were asked from farmers. Table 12 shows an example of field data.

TABLE 12. DATA COLLECTED AT THE EXPERIMENTAL SITE.

Day	Rain (mm)	Time for pump out (hour)
11/1/99	17.5	2
11/8/99	20.7	2
11/12/99	4.7	
11/13/99	20.7	2
11/14/99	49.3	4
11/15/99	44.5	4
11/28/99	35.0	4
Sum	182.4	**18**

The results are presented in figure 36.

FIGURE 36. RESULTS



The results show that the total hours to pump out coincided with the experimental data.

The consistency of the model could be totally tested within the framework of the project, including test of parameters sensitiveness. The following table provides an example of occurrences of pumping operations for 10 years of precipitations and two hydrograph in the canal.

Table 13. Frequency of operations for each year and 2 situations of reference for the water level

	1989 (dry)				**1998 (rainy)**			
Year	Drought risk	Pump out	Pump in	Flood risk	Drought risk	Pump out	Pump in	Flood risk
70	0	5	18	5	1	5	5	13
76	0	4	21	4	3	2	5	15
77	0	4	20	7	2	3	9	14
78	0	8	19	2	0	8	6	10
79	0	9	18	4	2	8	8	12
80	0	4	20	4	2	2	7	11
81	0	4	19	3	3	2	8	10
82	0	7	17	6	2	6	5	13
83	0	7	21	3	3	5	7	14
84	0	7	19	2	2	5	4	14
85	0	4	18	4	1	2	3	15
86	0	5	14	3	2	2	3	15
87	0	5	20	6	2	3	8	13
Sum	**0**	**73**	**244**	**53**	**25**	**53**	**78**	**169**
Aver	**0**	**6**	**19**	**4**	**2**	**4**	**6**	**13**
dev	0,0	1,8	1,9	1,6	0,9	2,3	2,0	1,8

Testing different situations shows clearly that drainage problems do not occur in years which have maximum daily or yearly rainfall, but in the case of a sequence of medium to heavy precipitations over a period of several days.

More work is required to draw the full benefit from this programme.

FIGURE 37. TOTAL VOLUME AND PERCENTAGE OF DRAINAGE BY GRAVITY AND BY PUMPING IN DRY SEASON

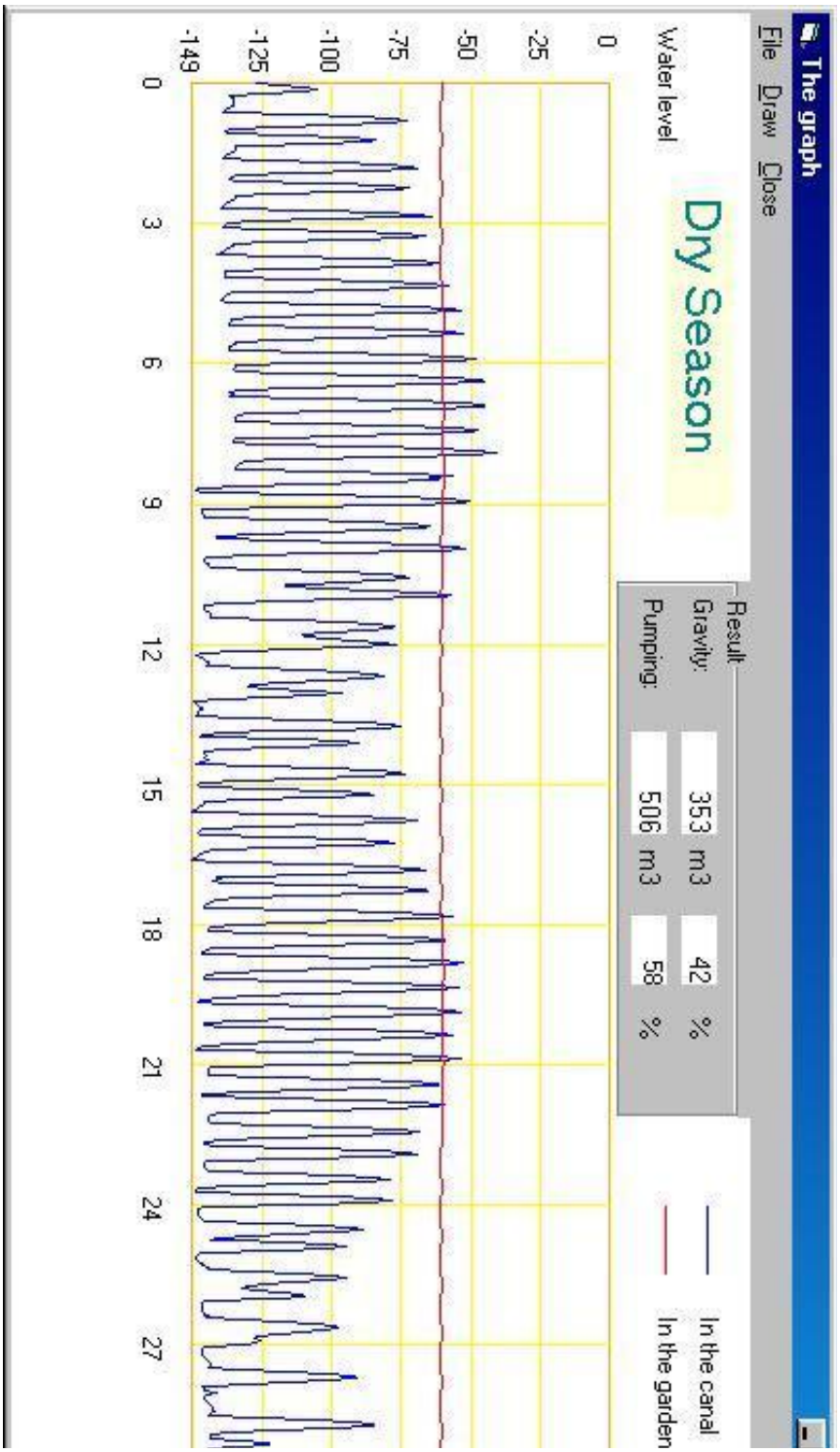
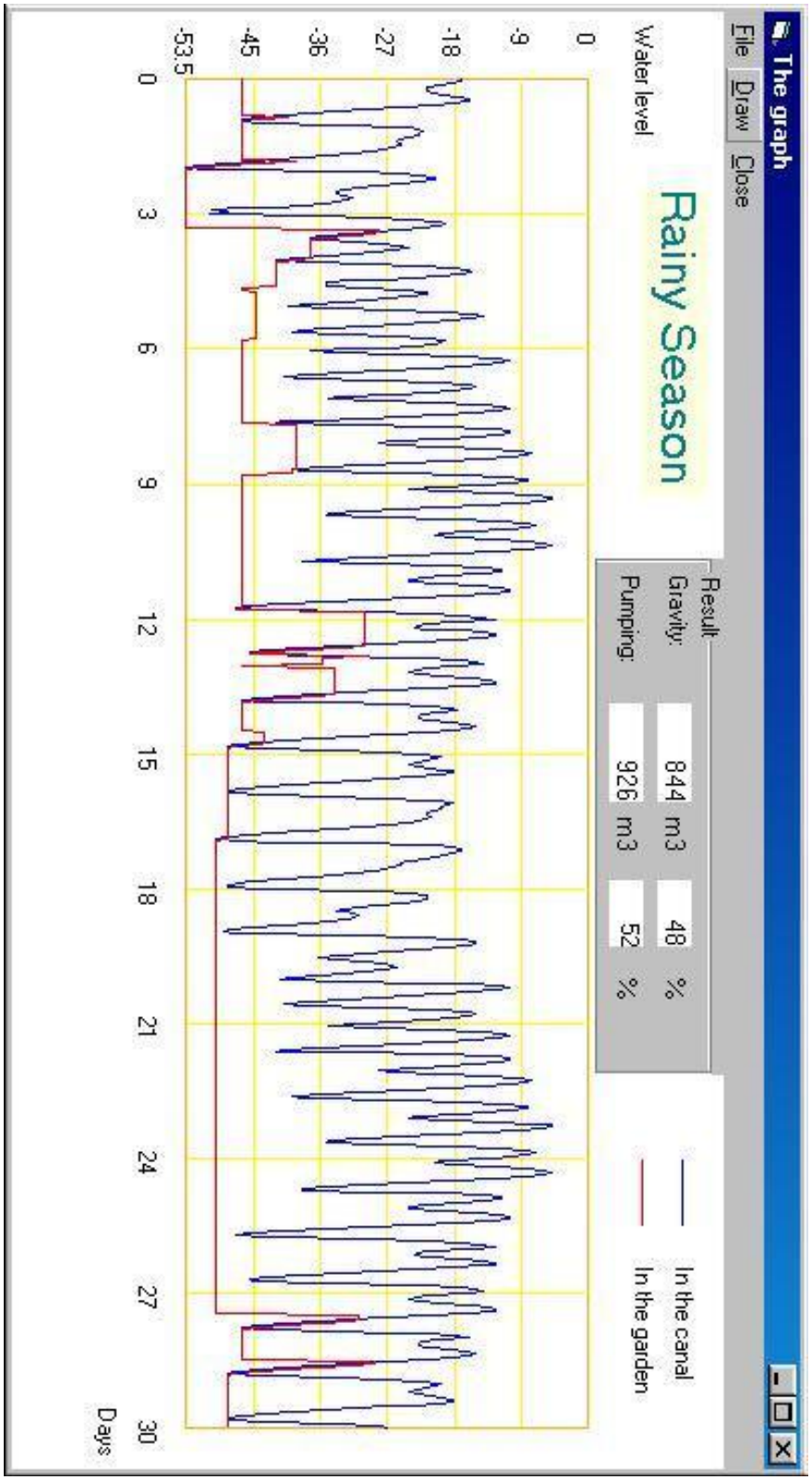


FIGURE 37. TOTAL VOLUME AND PERCENTAGE OF IRRIGATED BY GRAVITY AND BY PUMPING IN THE RAINY SEASON



11 Conclusions

1. The potential to establish new fruit orchards in Can Tho is very high because the water management of orchard in Can Tho is more favourable than in other provinces, the fresh water is available year round.

2. Land use in the Mekong Delta in general or in Can Tho in particular has considerably changed, both in terms of planting area and in type of plants.

3. Farmers are well experienced with fruit tree raised bed construction. However, the stability of plantations is still poor because of price fluctuations and natural disasters.

4. For orchards in Can Tho as well as in most parts of the Mekong Delta, drainage is normally giving way to some problems, but irrigation is not.

5. The results of tidal movement comparison show that tide and topography are interrelated due to the accumulation of solid elements. In other words, the lower the topography is the lower the highest tide and the amplitude are.

6. The research has solved the problem of calculating water equilibrium in the orchard according to hourly tide changes and daily rainfall.

7. A model has shown how the different parameters (topography, tidal effect, rainfall pattern, etc) impact on the needs for pumping and on the risk of flood. It was initially planned to use the model to show in which conditions investments and risk would be acceptable but this objective could not be achieved.

Appendix

Data on the rain in the province of Omon of 1949 to 1987

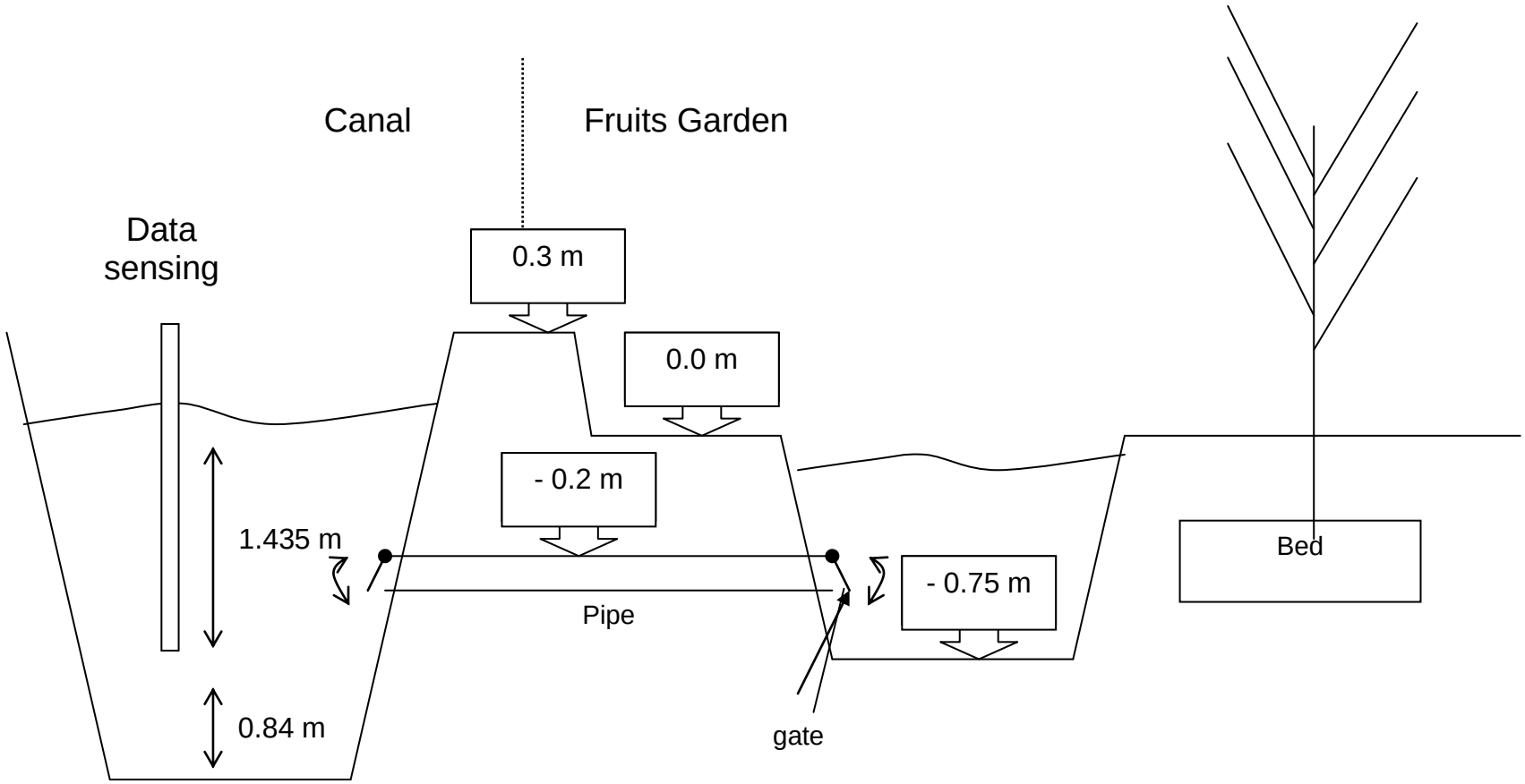
	1	2	3	4	5	6	7	8	9	10	11	12	Tot
1987	0.0	0.0	0.2	4.8	50.8	246.4	141.1	167.2	292.9	276.5	259.6	26.0	**1465.5**
1986	1.5	2.0	22.4	11.8	196.0	171.2	204.8	143.6	421.9	303.5	315.8	36.5	**1831.0**
1985	0.2	11.9	19.1	137.4	278.0	187.6	122.7	289.6	200.3	257.4	128.8	15.3	**1648.3**
1984	35.3	0.0	1.7	110.8	130.7	352.1	91.9	269.6	236.8	203.1	78.5	24.0	**1534.5**
1983	0.3	0.0	0.0	0.0	168.0	240.3	261.2	307.6	330.0	319.4	153.2	17.8	**1797.8**
1982	0.0	0.0	13.5	41.2	157.7	154.5	361.5	318.5	273.0	316.6	80.0	23.0	**1739.5**
1981	2.9	0.0	0.0	5.4	233.0	296.5	110.0	235.0	244.5	306.4	164.2	32.1	**1630.0**
1980	0.0	0.0	28.3	3.9	258.6	350.9	126.0	220.1	167.8	343.6	162.6	42.5	**1704.3**
1979	0.0	0.0	0.1	117.9	86.1	168.9	321.8	223.1	224.1	157.7	161.8	14.0	**1475.5**
1978	0.0	0.0	2.7	12.1	177.4	334.8	260.0	206.9	347.3	147.8	189.7	25.4	**1704.1**
1977	1.4	0.0	0.0	0.4	83.6	118.0	166.2	269.5	233.0	172.0	169.8	4.7	**1218.6**
1976	0.0	0.0	0.0	0.0	0.0	0.0	243.0	223.3	269.5	251.1	74.3	4.5	**1065.7**
1972	26.8	0.0	0.0	76.0	59.2	264.3	216.2	233.8	261.7	349.2	145.4	36.6	**1669.2**
1971	0.0	0.0	0.0	36.5	351.2	428.6	230.8	392.7	124.7	489.6	49.1	96.0	**2199.2**
1970	26.2	0.0	0.0	34.7	230.1	161.0	184.4	291.1	437.0	703.8	216.2	23.8	**2308.3**
1969	58.2	10.7	0.0	4.5	89.5	194.6	266.4	209.1	456.4	387.5	18.0	41.3	**1736.2**
1968	0.0	0.0	0.0	69.5	185.0	168.8	203.1	299.4	96.1	264.9	67.0	2.5	**1356.3**
1967	84.5	0.0	5.5	72.2	211.0	182.3	337.7	313.6	261.7	436.9	46.3	0.0	**1951.7**
1966	2.5	1.5	71.3	65.5	384.7	240.6	322.2	265.9	261.5	410.7	167.0	51.2	**2244.6**
1965	0.0	0.0	0.0	39.5	239.6	149.1	157.4	114.9	319.4	502.3	130.0	34.8	**1687.0**
1964	0.0	0.0	0.0	18.3	430.8	215.0	266.5	230.8	157.5	225.9	218.5	71.5	**1834.8**
1963	6.8	0.0	0.0	0.0	112.3	158.2	165.8	219.5	227.0	283.0	468.5	4.3	**1645.4**
1962	13.8	0.0	0.0	24.5	116.5	153.0	219.2	379.9	348.2	495.5	34.6	8.0	**1793.2**
1961	0.0	3.8	1.5	151.7	193.9	348.3	195.3	231.1	212.5	218.0	46.7	0.0	**1602.8**
1960	5.0	0.0	13.2	1.7	88.9	290.9	317.4	217.2	234.3	134.5	306.4	58.6	**1668.1**
1959	0.0	0.0	53.5	17.8	103.2	231.3	301.7	187.4	127.5	465.8	35.2	49.2	**1572.6**
1958	14.5	0.0	16.9	34.5	248.4	137.2	151.1	210.8	144.0	250.8	142.9	0.0	**1351.1**
1957	4.9	0.2	0.5	3.9	75.3	114.0	221.3	299.8	198.3	168.6	78.1	0.0	**1164.9**
1956	0.0	4.0	0.0	130.6	155.2	170.2	267.5	188.3	305.9	307.3	226.8	121.9	**1877.7**
1955	0.0	0.0	0.0	31.5	148.3	154.3	102.0	136.6	228.1	177.0	392.3	9.8	**1379.9**
1954	0.0	0.0	5.0	0.0	137.7	141.1	166.3	312.4	374.9	219.0	125.6	14.5	**1496.5**
1953	0.0	5.0	27.0	86.0	201.0	278.0	148.5	176.0	294.7	278.5	188.7	56.0	**1739.4**
1952	0.0	10.2	31.5	29.0	222.7	223.5	203.9	191.2	445.2	433.2	141.7	0.0	**1932.1**
1951	1.8	0.0	0.0	103.8	209.3	283.5	424.5	263.0	463.4	174.3	191.7	16.5	**2131.8**
1950	88.9	0.0	0.0	106.8	54.8	291.4	245.9	234.0	235.8	160.5	244.6	94.2	**1756.9**
1949	82.7	3.7	0.0	130.5	112.4	208.7	154.4	210.7	209.3	322.0	111.3	6.3	**1552.0**

Average 1977-1987 = 1613.55

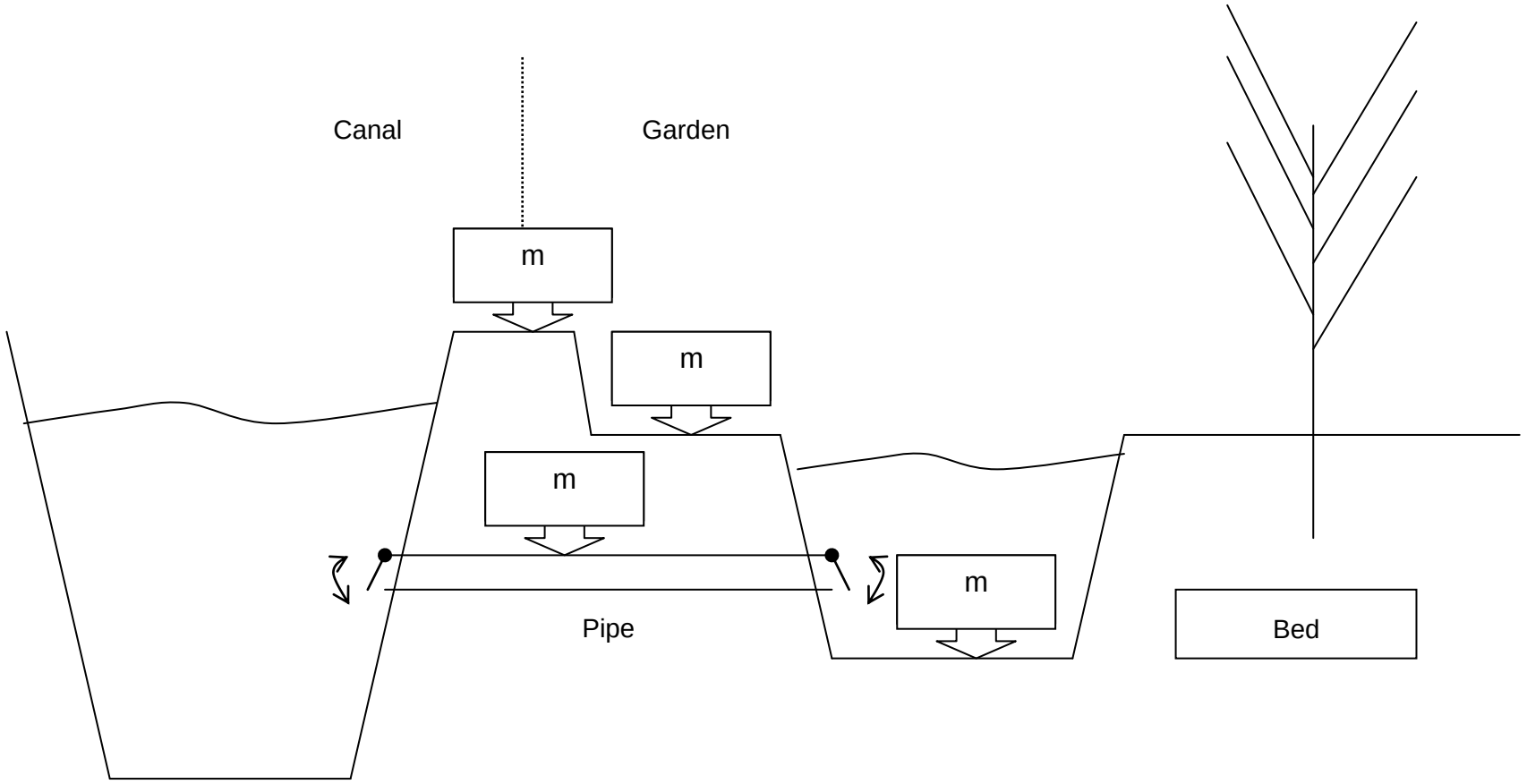
Evaporation in the province of Omon

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
2.8	3.3	3.6	3.3	2.4	2.0	2.0	1.9	1.7	1.6	2.1	2.3	2.4
5.6	6.0	5.9	6.2	4.7	4.6	4.4	3.7	3.6	3.7	5.2	4.6	6.2
1.2	1.1	1.1	0.6	0.4	0.5	0.3	0.4	0.4	0.4	0.6	0.7	0.3

Typical cross-section of an orchard



Typical bed cross-section



Part III

A study of marketing of longan, cucumber, bittermelon and tomato in Can Tho province

Nguyen Phu Son

Bcs Nguyen Thi Cam Chi

Bcs Lam Ngoc My Trang

Bcs Nguyen Minh Chau

Bcs Tran Minh Hai

Bcs Tran Phi Hung

Bcs Nguyen Duc Loc

Bcs Nguyen Van Thach

1 Introduction

After 1989, as Viet Nam had become a big rice exporter, the issue of diversification in the rice-based farming systems also started to come the fore, especially in the Mekong Delta. Up to now, diversification has been considered as a strategy to increase production and households' income while the price of rice was decreasing. In recent years, farmers who designed these models themselves have applied many production models.

The scale of diversification has developed substantially. For example, the rates of average increase in areas of annual crops of Can Tho province were 0.7 % and 7.4% for the periods of 91-95 and 96-98, respectively. Also, these figures in yield were 0.9% and 13% for the respective periods (*Statistical Yearbook of Can Tho province, 1997)*. Up to 1998, about 5,411 ha of various kinds of vegetable were planted in Can Tho province (*Statistical Yearbook of Can Tho province, 1998).* The expected trend in vegetables set up in the master plan of Can Tho agricultural field for 2010 is 18,600 ha. The same can be said for fruit trees, with an average rate of growth in area for the 1994 – 1996 period of 7.75%, and 10% for the period of 1997 – 1999. Up to now, the area for fruits in the Mekong Delta was over 200,000 hectares, occupying about 50% of the total fruit area in the whole country. The area for longan was the highest, accounting for 17% (approximately 40,000 hectares). Although the government has started investing in technology and finance, there are still many issues questioned, such as (1) what kind of crops/trees farmers should grow; (2) how is the market for a given crop, and (3) how does the market operate, etc… So far, it is clear that farmers are facing too many risks caused by a low technological level and a lack of market information on products. Besides, some other operators along the marketing channels are also facing many problems in trade. Therefore, a detailed study on some selected crops and operation of actors along the marketing channels is very necessary in order to supply useful information to all participants in the field of agricultural businesses as well as to anyone paying attention to the markets of agricultural products.

2 Research objectives and methodology

The general objective of this research is to describe the marketing channels of some agricultural products from the producers to consumers and analyse the functioning of the market as well as examine the factors affecting the price setting mechanism.

Specific objectives are:

- To examine the market structure of some selected products.
- To describe the marketing channels and market institutional arrangements of selected products and how they operate, as well as arrangements for sales and purchases of these products and the types of arrangements.
- To describe market prices of selected products and price setting practices.

Although there are many provinces belonging to the Mekong delta that have a large area growing fruit trees and vegetables, such as Tien Giang, Vinh Long, Ben Tre, etc., because of

time and fund constraints we have conducted this research on Chau Thanh district, Can Tho province. The two villages included in this research are Dong Thanh hamlet and Tan Phu Thanh village. Over 100 farmers who were either growers of vegetables and fruit trees were interviewed, as well as a total of over 20 collectors and 20 retailers, 10 processors, 4 wholesalers, in order to collect information on production and processing costs. Some of the collectors and processors coming from Vinh Long were included in this sample. Marketing costs, and marketing margins were analysed. The marketing channels of the products were sketched out including the estimated percentage shares of each channel. The record of past prices could not be found. The information on seasonal variations of market prices was based on the recollection of records of interviewed agents.

The study was limited by two factors:

– The study area only included Chau Thanh district, Can Tho province and Vinh Long province.

– The selected crops were comprised of *Tieu Da Bo* Longan for fruit trees and Cucumber, bitter melon, tomato for vegetables

3 A review of main economic parameters for main crops compared to rice

As it is well known, one of main reasons leading to the diversification of rice-based fields was that the economic efficiency of rice was lower than that of longan and almost all annual crops including annual industrial crops, vegetable and beans, etc. To see what were the economic efficiency of rice and longan as well as some kinds of vegetable, a review of their main economic parameters is presented below

3.1 For cucumber, bitter melon and tomato

Table 1 shows that the labour requirement for growing vegetables was much higher than that for growing paddy (at least 5 times as much). The cash costs invested in growing vegetables and total revenues obtained were also much higher than that in growing paddy. This shws that growing vegetable allowed farm households to make a better use of family-labour as well as it required them to invest more for operating capital. As a result, farm households received a higher gross margin from growing vegetables compared to doing paddy so that the gross margin obtained on man-day of farm households growing vegetables was higher than for those growing paddy. Economically, all the financial ratios presented in Table 1 indicate that the economic efficiency of growing vegetable was higher than that of growing paddy. Indeed, if the ratio of gross margin on cash cost of paddy was 0.53, these figures of cabbage, field-radish, and watermelon were 2.34, 1.51 and 2.81, respectively. The same applies to the two remaining ratios.

TABLE 1. ECONOMIC EFFICIENCY OF PADDY AND SOME KINDS OF VEGETABLE IN O MON AND THOT NOT DISTRICTS SPRING-SUMMER 95-96

Kinds of Crops	Family labour (man-day/ha)	Cash Cost (VND/ha)	Total Revenue (VND/ha)	Gross margin (VND/ha)	Ratio of gross margin on cost	Ratio of gross margin on revenue	Ratio of revenue on cost	Ratio of gross margin on family-labour (VND/man-day)
Cabbage	590	9,7561,83	32,597,766	22,841,583	2.34	3.34	0.70	38,715
Field-Radish	492	9,154,804	22,933,760	13,778,956	1.51	2.51	0.60	28,000
Water-melon	552	5,623,945	21,448,820	15,824,875	2.81	3.81	0.74	28,670
Paddy	93	4,218,465	6,452,727	2,234,262	0.53	1.53	0.35	24,025

(Source: Thesis for master degree of Mr.Tran Van Sau, Mekong Delta FSR &D Institute, 1997)

Another study in Chau Thanh district showed that growing vegetables resulted in a higher economic efficiency than growing paddy. The two kinds of vegetable considered were Green Radish and Chinese Radish with 60 farm households surveyed. The figures in Table 2 provide the results obtained through the information supplied by these farm households.

Table 2 shows that total gross margins per hectare of green radish and Chinese radish were higher than those of paddy were. Thus, while the gross margin per hectare of winter-spring paddy, the highest among two other paddy seasons was approximately 6.1 million VND; these figures of green radish and Chinese radish were of 10.16 million VND and 6.29 million VND, respectively. As a result, the financial ratios of vegetables were also higher than those of paddy. However, it is significant that the ratios of gross margin on family labour of households growing these vegetables were lower than that growing paddy. This could be explained as the result of the intensive use of family labour.

TABLE 2. ECONOMIC EFFICIENCY OF PADDY AND GREEN RADISH AND CHINESE RADISH IN CHAU THANH DISTRICTS, MARCH 2000

Kinds of Crops	Family labour (man-day/ha)	Cash Cost (VND/ha)	Total Revenue (VND/ha)	Gross margin (VND/ha)	Ratio of gross margin on cost	Ratio of revenue on cost	Ratio of gross margin on revenue	Ratio of gross margin on family-labour (VND/man-day)
Green-Radish	419	5,176,220	15,341,152	10,164,931	1.964	2.964	0.663	24,351
Chinese Radish	457	6,011,930	12,308,851	6,296,920	1.050	2.050	0.510	13,778
Winter-Spring Paddy	49	4,067,027	10,251,719	6,184,692	1.521	2.521	0.603	125,500
Summer-Autumn Paddy	53	2.,976,100	6,787,833	3,811,733	1.281	2.281	0.562	71,885
Mua Paddy	68	3,576,278	7,444,047	3,867,769	1.082	2.081	0.520	56,500

(Source: Thesis for Bachelor degree of Mr. Vo Ngoc Nien, 2000)

In this research, we also conducted a comparison of economic efficiency between paddy and cucumber, tomato and bitter melon. 60 farm households were surveyed for three kinds of vegetables. The results computed are presented in Table 3.

Table 3 indicated that most financial ratios for cucumber, tomato and bitter melon were higher than those of paddy. Tomato was considered to have the highest economic efficiency, with the ratio of gross margin on cost at 3.76, and the ratio of the revenue on cost at 4.76. If

a farmer obtained 1 million of the revenue, he would receive 790,000 VND. Bitter melon ranked second in terms of economic efficiency, when compared with cucumber, tomato and paddy (except winter-spring paddy). For the ratio of gross margin on family labour, the results were similar to those of the previous case.

TABLE 3. ECONOMIC EFFICIENCY OF PADDY AND CUCUMBER, TOMATO AND BITTER MELON IN CHAU THANH DISTRICTS, JULY 2000

Kinds of Crops	Family-labour (man-day/ha)	Cash Cost (VND/ha)	Total Revenue (VND/ha)	Gross margin (VND/ha)	Ratio of gross margin on cost	Ratio of revenue on cost	Ratio of gross margin on revenue	Ratio of gross margin on family-labour (VND/man-day)
Cucumber	367	5,757,332	12,964,098	7,206,766	1.252	2.252	0.556	19,350
Tomato	461	6,101,978	29,017,500	22,915,522	3.755	4.755	0.790	49,700
Bitter Melon	468	6,161,769	25,580,838	19,419,069	3.152	4.152	0.759	41,500
Winter-Spring Paddy	49	4,067,027	10,251,719	6,184,692	1.521	2.521	0.603	125,500
Summer-Autumn Paddy	53	2.,976,100	6,787,833	3,811,733	1.281	2.281	0.562	71,885
Mua Paddy	68	3,576,278	7,444,047	3,867,769	1.082	2.081	0.520	56,500

(Source: Survey, May 2000)

3.2 Longan

For this product, there is something different from vegetable products regarding productive characteristics; for example, farmers must spend at least one and a half year for establishing longan garden. The costs of establishment of one hectare of longan appear in Table 4.

TABLE 4. COST OF ESTABLISHMENT OF ONE HECTARE OF LONGAN, DONG THANH VILLAGE, CHAU THANH DISTRICT, CAN THO PROVINCE.

Cost Item	Cash Cost (VND/ha)	Cost of labour rent (VND/ha)	Family labour (man-day/ha)	Total cash cost (VND/ha)
Land preparation	3,210,139	856,661	24.48	4,066,800
Seedlings and Planting	3,082,006	236,396	7.88	3,318,402
Other cost	592,749	-	-	592,749
Total	6,884,893	1,093,057	32.36	7,977,950

(source: surveyed results in october,1999)

Table 4 shows that to establish one hectare of longan, farmers had to invest approximately 8 million VND in cash and about 32 man-days of family labour, with the costs for land preparation and seedlings and planting standing out as the main cost items.

To see what was the economic efficiency of shifting from rice crop to fruit tree, a comparison was conducted through the information provided by farmers who are growing longan in former rice-based fields. A number of 37 farmers were interviewed in this research in which 18 farmers were involved in third-year longan garden, and 19 farmers involved in fourth-year longan garden. Some main economic parameters of rice and longan are presented in Table 5.

TABLE 5. SOME MAIN ECONOMIC PARAMETERS OF RICE AND LONGAN

	Second-year Longan garden	Third-year Longan garden	Fourth-year Longan garden	Rice field**
Total costs*/ha(VND/ha)	13,455,108	13,795,845	14,007,576	10,492,873
Total revenue/ha(VND/ha)	8,609,020	31,841,390	60,121,278	18,927,563
Gross margin/ha(VND/ha)	-4,846,087	18,045,546	46,113,702	8,434,690
Family labour(man-day/ha)	135.15	145.25	103.50	89.60
Gross margin/total cost	-	1.31	3.29	0.80
Total revenue/total cost	0.64	2.31	4.29	1.80
Gross margin/family labour (VND/man-day)	-	124,237	445,543	94,137

Note: * not including cost of family labour ,but comprising of cost of establishment distributed

** Two rice crops per year

(Source: surveyed results in october,1999)

Table 5 indicates that the annual average investments for longan and rice was not significantly different. However farmers had to spend a relatively high amount of money for initial investment (approximately 8 million VND per hectare, Table 4). For longan, in the second year the total revenue was low compared to that of rice (8.6 million VND per hectare for longan and 18 million VND per hectare for rice), because the yield of longan in this year was not too high. But the total revenues obtained from longan per hectare were very high in the next two years (31 million VND and 60 million VND) leading to a higher economic return compared with rice (a total revenue per hectare of approximately 19 million VND). Because of the low yield in the second year, the gross margin per hectare was negative, but the figures for the third and fourth year in longan garden were 18 million VND and 46 million VND, higher than the gross margin per hectare for growing rice. Table 5 also shows that the financial ratios, such as the ratio of gross margin on total cost and the ratio of total revenue on total cost as well as the ratio of gross margin on family labour of growing longan were higher than that of growing rice in the third and fourth year in longan garden.

In sum, the economic efficiency of growing cucumber, bitter melon, tomato and longan was higher than that of growing rice. This conclusion is illustrated by some main economic parameters mentioned above. This result indicates that the issue of diversification in the Mekong Delta has helped farm households increase their income. However, this research will concentrate mainly on the market operation of these products through a detailed study of marketing channels in the study area. This research is divided into two sections for two groups of products: Fruit tree and vegetable, in which Longan product and cucumber, bitter melon and tomato are the selected crops.

4 Longan marketing channel

4.1 Basic concepts

4.2 Production cost

Cost components in establishing one hectare of Longan as well as annual cash payment of Longan were estimated from information provided by farmers. These averaged values were computed using reported data of those farmers who actually performed the operations. The

variation in the level of investment was quite large across farmers. No attempt has been made to compute the time value of costs incurred at different time periods.

Processing cost

Cost components in drying one ton of Longan were estimated from information provided by processors. These costs can be different among processors depending on their method of purchasing from farmers or assemblers.

Marketing institutions

There were four groups of participants: (1) Producer (2) Processor and (3) Buyer (4) Export Agent

Producer

Farmers: who grow Longan directly on their own land where rice used to be grown before.

Processors

Who own drying facilities, in which they invested. They mainly buy Longan from collectors within Vinh Long province, or from those coming from other provinces, such as Can Tho, Ben Tre, Dong Thap, so on…After drying, they bring dried Longan to Lang Son market for sale. Normally, when arriving there, they sell products to the Chinese market through some Vietnamese agent who receives a commission and a fee for export. Furthermore, these processors also by Longan from farmers when the market demand increases a lot, while they sell dried Longan to assemblers coming from Lang Son province, in the north of Viet Nam, when the price of Longan is not high.

Buyers

*Collectors**:*** they buy Longan or Vegetable products from farmers and sell them to wholesalers or processors. They do not own stocking ground or selling facilities. They normally own transportation facilities or rent boats to transport products from farmers to wholesalers or processors.

Wholesalers: they own large storage grounds, but do not own transport facilities. They mainly buy products from collectors, and sometimes buy directly from farmers. After that they sell to retailers.

Retailers: They buy products from wholesalers or from farmers who bring products in small amounts to sell directly to retailers at the market places. Retailers sell directly to the final consumers/industrial consumers who own restaurants or meal shops.

Export Agents: They are responsible for linking foreign importers with domestic sellers who are either processors, or farmers with a big business scale. Export agents not only supply information about export prices to processors/farmers, but also take care of

custom documents for export. After completing trade, they receive a commission of 20 million Dong per 12 tons.

4.3 The specification of all actors along the channels from producers to consumers

The marketing process is the link between the producers and the ultimate consumers. The routes by which products move from the point of production to the final consumers are termed marketing channels.

The variety of Longan considered here is *Tieu Da Bo.* This product in the study area was moved from farm households to either domestic final consumers, or foreign consumers through five main marketing channels, which can be described as follows:

Channel 1*:* Farmers sold Longan directly to processors who are in Vinh Long province, 60 km far from the point of production. Usually farmers would bring Longan themselves to processors for selling. However, the quantity of product sold per transaction in this case was not too high. These product after being dried by processors would be moved to Ha Noi for export through some agent responsible that would be given the amount of the export tax as well as a commission (20 million VND per 12 tons of Longan) from processors. This agent would never let processors know who are foreign consumers.

Farmers ⟶ *Processors* ⟶ *Agent for Export*

Channel 2: collectors visit farm to buy Longan bought Longan produced by farmers. These collectors were coming from Vinh Long province. They usually owned transportation facilities. After collecting a big amount of Longan from many farmers, they shipped products to processors for selling. Longan after passing the progressing process would be brought to Ha Noi by processors. Thereafter, through some agent these products were exported to China.

Farmers ⟶ *Collectors* ⟶ *Processors* ⟶ *Agent for Export*

Channel 3*:* After buying Longan from farmers, collectors from the Can Tho province bring them to wholesalers who are in Can Tho or Cai Rang market place for selling. This marketing channel mainly sells to domestic consumers. Then, wholesalers would sell all products to retailers around Can Tho city and Chau Thanh district. Finally, these retailers would sell directly to domestic final consumers.

Farmers ⟶ *Collectors* ⟶ *Wholesalers* ⟶ *Retailers* ⟶ *Consumers*

Channel 4*:* Some farmers who usually own transportation facilities and grow a large area of Longan bring products themselves to wholesalers for selling. In this case, farmers can save selling cost. Then, wholesalers would sell them to retailers who sell product to domestic final consumers.

Farmers ⟶ *Wholesalers* ⟶ *Retailers* ⟶ *Consumers*

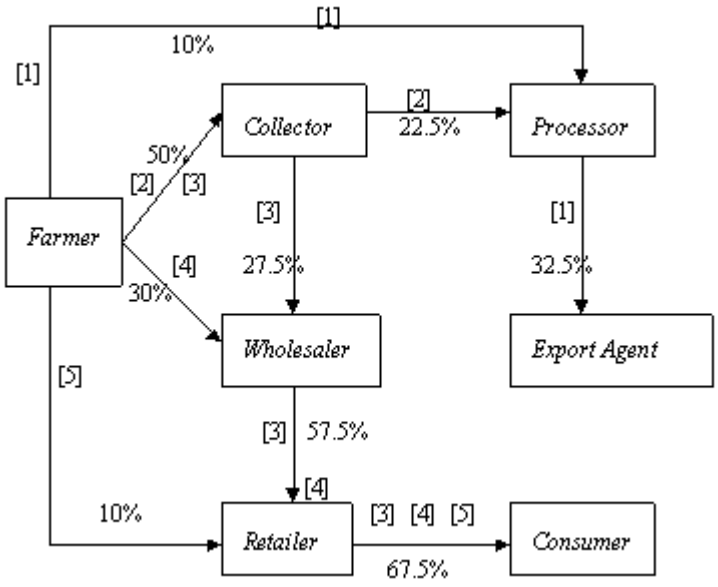
Channel 5*:* This marketing channel is similar to channel 4, but farmers sell here their product to retailers instead of wholesalers. Usually these farmers had a small area of Longan.

Farmers ⟶ *Retailers* ⟶ *Consumers*

In general, there were three main marketing channels for Longan product in the study area. They are the channel 2, the channel 3 and the channel 4.

Figure 1 specifies the whole marketing channel of Longan in Chau Thanh district , Can Tho province.

FIGURE 1. MARKETING CHANNELS OF LONGAN PRODUCT IN CHAU THANH-CAN THO



Large proportion went to collector channel (50%) and the wholesaler channel (30%), while only a small amount was sold to processors and retailers (10% each).

From the collectors, 27.5 percent of Longan was sold to the wholesalers who own a large store and the remaining 22.5% percent to processors.

From the wholesalers, all the Longan products were sold to retailers (57.5%).

Finally 67.5 percent of Longan product from retailers was sold to domestic ultimate consumers and the remaining 32.5% to foreign consumers, who are mainly Chinese, through an export agent who is in Dong Dang district, Lang Son province.

4.4 The costs and margins of the different operators

4.4.1 Marketing cost of actors along the marketing channels

The marketing cost of Longan in Can Tho province refers to all the costs incurred from the point of production down to the point of distribution for final consumers or agent for export.

Marketing margin of Longan product is the different between the price paid by ultimate consumers/importers and that obtained by producers. Thus we can write:

Marketing margin = Selling price - Buying price

Total profit margins = Gross marketing margin - Total marketing costs

Based on those equations and the data collected from operations along the marketing channels mentioned above, marketing costs were calculated; marketing margin by type of traders are discussed in the following sections.

4.4.1.1 Marketing cost of collectors

Table 6 shows various marketing cost items of collectors. On the average, their total marketing costs amounted to 180,500 Dong/ton. Harvesting costs were the major cost item accounting for 40 percent of the total marketing cost. Most collectors in this channel own boats which are used to ship Longan product to wholesalers for sale. Here, no attempt was made to compute depreciation cost of their transportation facilities. The reason for this is that their boats are usually utilised for many various purposes, so that it is very difficult to include depreciation cost in total marketing cost.

The second highest marketing cost item was fee for family labour (24 percent in the total). This cost include expenses in food, food-stuff, transaction and management in the process of looking for sellers (farmers) as well as making purchase agreements with farmers. In addition, the salary for some family members involved in this business was included in this cost item.

The next two highest costs were unloading and fuel fees. Fuel cost was very important and necessary for shipping products from the farms to other traders' place in the marketing channel. The difference between unloading and loading costs (unloading cost is higher than loading cost) can be here explained by the fact that a large part of the loading costs was incurred by farmers and another part was accounting for family labour cost.

It can be noted in Table 6 that the collectors paid very small taxes. They did not have to pay for license tax, turnover tax, income tax, value added tax, etc.

TABLE 6: MARKETING COST OF COLLECTORS IN CAN THO PROVINCE ALONG THE MARKETING CHANNEL 3

Cost Items	Marketing Cost (000' Dong/ton)	Cost Structure (%)
1. Harvest	72.50	40.17
2. Fuel	19.75	10.94
3. Loading	8.25	4.57
4. Unloading	27.00	14.96
5. Tax	8.75	4.85
6. Family Labour	44.25	24.52
Total	180.5	100.00

The marketing cost of collectors in Vinh Long province along the marketing channel 2 was a little different when compared with that of the collectors in the marketing channel 3. Table 6b indicates this difference:

TABLE 7. MARKETING COST OF COLLECTORS IN VINH LONG PROVINCE ALONG THE MARKETING CHANNEL 2

Cost Items	Marketing Cost (000' Dong/ton)	Cost Structure (%)
1. Harvest	70.57	36.59
2. Fuel	50.86	26.37
3. Loading	9.29	4.81
4. Unloading	15.00	7.78
5. Tax	0.00	0.00
6. Family Labour	47.14	24.44
Total	192.6	100.00

For the collectors of this marketing channel, the highest cost item was also harvesting (36.6%). However, the cost of fuel in this marketing channel was next, accounting for 26%, the reason for this is the transportation distance. While the transportation distance in the marketing channel 3 was around 20 km, that in this marketing channel was approximately 60 km from the point of buying place to the point of selling.

The second difference in cost item among two collectors in these two marketing channels was unloading cost. The unloading cost in the marketing channel 2 was lower than that in the marketing channel 3 (8% compared with 15%). It can be explained, as the price of renting labour in Vinh Long, far from the Vinh Long City, was cheaper than that in the market places of Can Tho City and Chau Thanh districts. These collectors in this marketing channel did not have to fully pay for any tax. The two cost items of loading and family labour in this marketing channel are close to those in the marketing channel 3 (4.8% and 24%, compared with 4.6% and 24.5%).

4.4.1.2 Marketing cost of wholesalers in the marketing channel 3 and the marketing channel 4.

Marketing costs incurred by wholesalers are presented in Table 8. Their total costs averaged 318,160 Dong/ton and 183,160 Dong/ton in the marketing channel 4 and the marketing channel 3, respectively. For the marketing channel 4, wholesalers directly came to the farm households to buy products and were responsible for paying harvesting. So, like collectors they had to incur a highest harvest cost accounting for 30.25% in the total marketing cost. Because they buy in big amounts and sell to retailers in small amounts, they have to cope with a maintenance cost of 67,500 Dong/ton (21% of the total marketing cost). Besides, the expense on family labour was the third highest cost (17%). For the marketing channel 3, wholesalers buy the products from collectors who brought products at the door of wholesalers, and they sell them to retailers who come to the wholesalers' stalls to buy the products so that wholesalers do not have to pay any fees for harvesting and transporting as well as loading and unloading. The two highest marketing cost items were maintenance and family labour fee (37% and 30% of total). In addition, wholesalers also bear large costs for hiring labour and renting stalls because they handle a large volume of products.

TABLE 8. MARKETING COST OF WHOLESALERS IN THE MARKETING CHANNEL 3 &4, 1999

	Wholesaler in the channel 4		Wholesaler in the channel 3	
Cost Items	(000'Dong/ton)	(%)	(000'Dong/ton)	(%)
1.Harvest	77.50	21.63		0.00
2.Maintenance	67.50	18.84	67.50	30.23
3. Loading & Unloading	22.50	6.28	0.00	0.00
4. Transportation fee	35.00	9.77	0.00	0.00
5. Rent Labour	24.30	6.78	24.30	10.89
6. Rent Stall	22.08	6.16	22.08	9.89
7. Income tax	54.69	15.26	54.69	24.49
8. Family Labour	54.69	15.26	54.69	24.49
Total	358.26	100.00	223.26	100.00

4.4.1.3 Marketing cost of Processors in the marketing channel 1 and 2

Table 9 shows the marketing cost items of processors who increased the value of Longan through drying process. Processors buy the products from farmers and collectors who bring the products to their door. After drying, they sell to export agents either at a point of collect, or at the door of agents. According to the processors, when the price of dried longan for export is high, they would bring products to Ha Noi for selling. And they would sell at the point of collect when this price is low.

TABLE 9. PROCESSING AND MARKETING COSTS OF PROCESSORS IN THE MARKETING CHANNEL 1 & 2,1999

	Selling at the point of processing		Selling at the door of agents	
Cost Items	(000'Dong/ton)	(%)	(000'Dong/ton)	(%)
1. Depreciation	15.576	01.6	15.576	00.6
2. Fuel (coal)	189.533	19.5	189.533	07.2
3. Rent labour	88.925	09.2	88.925	03.4
4. Package	32.442	03.3	32.442	01.2
5. Loading	17.800	01.8	17.800	00.7
6. Transportation	300.000	30.9	300.000	11.4
7. Export tax	55.765	05.7	55.765	02.1
8. Wastage in quantity	244.769	25.2	244.769	09.3
9. Interest on capital	6.458	00.7	6.458	00.2
10. Family labour	20.870	02.2	20.870	00.8
11. Commission for export agent	000.000	00.00	1,666.667	63.1
Total	972.138	100	2,638.805	100

In the processing cost, the quantity of water inside longan is diminished and considered as a loss. In addition, this lost quantity includes a loss in the process of transporting and measuring. According to Table 9, this cost item averaged 244,769 Dong/ton (25.2%). The next two highest cost items were fuel and hired labour (19.5% and 9.1%). These costs are very important and necessary for processing. For marketing costs, the major cost item incurred by processors was transportation fee (30.86% of total) because the distribution distance is very long between the point of collect and the door of export agents. These cost structures were the same for the processors selling either at the point of collect or at the door of export agents. However, for the latter the cost item of commission for export agents

became dominant (63.2%). It is clear that the role of export agents in these marketing channels was very important.

4.4.1.4 Marketing cost of retailers in the marketing channel 3, 4 and 5

As shown in Table 10, on average, the total marketing costs of retailers amounted to 185,459 Dong/ton, in which the highest marketing cost component was family labour (41.3%) followed by transportation and annual taxes (34.3% and 12.5%). The high cost for family labour can be explained as retailers have to spend much more time than other actors in the marketing channel. Usually they have to spend at least 12 working hours per day. Retailers usually buy a small volume of products per transaction, so they have to incur a high transportation cost.

TABLE 10. MARKETING COST OF RETAILERS, 1999

Cost Items	Marketing cost (000'Dong/ton)	Cost Structure (%)
1. Transportation	63.636	34.31
2. Annual taxes	23.225	12.53
3. Social contribution	8.787	4.74
4. Stall renting	12.834	6.92
5. Umbrella renting	0.308	0.17
6. Family labour	76.668	41.34
Total	185.458	100

Table 11 summarises the marketing costs of all actors along the marketing channels.

TABLE 11. THE MARKETING COSTS OF ALL ACTORS (000'DONG/TON)

Actors	**Channel 1**	**Channel 2**	**Channel 3**	**Channel 4**	**Channel 5**
Collectors[1]			180.500		
Collectors[2]		192.600			
Wholesalers[3]			223.260		
Wholesalers[4]				358.26	
Processers[5]	972.138	972.138			
Processers[6]	2,638.805	2,638.138			
Retailers[7]			185.46	185.46	185.46

Notes:
(1) These collectors in Can Tho province sold the products to wholesalers
(2) These collectors in Vinh Long province sold the products to processors
(3) These wholesalers bought the products from collectors
(4) These wholesalers bought the products from farmers
(5) Processors sold the products at the point of processing
(6) Processors sold the products at the door of export agents

As shown in Table 11, the collectors in Can Tho province incurred the lowest marketing cost amounting to 180,500 Dong/ton. The reason for this can be explained as they seemed not to pay any taxes for their business, excepting the quay-age tax. The second lowest marketing cost fallen to retailers accounting for 185,460 Dong/ton. The highest marketing cost incurred to the processors who brought the products to Lang Son province for selling. The highest marketing cost component was commission fee (63.2%) and transportation cost (11.4%). The difference in marketing cost between the two collectors was because of the transportation distance. While the collectors[1]' distance is around 20 km from the buying place, the collectors[2]' distance is around 60 km. The difference in marketing cost between the two wholesalers was also explained as a difference in harvesting costs. In fact, the

wholesalers in the marketing channel 4 were responsible for harvesting when buying from farmers. In contrast, those in the marketing channel 3 were not. Finally, the difference in marketing cost between the two processors was caused by the processors' behaviour according to the price of dried longan, that is, when the price of dried longan increased, processors preferred to sell the products at the door of export agents, even if they must pay a big amount of money for commission fee. But, they would not be willing to do so when the price of dried longan decreases.

4.4.2 Marketing margin and profit margin of actors along the marketing channels

4.4.2.1 Marketing channel 1

According to Table 12, farmers obtained a gross margin of 4,342,000 Dong/ton when they sold the products to processors. For processors, if they sold the products to export agents at the point of processing, they got a marketing margin and a profit margin of 2,289,000 Dong/ton and 1,317,000 Dong/ton, respectively. But, if they sold the products to export agents at the door of export agents, they earned 4,630,000 Dong/ton and 1,992,000 Dong/ton in marketing margin and profit margin, respectively. This was the reason why processors liked to bring the products to Ha Noi for sale when the price of dried longan increase.

TABLE 12. MARKETING MARGIN AND PROFIT MARGIN (000'DONG/TON) OF ACTORS ALONG THE MARKETING CHANNEL 1

Actors	Av. Buying price or Production cost	Av. Selling price	Gross Margin	Marketing Margin	Av. Marketing Cost and Processing cost	Profit Margin
Farmers	1,978	6,320	4,342			
Processors*	6,320	8,609		2,289	972	1,317
Processors**	6,320	10,950		4,630	2,638	1,992

Notes: * Selling dried longan to agents at the point of processing
** Selling dried longan to agents at the door of agents

4.4.2.2 Marketing channel 2

TABLE 13. MARKETING MARGIN AND PROFIT MARGIN (000'DONG/TON) OF ACTORS ALONG THE MARKETING CHANNEL 2

Actors	Av. Buying price or Production cost	Av. Selling price	Gross Margin	Marketing Margin	Av. Marketing Cost and Processing cost	Profit Margin
Farmers	1,978	6,000	4,022			
Collectors***	6,000	7,000		1,000	193	807
Processors*	7,000	8,609		1,609	972	637
Processors**	7,000	10,950		3,950	2,638	1,312

Notes: * Selling dried longan to agents at the point of processing
** Selling dried longan to agents at the door of agents
*** Collectors being in Vinh Long

Farmers got a smaller gross margin as they sold the products to collectors who came from Vinh Long province. Table 13 shows that their gross margin was 4,022,000 Dong/ton while they got 4,342,000 Dong/ton when they sold the products to processors. For the collectors, their marketing margin amounted to 1,000,000 Dong/ton and they received a profit margin of

807,000 Dong/ton. Like the marketing channel 1, there was a difference in marketing margin and profit margin between the processors selling the products at the point of processing and those selling the products at the door of export agents. Table 13 shows that the marketing margin and the profit margin of processors* were 1,609,000 Dong/ton and 637,000 Dong/ton while these figures of processors** were 3,950,000 Dong/ton and 1,312,000 Dong/ton.

4.4.2.3 Marketing channel 3

For this marketing channel, farmers received a gross margin of 4,022,000 Dong/ton. The collectors earned the highest marketing margin and profit margin amounted to 850,000 Dong/ton and 670,000 Dong/ton, respectively. The lowest marketing margin and profit margin were for wholesalers: 750,000 Dong/ton and 527,000 Dong/ton, respectively.

TABLE 14. MARKETING MARGIN AND PROFIT MARGIN (000'DONG/TON) OF ACTORS ALONG THE MARKETING CHANNEL 3

Actors	Av. Buying price or Production cost	Av. Selling price	Gross Margin	Marketing Margin	Av. Marketing Cost and Processing cost	Profit Margin
Farmers	1,978	6,000	4,022			
Collectors*	6,000	6,850		850	180	670
Wholesalers	6,850	7,600		750	223	527
Retailers	7,600	8,400		800	185	615

Note: *** Collectors being in Can Tho

4.4.2.4 Marketing channel 4

TABLE 15. MARKETING MARGIN AND PROFIT MARGIN (000'DONG/TON) OF ACTORS ALONG THE MARKETING CHANNEL 4

Actors	Av. Buying price or production cost	Av. Selling price	Gross Margin	Marketing Margin	Av. Marketing Cost and Processing cost	Profit Margin
Farmers	1,978	6,300	4,322			
Wholesalers	6,300	7,600		1,300	358	942
Retailers	7,600	8,400		800	185	615

Unlike marketing channel 3, in this market the marketing margin and the profit margin of wholesalers were much larger than those of retailers. The wholesalers got a marketing margin of 1,300,000 Dong/ton and 942,000 Dong/ton, while these figures of retailers were 800,000 Dong/ton and 615,000 Dong/ton.

4.4.2.5 Marketing channel 5

TABLE 16. MARKETING MARGIN AND PROFIT MARGIN (000'DONG/TON) OF ACTORS ALONG THE MARKETING CHANNEL 5

Actors	Av. Buying price or production cost	Av. Selling price	Gross Margin	Marketing Margin	Av. Marketing Cost and Processing cost	Profit Margin
Farmers	1,978	7,000	5,022			
Retailers	7,000	8,400		1,400	185	1,215

In this marketing channel, farmers received the highest gross margin compared to the other marketing channels: 5,022,000 Dong/ton, because they sold the products directly to retailers.

Also, retailers in this marketing channel earned the highest marketing margin and profit margin per ton (1,400,000 Dong and 1,215,000 Dong).

In sum, we can give some results obtained from the above analyses about the marketing costs, marketing margin and profit margin of all actors along the longan marketing channels in Can Tho province.

TABLE 17. MARKETING COST, MARKETING MARGIN AND PROFIT MARGIN OF ACTORS ALONG THE MARKETING CHANNELS (000' DONG/TON)

Actors along marketing channels	AV. Unit cost	AV. buying price	AV. selling price	Gross margin	Marketing margin	Marketing cost	Profit margin
Channel 1							
Farmers	1,978		6,320	4,342			
Processers[1]		6,320	8,609		2,289	972	1,317
Processers[2]		6,320	10,950		4,630	2,638	1,992
Channel 2							
Farmers	1,978		6,000	4,022			
Collectors		6,000	7,000		1,000	193	807
Processers[1]		7,000	8,609		1,609	972	637
Processers[2]		7,000	10,950		3,950	2,638	1,312
Channel 3							
Farmers	1,978		6,000	4,022			
Collectors		6,000	6,850		850	180	670
Wholesalers		6,850	7,600		750	223	527
Retailers		7,600	8,400		800	185	615
Channel 4							
Farmers	1,978		6,300	4,322			
Wholesalers		6,300	7,600		1,300	358	942
Retailers		7,600	8,400		800	185	615
Channel 5							
Farmers	1,978		7,000	5,022			
Retailers		7,000	8,400		1,400	185	1,215

As shown in Table 17, farmers obtained a highest gross margin in the marketing channel 5 (5,022,000 Dong/ton) compared to the other marketing channels. This fits the marketing principle according to which the longer the marketing channel is, the less income the producers receive. However, the farmers along this marketing channel usually sell a small volume of products. So, when the specialization of production increasers this marketing seems not to be popular. The lowest gross margin obtained by farmers was found in the marketing channel 2 and 3 (4,022,000 Dong/ton). The farmers in these marketing channels traded a big volume of products and they did not have transportation facilities. So, they had to share a part of their gross margin with collectors. In addition, the collectors usually buy the products in large quantities. Similarly, the retailers in the marketing channel 5 earned a highest marketing margin and profit margin compared to the other marketing channels because they directly bought the products from farmers (1,215,000 Dong/ton compared to 615,000 Dong/ton in profit margin.) In comparison, wholesalers in the marketing channel 4 were considered to have a higher efficiency in trade than those in the marketing channel 3 although their marketing cost was higher (358,000 Dong/ton > 223,000 Dong/ton.) This can be explained because the wholesalers in the marketing channel 4 buy the products at a

lower buying price (6,300,000 Dong/ton < 6,850,000 Dong/ton) For the collectors in the marketing channel 2 and 3, the situation was similar to that of the wholesalers mentioned above, but here the advantage of the collectors in the marketing channel 2 was that they got a higher selling price (7,000,000 Dong/ton > 6,850,000 Dong/ton) The processors in the marketing channel 1 had higher efficiency than those in the marketing channel 2 because they bought the products from the farmers at a lower buying price (6,320,000 Dong/ton < 7,000,000 Dong/ton). In both these marketing channels, the processors earned more marketing margin and profit margin when they brought the products to the door of the export agents for selling when the price of dried longan increased.

4.4.3 The risk/uncertainty relative to the activity of each of these operators

4.4.3.1 For farmer

TABLE 18. RISKS FOR FARMERS

Kind of risk	The number of farmers facing that risk	Frequency (%)
1. Natural calamity	21	43.75
2. Dead seedlings	11	22.92
3. Disease caused by pests	5	10.42
4. Control of flowering	19	39.58
5. Selling at a price that does not compensate	28	58.34
6. Buyers delaying/refusing	7	14.58
7. Decreased price	26	54.17
Total of interviewed farmers	48	

Table 18 shows that the two main sources of risk for farmers growing longan are natural calamities and depressed prices that do not cover expenditures. The second problem was a farm gate price decrease which could be caused by a declining demand and/or an excess of supply. This is a macro-level problem that the farmers cannot overcome themselves; more than half of the 48 farmers interviewed (54%) complained about this problem and about the lack of governmental policies aiming at solving it. To limit this problem, the only way applied by farmers was the technique of controlling the harvesting season by inducing flowering. However, they were not much successful amounting to 39.58% farmers of total falling this situation because they had not enough knowledge for applying this technology. In addition, because the governmental services supplying seedlings could not satisfy the growing demand, farmers had to buy them from many sources belonging to private services which were usually not providing good quality material, as shown in Table 18 where 22.92% farmers had problems of dead seedlings.

To solve or limit these problems for farmers growing longan, the government should broadcast more communication programs on the radio, television and newspapers in order to provide price information to farmers. Moreover, the government should also improve the extension programs, which can be achieved through increasing the number of extension workers that demonstrate the adequate technologies to farmers, especially in the technology of controlling flowering. A system of services supplying breeding trees would also be instrumental in limiting the problems faced by farmers.

4.4.3.2 For collector

TABLE 19. RISKS OF COLLECTORS

Kind of risk	The number of collectors facing that risk	Frequency (%)
1. Overestimation of the yield of longan	1	9.09
2. Buyer refusing to buy because of bad quality	3	27.70
3. Offensive products in transportation/maintenance	1	9.09
4. Farmers refusal to sell, aiming at increasing price	5	45.45
5. Buyer refusal to buy, aiming at decreasing price	2	18.18
6. Competition from other collectors	4	36.36
7. Excess supply/substitution products	3	27.27
Total of interviewed collectors	11	

As shown in Table 19, the biggest risk faced by collectors was farmers refusing to sell the products with a view of increasing selling price (45.45% of total). The competition between collectors was the second main risk, because of their increased marketing costs. The next two main risks were buyers' refusal, because they wanted to decrease buying price, as well as the attempt by buyers to underestimate the quality of the products (18.18% and 27.70%). These problems show that an increased economic contractualisation would be very useful in the trading process. Although an excess of supply or an existing substitution product will decrease the price to consumers and can be considered as a positive for the general social welfare, this entails a risk for collectors because of their decreased marketing margin. This risk was mentioned by 27.70% of farmers.

4.4.3.3 For processor

TABLE 20. RISKS OF PROCESSOR

Kind of risk	The number of processor facing risk	Frequency (%)
1. Buyer refusing to buy, aiming at decreasing buying price	1	10
2. Delay in handling the products because of natural calamity or transportation	2	20
Total of interviewed processors	**10**	

Compared to other actors, processors have the lowest risk. According to Table 20, only 20% of the interviewed processors faced risks in their marketing operations. Because the main harvesting time falls within the wet season (from April to January in year), they sometimes faced storms which forced them to delay transportation, leading to the refusal of buyers, or to the deterioration of fruits. Besides, there was also the risk caused by buyers who wanted to decrease purchasing prices. However, it can be said that processors have much more information on prices compared with the others in the marketing channels. They usually trade on certain information on prices and quantity.

4.4.3.4 For wholesalers

TABLE 21. RISKS OF WHOLESALERS

Kind of risk	The number of wholesalers faced to risks	Frequency (%)
1. Violation from farmers	1	50.00
2. Overestimation of quantity	1	50.00
3. Competition of substitutes	1	50.00
4. Decreased price	2	100.00
Total of interviewed wholesalers	2	

The risks faced by wholesalers were similar to those of collectors and a decreased price was their biggest risk (100%), because they usually buy products in large amounts; if the price of the products decreases, their marketing margin would be significantly reduced.

4.4.3.5 For retailer

TABLE 22. RISKS OF RETAILER

Kind of risk	The number of retailers facing risk	Frequency (%)
1. Violation from sellers aiming at increasing selling price	1	9.09
2. Excess supply/substitutes	8	72.72
3. Decreased price	8	72.72
Total of interviewed retailers	11	

As shown in Table 22, the risks faced by retailers were similar to those of collectors and wholesalers: an excess in supply and a decreasing price accounting for 72% each. This suggests that the retailers were not getting enough market information. To limit this problem for retailers, the government should supply much more market information to retailers through the communication systems on the radio, television, newspapers, etc.

4.5 Conclusion

Farmers mainly sold longan to collectors who came from either Vinh Long province or Can Tho city (50% of total). A total of 67.5% of the longan production was consumed in the domestic market, while the remaining 32.5% was sent to the Chinese market through export agents who live in Lang Son province, next to the border between China and Viet Nam.

The marketing cost of collectors in Can Tho was lower than that of Vinh Long (180,500 VND/ton < 192,600 VND/tan). Both of them had to pay a high cost for harvesting (40.17% for collectors in Can Tho and 36.59% for collectors in Vinh Long). However, tax cost was either very low (4.85% for collectors in Can Tho, or zero for collectors in Vinh Long).

Wholesalers must pay a higher marketing cost (358,260 VND/ton) as they buy longan products directly from farmers instead of buying from collectors (223,260 VND/ton). This was because they had to pay for three cost items that they would not have to pay for when buying from collectors (harvesting: 77,500 VND/ton, loading and unloading: 22,500 VND/ton, transportation: 35,977 VND/ton).

The retailers who bought longan product directly from farmers obtained a profit margin twice higher than when buying from collectors (1,215 VND/kg > 615 VND/kg).

The processors who sold longan products at the point of processing earned a lower profit margin compared with those selling longan products at the door of agents (637,000 VND/ton < 1,312,000 VND/ton).

Almost of actors along the marketing channels as well as farmers faced high risks of market price fluctuation.

5 Cucumber, bitter melon and tomato marketing channels

5.1 Description of cucumber, tomato and bitter melon marketing channels

The marketing process is the link between the producers and the ultimate consumers. The routes by which products move from the point of production to the final consumers are termed marketing channels. In this study, the point of production was in Tan Phu Thanh (TPT) village, and final consumers included people being TPT, Vi Thanh, Vi Thuy, Long My, Rach Goi, Cai Rang and Can Tho.

Marketing Institutions:

Farmers: grew vegetable directly on their own land. The farmers in this research included the farmers who grew cucumber, tomato and bitter melon.

Assemblers: were those who bought vegetable products from farmers to sell to retailers or wholesalers in the market places far from the study area, such as Ca Mau, Ha Tien, Soc Trang and Chau Doc provinces.

Collectors: bought vegetable products directly from the farmers who usually brought their products to market places. Thereafter, they sold a part of these products to retailers, while another part was sold by themselves on the same market place.

Retailers: bought vegetable products from collectors and also from farmers and sold directly to final consumers.

5.1.1 Cucumber

FIGURE 2. THE MARKETING CHANNEL OF CUCUMBER

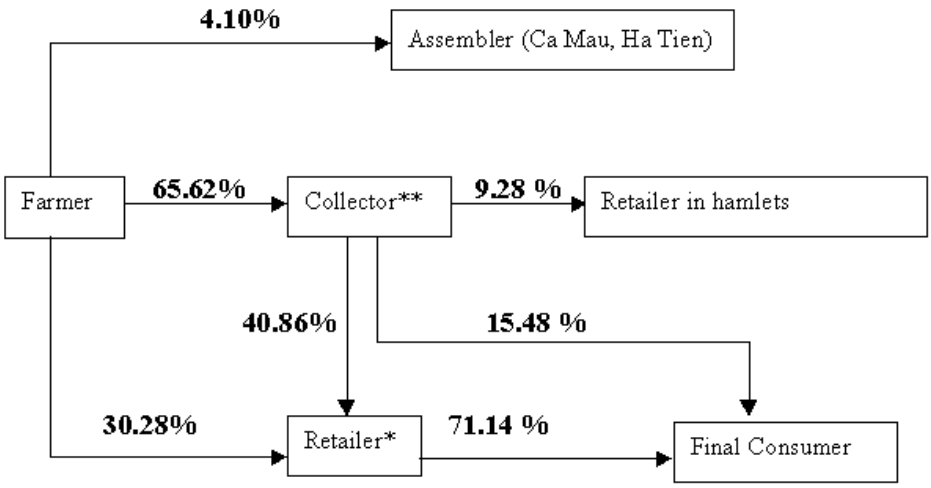


Figure 3 shows the marketing channel of Cucumber product in Tan Phu Thanh village, Chau Thanh district. Large proportion went to the collectors channel (65.62%) and the retailers channel (30.28%), while only small amount were sold to assemblers coming from Ca Mau and Ha Tien (4.10%). Here, the collectors** and retailers* mentioned included either the local

collectors/retailers, or the collectors/retailers coming from Vi Thanh, Vi Thuy, Long My, Rach Goi, Cai Rang and Can Tho.

From the collectors, 40.86 percent of the cucumber production was sold to the retailers who had a space at district/town market places for selling vegetables. Another 15.48 percent of this product moved to final consumers. In this case, the collectors played a role of not only collectors, but also retailers. And the remaining 9.28% went to other retailers who came from hamlets belonging to the above districts.

Overall, a total of 71.14% of cucumber products from retailers* was sold to final consumers, and the remaining 15.48 % was provided by collectors to the consumers. The remaining share went to retailers in hamlets and assemblers in Ca Mau and Ha Tien provinces. This marketing channel was not included in this research.

5.1.2 Tomato

FIGURE 3.THE MARKETING CHANNEL OF TOMATO

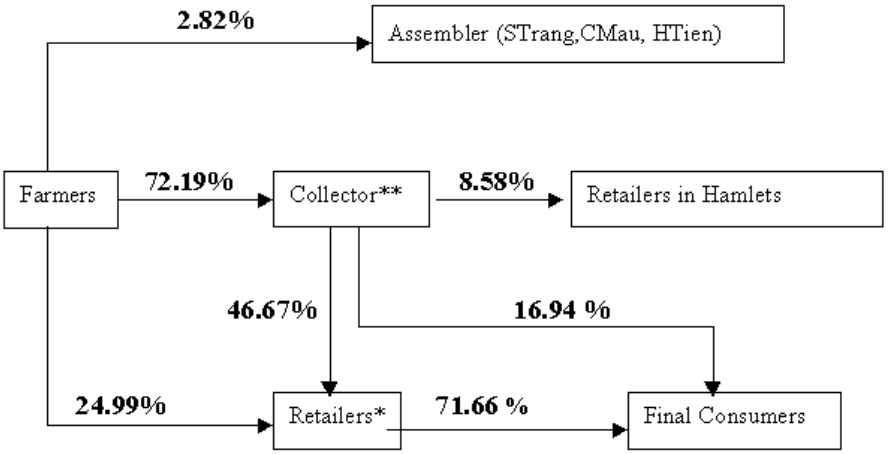


Figure 4 indicates that the majority of tomato products (72.19%) produced by farmers in TPT was sold to the collectors** who are identical to the collectors** for cucumber production, followed by the retailers channel with 24.99% of the total moved from the farmers to the retailers* before going to final consumers. The remaining 2.82% of tomato was distributed by the assemblers in Soc Trang, Ca Mau and Ha Tien provinces. This marketing channel was not studied here. From the collectors**, a large volume (46.67%) was passed on to the retailers* (who also deals cucumber products) and another share of 16.94% was sold directly to final consumers, while a small amount was bought by the retailers in hamlets belonging to the mentioned districts, such as Vi Thanh, Vi Yhuy, Long My, Rach Goi, Cai Rang and Can Tho. This marketing channel was not also considered here. In sum, final consumers consumed 71.66% of tomato product directly from the retailers*, and 16.94% from the collectors**.

5.1.3 Bitter melon

FIGURE 4. THE MARKETING CHANNEL OF BITTER MELON

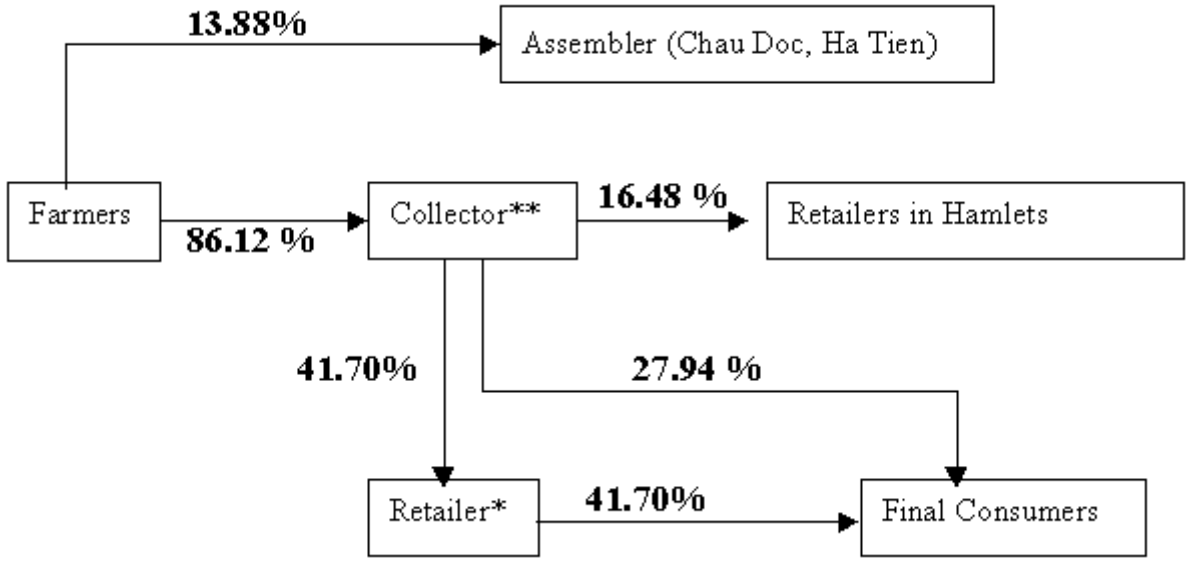


Figure 4 shows that little of the bitter melon production was sold directly to the retailers, while 86.12% of it bitter melon produced by farmers was shipped to the collectors** (the same collectors of the two other products). The remaining 13.88% moved to the assemblers channel which was not included in this analysis. The retailers* were the major buyers from the collectors**, with 41.70% of the total distributed to them. Another 27.94% was sold directly to final consumers. Finally, the remaining 16.48% went to the retailers in Hamlets belonging to the districts: Vi Thanh, Vi Thuy, Long My, Rach Goi, Cai Rang and Can Tho.

In general, there were three main marketing channels for cucumber, tomato and bitter melon. They were:

(1) Farmers → Collectors → Final Consumers

(2) Farmers → Collectors → Retailers → Final Consumers

(3) Farmers → Retailers → Final Consumers..

These channels were called the main marketing channels since the bulk of the total vegetable products was distributed through those channels which also were the popular channels existing in the present markets.

5.2 Analysis of production cost and marketing cost

5.2.1 Production costs of farmers

It is very useful to conduct an analysis of the production costs of different kinds of vegetable, because it is a factor affecting the issue of determining the selling price of farmers. Besides, knowing what is the cost structure helps us realize what were the main cost items incurred to farmers. Here, the concept of production cost is necessary to consider. Production Cost:

Cost components in producing 1 kg of each kind of vegetable were estimated from information provided by farmers. These average values were computed using data reported by these farmers who actually perform these operations. The values of the cost items for every products are presented in Table 23, 24 and 25.

TABLE 23. AVERAGE PRODUCTION COST OF CUCUMBER PER HECTARE

Cost Items	Family- labour	Rent-Labour	Cost of rent Labour	Cash cost	Total cost	Rate
	(Man day)	*(Man day)*	*(VND)*	*(VND)*	*(VND)*	(%)
Land Preparation	69	12	347,899	0	347,899	6.04
Trellis	33	1	6,723	1,625,807	1,632,530	28.36
Seed	0	1	8,403	803,529	811,932	14.10
Sowing	18	0	12,605	16,807	29,412	0.51
Hand weeding	67	6	70,588	0	70,588	1.23
Herbicide	0	0	0	10,420	10,420	0.18
Irrigation	86	0	0	3,025	3,025	0.05
Fertilizer	24	0	0	1,559,613	1,559,613	27.09
Pesticide	17	0	0	816,639	816,639	14.18
Harvesting	41	0	0	0	0	0.00
Transportation	12	0	0	213,378	213,378	3.71
Packing	0	0	0	0	0	0.00
Agricultural-Tax	0	0	0	0	256,854	4.46
Interest	0	0	0	0	5,042	0.09
Other	0	0	0	0	0	0.00
Total cost per hectare	367	20	446,218	5,049,218	5,757,332	100

Table 23 shows that the total production costs, not including the costs for family labour, incurred to the farmers growing cucumber were approximately 5,757 million VND/ha. The costs for making trellis and for applying fertilizers ranked highest, with shares of 28.35% and 27.09% respectively, followed by costs for applying pesticides and seeds (14.18% and 14.10%). The farmers mainly used their family labour for cultivation (366 man-days/ha comparing with an amount of 20 man-days of hired labour). Particularly, they used all family labour for harvesting. Growing cucumber is clearly labour intensive (41 man-days/ha). So, the ratio of the cost for hired labour to the total production costs was about 9%.

Table 24 indicated that the two highest cost items for tomato production were fertilizer and pesticide applications, accounting for 32.07% and 21.89% of the total respectively. The next highest cost component was making trellis (11.86%). Besides, the two other items considered as major ones were land preparation and seeds (9.40% and 9.88%). For this product, the family labour was also the main source used here. Table 24 shows farmers invested 461 family man-days within a total of 499 man-days needed to cultivate tomato. If excluding opportunity cost of family labour, the total production cost of tomato was approximately 6.100 million VND/ha.

TABLE 24. AVERAGE PRODUCTION COST OF TOMATO PER HECTARE

Cost Items	Family- labour	Rent-Labour	Cost of rent labour	Cash cost	Total cost	Rate
	(Man day)	*(Man day)*	*(VND)*	*(VND)*	*(VND)*	(%)
Land Preparation	79	23	573,864	0	573,864	9.40
Trellis	34	0	0	723,523	723,523	11.86
Seed	0	0	0	602,727	602,727	9.88
Sowing	15	5	117,045	0	117,045	1.92
Hand weeding	54	10	196,591	0	196,591	3.22
Herbicide	1	0	0	11,705	11,705	0.19
Irrigation	132	0	0	0	0	0.00
Fertilizer	40	0	0	1,956,750	1,956,750	32.07
Pesticide	23	0	0	1,335,909	1,335,909	21.89
Harvesting	62	0	0	0	0	0.00
Transportation	21	0	0	264,432	264,432	4.33
Packing	0	0	0	0	0	0.00
Agricultural Tax	0	0	0	319,432	319,432	5.23
Interest	0	0	0	0	0	0.00
Other	0	0	0	0	0	0.00
Total cost per hectare	461	38	887,500	5,214,478	6,101,978	100.00

Similarly to tomato and cucumber production, Table 25 indicates that the four main cost items for bitter melon were relative to fertilizer, trellis, seed and pesticides, amounting to 28.46%, 23.40%, 19.19% and 14.95%, respectively. Farmers only used family labour (468 man-days/ha). And the total production cost per hectare was approximately 6.160 million VND.

In general, for these three products, the major cost items incurred to farmers comprised of trellis, seed, fertilizer and pesticides. The majority of labour used for producing was family labour (over 85% in total)

TABLE 25. AVERAGE PRODUCTION COST OF BITTER MELON PER ONE HECTARE

Cost Items	**Family- labour**	**Rent-Labour**	**Cost of rent labour**	**Cash cost**	**Total cost**	**Rate**
	(Man day)	*(Man day)*	*(VND)*	*(VND)*	*(VND)*	(%)
Land Preparation	64	0	0	29189	29,189	0.47
Trellis	52	0	0	1,441,757	1,441,757	23.40
Seed	0	0	0	1,182,432	1,182,432	19.19
Sowing	14	0	0	0	0	0.00
Hand weeding	68	0	0	0	0	0.00
Herbicide	1	0	0	14,324	14,324	0.23
Irrigation	154	0	0	0	0	0.00
Fertilizer	46	0	0	1,753,649	1,753,649	28.46
Pesticide	26	0	0	921,351	921,351	14.95
Harvesting	36	0	0	0	0	0.00
Transportation	8	0	0	241,486	241,486	3.92
Packing	0	0	0	0	0	0.00
Agricultural Tax	0	0	0	238,392	238,392	3.87
Interest	0	0	0	301,351	301,351	4.89
Other	0	0	0	37,838	37,838	0.61
Total cost per hectare	468	0	0	6,161,769	6,161,769	100.00

5.2.2 Marketing cost of collectors

5.2.2.1 Marketing cost of collectors in the marketing channels 1.1 and 2.1

(Farmers → Collectors →Final Consumers/Retailers) in Vi Thanh – Vi Thuy – Long My.

Table 26 shows the different marketing cost items of collectors for the three products. On average, their marketing costs amounted to approximately 110 VND/kg, 160 VND/kg and 155 VND/kg for Cucumber, Tomato and Bitter Melon respectively. If we consider three aggregated values for the products, transportation costs were the major cost item accounting for 39.67%, followed by the cost of losses occurring in the process of buying-selling and other costs which included: umbrella renting, scale renting, basket and fee for agents, accounting for 35.43% and 21.27%, respectively. The collectors mainly took products to the market places either by coach, or by motorcycle (average distance of 40 km from TPT) where they sold the products not only to retailers, but also to final consumers. However, there were some other collectors renting motorcycles for transportation. These collectors did not have to pay any cost for interest, loading and unloading, because they had enough operating capital and also because the work of loading and unloading was done by farmers and transporters at the point of buying and at the point of selling. For all the three products, the costs of losses mainly occurring in measuring and transporting were extremely high, especially for tomato and bitter melon. It can be noted in Table 4 that the collectors paid very small taxes (4.54%, 3.13% and 3.20% of total for cucumber, tomato and bitter melon respectively).

TABLE 26. MARKETING COST STRUCTURE OF COLLECTORS FOR THREE PRODUCTS

Cost item	Cucumber	**Percent(%)**	Tomato	**percent(%)**	Bitter Melon	**percent(%)**
Transportation	54.44	49.69	54.44	34.24	54.44	35.10
Loading	0.00	0.00	0.00	0.00	0.00	0.00
Unloading	0.00	0.00	0.00	0.00	0.00	0.00
Cost of loss	20.97	19.13	70.40	44.28	66.53	42.88
Taxation	4.97	4.54	4.97	3.13	4.97	3.20
Interest	0.00	0.00	0.00	0.00	0.00	0.00
Other	29.19	26.64	29.19	18.36	29.19	18.82
Total	**109.57**	100.00	**159.01**	100.00	**155.13**	100.00

5.2.2.2 Marketing cost of collectors in the marketing channels 1.2 and 2.2

(Farmers → Collectors →Final Consumers/Retailers) in Rach Goi, Cai Tac and Cai Rang.

Table 27 indicates that on average, the marketing costs per kilo of Cucumber, Tomato and Bitter Melon were approximately 90 VND, 100 VND and 80 VND, respectively, in which, for all three products, transportation, losses in the process of buying-selling and other costs including umbrella renting, scale renting, basket, fee for agents who stayed at Tan Phu Thanh market place were the major cost items. If computing for all three products, the cost of loss (40.35%) was found highest compared with the two other components (29.25% for transportation fee with the average distance of around 20 km from TPT, and 26.36% for other costs). Similar to the collectors in the marketing channel 1.1, the costs of loading, unloading and interest were not incurred by the collectors. However, the marketing costs for three products in this marketing channel were lower than that in the marketing channel 1.1.

This resulted from the difference in transportation cost, lower in this marketing channel than in marketing channel 1.1. This is not surprising because the average distance from the buying point to that of selling was different (40 km against 20 km).

TABLE 27. MARKETING COST STRUCTURE OF COLLECTORS FOR THREE PRODUCTS

Cost Item	Cucumber	Percent(%)	Tomato	percent(%)	Bitter Melon	percent(%)
Transportation	26.05	29.09	26.05	25.76	26.05	32.90
Loading	0.00	0.00	0.00	0.00	0.00	0.00
Unloading	0.00	0.00	0.00	0.00	0.00	0.00
Cost of loss	36.44	40.69	48.00	47.47	26.05	32.90
Taxation	3.50	3.91	3.50	3.46	3.50	4.42
Interest	0.00	0.00	0.00	0.00	0.00	0.00
Other	23.57	26.32	23.57	23.31	23.57	29.77
Total	89.56	100.00	101.12	100.00	79.17	100.00

5.2.2.3 Marketing cost of collectors in the marketing channels 1. 3 and 2.3

(Farmers → Collectors →Final Consumers/Retailers) in Can Tho.

As shown in Table 28, the collectors faced the highest marketing costs, amounting to approximately 175 VND/kg, 205 VND/kg and 255 VND/kg for cucumber, tomato and bitter melon, respectively. The highest marketing cost component was transportation cost (an aggregated rate for three products of 50.02%), followed by other costs and cost of losses with the aggregated rates of 26.78% and 14.55% respectively. Especially, in contrast with the two above collectors, the collectors in this marketing channel had to cope with a higher amount of taxation (8.64%, compared with 3.63% and 3.93% in the marketing channel 1.1 and 1.2, respectively).

In general, for the marketing channel 1 (farmers → Collectors → Final consumers), the three major cost items incurred by the collectors were transportation**,** cost of loss and other costs which included scale renting, umbrella renting, basket, fee for agents who stayed at Tan Phu Thanh market place. The collectors did not bear heavy taxes (an average of 5.4% on the whole). In addition, the collectors had enough capital for their operation, so they did not pay any interest. Besides, any cost for loading and unloading activities was borne by farmers at the point of buying and by retailers at the point of selling.

TABLE 28. MARKETING COST STRUCTURE OF COLLECTORS FOR THREE PRODUCTS

Cost Item	**Cucumber**	**Percent(%)**	Tomato	**percent(%)**	**Bitter Melon**	**percent(%)**
Transportation	103.77	59.24	103.77	50.23	103.77	40.59
Loading	0.00	0.00	0.00	0.00	0.00	0.00
Unloading	0.00	0.00	0.00	0.00	0.00	0.00
Cost of loss	23.29	13.29	54.71	26.48	103.77	40.59
Taxation	17.92	10.23	17.92	8.68	17.92	7.01
Interest	0.00	0.00	0.00	0.00	0.00	0.00
Other	30.19	17.23	30.19	14.61	30.19	11.81
Total	**175.18**	100.00	**206.60**	100.00	**255.66**	100.00

5.2.3 Marketing cost of retailers

5.2.3.1 Marketing cost of retailers buying products from farmers at TPT market place

TABLE 29. MARKETING COST STRUCTURE OF RETAILERS FOR THREE PRODUCTS

Cost Item	Cucumber	percent(%)	Tomato	percent(%)	Bitter-melon	percent(%)
Cost of loss	18	19.80	29	28.32	52	41.11
Transportation	25	27.17	25	24.29	25	19.95
Taxation	18	19.81	18	17.71	18	14.55
Other	31	33.21	31	29.68	31	24.39
Interest	0	0.00	0	0.00	0	0.00
Total Cost	92	100.00	103	100.00	125	100.00

The marketing costs of retailers who bought the products directly from farmers bringing the products to marketplace themselves are presented in Table 29. Their marketing costs averaged 90 VND/kg, 100 VND/kg and 125 VND/kg for cucumber, tomato and bitter melon respectively. The major cost item incurred by retailers was fees for umbrella renting accounting for 33.21%, followed by taxes (19.81%) and cost of losses (19.80%). Comparing with the collectors, retailers had to bear higher taxes (17.35% >5.40%). Similar to the collectors, retailers did not have to pay for unloading fee because farmers usually sold their products at market places, where retailers had a space for selling.

5.2.3.2 Marketing cost of retailers buying products from collectors at market places of Vi Thanh, Vi Thuy and Long My

As shown in Table 30, on average the marketing costs of retailers amounted to approximately 120 VND/kg for cucumber, 200 VND/kg for tomato and 180 VND/kg for bitter melon. The costs of losses in the process of business was highest (an aggregated rate of 46.34%) if compared to other cost components. This cost was mainly driven by losses due to the bad quality of products as well as in measuring, especially for tomato and bitter melon (57.75% and 52.86% in total). In comparison, retailers had to pay significantly higher taxes than collectors and retailers who stayed at TPT market place and bought the products directly from farmers (an aggregated rate for three products of 28.45% compared to 5.40% and 19.81%). Besides, in contrast with the collectors, retailers had to pay high interests, because they did not have enough capital for their operation. On the average for three aggregated products, they had to pay about 11.59% of the total. In addition, the other cost items were also high (18.15% for cucumber, 10.72% for tomato and 11.95% for bitter melon).

TABLE 30. MARKETING COST STRUCTURE OF RETAILERS FOR THREE PRODUCTS

Cost Item	Cucumber	Percent(%)	Tomato	Percent(%)	Bitter Melon	Percent(%)
Cost of loss	34	28.43	117	57.75	96	52.86
Loading	0	0.00	0	0.00	0	0.00
Unloading	0	0.00	0	0.00	0	0.00
Transportation	0	0.00	0	0.00	0	0.00
Taxation	45.4	37.96	45	22.41	45	25.00
Interest	18.5	15.47	19	9.13	19	10.19
Other	21.71	18.15	22	10.72	22	11.95
Total	119.61	100.00	203	100.00	182	100.00

5.2.3.3 *Marketing cost of retailers buying products from collectors at market places of Cai Rang, Cai Tac (TPT) and Rach Goi*

Table 31 shows a situation similar to that of the retailers in the previous marketing channel. That is, the cost of loss and taxation were found to be the highest (44.58% and 25.68% on the average of three products). Their marketing costs amounted to approximately 125 VND/kg for cucumber, 190 VND/kg for tomato and 145 VND/kg for bitter melon. Retailers also did not have to pay fees for loading, unloading and transportation.

TABLE 31. MARKETING COST STRUCTURE OF RETAILERS FOR THREE PRODUCTS

Cost Item	Cucumber	Percent(%)	Tomato	Percent(%)	Bitter Melon	Percent(%)
Cost of loss	43	34.35	109	56.90	61	42.49
Loading	0	0.00	0	0.00	0	0.00
Unloading	0	0.00	0	0.00	0	0.00
Transportation	0	0.00	0	0.00	0	0.00
Taxation	38	30.42	38	19.97	38	26.65
Interest	22	17.73	22	11.64	22	15.53
Other	22	17.50	22	11.49	22	15.33
Total	126	100.00	192	100.00	144	100.00

5.2.3.4 *Marketing cost of retailers buying products from collectors at market places of An Nghiep – Can Tho City.*

The figures in Table 32 show that the total marketing costs of these retailers for cucumber, tomato and bitter melon amounted to approximately 155 VND/kg, 200 VND/kg and 240 VND/kg respectively. For cucumber, retailers had to bear 45.37% of the total because of the small amount of this product. The second was cost of loss in trade (26.12%). Besides, interest and other costs amounted to 14% each approximately. The picture obtained for tomato and bitter melon was similar. Finally, these retailers did not incur the burden of cost items such as loading, unloading and transportation.

In sum, the retailers who bought the products directly from farmers had lower marketing costs than the retailers who bought the products from collectors for all three products. Among retailers, the retailers in Can Tho faced the highest marketing costs.

TABLE 32. MARKETING COST STRUCTURE OF RETAILERS FOR THREE PRODUCTS

Cost Item	Cucumber	Percent(%)	Tomato	Percent(%)	Bitter Melon	Percent(%)
Cost of loss	40	26.12	88	43.56	125	52.30
Loading	0	0.00	0	0.00	0	0.00
Unloading	0	0.00	0	0.00	0	0.00
Transportation	0	0.00	0	0.00	0	0.00
Taxation	70	45.37	70	34.65	70	29.29
Interest	22	14.26	22	10.89	22	9.21
Other	22	14.26	22	10.89	22	9.21
Total	154	100.00	202	100.00	239	100.00

5.2.3.5 Analysis of marketing margin and marketing profit of the vegetable marketing channels

To clarify the economic efficiency of the actors along every marketing channels, an analysis of marketing margins and marketing profits was conducted. Some basic economic concepts used in the analysing process are first presented here:

Marketing Cost: refers to all the costs incurred from the point of production up to the point of distribution for final consumers. Values of the cost items are presented in the preceding tables.

Marketing Margin: is the difference between the price paid by ultimate consumers and that obtained by producers.

Profit Margin: is the difference between the gross marketing margin and the total marketing cost.

Thus, we can write the following formulas

Marketing Margin = Selling Price – Buying Price

Total profit margins = Gross Marketing Margin – Total Marketing Cost

There are 6 marketing channels for our three kinds of vegetable (cucumber, tomato and bitter melon) in Can Tho province. However, we will just focus here on the three main marketing channels in terms of total selling/buying volumes: (1) Farmers – Collectors – Final Consumers (2) Farmers – Collectors – Retailers – Final Consumers (3) Farmers – Retailers – Final Consumers. Each marketing channels was divided into several smaller marketing channels which products were moved to other market places.

Channel 1: Farmers ⟶ Collectors ⟶ Final Consumers

Channel 1.1: Farmers⟶ Collector group far from TPT⟶ Final Consumers
(Vi Thanh, Long My, Vi Thuy)

In this marketing channel, there were 60 farmers and 10 collectors interviewed, mostly in three hamlets: Long An, Tan Thanh Tay and Thanh My B. The collectors arrived from the districts of Vi Thanh, Long My and Phung Hiep. A part of the products bought from farmers in Tan Phu Thanh (TPT) was sold directly to final consumers at the district market places. The marketing cost components incurred in this operation are presented in Table 28, while the marketing margin as well as the profit margin are presented in the following table.

TABLE 33. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN LONG MY, VI THANH AND VI THUY, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	1,731	913(1,347*)		
Collectors	1,731	2,893	1,162	159	1,003
2. Cucumber					
Farmers	998(514*)	1,085	97(571*)		
Collectors	1,085	1,795	710	110	600
3. Bitter Melon					
Farmers	1,163(544*)	2,211	1,048(1,667*)		
Collectors	2,211	2,963	752	155	597

Note: * not including the opportunity cost of family labour

Channel 1.2: Farmers ⟶ Collector group near to TPT ⟶ Final Consumers
(Phung Hiep,Cai Rang, Cai Tac)

In this marketing channel, 60 farmers and 9 collectors were interviewed. These collectors usually stay in TPT, Phung Hiep district, Cai Rang town and Cai Tac Village. A part of the production bought from farmers in TPT was sold directly to final consumers at the market places of Rach Goi, TPT and Cai Rang. The costs incurred in this operation are presented in Table 28, while the marketing margin and the profit margin obtained are presented in the following table.

TABLE 34. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN PHUNG HIEP, CAI RANG AND CAI TAC, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	1,731	913(1,347*)		
Collectors	1,731	2,694	963	101	862
2. Cucumber					
Farmers	998(514*)	1,151	153(637*)		
Collectors	1,151	1,775	624	90	534
3. Bitter Melon					
Farmers	1,163(544*)	2,211	1,048(1,667*)		
Collectors	2,211	3,097	886	79	807

Note: * not including the opportunity cost of family labour

Channel 1.3: Farmers ⟶ Collector group in Can Tho ⟶ Final Consumers

In this marketing channel, 4 collectors were interviewed. They came to TPT from Can Tho city to buy the products. Then, they brought them to An Nghiep market place to sell a part to final consumers. The marketing costs incurred to them are presented in Table 6 and their marketing margin as well as the profit margin are presented below.

TABLE 35. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN CAN THO CITY, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	1,778	960(1,394*)		
Collectors	1,778	3,052	1,274	207	1,067
2. Cucumber					
Farmers	998(514*)	1,107	109(593*)		
Collectors	1,107	1,936	829	175	654
3. Bitter Melon					
Farmers	1,163(544*)	2,350	1,187(1,806*)		
Collectors	2,350	3,304	954	257	697

Note: * not including the opportunity cost of family labour

– ***Tomato***

The figures in Tables 33, 34 and 35 show that the buying price of tomato is in the 1,730 – 1,778 VND/kg bracket, with the collectors arriving from Can Tho city paying the highest price compared to other collectors. But, they also obtained the highest selling price of 3,052 VND/kg, in comparison. This indicates that the price of tomato in Can Tho city was higher than that in Long My, Vi Thanh, Vi Thuy, Rach Goi, Cai Tac and Cai Rang. As a result, the marketing margin obtained by the collectors in Can Tho was also the highest (1,274 VND/kg), while that obtained by the collectors selling the products at the market places of Cai Tac, Cai Rang and Rach Goi was the lowest (963 VND/kg). Similarly, while the profit margin of the collector group along the marketing channel 1.2 was the lowest (862 VND/kg), that of the collector group along the marketing channel 1.3 was the highest (1,067 VND/kg), accompanied by a highest marketing cost (207 VND/kg). Overall, the aggregate values for tomato in the marketing channel 1 are as follows:

TABLE 36. MARKETING MARGIN AND PROFIT MARGIN OF THE COLLECTORS ALONG THE MARKETING CHANNEL 1 FOR THE TOMATO PRODUCT

Tomato	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
Farmers	818(384*)	1,747	929(1,363*)		
Collectors	1,747	2,880	1,133	156	977

Note: * not including the opportunity cost of family labour

Table 36 indicates that the price farmers received in this marketing channel was 1,747 VND/kg in average while the average price paid by consumers was 2,880 VND/kg. The collectors earned a marketing margin of 1,133 VND/kg and a profit margin of 977 VND/kg.

- ***Cucumber***

Tables 33, 34 and 35 show the profit and marketing margin of the collectors along the marketing channels 1.1,1.2 and 1.3. On average, the collectors in the marketing channel 1.3 earned a highest benefit (654 VND/kg), although they also incurred the highest marketing costs (175 VND/kg). This resulted from the higher selling price that the collectors received from final consumers in Can Tho (1,936 VND/kg). Similar to the tomato marketing channel, the collectors in the marketing channel 1.2 were found to have a lowest marketing margin in

trade (624 VND/kg compared with 710 and 828 VND/kg for the collectors in the marketing channel 1.1 and 1.3, respectively). An aggregate calculation for all collectors in the marketing channel 1 for cucumber is presented under the following table:

TABLE 37. MARKETING MARGIN AND PROFIT MARGIN OF THE COLLECTORS ALONG THE MARKETING CHANNEL 1 FOR CUCUMBER

Cucumber	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
Farmers	998(514*)	1,114	116(600*)		
Collectors	1,114	1,835	721	125	596

Note: * not including the opportunity cost of family labour

The marketing cost for cucumber, from the point of production (farmers in TPT) up to the point of distribution for final consumers in this marketing channel, was 125 VND/kg. After deducting this marketing cost from the marketing margin, the collectors in this marketing channel got a profit margin of 596 VND per kilo. The gross margin that farmers earned in this marketing channel was 600 VND/kg, and final consumers had to pay 1,835 VND per kilo on average.

- ***Bitter Melon***

Bitter melon differed from tomato and cucumber in some aspects. First, the collectors selling bitter melon to final consumers in Cai Tac, Cai Rang and Rach Goi got a highest profit margin (806 VND/kg), although their marketing margin was comparatively lower than that of the other collectors (885 VND/kg < 954 VND/kg). This was due to the too high marketing cost incurred by the collectors in the marketing channel 1.3 (256 VND/kg) while the marketing costs of the collectors along the marketing channel 1.1 and 1.2 were 155 VND/kg and 79 VND/kg, respectively. In addition, the buying price of the collectors in the marketing channel 1.3 was also comparatively higher than that of the other collectors. An aggregate calculation for all collectors in this marketing channel is presented in Table 38.

TABLE 38. MARKETING MARGIN AND PROFIT MARGIN OF THE COLLECTORS ALONG THE MARKETING CHANNEL 1 FOR THE BITTER MELON PRODUCT

Bitter Melon	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
Farmers	1,163(544*)	2,256	1,093(1,747*)		
Collectors	2,256	3,121	865	163	702

Note: * not including the opportunity cost of family labour

Generally, the collectors of this marketing channel earned the highest profit margin when trading tomatoes (977 VND/kg), and got the lowest profit margin when trading cucumber (721 VND/kg). As mentioned in the previous section, another part of the vegetables that the collectors bought from farmers in TPT was moved to retailers before being moved to final consumers. Thus, an analysis of marketing margin and profit margin on each type of the traders along this marketing channel was carried out.

Channel 2: Farmers ⟶ Collectors ⟶ Retailers ⟶ Final Consumers

Channel 2.1. Farmers → Collectors → Retailers → Final Consumers
(Vi Thanh, Vi Thuy and Long My)

Table 39 indicates that the marketing margin obtained by the collectors was higher than that obtained by retailers (747 VND/kg > 415 VND/kg) for tomato. The reason for this was a large difference between the buying and selling prices. And, in comparison, the collectors were considered to display a high efficiency because they incurred a lower marketing cost accompanied with a higher marketing margin. Indeed, as presented in Table 39, the profit margin of the collectors was 588 VND/kg while that of retailer was only 212 VND/kg. Unlike tomato, the marketing margin and profit margin of the collectors of cucumber and bitter melon were lower than that of the retailers.

TABLE 39. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN VI THANH, VI THUY AND LONG MY, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV.Buying price/Production Cost	AV.Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	1,731	913(1,347*)		
Collectors	1,731	2,478	747	159	588
Retailers	2,478	2,893	415	203	212
2. Cucumber					
Farmers	998(514*)	1,085	87(571*)		
Collectors	1,085	1,410	325	110	215
Retailers	1,410	1,795	385	120	265
3. Bitter Melon					
Farmers	1,163(544*)	2,211	1,048(1,667*)		
Collectors	2,211	2,556	345	155	190
Retailers	2,556	2,963	407	182	225

Note: * not including the opportunity cost of family labour

Channel 2.2. Farmers → Collectors → Retailers → Final Consumers
(Cai Rang, Cai Tac and Phung Hiep)

TABLE 40. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN CAI RANG, CAI TAC AND PHUNG HIEP, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384)	1,731	913(1,347*)		
Collectors	1,731	2,062	331	101	230
Retailers	2,062	2,694	632	192	440
2. Cucumber					
Farmers	998(514*)	1,151	153(637*)		
Collectors	1,151	1,456	305	90	215
Retailers	1,456	1,775	319	126	193
3. Bitter Melon					
Farmers	1,163(544*)	2,211	1,049(1,667*)		
Collectors	2,211	2,485	274	79	195
Retailers	2,485	3,097	612	144	468

Note: * not including the opportunity cost of family labour

The figures in Table 40 show that the collectors earned a lower marketing margin than retailers in trade of all three products, especially in the bitter melon product. However, for cucumber, the collectors got a higher profit margin of 215 VND/kg than the retailers (193

VND/kg) because the marketing costs incurred by them was much lower than that of the retailers.

Channel 2.3. Farmers → Collectors → Retailers → Final Consumers
(Can Tho)

TABLE 41. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN CAN THO, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	1,778	960(1,394*)		
Collectors	1,778	2,636	858	207	651
Retailers	2,636	3,052	416	202	214
2. Cucumber					
Farmers	998(514*)	1,107	109(593*)		
Collectors	1,107	1,379	272	175	97
Retailers	1.,379	1,936	557	154	403
3. Bitter Melon					
Farmers	1,163(544*)	2,350	1,187(1,806*)		
Collectors	2,350	2,875	525	256	269
Retailers	2,875	3,303	428	239	189

Note: * not including the opportunity cost of family labour

Table 41 indicates that except for cucumber the collectors received a higher marketing margin and profit margin compared with the retailers. Indeed, there was a very large difference in profit margin between the collectors and the retailers (97 VND/kg against 403 VND/kg). This was due to the retailers receiving a large difference between the buying price and the selling price. In contrast with cucumber, the profit margin of collectors of tomatoes in this marketing channel was three times that of retailers. This was the result of a very large difference between the selling price and the buying price.

If we calculate following the product chain, regardless of the trade places, we get the following table, derived from Table 20.

TABLE 42. MARKETING MARGIN AND PROFIT MARGIN OF ALL ACTORS ALONG THE MARKETING CHANNEL FOR ALL THREE PRODUCTS

Types of product	AV. Buying price/Production Cost	AV. Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	1,746	928(1,362*)		
Collectors	1,746	2,391	645	155	490
Retailers	2,391	2,880	489	200	289
2. Cucumber					
Farmers	998(514*)	1,114	116(600*)		
Collectors	1,114	1,414	300	125	175
Retailers	1,414	1,835	425	133	292
3. Bitter Melon					
Farmers	1,163(544*)	2,257	1,049(1,713*)		
Collectors	2,257	2,637	380	163	217
Retailers	2,637	3,115	478	188	290

Note: * not including the opportunity cost of family labour

- ***Tomato***

In this marketing channel farmers earned a gross margin of 928 VND/kg. The collectors were considered to have higher efficiency than the retailers, because they got a higher marketing margin and profit margin than retailers (645 VND/kg > 489 VND/kg and 490 VND/kg > 289 VND/kg). The marketing cost from the point of production to the point of final consumption was 1,134 VND/kg (2,880 VND/kg – 1,746 VND/kg).

- ***Cucumber***

Contrary to tomato, the retailers trading cucumber showed a higher efficiency. The figures in Table 20 indicated that both the marketing margin and the profit margin of the retailers were higher than that of the collectors (425 VND/kg > 300 VND/kg and 292 VND/kg > 175 VND/kg). The marketing cost from the farm gate to final consumers in this marketing channel was 721 VND/kg.

- ***Bitter Melon***

For this product, the situation was similar to that of cucumber, that is, the marketing margin and profit margin obtained by the collectors were lower than that obtained by the retailers (380 VND/kg < 478 VND/kg and 217 VND/kg < 290 VND/kg). The price of bitter melon that final consumers had to pay was 3,115 VND/kg, while the price received by farmers was 2,257 VND/kg.

Channel 3: Farmers s ⟶ Retailers ⟶ Final Consumers

Channel 3.2. Farmers → Retailers → Final Consumers
(Cai Tac)

TABLE 43. MARKETING MARGIN AND PROFIT MARGIN (VND/KG) OF THE COLLECTORS BY TYPE OF PRODUCT IN PHUNG HIEP, CAN THO PROVINCE, VIETNAM, AUGUST 2000

Types of product	AV.Buying price/Production Cost	AV.Selling price	Marketing Margin/Gross Margin	AV. Marketing Costs	Profit Margin
1. Tomato					
Farmers	818(384*)	2,060	1,142(1,676*)		
Retailers	2,060	2,605	545	103	442
2. Cucumber					
Farmers	998(514*)	1,213	215(699*)		
Retailers	1,213	1,581	368	92	276

Note: * not including the opportunity cost of family labour

- ***Tomato***

Table 43 indicates that farmers earned a gross margin of 1,142 VND/kg if they sold their products to the retailers who had a space in TPT market. The retailers in this marketing channel got a marketing margin of 545 VND/kg, and after deducting the marketing costs they obtained 442 VND/kg in profit margin.

- ***Cucumber***

As shown in Table 43, while the farmers in this marketing channel obtained a gross margin of 699 VND/kg, the marketing margin obtained by the retailers amounted to 368 VND/kg. Deducting a marketing cost of 92 VND/kg from this marketing margin, the retailers received a profit margin of 276 VND/kg.

In sum, the market operation for the vegetable products was very varied. It included various marketing channels existing in the same time and the same places, in which some actors could play several roles in a marketing channel. For example, in the marketing channel 1 mentioned above, an actor could be only a collector, but also a retailer. The vegetables produced by farmers could be acquired by many various buyers, and at the scale of this research, only three of them were analysed. However, in each marketing channel, we were conducted deeper analyses for each market. We can summarise the information obtained from the above analyses. The results are presented in the following tables.

TABLE 44. MARKETING MARGIN AND PROFIT MARGIN OF ALL ACTORS ALONG EVERY MARKETING CHANNELS FOR TOMATO.

	Farmer			Collector			Retailer		
	MC 1	MC 2	MC 3	MC 1	MC 2	MC 3	MC 1	MC 2	MC 3
AV. Buying price/production Cost	820	820	820	1,750	1,750			2,390	2,060
AV. Selling Price	1,750	1,750	2,060	2,880	2,390			2,880	2,605
Marketing Margin/Gross Margin	930	930	1,240	1,130	640			490	545
Marketing Cost				155	155			200	100
Profit Margin				975	485			290	445

Notes: (1) Figures in Table were rounded
(2) MC 1; MC 2 and MC 3 : Marketing Channel 1, 2 and 3

Table 44 shows that farmers received 1,750 VND per kilo of tomato while final consumers in the marketing channel 1 (MC 1) paid 2,880 VND per kilo. This means that the total marketing cost of tomato in this marketing channel was 1,130 VND/kg, equal to the collectors' marketing margin in this marketing channel. For these collectors, their marketing cost amounted to 155 VND/kg, therefore they got a profit margin of 975 VND/kg. The collectors in this marketing channel either came from other locals, such as Vi Thanh, Vi Thuy, Long My, Rach Goi, Cai rang and Can Tho, or stayed at TPT. For the marketing channel 2 (MC 2), the farmers also received a gross margin similar to that of farmers in MC 1. Their products were also moved to the collectors. However, the collectors in this marketing channel would sell all products bought from the farmers to the retailers in the market places, instead of selling a part to retailers, as in the marketing channel 1. So, while the collectors in MC 1 sold 1 unit of tomato directly to final consumers at the price of 2,880 VND, the collectors in this marketing channel only earned 2,390 VND/kg when selling to the retailers. Hence, with the same marketing cost incurred by them, they received a profit margin lower than that of the collectors in the MC 1 (485 VND/kg < 975 VND/kg). However, their total profit margins could be larger, because they had the advantage of buying and selling in larger amounts. In this marketing channel, the main economic parameters concerning retailers, such as marketing margin and profit margins, were all lower than that of the collectors. For example, while the marketing margin and profit margin of the collectors in MC 1 were 640 VND/kg and 485 VND/kg, these figures were 490 VND/kg and 290 VND/kg for collectors in the MC 2. It is worth noting here that the marketing cost of retailers was higher than that of the collectors (200 VND/kg > 155 VND/kg). This is not surprising because most collectors have not usually

paid any tax, which usually amount to a high proportion of total marketing costs. For the marketing channel 3 (MC 3), because of selling the products directly to the retailers, the farmers earned a higher gross margin than the farmers in the MC 2 (1,240 VND/kg > 930 VND/kg). Also, because they bought the products directly from farmers, the retailers in this marketing channel paid a lower purchasing price when compared to the retailers in the MC 2 (2,060 VND/kg < 2,390 VND/kg). As a result, in comparison with the MC 2, although they sold the products to final consumers at a lower price (2.605 VND/kg compared to 2,880 VND/kg), they got a higher marketing margin (545 VND/kg > 490 VND/kg). In addition, the marketing cost incurred to the retailers in this marketing channel was half of that of the retailers in the MC 2. Therefore, their profit margin per kilo of tomato was higher than that of the retailers in the MC 2. (445 VND/kg > 290 VND/kg). In sum, The farmers benefited from selling the products to the retailers rather than to collectors. The collectors selling the products to final consumers got more benefit than those selling the products to retailers. The retailers buying directly from farmers earned a higher profit margin than those buying from the collectors. In comparison, the collectors were considered to have a higher efficiency in trade, because they incurred lower marketing costs and a higher marketing margin than the retailers.

TABLE 45. MARKETING MARGIN AND PROFIT MARGIN OF ALL ACTORS ALONG EVERY MARKETING CHANNELS FOR CUCUMBER.

	Farmer			Collector			Retailer		
	MC 1	MC 2	MC 3	MC 1	MC 2	MC 3	MC 1	MC 2	MC 3
AV. Buying price/production Cost	515	515	515	1,115	1,115			1,415	1.215
AV. Selling Price	1,115	1,115	1,215	1,835	1,415			1,835	1,580
Marketing Margin/Gross Margin	600	600	700	720	300			420	365
Marketing Cost				125	125			135	90
Profit Margin				595	175			285	275

Table 45 indicates that if the farmers sold cucumber directly to retailers, they earned a gross margin of 1,215 VND/kg, while they got 1.115 VND/kg if selling to collectors. Also, if cucumber was moved to the retailers, the price of cucumber paid by the final consumers was higher than when cucumber was moved to the collectors (1,580 VND/kg against 1,835 VND/kg). As for collectors, those in the MC 1 had a significantly higher marketing margin than the collectors in the MC 1 (720 VND/kg > 300 VND/kg). And with the same marketing cost of 125 VND/kg, the collectors in the MC 1 obtained a higher profit margin than the collectors in the MC 2 (595 VND/kg > 175 VND/kg). The same holds for the retailers in both MC 1 and MC 2 regarding marketing margin and profit margin, though absolute values were smaller (420 VND/kg compared to 365 VND/kg in marketing margin, and 285 VND/kg compared to 275 VND/kg in profit margin). A point that needs to be mentioned here is that the marketing costs of the retailers in the MC 3 was lower than that in the MC 2. This difference was driven by the taxation cost item that was twice higher for the retailers in MC 2 (70 VND/kg compared to 38 VND/kg).

TABLE 46. MARKETING MARGIN AND PROFIT MARGIN OF ALL ACTORS ALONG EVERY MARKETING CHANNELS FOR BITTER MELON.

	Farmer		Collector	Retailer	
	MC 1	**MC 2**	**MC 1**	**MC 2**	**MC 2**
AV. Buying price/production Cost	1,165	1,165	2,255	2,255	2,635
AV. Selling Price	2,255	2,255	3,120	2,635	3,115
Marketing Margin/Gross Margin	1,090	1,090	865	380	480
Marketing Cost			165	165	190
Profit Margin			700	215	290

For bitter melon, the farmers sold their products only to collectors, and they earned a gross margin of 1,090 VND/kg, whereas the collectors who bought the products from the farmers and sold a part of the total product directly to final consumers at market places earned 865 VND per kilo of bitter melon in marketing margin. However, the collectors who bought the products from farmers and sold all of them to retailers received only 380 VND/kg in marketing margin. So, with the same marketing cost, the profit margin of the collectors in the MC 1 was three times higher than that in the MC 2 (700 VND/kg > 215 VND/kg). In the MC 2, the retailers were considered to have a higher efficiency compared to the collectors, because their marketing margin and profit margin were higher than that of the collectors (480 VND/kg compared with 380 VND/kg, and 290 VND/kg compared with 215 VND/kg), although their marketing cost was higher (190 VND/kg > 165 VND/kg).

5.3 Risk analysis

5.3.1 Risk for farmers growing vegetables

5.3.1.1 Cucumber product

TABLE 47. RISKS FOR FARMERS GROWING CUCUMBER

Risks for farmers	Frequency	Percent(%)	Biggest Problems	Frequency	Percent(%)
No response	2	6.9	Not problem	5.00	17.2
Weather	25	86.2	Market	9.00	31.0
Dead seedling	6	20.7	Lack of capital	8.00	27.6
Pest	7	24.1	Technology	4.00	13.8
price fluctuation	20	69	Pest	4.00	13.8
Selling	0	0.00	Weather	5.00	17.2
decreased price by buyers	12	41.4	High price of agricultural inputs	1.00	3.5
Total	29		Quality of land	2.00	6.9
			Total	29	

Table 47, based on a sample of 29 farmers growing cucumber, shows that there were 25 persons (86.21%) mentioning the risk resulting from bad weather, which was considered as the main objective factor impacting on agricultural production. Another important risk which farmers had to face was price fluctuation (69% farmers). In fact, farmers did not have any means to improve this situation. Hence, they fully depended on market price. In addition, the farmers were usually forced to decrease the selling price by buyers who were usually collectors at the market place. The farmers interviewed complained that they did not get any market information before deciding what kinds of vegetable to grow as well as at what price

to sell. Besides, farmers growing vegetable were also faced with other risk factors, including dead seedlings (20.7%) and pest pressure (20.1%). Finally, there was no farmers complaining about the issue of selling products. This means that market demand for the product was high and suggests that the market was rather competitive.

Apart from the risks mentioned above, the farmers growing cucumber presently faced with the biggest problems which comprised of problems of market (31%), such as market information, price determination in relation to buyers; lack of capital for production accounting for 27.6%. Besides, the issue of productive technology was still a big difficulty for farmers growing cucumber (13.8%).

TABLE 48. RECOMMENDATION OF FARMERS FOR PRODUCTIVE DEVELOPMENT

Recommendation	Frequency	Percent(%)
No response	9.00	31.0
Technological training	12.00	41.4
Capital supporting	6.00	20.7
Agricultural material servicing	3.00	10.3
Stabilizing market price	3.00	10.3
Policies for buying product	3.00	10.3
Establishing the governmental buying shops	1.00	3.5
Decreasing taxation	2.00	6.9
Total	**29**	

Table 48 indicates that the farmers growing cucumber needed to participate in training courses which would help them improve cultivation technology aiming at increasing the yield of cucumber (41.4%). In addition, they also needed to be supplied capital for production from governmental credit organizations (20.7%). Besides, some other recommendations which are belonging to macro-level were mentioned by the farmers interviewed, such as agricultural material servicing, market price stabilization, policies for buying products (10.3% for every on). In addition, the farmers also suggested that the government should establish shops for buying products directly from farmers, in order to avoid the collectors' power in price making (3.5%) as well as to decrease the level of tax to farmers. (6.9%).

5.3.1.2 Tomato product

Similarly to the case of farmers growing cucumber, the main risk for tomato were linked to bad weather (70%). However, risks in the (technical) production process affected farmers' production more than that relative to the market. Indeed, while there were only 20.7% farmers growing cucumber getting into trouble because of dead seedlings, there were up to 75% farmers growing tomato with such a problem. Pest was also a big risk for these farmers, in 25% of the cases. Compared with the farmers growing cucumber, the farmers growing tomato were faced with the risks of price fluctuation and price determination with lower frequency (45% and 20% < 69% and 41%). Also, there was no difficulty for these farmers regarding buying/selling issues. As a result, while the problems of lack of capital for production and market was their biggest current difficulty, farmers growing tomato faced technological problems in cultivation and pest prevention (25% and 15% of total).

TABLE 49. RISKS FOR FARMERS GROWING TOMATO

Types of risk	Frequency	Percent(%)	Biggest problem	Frequency	Percent(%)
No response	2	10.00	Market	6	30.00
Weather	14	70.00	Lack of capital	1	5.00
Dead seedlings	15	75.00	Technology	2	10.00
Pest	5	25.00	Pest	5	25.00
price fluctuation	9	45.00	Weather	3	15.00
Selling	0	0.00	High price of agricultural inputs	2	10.00
decreased price by buyers	4	20.00	Quality of land	2	10.00
Total	20			20	

With the above risks and present problems, the farmers growing bitter melon would like to improve their technological knowledge through training courses (20%). In addition, the farmers suggested that government should organize some services for the supply of input factors as well as for buying products directly from farmers (20%).

TABLE 50. RECOMMENDATION OF FARMERS FOR PRODUCTIVE DEVELOPMENT

Recommendation	Frequency	Percent(%)
No response	8	40
Technological training	4	20
Capital supporting	0	0
Agricultural material servicing	4	20
Stabilizing market price	2	10
Policies for buying product	4	20
Establishing the governmental buying shops	1	5
	20	

5.3.1.3 Bitter Melon product

Table 51 indicates that except for the objective risk of bad weather (87%), the farmers growing bitter melon had to bear the highest risk of price fluctuation, amounting to 52%, followed by the problems of pest and dead seedlings which resulted from poor variety (26% for every one). Besides, they also faced problems of low price determination from the collectors (17%). Remaining risks problems for farmers are a floating market price (26%), a high price of agricultural material (17%) and a lack of an efficient solution for pest prevention (17%).

TABLE 51. RISKS OF FARMERS GROWING TOMATO

Types of risk	Frequency	Percent(%)	Biggest Problem	Frequency	Percent(%)
No response	1	4	Not problem	6	26
Weather	20	86	Market	6	26
Dead seedling	6	26	Lack of capital	2	8
Pest	6	26	Technology	1	4
price fluctuation	12	52	Pest	4	17
Selling	0	0	Weather	3	13
decreased price by buyers	4	17	High price of agricultural inputs	4	17
Other	4	17			
Total	23		Total	23	

Table 52 shows that, although the farmers growing bitter melon faced the highest problems of market, they also had a higher need in training technology (30%) while there were only 9% farmers suggesting policies for stabilizing market prices.

Overall, farmers growing vegetable considered the risk of bad weather as the highest (82% of the total), followed by the risk of price fluctuation (57%). In addition, the situation of dead seedlings was a big risk for farmers growing vegetables in 37% of the cases. Besides, in the buying-selling process, the farmers were usually forced to decrease selling prices by buyers (28%). In sum, except for the risk resulting from bad weather, the farmers growing vegetables had to face the two main risk factors: (1) price fluctuation, which causes an unstable income for farmers (2) dead seedlings, which was caused by bad quality of the varieties used. As a result, these risks still affect farmers' production: interviewed farmers complained that the risk in market was considered as one of their biggest problems (22%), while the issue of lack of capital for applying fertilizers and pesticides was another biggest problem (17%). Besides, the absence of efficient solutions for cultivating and preventing pests were still a big difficulty for farmers growing vegetables (14% and 15%).

TABLE 52. RECOMMENDATION OF FARMERS FOR PRODUCTIVE DEVELOPMENT

Recommendation	Frequency	Percent(%)
No response	14	61
Technological training	7	30
Capital supporting	1	4
Agricultural material servicing	1	4
Stabilizing market price	2	9
Policies for buying product	1	4
Total	23	

With the existing problems, the farmers growing vegetables gave the following suggestions: (1) the government should organize training courses to disseminate technological knowledge to farmers in order to improve vegetable yields (32%); (2) the government should organize services that supply agricultural materials as well as buy outputs produced by farmers (11% and 46%) in order to lower production costs and to receive a selling price as high as possible; (3) the government should devise some macro policies which support capital loans as well as stabilize market prices for farmers (10% and 10%).

TABLE 53. RISKS OF FARMERS GROWING VEGETABLES

Types of risk	Frequency	Percent(%)	Biggest Problem	Frequency	Percent(%)
No response	5	6	Not problem	17	24
Weather	59	81	Market	16	22
Dead seedling	27	37	Lack of capital	12	17
Pest	18	25	Technology	10	14
Price fluctuation	41	57	Pest	11	15
Selling	0	0	Weather	10	14
Decreased price by buyers	20	28	High price of agricultural inputs	7	10
Total	72		Quality of land	4	6
			Total	72	

Table 54 indicates that the issue of establishing governmental purchasing organizations is a necessary requirement of farmers growing vegetables (46%), followed by the requirement of

participating in training courses (32%). Besides, the farmers also suggested that the services supplying agricultural materials should be established by the government (11%).

TABLE 54. RECOMMENDATION OF FARMERS FOR PRODUCTIVE DEVELOPMENT

Recommendation	Frequency	Percent(%)
No response	31	43
Technological training	23	32
Capital supporting	7	10
Agricultural material servicing	8	11
Stabilizing market price	7	10
Establishing the governmental buying shops	33	46
Decreasing taxation	2	3
Total	72	

5.3.2 Risk for the collectors

TABLE 55. RISKS FOR COLLECTORS

Types of risk	Frequency	Percent(%)	Biggest problem	Frequency	Percent(%)
Inexact classification of product quality	7	50	Not response	7	50
Loss in buying-selling process	11	79	Lack of capital	2	14
Contract violation by buyers	6	43	Dockage	1	7
Inexact price information	13	93	Means of transportation	1	7
Total	14		Price fluctuation	1	7
			Weather	1	7
			Collection of debts	1	7
			Total	14	

Table 55 indicates that the biggest risk faced by the collectors was a lack of market price information (93%), followed by loss in the buying-selling process caused by their insufficient managing capacity. This loss usually occurred in measuring and transporting (79%). Besides, the issue of the overestimation of product quality was a relatively big risk for them (50%). Finally, the contract violation by buyers was a risk for the collectors (43%). In fact, no written contract was signed between the collectors and other buyers, such as wholesalers, retailers, etc. They usually agreed with each other orally, so the refusal to sell of buyers was not surprising. However, figures in Table 56 shows the collectors underwent fewer problems than farmers, in which the issue of lack of capital (14%) was considered as the biggest problem causing a low comparative position in business.

TABLE 56. RECOMMENDATION OF COLLECTORS FOR PRODUCTIVE DEVELOPMENT

Recommendation	Frequency	Percent(%)
No response	13	93
Getting loans from government	1	7
Total	14	

Table 56 shows that there was only one recommendation from the collectors (7%). This was getting loans from governmental credit organizations aiming at meeting their need for capital in business.

5.3.3 For the retailers

TABLE 57. RISKS FOR RETAILERS

Risks	Frequency	Percent (%)	Biggest Problem	Frequency	Percent (%)
Contract violation by sellers	25	64	No response	18	46
Decreased selling price by excess supply on the market	34	87	Lack of capital	7	18
Total	39		Spoiled vegetable	2	5
			High taxation	2	5
			Decrease in sold quantity	6	15
			Weather	3	8
			Total	39	

Table 57 indicates that the retailers had to face the risk of decreasing prices (87% of total retailers interviewed). This was caused by a lack of market information, and as a result, they are the actors bearing the highest risk, compared with other actors in the marketing channel. Indeed, if there was any an excess supply coming from either a decreasing demand of consumers or from an excess supply of products on the market, the retailers selling vegetable could not return vegetables back to sellers, because of the degradation of the products. The second risk faced by retailers was contract violation from sellers (64%). This risk resulted from either the measuring process of seller, or in the process of supplying products, with inadequate quantity and quality. Except for the problem of bad weather, the retailers faced the two biggest problems: (1) lack of capital for their operation (18%) and (2) a decrease in sold quantity of product resulting from either a decrease in market demand, or an increase in supply (15%).

6 Conclusion

The diversification trend appeared to offset rice-monoculture farming systems because the gross margins obtained by farmers from growing vegetables were higher than that from growing rice. On the average, farmers earned a gross margin of 15 million VND per one crop of vegetable while this figure was 5 million VND per one crop of rice. Of the three kinds of vegetable considered in the study, tomato was found to be the most profitable, with a gross margin per hectare of approximately 24 million VND.

There were three main marketing channels of vegetables in the study area: (1) Farmers → Collectors → Ultimate consumers (2) Farmers → Collectors → Retailers → Ultimate consumers, and (3) Farmers → Retailers → Ultimate consumers. A large output of vegetable products produced by farmers went to collectors, accounting for approximately 70% of the total. For bitter melon product, a small output moved to assemblers (around 10%), the remaining was sold to collectors. Most of the collectors played a role not only as collector, but also as retailer.

For the collectors, three marketing cost items were found to be highest: (1) transportation (2) loss in the buying/selling process, and (3) other costs including umbrella renting, scale renting, basket and fee for agents. Generally, the collectors did not have to incur high taxes, when compared with retailers.

Similar to the collectors, the retailers had to bear high costs of loss in buying/selling and other cost items (umbrella renting, basket). However, they incurred a low cost of transportation and a high cost of taxation and interests. The marketing cost of the retailers buying products directly from farmers was lower than from collectors.

In the marketing channel: Farmers → Collectors → Ultimate consumers, the collectors earned a gross margin of 1,133 VND/kg and a profit margin of 977 VND/kg for tomato. These figures were 721 VND/kg and 596 VND/kg; 865 VND/kg and 702 VND/kg, for cucumber and bitter melon respectively.

In the marketing channel: Farmers → Collectors → Retailers → Ultimate consumers, except for tomato for which the collectors were considered to have a higher efficiency than the retailers, because their marketing margin and profit margin were higher than those of the retailers (645 VND/kg > 489 VND/kg in marketing margin and 490 VND/kg > 289 VND/kg in profit margin). For the two remaining products, the retailers fared better than the collectors in terms of marketing margin as well as profit margin (425 VND/kg > 300 VND /kg in marketing margin for cucumber, and 292 VND/kg > 175 VND/kg in profit margin. These figures for bitter melon were 478 VND/kg and 380 VND/kg in marketing margin; 290 VND/kg and 217 VND/kg in profit margin.

Bitter melon products did not follow the marketing channel: Farmers → Retailers → Ultimate consumers. The retailers got a marketing margin of 545 VND/kg and a profit margin of 442 VND/kg for tomato, while they earned a marketing margin of 368 VND/kg and a profit margin of 276 VND/kg for cucumber.

The collectors in the marketing channel 1 (Farmers → Collectors → Ultimate consumers) operated more efficient than those in marketing channel 2 (Farmers → Collectors → Retailers → Ultimate consumers). The retailers in the marketing channel 3 (farmers → Retailers → Ultimate consumers) were found to have higher efficiency in trade than those in the marketing channel 2.

The main risks faced by farmers in their operation included bad weather, price fluctuation, price under-determination from buyers, dead seedlings and pest. Themain current problems they complained about was lack of capital for production, lack of market information, lack of technological knowledge for cultivating and preventing pest.

The collectors operating in this vegetable chain took not too many risks compared with other actors in the marketing channel. Their biggest and single problem was a lack of capital for business. Particularly, they did not have to pay many taxes for their operation.

Similar to collectors, retailers had to face problems of contract violation. Also, both retailers and collectors did not have enough market information for operation.

Part IV

Organisation of the fruit commodity chain and dynamics of agricultural diversification in the Mekong Delta

Geneviève Charrier

1 Introduction

During the last fifteen years, fruit cultivation has increased by 138% in the Mekong River Delta, becoming the second agricultural activity after rice, and constituting thereby the main illustration of an agricultural diversification in this region. This process does not simply concern fruit production itself, in the sense that it rather results from a complex set of factors that have fostered the development of this activity at the farm level.

Among these factors, the development of agriculture through the intensification of staple crops as well as economic growth constitute prior steps to the triggering of such a process. In other words, agricultural diversification is closely connected to a wider development dynamic that includes a structural transformation of agriculture as follows:

- The agricultural system is transforming from a self-subsistence economy to an economy where an increasing part of the farmers' output is commercialised. This process is facilitated by improvements in rural infrastructure;

- This transformation is triggered by the green revolution that allows an increase in production of food staples through the adoption of high yielding varieties of cereals. Then, food security could be reached and a surplus exported;

- An overall economic growth leads to an increase in income and in urbanisation that induces in return a change in food demand patterns. Therefore, there is a shift away from staple foods towards fruits, vegetables and animal products, which are characterised by higher elasticity of demand and value added;

- The change in technological and market conditions lower real prices of cereals food staples compared to other foods. Thus, farmers find more incentives to divert their resources to the production of food items with higher value added than cereals. Indeed, they both intend to maintain their income and to increase it by exploiting new market opportunities.

From the remarks above, agricultural diversification appears to be a largely spontaneous phenomenon in the sense that it is a process of adjustment of both farmers and the entire rural economy to new conditions created by economic development which increasingly involve economic agents in a market economy:

- For the farm households, market forces encourage them to diversify their farming activities with the perspective of a higher and more stable income;
- For the other economic agents, both diversification of agricultural production and demand for food generate opportunities of higher income and profit through trading and processing activities.

Thereby, the process necessarily implies the development of a marketing system as well as agro-food industry which both bring outlets for production according to the evolution of demand.

However, for agents who mainly belong to the private sector, new activities often induce high risks both in production and in commercialisation:

- Indeed, at the level of production, agricultural diversification concerns the adoption of new technologies for which capital and information are strongly indispensable and not easily available in developing countries, especially in rural areas;
- As for commercialisation, agents operate in markets that are far from being well developed and are characterised by large asymmetry of information and high transaction costs;
- Regarding processing, security in supply in both quantity and in quality, access to information and capital as well as adaptation of production to the demand requirements are particularly difficult to achieve.

Thus, according to Francesco Goletti[1], effective diversification requires key investments in infrastructure and institutional changes to promote the private sector, particularly in rural areas, which means that there is scope for intervention of the State through policies that aim at facilitating the development of production as well as of post-harvest activities.

The concept of commodity chain as developed within a mesodynamic logic, in particular by the French agro-economic research, constitutes an appropriate framework for a better understanding of agricultural diversification, as it considers all the activities that directly or indirectly condition the production of a specific commodity (i.e. consumption, commercialisation, processing and support activities). Besides, it also considers the actors who are involved in each of them, their nature, their own logic and their constraints as well as the interactions between them that eventually determine the dynamic of the whole commodity chain and consequently of the diversification process.

Though the diversification process in the MRD concerns with several types of fruits, we have focused our field study on the organisation of the orange-mandarin commodity chain, as it constitutes the main development of fruit production in the region, notably in Can Tho (CT) province. Because of the high informality of the fruit marketing system and the resulting importance of trust in getting relevant information, as well as the specialisation of the traders, we had to limit our interviews to the main fruits produced and exchanged in Can Tho province, i.e. orange and mandarin. Thus, in order to understand the dynamic of this commodity chain and the limits of its development, interviews of the different actors involved in it, including officials and researchers, have been made in 1999 and 2000. Our analysis of the diversification process in the MRD was focused on this issue because, until recently, there had been little concern from the Vietnamese Authorities, and consequently from researchers, about the fruit commodity chain.

This Chapter unfolds as follows:

- Parts 2, 3 and 3.3 explain the main factors that have generated agricultural diversification through fruit production in the Mekong River Delta;

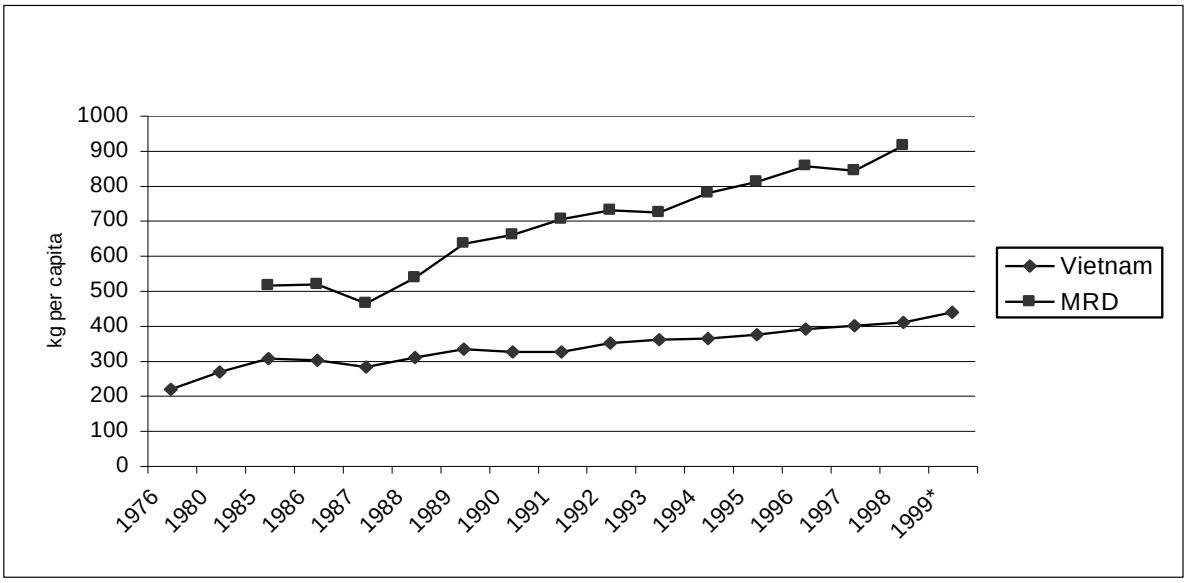
[1] Francesco Goletti: “Agricultural diversification and rural industrialisation as a strategy for rural income growth and poverty reduction in Indochina and Myanmar”. MSS Discussion Paper N°. 30. IFPRI. June 1999. page 5.

- Part 4 presents the functional organisation of the orange-mandarin commodity chain in the MRD according to the conceptual framework chosen in this work;
- Part 5 analyses the production activity and its dynamic in order to emphasize the farmers' logic and strategies as well as the main constraints they face;
- Part 7 focuses on marketing. The structure and the dynamic of the marketing system, the functioning of the markets as well as the distribution of the margin are analysed in order to emphasize the high level of transaction costs borne by the actors involved in the system and their subsequent strategy to reduce costs;
- Finally, Part 7 considers the support activities (input supply, research and extension, rural credit) and, indirectly, the role of the State in the development of the main activities of the commodity chain, i.e. production and marketing.

2 The diversification process in Vietnam: major aspects

In Vietnam and in the Mekong River Delta, agricultural diversification has really developed following the new orientations of the "Doi Moi" policy (1986) that aims at the progressive transformation of the economy from a command system to a system based on market principles. The reforms then undertaken have created a more favourable institutional environment for the private sector in general, and for the farm households in particular, as shows the rapid increase in the per capita food production (see Figure 5).

FIGURE 5: EVOLUTION OF THE FOOD PRODUCTION PER CAPITA RATIO



Source: GSO Statistical data from statistical data 1996 and 1999.
** "Vietnam's economy in 1999". CIEM. Statistical Publishing House. 2000*

2.1 The reasons for an institutional change

While, in 1975, agriculture in the North had already been organised according to the socialist orientation for several years, the South had experienced a rather diversified and commercialised peasant agriculture that was already inserted in the market economy, even during the war against the American. Therefore, when the northern model of cooperatisation and collectivisation was extended to the South, with the reunification of the country, it met a strong resistance from the farmers. Furthermore, though the model had already shown its weaknesses, its implementation was strengthened by some other anti-economic measures such as the regulation prohibiting free circulation of food staples between districts (31/3/78).

Most farmers were not satisfied with these arrangements and mainly concentrated their efforts on their gardens, on animal husbandry and on the 5% of rice fields left for the household economy.

As a result, a first serious food and economic crisis occurred in 1978, which led the Vietnamese Communist Party to change its orientations in September 1979 during the 6th Plenum. It was then decided to:

- Accept the existence of the private sector and the household economy beside the state sector,
- Adjust the prices fixed by the State to the market prices,
- Foster the development of the household economy,
- Liberalize transport and trade,
- Authorize the attempts of new production contracts between cooperatives and farmers.

This declaration constituted an official recognition of the real Vietnamese economy and was soon followed by the Resolution 100 CT/TW ("Contract 100") and two revaluations of the State prices, in 1981 and 1985.

However, if "Contract 100" brought a temporary improvement in food production, the two other measures, specially the latter one, rather worsened the economic situation of farmers.

In short, the analyse of the period 1979-1987 reveals:

- The inability of the collective system to generate development,
- The positive impact on the farmers' behaviour of more freedom in production choices and in marketing.

The difficult economic situation of 1986 then pressed for more liberalisation.

2.2 The new institutional environment and its economic impacts

As a result, at the 6th congress in December 1986, the Vietnamese Communist Party decided to open the way to renovation (Doi Moi policy), which led to economic growth and agricultural transformation as shown in the following table.

At a global level, this declaration followed by Decision 306, Directive 11 NQ/TW and Resolution 16 (see Annex 1) revealed the will from the Vietnamese Authorities to implement a really favorable institutional environment for a non-planned and quasi-autonomous development of the private sector and of the household economy, namely through market liberalisation.

A specific reform for agriculture followed, in the form of Resolution 10 (see Annexe 7), also called "contract 10", that allowed farmers to become responsible for the whole process of production on parcels they could use up to 15 years. Since then they have been free to choose their activities as well as the level of crop intensification. Moreover, the obligation to sell to cooperatives was abolished.

TABLE 58: REAL GROWTH OF THE GROSS DOMESTIC PRODUCT AND OF ITS STRUCTURE

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Growth rate in % (at constant (1989) prices													
Real GDP	3.9	5.0	8.5	5.1	6.0	8.6	8.1	8.8	9.5	9.3	8.8	5.8	4.8
Agriculture													
Forestry	- 0.6	4.0	7.7	1.6	2.2	7.1	3.8	3.9	5.1	4.4	4.8	3.6	5.2
Excluding Rice	2.7	-1.1	5.0	1.8	2.3	5.0	2.4	4.4					
Industry & Construction	10.0	2.2	-3.1	2.9	9.0	14.0	13.2	14.0	13.9	14.4	10.5	12.1	7.7
Services	5.5	8.9	19.1	10.8	8.3	7.0	9.2	10.2	10.6	10.0	9.9	2.0	2.3
Share in GDP in % (at current prices)													
Agriculture Forestry		42.4	42.1	40.7	40.2	33.9	29.9	28.7	28.4	27.2	26.2	26	25.6
Industry & Construction		25.7	22.9	22.5	23.1	27.3	28.9	29.6	30.0	30.7	31.3	33	33.7
Services		31.9	34.0	36.9	37.7	38.8	41.2	41.6	41.7	42.1	42.5	41	40.7

Source: IFM for the years 1987 –1997. Intelligence Economic Unit for 1998. For 1999: "VIETNAM' ECONOMY IN 1999". CIEM. GSO. Current prices

On the other hand, measures such as liberalisation of foreign trade (1988) and prices of both inputs and agricultural products (1989) have created opportunities to sell on foreign markets as well as to import agricultural inputs. This was accompanied by a stabilisation of prices for agricultural output coupled with a decrease in input prices.

These reforms elicited a rapid response in rice production and in land use.

2.3 Rice Intensification

As a matter of fact, paddy output increased immediately at an annual rate of 6.87 % for 1988-1993 compared to 2.36 % for 1985-1988, corresponding to a total increase in the output of 34.33 % compared to 7.09 % (see Table 59).

TABLE 59: EVOLUTION OF RICE CULTIVATION IN VIETNAM BETWEEN 1985-1998

Unit: %

	1985 - 1988		1988 – 1993		1993-1998	
	Tot Δ	per year	Tot Δ	per year	Tot Δ	per year
Sown area of paddy	0.39	0.13	14.55	2.91	12.24	2.45
Sown area of winter paddy [(a)]	-7.54	-2.51	-5.81	-1.16	-9.16	-1.83
Sown area of Spring paddy [(b)]	6.63	2.21	23.57	4.71	19.68	3.94
Sown area of Autumn paddy [(b)]	15.88	5.29	55.84	11.17	38.17	7.63
Gross output of paddy	7.09	2.36	34.33	6.87	27.61	5.52
Gross output of winter paddy [(a)]	-2.65	-0.88	22.88	4.58	-1.32	-0.26
Gross output of Spring paddy [(b)]	12.64	4.21	29.56	5.91	50.07	10.01
Gross output of Autumn paddy [(b)]	18.29	6.10	66.63	13.33	33.54	6.71

(a) Winter paddy corresponds to long duration varieties such as traditional rice and floating rice harvested in winter

(b)Spring and autumn paddy are short duration varieties harvested respectively in spring and in autumn.

Source: Calculation made from data of the GSO 1996 and 1999.

This evolution can be explained by:

- An increase in the irrigated area (from 4.4 million ha in 1984 to 6 million ha in 1995) resulting from more state investment in irrigation since 1984 that has allowed to increase the number of rice crops per year;
- An increase in the sown area (28.6% between 1988 and 1998 compared to 4.4% for 1979-1988), particularly in the sown area of spring crop (47.9% for 1988-1998 compared with 9.65 % for 1979-1988) and autumn crop (115.3% compared to 50.64 %);
- An increase in yield (67% for spring crop and 20.7% for autumn crop between 1987 and 1997) resulting from both a greater use of selected varieties and of fertilizers[2], whereas the agricultural land dedicated to rice cultivation decreased of 1.31 % from 1987 to 1997.

2.4 Diversification into other agricultural activities

As we can see in Table 59, rice intensification has been particularly important during the 1988-1993 period while it slowed down afterwards. In 1991, the fall in the paddy price coupled with the changed pattern of demand produced by the increase in income in urban areas strongly encouraged farmers to diversify. Besides following the Resolution n°5 of 1993 (see

[2] The use of fertilizers increased about 272% from 1987 to 1997.

Annex 2), the government undertook several measures in the field of rural credit, land use and technology transfer, in order to strengthen the farmers' institutional environment and, thereby, give them more incentives to invest in activities with higher returns.

Table 60 shows that crops diversification has been more significant since 1993. For crops other than paddy, the annual increase in the sown area has been higher for the 1993-1998 period than for 1988-1993. However, the development of fruit cultivation has begun earlier (10.85% of annual growth) and only slowed down between 1988 and 1993 (2.06%) to accelerate after 1993 (6.69%). The reasons of such an evolution will be explained later.

TABLE 60: EVOLUTION OF THE SOWN AREA OF CROPS FOR 1985-1998 IN VIETNAM (UNIT: %)

	1985-1988 Annual growth	1988-1993 Annual growth	1993-1998 Annual growth	1985-1998 Total growth
Total	1.27	2.45	3.46	36.79
. Total annual crops of which:	0.67	2.24	2.51	27.69
- Food crops	0.65	2.38	1.91	24.98
- Paddy crop	0.13	2.91	2.45	29.08
- Vegetables & Beans	2.89	3.72	6.21	68.86
- Annual industrial crops	0.02	-0.07	6.99	34.54
. Total perennial crops of which:	7.8	4.56	11.20	136.6
- Perennial industrial crops	9.37	4.80	11.75	152.16
- Fruit crops	**10.85**	**2.06**	**6.69**	**95.06**

Source: calculation according to the data of the General Statistical Office. 1996 & 1999

The gross output of aquaculture has evolved in the same direction, with a total increase for the 1986-1998 period of 148.1%, but a higher annual rate for 1993-1998 (11.9%) than for 1988-1993 (7.11%).

Concerning pigs and poultry, the number of heads has globally increased for the 1988-1998 period (respectively of 55.7% and 72.26%) but at a higher annual rate for 1988-1993 (5.72% for pigs and 7.62% for poultry) than for 1993-1998 (respectively of 4.22% and 4.95%). However, the development of animal husbandry depends more on a change in the pattern of demand and on the resulting markets opportunities for farmers than on the reforms on land property.

2.5 Change in the pattern of demand

According to the two surveys realised by the General Statistical Office in 1992-1993 and 1997-1998 on "Vietnam living standards"[3], the share of food expenditures in the total

[3] The first one has concerned 4800 households and the second one 6000 households selected in all Vietnam.

expenditures of the surveyed households has fallen from 61% to 53% between the two periods. Moreover, among the food expenditures, the share of cereals decreased from 42 % to 33%, while shares of meat and fruits increased from 16% to 19% for the former and 3% to 3.7% for the latter.

Summary about the driving forces of agricultural diversification in Vietnam:

- 1. Economic liberalisation inducing an economic growth and a resultant change in the pattern of demand;
- 2. Rice intensification, through the adoption of High Yield Varieties and the increase in irrigated rice cultivation;
- 2. Market liberalisation encouraging farmers to shift to high value-added products;
- 3. A more secured institutional environment for farmers, leaving them free of their production choices and allowing them to invest in their land thanks to a new land law, as well as the implementation of rural credit facilities and extension system.

3 Diversification and development of fruit crops in the MRD

3.1 Main aspects of the process

The response of the MRD's farmers to the changes in policy has been rapid and quite significant, especially regarding paddy, vegetable and fruit crops, as revealed by the evolution of the sown area between 1985 and 1998 (see Table 61).

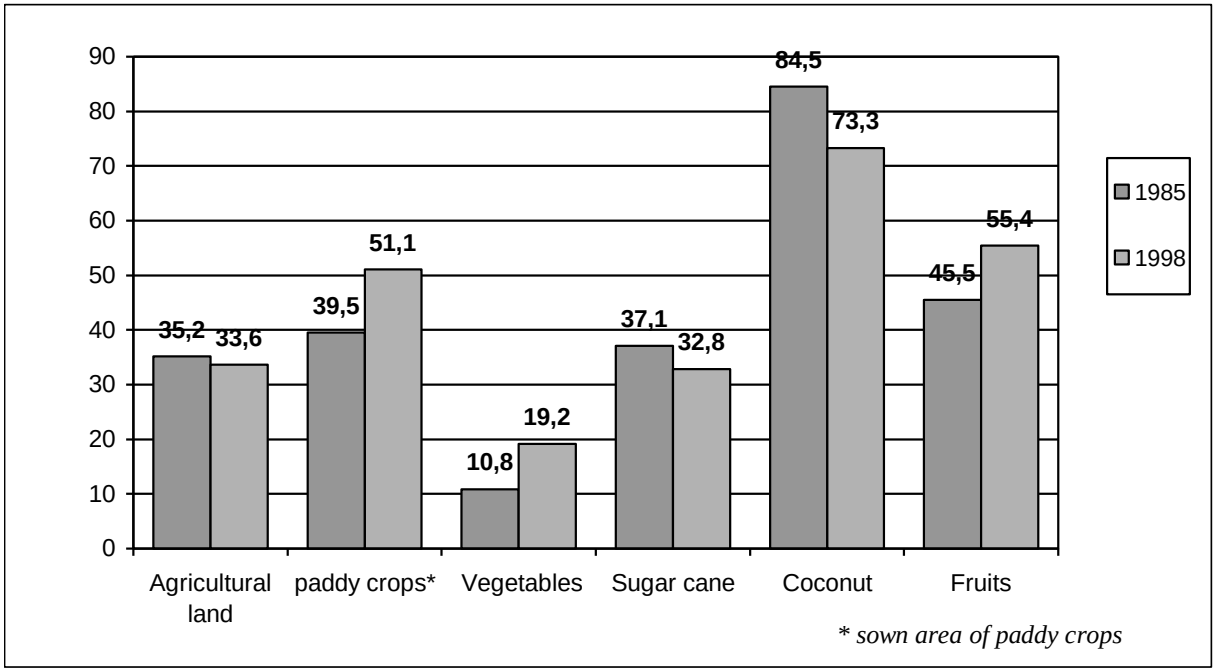
TABLE 61: EVOLUTION OF THE SOWN AREA OF CROPS BETWEEN 1985– 1998 IN THE MRD UNIT (%)

	1985-1988 annual growth	1988-1993 annual growth	1993-1998 annual growth	1985-1998 total growth
Total	2.34	4.95	4.80	65.49
. Total annual crops of which:	1.32	5.26	5.10	64.76
- food crops	0.95	5.71	5.00	65.33
- paddy crop	**0.93**	**5.87**	**5.13**	**67.08**
- vegetables	19.83	6.63	10.04	219.01
- beans	16.24	- 4.37	- 1.31	8.63
- annual industrial crops	8.60	- 2.01	6.16	48.03
. Total perennial crops of which:	16.00	1.6	0.84	66.53
- perennial industrial crops	19.04	- 0.26	- 3.1	31.05
- fruit crops	**12.6**	**3.96**	**8.82**	**137.79**

Source: calculation according to the data of the General Statistical Office. 1996 & 1999 and SOFRI for fruit crops in 1998.

If we compare the evolution of the sown area of both paddy and fruit crops in the MRD with that of Vietnam between 1985 and 1998 (see Table 60 and Table 61), we can notice that the process of **rice intensification and diversification into fruit crops has been more important in the region than in the whole country**: 67.1% of increase compared to 29.1% for paddy crops and 137.8% compared to 95.1% for the fruit area. As a result, the share of the MRD in the total sown area of these crops has increased (see Table 62), demonstrating **a growing specialisation of the region in fruit cultivation** which represents, in 1998, 55% of the total fruit area, or 219,000 hectares.

TABLE 62: EVOLUTION OF THE SHARE OF THE MRD IN THE MAIN CROPS OF VIETNAM IN %



Source: GSO 1996 & 1999. For figures about the fruit area in 1998: SOFRI.

However, **this specialisation has been mainly significant since 1993,** even though crop diversification began earlier, as indicated by an annual growth rates of vegetables, beans and perennial crops (industrial and fruit crops) higher for the 1985-1988 period than after 1993. Indeed, only fruit and vegetable areas have continued to increase with a little slowdown between 1988 and 1993 due to the concentration of farmers on rice intensification, as shown on Table 63.

TABLE 63: EVOLUTION OF THE PADDY CROPS BETWEEN 1985 –1998 IN THE MEKONG DELTA (*UNIT: %)*

	1985- 1988		1988 - 1993		1993 – 1998	
	Tot Δ	per year	Tot Δ	per year	Tot Δ	per year
Sown area of paddy	2.80	0.93	29.36	5.87	25.64	5.13
Sown area of winter paddy (a)	-14.23	-4.74	-22.00	-4.40	-21.34	-4.27
Sown area of Spring paddy (b)	25.16	8.39	67.54	13.51	39.52	7.90
Sown area of Autumn paddy (b)	20.41	6.80	73.83	14.77	45.79	9.16
Gross output of paddy	10.86	3.62	44.74	8.95	39.18	7.84
Gross output of winter paddy (a)	-9.01	-3.00	-10.90	-2.18	-18.35	-3.67
Gross output of Spring paddy (b)	28.14	9.38	61.76	12.35	73.87	14.77
Gross output of Autumn paddy (b)	22.15	7.38	88.19	17.64	35.57	7.11

(a) Winter paddy is long duration varieties such as traditional rice and floating rice harvested in winter .
(b) Spring and Autumn paddy are short duration varieties. Source: GSO 1996 & 1999

This evolution can be explained by the specificity of Southern Vietnam's recent history as well as the fact that this region is the native home of many exotic tropical fruit trees, thanks to its favourable natural conditions, especially its monsoon tropical semi-equatorial climate.

3.2 Recent history of agriculture in the Mekong Delta

3.2.1 Before reunification

For a long time, the main objective of Vietnamese agriculture was focused on rice cultivation, and the MRD's farmers (mainly the big landlords) only grew fruit trees in home gardens for self-consumption.

In the 1950s and 1960s, fruit gardens became a distinct production system and farmers began to commercialise a part of their production in the local retail markets or in the wholesale markets such as Phong Dien and Cai Rang for Can Tho province, Cai Be for Tien Giang Province and even to HCMC.

Fruit production was concentrated around the two main cities: My tho (Tien Giang province) and Can Tho.

In 1966, the introduction of High Yielding Rice varieties (such as IR5 and IR8) allowed the intensification of rice cultivation on suitable land such as the river banks where irrigation was easy to ensure. Then, thanks to the digging of new canals for irrigation and drainage, the cultivated area of two rice crops per year could extend to middle lands with alluvial soils, especially inTien Giang and Can Tho Provinces.

Simultaneously, within these two provinces, the highest lands, which are not very suitable for rice cultivation[4], were dedicated to a diversified fruit cultivation (mango, banana and coconut trees mixed with smaller trees such as orange, mandarin, papaya, …all grown from seeds). Nevertheless, in 1968, farmers had to live around the cities and left most of the countryside uncultivated because of the war.

In 1975, when Vietnam was reunified, fruit trees were planted on 50,000 to 60,000 ha in the Mekong Delta.

3.2.2 Reunification and collectivisation

After the war, people returned to their home and rebuilt their fruit gardens, depending on the damages caused by the war as well as the available capital and family labour. Some others installed new orchards from germinated seeds.

In 1978, the government attempted to collectivise rice production in the MRD. However, as it met rapidly a strong resistance from farmers, it could only abolish the individual ownership of tractors, tillers, threshers, pumps and draft power, as well as the previous private market infrastructure. Consequently, agriculture continued on a family farm basis and farmers remained the primary decision-makers on their assigned land, but sharing labour and production resources became more common, while the private marketing systems for agricultural inputs and output were replaced by a state system.

In short, the combination of bad weather in 1978 and of poorly appropriate measures (see § 2.1) did not encourage farmers to develop fruit cultivation until 1986, even if they concentrated their efforts on this activity after the rice lands were "cooperativised". Indeed, it

was not allowed to raise beds for fruit cultivation in rice fields and outlets were limited by trade restrictions. Therefore, the fruit area did not really increase during the collectivisation period of the South.

However, **the positive point of collectivisation was the increase in the irrigated area** by 122,000 ha/year in the 1976-1980 period, compared to 62,000 ha/year between 1981 and 1985, and 70,000 ha/year between 1986 and 1990[5], **which allowed the extension of the irrigated rice-based systems and fruit gardens on raised beds in line with the restoration of the market economy in the region**.

3.2.3 The restoration of the market economy in the MRD

As people, prior to 1975, were used to private enterprise, the new reforms that accompanied the "Doi Moi" policy led to a rapid recovery in Southern Vietnam:

- Even if the State tried to monopolised food trade, private traders especially for fruits remained active during collectivisation. Thus, as soon as food trade was liberalised, the fruit commodity chain spontaneously reorganised, which may explain the strong increase in fruit cultivation from 1985 to 1988 (see Table 61);
- Besides, the marketing system for the supply of input was also liberalised at the same time, which resulted in **a rapid increase of rice yields and output** (see Table 63), chiefly between 1988 and 1993;
- After 1993, the market opportunities created by the general evolution in Vietnam (see § 2.4) as well as the new reforms encouraged farmers to diversify into the crop for which they had a comparative advantage, i.e. fruit cultivation;
- Thereby, the MRD progressively diversified and specialised in fruit cultivation. Then, in 1998, the MRD accounted for 55% of the total fruit area of the country and generated 66% of the national fruit output[6], with 2.5 millions tons of fruit. The average fruit output per capita is therefore higher in the MRD (146 kg/capita) than in the whole country (61k g/capita).

[4] i.e. with an elevation superior to 0.5m above mean sea level and an annual depth of inundation about 30-40 cm.

[5] Vo Tong Xuan & Shigeo Matsui: "Development of farming systems in the Mekong Delta of Vietnam". HCMC Publishing House. Saigon Group. Vietnam Asia Pacific Economic Center. page 48.

[6] Truong Thuy Duong: "Benefits and comparative advantage of paddy and fruit trees growing in the Mekong Delta. Vietnam". Master Thesis. National University-HCMC. College of Economics. Vietnam & Institute of Social Studies. The Hague. The Netherlands. Sept 1998. page 35.

3.3 Evolution of fruit production in the Mekong River delta

3.3.1 Geographical aspects

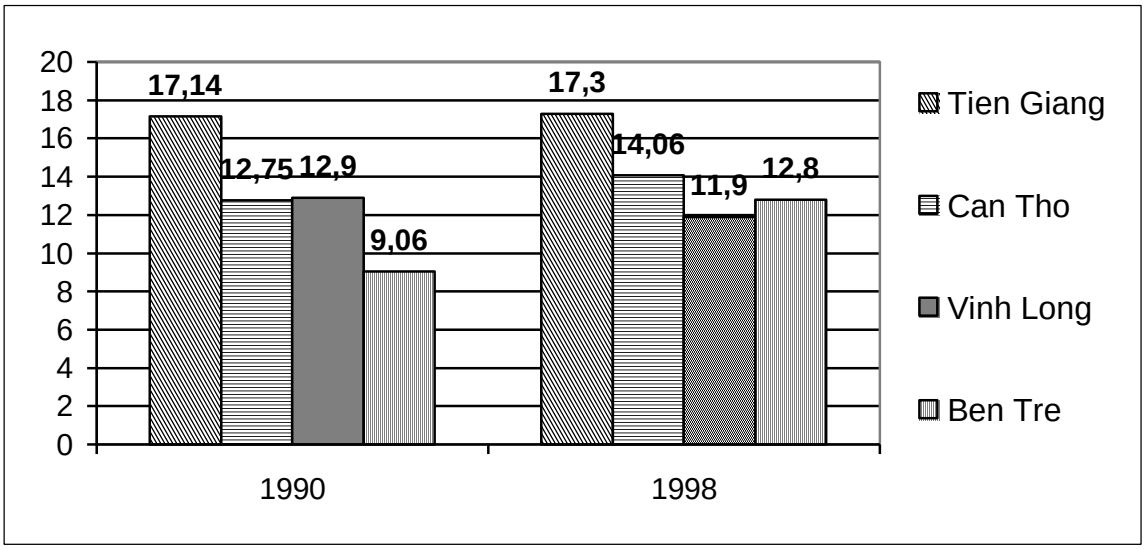
According to the agro-ecologic conditions of the MRD, there are two subsystems within the garden system:

- the mixed fruit tree gardens on alluvial soils,
- the pineapple garden system on slightly or severely acid sulphate soils in the shallow flooded areas, or on severely acid sulphate soils intruded by saline water.

The first system is the most widespread since its expansion constitutes the core of the diversification process in the MRD. Besides, it mainly concerns the central part of the region, i.e. Tien Giang, Can Tho, Vinh Long and Ben Tre provinces, because the soil and inundation conditions in this area are the most appropriate to this system. In 1998, these four provinces represent 55% of the regional fruit area.

Indeed, between 1990 and 1998, the increase in the fruit area has been more or less significant depending on the provinces: 115.4% for Ben Tre, 68.3% for Can Tho, 54.5% for Tien Giang, 40.5% for Vinh Long, compared with 52.6% for the whole MRD. As a result, the share of each province has evolved differently: Ben Tre (12.8%) and Can Tho (14.1%) account for a larger part of the regional fruit production in 1998, whereas Vinh Long's contribution is lessened. Tien Giang province remains the leading producing province (17.3%).

FIGURE 6: EVOLUTION OF THE SHARE OF THE MAIN PROVINCES IN THE MRD FRUIT AREA IN %



Source: GSO 1996 and SOFRI for 1998

3.3.2 Structural characteristics

The evolution of the fruit area has also concerned its structure, as indicated on Table 64.

TABLE 64: STRUCTURE OF THE FRUIT AREA IN THE MRD AND MAIN PROVINCES BETWEEN 1990 AND 1998

	Evolution of the area For 1990-1998	Share in the total fruit area in 1998	Share of the province in the regional area in 1998
Citrus			
Total MRD	452 %	18.7 %	100 %
Tien Giang	107 %	14.6 %	13.5 %
Can Tho	**309 %**	**44 %**	**32.8 %**
Vinh Long	82 %*	26 %	16.3 %
Ben Tre	543 %	27 %	18.5 %
Mango			
Total MRD	2 %	5.8 %	100 %
Tien Giang	12 %	6.3 %	19 %
Can Tho	**600 %**	**9.6 %**	**23.3 %**
Vinh Long	0 %	8.0 %	16.4 %
Ben Tre	37 %	1.2 %	2.7 %
Banana			
Total MRD	- 4.85 %	15.9 %	100 %
Tien Giang	0.33 %	11.1 %	12.1 %
Can Tho	**- 34 %**	**9. 6 %**	**8.5 %**
Vinh Long	- 50 %	6.9 %	5.1 %
Ben Tre	- 49 %	7.1 %	5.7 %

** Data only available since 1992*

Source: calculation based on data of GSO 1996 and 1999

The most important increase has been that of citrus[7] (452% between 1990 and 1998), which now represents the main fruit crop in the MRD (18.7%). This evolution has been especially significant in the following provinces: Ben Tre (543%), **Can Tho (309%)** and Tien Giang (107%). As a result, these three provinces and Vinh Long concentrate, in 1998, 81% of the MRD citrus area, with 33% solely for CT province.

Besides, the expansion of citrus cultivation has been particularly sharp in 1993 for Can Tho province (206%) compared to Vinh Long (58%), Tien Giang (88%) and to the total MRD (94%).

Concerning the other fruit crops:

- the mango area has only grown by about 2% for the whole MRD, but with great disparities among the provinces: 600% for CT province compared with 12% for Tien Giang province;
- the banana area has globally decreased by about 5% for the MRD, especially in Vinh Long, Ben Tre, and Can Tho provinces. Actually, during the same time, it increased by 93% in Camau province.

[7] Citrus cultivation mainly concerned orange and mandarin in the MRD, then grapefruit and lemon.

Conclusion about the diversification process in the MRD:

This process is characterised by a specialisation in fruit cultivation, especially in citrus production and mainly concerns the central part of this region, particularly Can Tho province which accounts, in 1998, for 14% of the MRD fruit area and 44% of the regional citrus area.

The following analysis of the orange-mandarin commodity chain dynamic in the MRD details the role of each type of actors in the diversification process and in the evolution of fruit cultivation in this region during the last fifteen years, as well as their strategies and constraints.

4 General presentation of the orange-mandarin commodity chain

4.1 The concept of commodity chain

According to the literature about the concept of commodity chain, it can be considered from different points of view:

4.1.1 As a set of technical steps

A commodity chain is a set of activities which contribute to the production and the delivery of a product to the final consumers. These activities are closely related to technical steps in both production and marketing of the product and can be divided into two groups: the basic activities and the support activities.

Identifying these activities allow one to identify the actors that perform them and, consequently, the structure of the commodity chain at a given point in time.

Thus, the analysis of a commodity chain from this point of view is very important because it highlights its level of development, its complexity and its degree of integration as well as the nature of the relations that link the actors with one another.

4.1.2 As a set of markets

A commodity chain is also an organised and focused set of relations through market since, within a commodity chain, the different type of actors are often connected to each others by markets. This set of markets constitute the marketing system that aims at delivering the product to the final consumers.

However, depending on the final destination of the commodity, the size, the degree of integration, and the type of processing, several marketing channels can coexist within the same marketing system. They correspond to specific markets whereby actors can bear more or less transaction costs.

The analysis of the marketing system and the related channels is thus particularly important, especially because it concerns a developing economy in transition where markets are highly imperfect, when they are not non-existent, and for which new organisational structures have to be developed. Thus, the organisation of the market and the type of relations that accompanies the transaction will be of particular consideration.

4.1.3 A set of non-market relations

A commodity chain is also more than a set of commercial relationships, as it also includes non-market relations, namely those arrangements that aim at reducing transaction costs.

In a perfect market, prices convey information from consumers to producers regarding what the latter want and from producers to consumers about the production costs. In real markets, especially in developing economies, access to information is rather limited as infrastructure is imperfect and local market rules are non-transparent. Therefore, the actors tend to create

institutional arrangements between them to reduce the costs resulting from these imperfections.

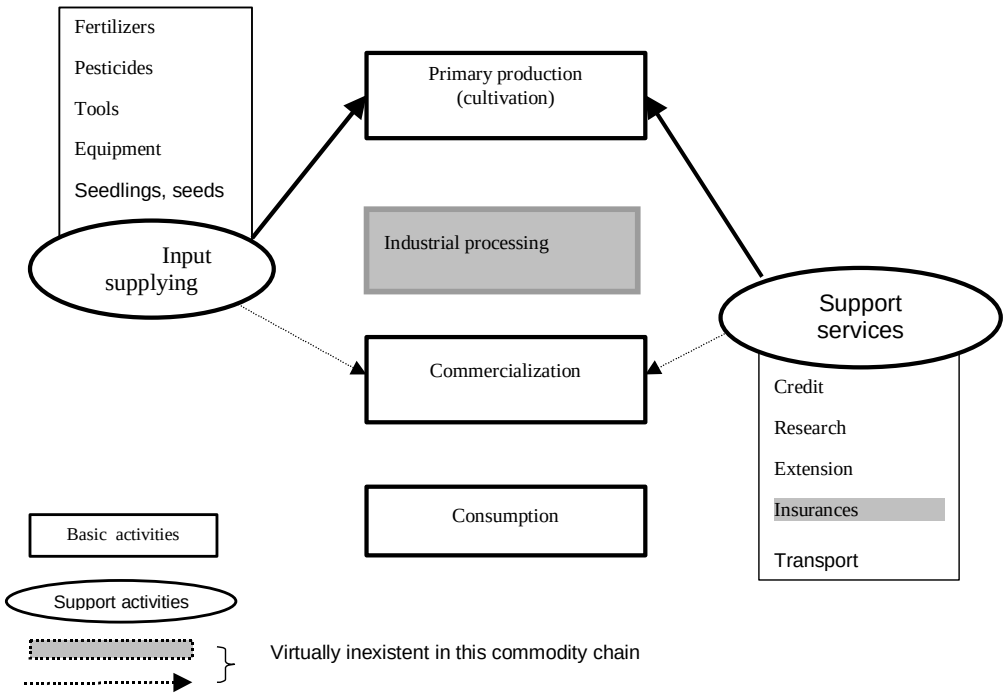
4.2 Main characteristics of the orange-mandarin commodity chain

As mentioned earlier, the main increase in the MRD fruit area was that of citrus and in CT province. Within the citrus category, orange and mandarin constitute the main crops and are often cultivated together in the same garden and sold by the same traders. Thus, our analysis focuses on the organisation of the commodity chain corresponding to these two types of fruit.

To be more precise, there are two different kinds of orange and mandarin fruits which are cultivated and exchanged in the MRD: for orange (cam in Vietnamese): orange "mat" (*Citrus sinensis L. Osbeck*) and orange "sanh"[8] (*citrus nobilis var. typica Hassk)*, for mandarin (quyt): mandarin "duong" *(citrus nobilis var. microcarpa Hassk*) and mandarin "tieu" (*citrus reticulata blanco*).

Following the above conception of the commodity chain, Figure 7 indicates the basic and support activities that constitute the present structure of the orange-mandarin commodity chain in the MRD.

FIGURE 7: STRUCTURE OF THE ORANGE-MANDARIN COMMODITY CHAIN IN THE MRD



In Vietnam, at present, most fruits (90-94 %[9]) are consumed on local market and mainly non-processed, which is particularly the case for oranges and mandarins because of problems that the following study will reveal. The remaining 6 to 10% of fruits that are processed and/or exported, mainly concerns pineapple.

[8] According to the SOFRI, orange "sanh" is a variety of mandarin, not an orange.

[9] Tuan TA MINH "San xuant va thi truong trai cay Nam Bo" in "San xuat va thi truong cay an qua". SOFRI 8-9/4/1999,pp 1-12.

Concerning the orange and mandarin production of Can Tho province, the greatest part is consumed in fresh as we have not found processing facilities related to these fruits.

The basic and support activities are carried out by actors who can accomplish one of them in part, while some actors are involved in several ones, as the functional analysis of the orange-mandarin commodity chain in the MRD indicates (see the following table).

TABLE 65: FUNCTIONAL ANALYSIS OF THE ORANGE-MANDARIN COMMODITY CHAIN

Basis and support activities	Technical steps	Agents	Products
♦ Supplying of inputs and services	. Production of inputs . Trade of inputs . Support services	. Vietnamese companies . Importers: state owned companies having a license to import fertilizers and pesticides, foreign companies, . Companies, traders* in shops in towns or on boat in communes . Bank for agricultural and Rural Development, Bank for the Poor, Rural joint-stock commercial banks, farmers and women associations, NGOs, money lenders, traders, . Research centers, extension departments, traders*, farmers and women association, NGOs, companies supplying fertilizers and pesticides...	. Fertilizers, pesticides . Capital . Research and transfers of technology
♦ Primary production	. Cultivation . Harvest	. Farm households . Farmers, assemblers, wholesalers	. Fresh fruits
♦ Marketing	. Transportation to the wholesaler and wholesale trade . Sale to retailers (can include transport) . Retail trade	. Farmers, assemblers, wholesalers, . Assemblers, wholesalers . Retailers	. Fresh fruits
♦ Consumption			. Fresh fruits

* traders designate people who buy and sell inputs; in this case they consist of wholesalers or retailers

Through this schematic presentation, we can notice the importance of the marketing activities between primary production and final consumption in this commodity chain.

The basic activities, i.e. production and marketing including consumption, are presented respectively in chapters 5 and 7, whereas support activities are addressed in chapter 7.

5 Production

Fruit production consists in two main activities: cultivation and harvest.

Regarding orange and mandarin cultivation in the MRD, **the farm household is the main actor, if not the only one**, who draws an income from a very small area of land. Consequently, farmers try to optimise their scarce land resource through diversification into fruit cultivation, according to the market opportunities, their technical constraints and financial capacity. The combination of those factors gives way to scattered fruit production.

5.1 The farm household: the main actor of a small scale agriculture

The reforms undertaken during the last ten years have aimed to recognize and reinforce the farm household as the basic unit of agricultural production in Vietnam. Consequently, for some crops, namely for most of fruit production, the farm household is the only actor.

However, Vietnamese agriculture is still an important activity in Vietnam[10] whereas agricultural land represents only a small part of the total area (23.5 %); as a result **the share of agricultural land per capita is among the smallest of the world: 0.15 ha** (this figure takes into account the agricultural population as a base for calculation[11]).

Concerning the MRD, which accounts for 23% of the total agricultural population and 34% of the total agricultural land, **the share of agricultural land per agricultural capita is slightly higher : 0.22 ha**.

The direct consequence of this characteristic is **a relatively small average farm size**: **1.16 ha for the region in 1997** (see Table 66), though it has slightly increased since 1990 in consequence of an increase in agricultural land (6.8%) higher than in the number of farm households (4.8%).

TABLE 66: AVERAGE SHARE OF AGRICULTURAL LAND PER HOUSEHOLD IN VIETNAM AND IN THE MRD BETWEEN 1990 AND 1997 (* *UNIT: HA PER HOUSEHOLD)*

	1990 *	1997*	Evolution 90-97 (%)
Vietnam	0.75	0.72	- 3.05
Mekong River Delta	1.14	1.16	+ 1.94

Source: calculation made from "GSO" data 1996 and 1999

In reality, this figure covers various situations within the MRD as well as within each of the provinces.

[10] It concerns in 1997, 67% of the total population and of the labour force.

[11] If we take, the entire population as a base for calculation, the share of agricultural land per capita is 0.1ha. Those data are given for 1996.

According to available date in 1994, given an average farm size about 1.24 ha for the MRD, **63.1% of the farm households were equally distributed among the three ranges of farm size: 0.2 - 0.5 ha, 0.5 - 1 ha and 1 – 3 ha** (see Table 67). On the other hand, although the 1993-1994 land reforms have allowed each household to "own" up to a limit of 3 ha for annual crops and 10 ha for perennial crops in regions such as the MRD, **it is very rare to find farms larger than 3 ha, especially in the provinces where fruit cultivation is concentrated**.

TABLE 67: DISTRIBUTION OF HOUSEHOLDS PER TYPE OF FARM SIZE IN 1994 (*UNIT : %)*

Size of farming land	**Vietnam**	**Mekong River Delta**
Landless	1.15	0.70
< 0.2 ha	**26.95**	6.15
0.2 – 0.5 ha	**43.96**	**25.65**
0.5 – 1 ha	**16.23**	**30.65**
1 – 3 ha	10.52	**32.48**
3 – 5 ha	0.98	3.63
5 – 10 ha	0.19	0.68
> 10 ha	0.02	0.05

Source: " Kinh te xa hoi Vietnam – Thuc trang, xu the va giai phap". 8/1996.[12] Agricultural and rural census in 1994.

Furthermore, there are some **disparities between the provinces of the MRD** (see Table 68), that result from several factors such as the density of population, the share of agricultural land on total land, the share of agricultural household in the total number of households and the average size of the household.

[12] Cited in "The effects of land rights on investment incentives & agricultural production. The case of farm household production in Vietnam's South-East provinces". Vu Thi Hong Thuy. Thesis of Master of Arts in Development and Economics. National University of HCMC. College of Economics and Institute of Social Sciences. The Hague. The Netherlands. November 1999. page 46.

TABLE 68: AVERAGE SHARE OF AGRICULTURAL LAND PER FARM HOUSEHOLD AND RELATED FACTORS IN THE PROVINCES OF THE MRD IN 1994

Provinces	Agricultural land / farm H.hold (ha)	Density of population (pers/km²)	Agricultural land/ Total land (%)	Agricultural H.hold / Total nb of H.hold (%)	Average number of pers. / farm H.hold
Long An	1.2394	232	54.65	91.94	4.78
Dong Thap	1.0523	370	69.19	90.21	5.44
An Giang	0.8842	434	70.48	90.71	5.60
Tien Giang	0.7992	579	72.61	75.83	5.06
Ben Tre	0.7517	509	67.92	85.00	5.20
Vinh Long	0.7220	579	82.32	96.31	5.39
Tra Vinh	1.1493	348	69.45	84.83	5.21
Can Tho	1.0380	447	82.50	93.87	5.69
Soc Trang	1.5040	287	76.85	87.91	5.32
Kien Giang	2.1639	160	48.11	66.48	5.36
Minh Hai *	2.8586	167	71.97	74.40	5.78
Total	1.2443	313	67.16	84.95	5.37

Source: General Statistical Office
**Include Ca Mau and Bac Lieu provinces because they were not administratively separated in 1994*

The smallest farms are located in the densest provinces such as Vinh Long (0.72 ha in 1994 and 0.68 ha in 1997), Ben Tre (respectively 0.75 to 0.73 ha) and Tien Giang (0.80 and 0.78 ha)[13].

In Can Tho province, the average farm size is larger than the other provinces producing fruits (**1.04 ha in 1994 and 1.03 ha in 1997**).

Now, if we consider the area where fruit cultivation is concentrated within CT province, the average farm size is globally about 1ha[14] or 1.28 ha[15] with more than 50 % of households having a farm size between 0.5 and 1.5 ha (see Table 69).

TABLE 69: DISTRIBUTION OF FARM HOUSEHOLD PER TYPE OF FARM SIZE IN CT PROVINCE

Size of farm (agricultural land)	Number of households (a)	Average area/H.h. (a)	Number of households (b)

[13] The difference between Vinh Long and Tien Giang provinces that have however the same density of population comes from a more important share of agricultural households in the total number of household for Vinh Long province that does not offsets its higher share of agricultural land on total land and larger household size.

[14] data from our sample=(1): Our survey concerns 80 farmers of Can Tho city (Long Hoa and Long Tuyen communes) and Chau Thanh district (Nhon Ai and Thanh Xuan communes) interviewed in 1999 and 2000.

[15] data from another source=(2): This survey was made in 1998 by Mr. La Hoang Hien in four districts of CT province: Figures are only given for Chau Thanh district (359 farmers from Thanh Xuan, Truong Long Tay, Dong Phuoc and Nhon Nghia communes). Results are presented in “Dieu tra va danh gia he thong canh tac thich nghi theo dieu kien sinh thai tinh Can Tho. Luan an thac si. Khoa Hoc Nong Hoc. DHCT. 1998.

≤ 0.5 ha	23.53 %	0.2920 ha	28.4 %
0.5 ha < …… ≤ 1 ha	35.29 %	0.7750 ha	37.4 %
1 ha < ……≤ 1.5 ha	27.94 %	1.2670 ha	16.2 %
1.5 ha < …… ≤ 3.8 ha	13.24 %	2.2610 ha	18 %

(a) Data from our survey (see note 18) (b) Data from another survey (see note 19)

5.2 The resulting farm household's logic: optimisation of farm resources and preference for fruit cultivation

Since farm households are free of their production choices in an economy driven by market forces, the first consequence of a small farm size is that farmers tend to optimize their land resources. For this reason, they have spontaneously diversified their farm activities, depending on the market opportunities, the physical constraints they face as well as the availability of capital and technical information.

5.2.1 Farm diversification

In Can Tho province, in the high and intermediary lands with alluvial soils, the main competition for land use has been between intensive rice cultivation (2-3 crops/year) and fruit garden, especially since the new Land Law (1993) and the Land Use Tax policy (1993-1994) that encourage farmers to invest in their land through land use right, and reduce the expenses of building a garden through exemption of land taxes during the first three years. As a result, in the surveyed areas, many farmers have transformed their rice fields into an orchard, after obtaining a land use certificate[16].

Therefore, in CT province, more than 60% of the fruit gardens[17] have been established during the last four years. Only in Chau Thanh district, the main fruit producing area of CT province, is it possible to find orchards older than 10 years but they constitute a small part of the total number of gardens (5%). In the other districts[18], fruit gardens have been established more recently (see the following table).

[16] In 1999-2000, 100% of surveyed farmers making fruit cultivation have the land use certificate. However, it is not the case in all the MRD. According to "The 1997-1998 Vietnam living standard survey", only 35.96 % of the agricultural and forestry land was used under the long term land use rights in the region at that time.

[17] This figure refers to economic fruit gardens that are planted on raised beds and not home garden around the farmer's house.

[18] Regarding the share of the districts in the provincial fruit area and of the districts' agricultural land (see annex 3 about CT province).

TABLE 70: AGE OF FRUIT GARDENS IN CAN THO PROVINCE IN 1998 (*UNIT: %)*

Age of fruit gardens	Chau Thanh District	Thot Not district	Phung hiep district	Vi Thanh district
< 4 years	67.30	91.70	88.20	87.30
4 – 6 years old	17.70	3.90	7.00	8.70
7 – 10 years old	10.00	4.40	4.80	4.00
> 10 years	5.00	0.00	0.00	0.00

Source: La Hoang Hien Dieu tra va danh gia he thong canh tac thich nghi theo dieu kien sinh thai tinh Can Tho. Luan an thac si. Khoa Hoc Nong Hoc. DHCT. 1998.

However, if we consider the surveyed households (see Table 71), we can see that few of them (26.9 %) have fruit cultivation as their sole farming activity whereas most of them (56.7 %) have at least three different farming activities, mainly through the VAC based system[19] (41.8% of the households), in order to broaden their sources of income.

TABLE 71:TYPE OF FARMING ACTIVITIES

Farming activities	Percentage of households concerned
- only fruit cultivation	26.9 %
- fruit and rice cultivation	43.3 %
- at least 3 activities: fruit garden and/or rice field and or animal husbandry and/or aquaculture	56.7 %
- VAC based system	41.8 %
- a complete diversified system (VAC system + Rice) with or without biogas	16.41 %

Source: Our survey

Moreover, among the farmers who only use their land for fruit cultivation (Table 72), most of them (50%) belong to the group of those who have the largest gardens (superior to 1ha) whereas those who have the smallest fruit garden (between 0.1 and 0.5 ha) are also often engaged in rice cultivation.

[19] Though the VAC system has been highly recommended by the Extension Departments in CT Province since 1980, it has been really developing since 1993-1994 among farmers, in response to the diversification of demand for food. The VAC term corresponds to V for Vuon, i.e. garden, A for Ao, i.e. Aquaculture mostly in pond and/or ditches, and C for Chan Nuoi, i.e. animal husbandry: poultry and pigs.

TABLE 72: CHARACTERISTICS OF THE FARMERS MAKING ONLY FRUIT CULTIVATION

Fruit crop area	Distribution of the farm households only having fruit garden	Share in the total number of farm households having the same size of fruit area
≤ 0.5 ha	39 %	22.6 %
0.5 ha m² < …… ≤ 1 ha	27 %	20.8 %
Superior to 1 ha	34 %	50 %

Source: own survey in 1999-2000

5.2.2 Farmers' crop choice and fruit production

Table 73 presents the farm household's strategy regarding its possible options for using farm resources (namely land and capital) and the constraints he faces.

The primary reason for choosing fruit cultivation rather than rice is the perspective of a higher income and profit. Another reason given is that fruit cultivation is less constraining than rice in terms of daily tasks: farmers can defer fertilizer or pesticide spreading as well as the harvest, which is not the case for rice cultivation.

TABLE 73: REASONS FOR CHOOSING EACH FARMING ACTIVITIES AND RELATED CONSTRAINTS

Activity	Reasons of the choice
Rice cultivation	1. Self-consumption 2. Profit 3. Use of available resources (cannot be transformed in fruit gardens)
Fruit garden	**1. Higher income** **2. Less constraining than rice cultivation. Can defer a task (spreading, harvesting,…)**
Upland crops	1. Profit and higher income 2. Use of available resources (rice field in dry season or unproductive fruit area and/or surrounding dike)
Animal husbandry	1. Profit 2. Use available resources 3. get waste
Aquaculture	1. Self consumption 2. Profit as well as improvement of water quality 3. Availability of suitable water bodies

Main present constraints:
1/ Price instability of output closely connected to the system of market economy :
Greater price instability for citrus production than for paddy
Lower prices for most of the products but higher profit with fruit cultivation than with rice
High dependence on traders. Lack of enough skills/information to sell by themselves (especially for fruits)
Lack of processing facilities namely for fruit
2/ Lack of capital
3/ Technical problems: disease on fruit trees, quality of fruit plants; disease on animals
4/ Access to technical information (depending on the dynamism of local extension services)

Table 74 shows the compared profitability of rice-based systems and of the major economic fruit crops in CT province, in order to understand better the farmers' preference for fruit cultivation, given the expected profit. Indeed, fruit cultivation can bring an annual profit more than three times to nine times higher than rice, depending on prices and yields.

TABLE 74: COMPARED PROFITABILITY BETWEEN THE RICE-BASED SYSTEMS AND THE MAIN ECONOMIC FRUIT CROPS IN CT PROVINCE FOR 1996-2000 [20] (*UNIT: MILLIONS VND)*

Type of crops	Minimum profit/ha/year	Maximum profit/ha/year
Rice based systems		
3 rice crops per year	10.2	< 19.6
2 rice crops per year	4.7	< 10.2
2 rice crops + upland crop	12.6	< 25
Fruit gardens21		
Orange type cam mat	16.2	< 75
Orange type cam sanh	22.8	< 132
Mandarin	46.2	< 126
Mango	93.8	< 138

Source: Own survey

However, if fruit production appears more attractive and profitable than rice cultivation, it presents some constraints that result from its technical aspects.

[20] Profit calculation takes into account the minimum and maximum prices, the minimum and maximum yields and the average costs for each commodity over 4 years (1996-2000).

[21] For fruit production, we have taken into account the costs of planting the orchard as well as the three or four years before the first harvest, which is not always considered by farmers when they estimate the annual profit of fruit production. Indeed, they often plant some upland crops among the trees until these ones give too much shade, so that they can have an income from the land during the time of unproductiveness of fruit trees. Moreover, we have not included costs of raising beds because cases are different among farmers. We considered them separately from this benefit calculation.

5.3 Technical requirements for fruit cultivation and related constraints

5.3.1 Physical constraints

In the Mekong River Delta, fruit cultivation depends on three important factors:

- The nature of the soil: most fruits can only grow on alluvial soils;
- The annual depth of inundation: fruit cultivation is suitable in areas where the depth is lower than 60 cm. The beds are all the more higher when the depth is important. However, it is not possible when it is greater than 100 cm;
- Water management: fruit cultivation is possible in areas where the hydraulic system is well developed.

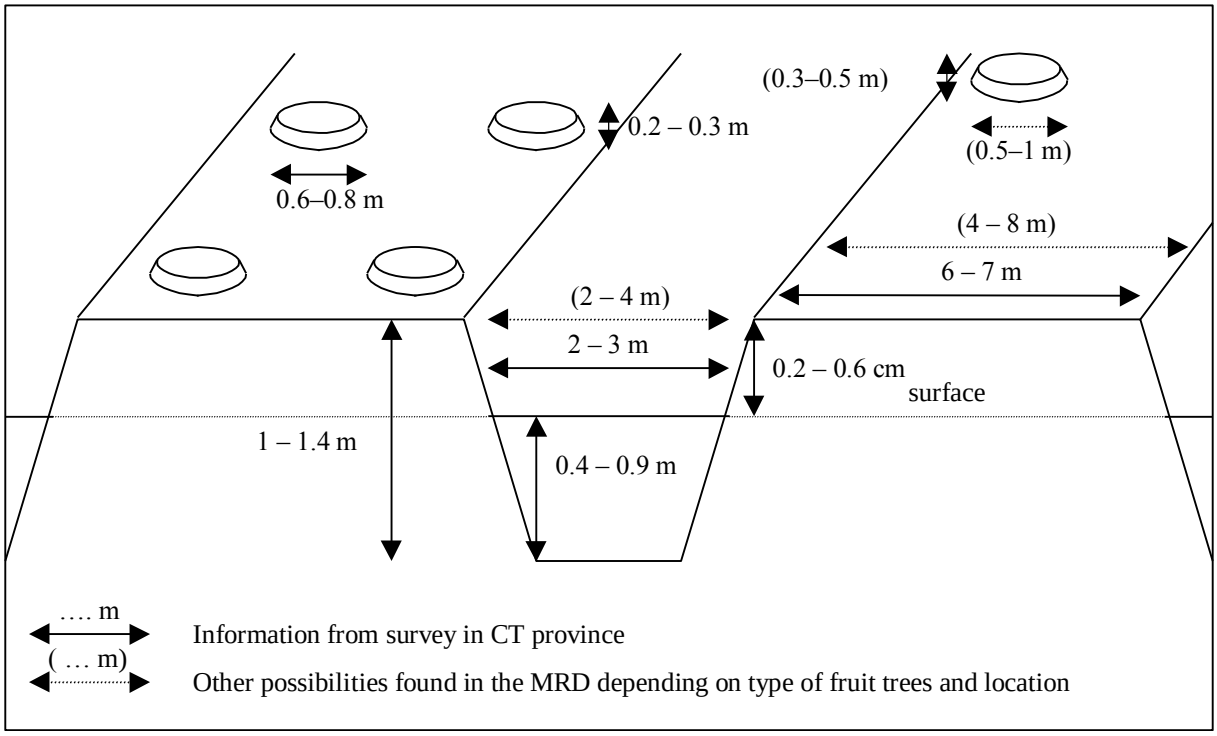
Annex 3 gives the main characteristics of Can Tho province and clearly shows the reason why fruit cultivation has mainly developed in the peripheral communes of Can Tho city and in Chau Thanh district, which were our surveyed areas.

According to those physical requirements, farm households located in high and intermediary lands nearby the Mekong and Can Tho rivers, along the roads and canals, can grow fruit in an orchard behind the farmers' house by using the raised bed technique.

5.3.2 Technique of fruit gardens on the raised bed system

Figure 8 presents the raised bed system for fruit cultivation as used by farmers in the MRD and particularly in Can Tho province.

FIGURE 8: THE RAISED BED SYSTEM FOR FRUIT CULTIVATION IN THE MRD



The length of the beds depends on the area of the garden and can be from 15 m up to 100-120 meters. Generally, 60 % of the land is used for the beds and 40% for the ditches.

Moreover, the beds are surmounted by mounds to avoid the deterioration of the roots during the rainy season. These mounds are consolidated every year.

Eventually, the garden is surrounded by a dike (1.5-2.5 m wide and 1-1.5 m high) which aims at protecting it from the annual and exceptional floods and has a height corresponding to the maximum level of the annual flood.

After having built the beds, farmers do not plant immediately the fruit trees that will compose their fruit garden, but rather papaya trees with sweet potatoes, cucumbers,…They can also leave it unused for a short while in order to wash the soil out and improve its quality.

Afterwards, at the beginning of the rainy season, farmers plant fruit trees, often following local cropping patterns, such as citrus in CT province. Eventually, they combine citrus with golden apple[22], mango or other fruits still mixed with the previous papayas and annual crops (tubercles, beans or vegetables) until fruit trees create too much shade. Inside the ditches, they breed fishes for self-consumption as well as additional income.

Finally, farmers usually establish their fruit garden with layered plants if the land is low and the usual water level in the canals is high. When the land is high and water level rather low, they can use graft or seeds. Actually, the explosion of demand in orange and mandarin plants between 1990 and 1994 has resulted in a huge increase of the area planted with layered plants that mainly came from Ben Tre province but were mostly contaminated by greening and Triteza diseases.

5.3.3 Related financial constraints

The investment in the construction of a fruit garden consists in the cost of raising beds and in the cost of planting fruit trees. In Table 75, these costs are given for the MRD and the main type of fruits cultivated in CT province.

To raise beds, farmers usually hire workers if they can not do it by themselves, which is often the case when they have a large area or because they lack family labour for this task. The cost of this operation is about VND 6-7 million.

[22] The golden apple fruit (coc in Vietnamese) belongs to *Anarcadiacae* family and is called *Spondias cytherea*.

TABLE 75: NECESSARY INVESTMENT FOR FRUIT CULTIVATION (*UNIT: MILLIONS VND/HA)*

Cost of raised beds	6 millions in 1996 7 millions in 2000				
Cost of planting	Orange cam mat	Orange cam sanh	Mandarin	Mango or durian	Golden apple (coc)
1996	0.95	1.2	0.9	3.44	insignificant
2000	1.89	3.0	1.8	6.02	insignificant
Total cost for the four first years *	20.76	25.15	20.73	16.62	Inferior to mango

** These costs include irrigation and watering, spreading of fertilizers and pesticides and depositing mud to consolidate the mounds.*

Source: Interviews with farmers, Extension services in CT province and researchers of Can Tho University.

Regarding the cost of planting, good seedlings of citrus fruits are very expensive (VND 10,000 to 20,000) and are mainly provided by Can Tho University and the Southern Fruit Research Institute. Because of their limited financial means and because it is difficult to avoid contamination anyhow, farmers try to minimize the cost of planting by usually buying from other farmers in Tien Giang, who sell cheaper seedlings (VND 3,000/seedling). However, this practice spreads the risk of disease and often results in lower output and worse quality.

Moreover, in the same logic, farmers plant golden apple trees rather than mango trees. Actually, for mango trees, farmers have to pay VND 14,000 to 15,000 per seedling whereas golden apple seedlings are free and often taken from trees of the home garden as those trees naturally grow in the MRD. Thereby, their financial constraints prevents farmers of making more profitable cultivation.

In addition, the costs of building the beds and planting the trees, during the first three years, farmers have to take care of the trees while they do not get production from them. That is why they must have other crops to derive benefit from the fruit area, as explained earlier. Therefore, the investment that farmers must undertake to start fruit cultivation is important.

Since 1993, farm households can obtain credit from the Vietnam Bank of Agriculture and more recently (1995) from other banks. However, for reasons that will be explained later, farmers can not borrow as much money as they need from these organisations, whereas the major farmers' constraints, after price instability, is the lack of capital (see Table 73). Thus, they often resort to informal credit (neighbours, moneylenders) which implies, in most cases, higher interest rates.

Consequently, depending on the availability of suitable land and capital, farmers turn their rice field into fruit garden in one time or progressively. In Can Tho province, most of them achieve transformation of rice fields by parts of 0.1 to 0.3 ha with an interval of six years between each actions as shown below.[23]

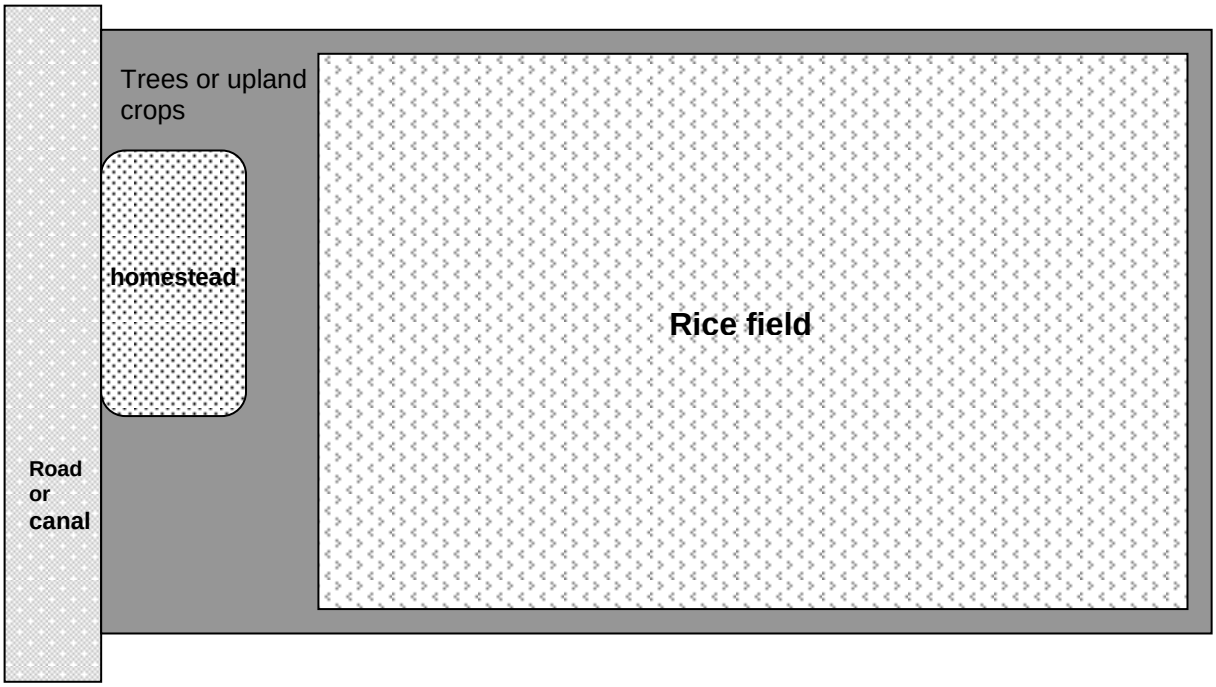
[23] In Tien Giang province, farmers tend to use a different method which consists in building mounds inside the rice field and planting a fruit tree on each of them. As fruit trees grow, farmers add soil to the mounds until they join to form beds. After three years, the system is completed and there is no more rice between the beds. According to M. Dang (researcher at CT university), the second system in not suitable for citrus garden because citrus trees are more sensitive to humidity than longan and mango that are planted with the second system in the Tien Giang

FIGURE 9: TRANSFORMATION OF A RICE FIELD INTO A FRUIT GARDEN IN CT PROVINCE

2. progressive transformation (stages 1,2,3)

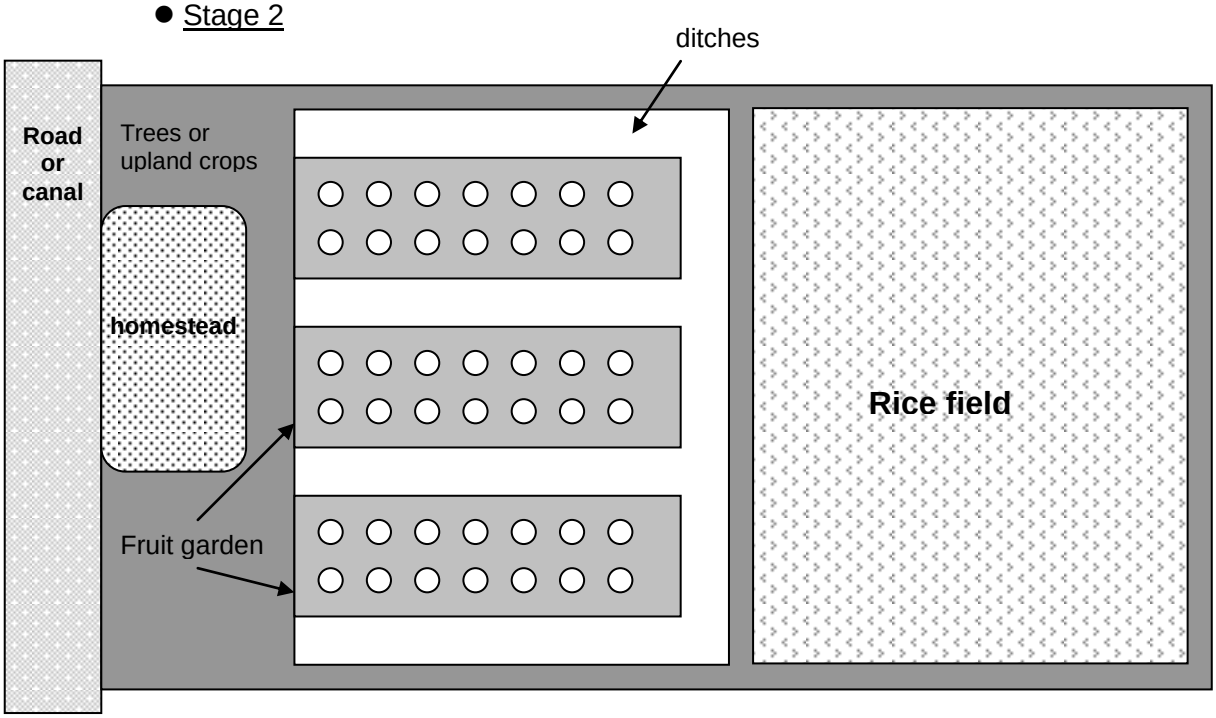
3. complete transformation (directly from stage 1 to stage 3)

- Stage 1

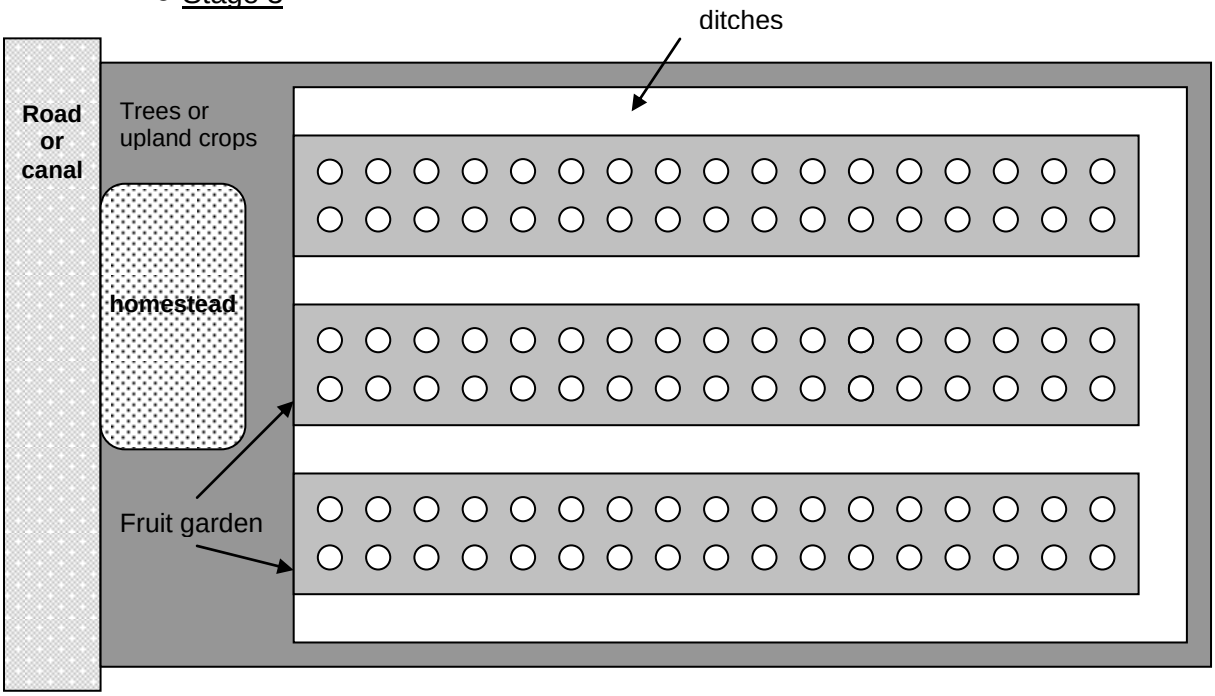


province. Another reason may be the lower inundation depth and the higher elevation of land in this province compared to Can Tho province.

● Stage 2



● Stage 3



In the same way, when farmers renew an old garden, they can proceed in one time or progressively depending on their financial means and under the condition that all the fruit trees are not suffering from diseases.

According to the previous characteristics (small farm, physical and financial constraints), fruit production is scattered among a large number of households which operate individually.

5.4 A scattered production

5.4.1 The small size of fruit gardens

Unlike rice production, increase in fruit output in the MRD has resulted primarily from an increase in the cultivated area at an average rate of 5.6 % per year since 1993 (against only 0.84 % for rice land), and mostly through the transformation of rice fields into fruit gardens, since agricultural land has not increased in such an extent (only 0.33% per year[24]). Besides, the number of farm households has increased only by 0.82 % per year between 1990 and 1997. As a result, the average share of fruit area per household is larger in 1997 than in 1990 (see Table 76). However, in the MRD as in the main four provinces producing fruits[25], it remains very small.

TABLE 76: EVOLUTION OF THE SHARE OF FRUIT LAND PER HOUSEHOLD BETWEEN 1990 AND 1997 COMPARED TO THE EVOLUTION OF THE FARM SIZE (*UNIT: HA PER HOUSEHOLD)*

	1990 *	1997*	Evolution 90-97	Evolution of farm size 90-97 (*)
Vietnam	0.0296	0.0394	32.93 %	- 3.05 %
Mekong River Delta	0.0665	0.0823	23.69 %	+ 1.94 %
- Tien Giang	0.1133	0.1602	41.41 %	- 3.32 %
- Can Tho	0.0817	0.1272	55.79 %	0.30 %
- Ben Tre	0.0581	0.1347	131.71 %	6.68 %
- Vinh Long	0.1321	0.1194	- 9.62 %	- 17.63 %

Source: calculation made with data of "GSO" 1996 and 1999 (*) only given for comparison

If we consider the fruit producing areas[26] of CT province, we can notice that the size of fruit garden is between 0.1 ha and 3.8 ha, which is the maximum found in our survey.

By comparing information from two different sources, including our survey (Table 77), it can be observed that:

- 51 % of farm households have an average fruit area from 0.5 to 1.5 ha;

[24] Increase in fruit area between 1993 and 1997: from 165.7 to 186 thousands ha; Increase of rice land: from 1952 to 2,008 thousands ha; Increase in agricultural land: 2,598 to 2,635 thousands ha.

[25] These four provinces represent 61.9% of the MRD fruit area in 1997 and for each of them, agricultural land dedicated to fruit cultivation is comprised between 11% and 20% in 1997 (Can Tho: 16.6%, Vinh Long:11.2%, Ben Tre: 14.6%, Tien Giang:19.5%).

[26] This refers to Chau Thanh district and peripheral communes of Can Tho town where 73 to 75 % of farming households have a fruit garden.

- from 36 % to 46 % of farm households have a smaller fruit area (less than 0.5 ha).

TABLE 77: PRESENT SIZE OF THE FRUIT GARDEN IN THE CT PROVINCE

Size of fruit area	Number of households	Average fruit area/ household	Number of households (a)
≤ 0.5 ha	46 %	0.35 ha	36 %
0.5 ha < …… ≤ 1 ha	36 %	0.71 ha	25 %
1 ha < ……≤ 1.5 ha	15 %	1.32 ha	26 %
1.5 ha < …… ≤ 3.8 ha	3 %	2.85 ha	13 %

Source: Our survey and Survey made by Mr. Ngyuen Phuoc Dang[27](a) in CT province in 1997 (86 farmers): in Can Tho city (Long hoa, Long Tuyen, My khanh communes) and Chau Thanh district (Dong Thanh, Nhon Ai, Thanh Phu Thanh communes)

Furthermore, if we also consider the farm size of the surveyed households (Table 69), we can notice that even by turning their total farming land into a fruit garden, the fruit area per household would remain small, between 0.5 to 1.5 ha, because more than 60% farm households have an average farming area included in this range. However, even among the surveyed areas, transformation of rice land into fruit gardens is not always possible. Thus, unless a process of land concentration occurs, fruit production will remain scattered.

5.4.2 Evolution of the structure of the fruit gardens in CT province

Table 64 has presented the global evolution of the fruit area between 1990 and 1998 in CT province. Indeed, though the citrus area has highly increased in the period (about 309%), a small decrease has been observed since 1996 (- 2.9%). Besides, the mango area has also been hugely increasing since 1994 (598.6 %).

This corresponds to the evolution of the structure of the fruit gardens in the province that results from economic and technical reasons and has consisted in specialisation from 1986 to 1996, followed by a little diversification after 1996.

The specialisation of fruit gardens has corresponded to an orientation of farmers towards a commercial and more profitable production. The technique of citrus cultivation -especially that of orange and mandarin trees- has been well-known in Can Tho province for several years; as demand for fruits increase, farmers specialised in those fruit crops regardless of whether they had already an orchard or not.

In 1994, the resulting increase in the production of orange and mandarin tended to depress prices, as demand did not catch up immediately. Besides, the rapid extension of the cultivated area, mostly achieved by layered plants between 1990 and 1994, resulted in 1995 in a large epidemic of greening and Tristeza diseases [28], and rapidly generated a strong instability in the prices of those fruits.

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[27] Nguyen Phuoc Dang: " Le role de la vulgarisation dans la promotion de la culture des arbres fruitiers dans le Delta du Mekong ». Memoire du Master VOPA. CNEARC. Universite de Can Tho. Avril 1997.

[28] In 1995, 30-40 % of the citrus area in Can Tho province was infected with the Greening disease. This figure mainly concerns orange Sanh (*C. nobilis var. typical Hassk.)* and mandarin. Regarding Tristeza, 50.4 % of the

Therefore, since 1996, fruit gardens are more diversified.

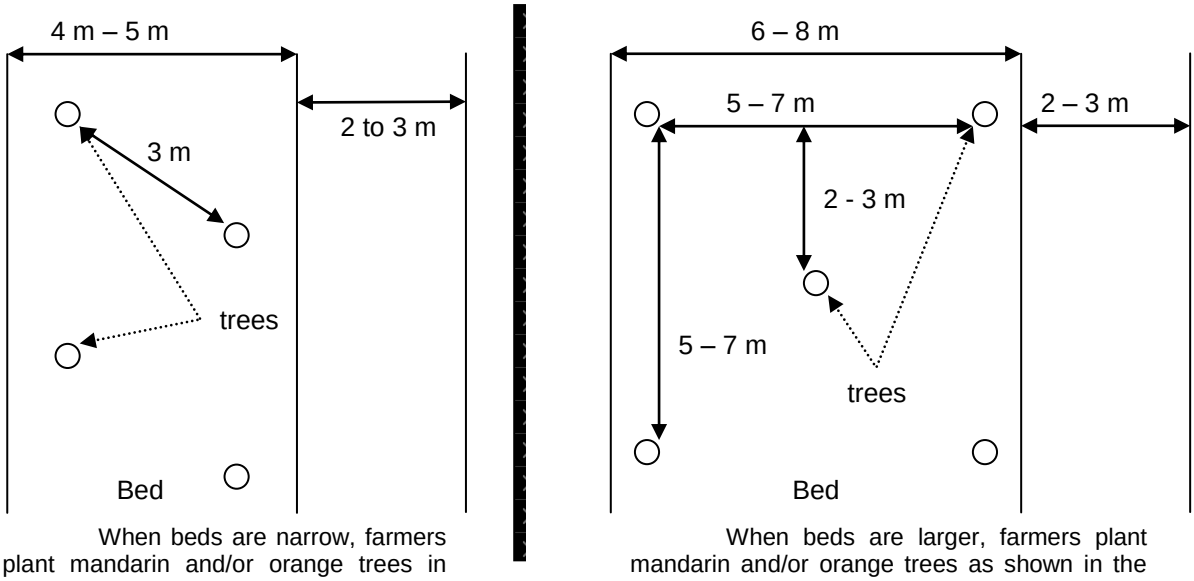
Indeed, most farmers keep orange and mandarin trees as their main fruit crop (area higher than 50%) but between those citrus trees they plant taller species such as golden apple, mango or banana trees. On the other hand, a few households have developed more diversified gardens (association of orange and mandarin trees (20%) with lime (10%), grapefruit (10%), mango (10%), golden apple (40%), durian (10%) for instance).

In short, the structure of fruit gardens has evolved from a mono-specific gardens (only citrus, especially orange and mandarin) to oligo-specific gardens (citrus with an increase of grapefruit cultivation, associated with fewer other species) as shown in Figure 10.

citrus area in CT province was infected, mainly orange Mat (*C. sinensis*) and mandarin Duong *(Citrus nobilis var. microcarpa Hassk.)* . (information given by researchers of CT University).

FIGURE 10: STRUCTURE OF FRUIT GARDENS IN CT PROVINCE

1/ Beds planted with only orange and mandarin trees: Monospecific garden



When beds are narrow, farmers plant mandarin and/or orange trees in triangle

When beds are larger, farmers plant mandarin and/or orange trees as shown in the above drawing

2/ Beds planted with orange and/or mandarin trees associated with taller species such as golden apple, mango, banana, durian…

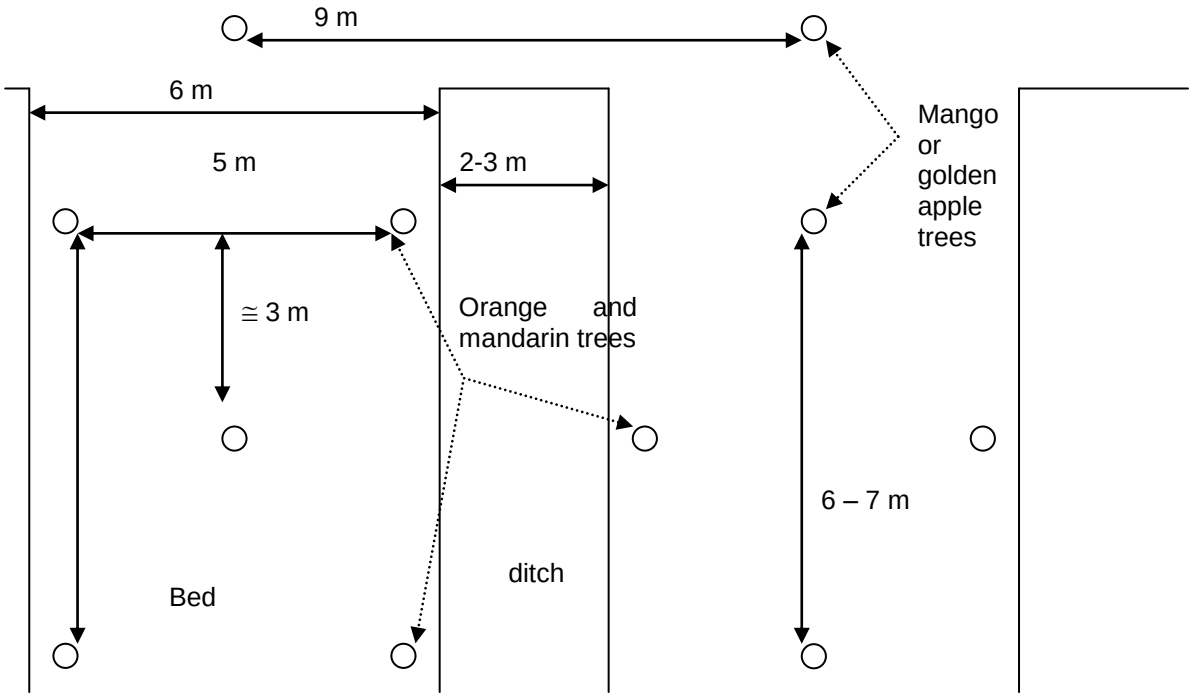


Table 78 gives the main characteristics of the fruit gardens in the surveyed area.

TABLE 78: MAIN CHARACTERISTICS OF THE FRUIT GARDENS IN THE SURVEYED AREA

- 87 % of the gardens are predominantly planted with citrus (more than 50% of the area). 4.5% have no citrus trees at all.

- 84 % are predominantly planted with orange and mandarin

- 83.6 % are specialised gardens with more than 65% of the area dedicated to citrus cultivation (mainly orange and mandarin) of which:

  - 40.3 % are mono-specific (i.e. with 100 % of citrus; most of them have a proportion of 50-70% of orange associated with 50-30% of mandarin);

  - 43.3 % are oligo-specific (dominant in citrus with more than 65 %)

- 16.4 % are more diversified gardens (less than 65 % of citrus)

♦ Oligo-specific gardens are mainly located in Nhon Ai commune (area of oldest gardens) and correspond to a strategy of diversification for technical (diseases) and economic reasons (price instability):

- Technical: in order to reduce the risk of Greening and Tristeza diseases, taller trees protect orange and mandarin trees from the sun and the wind. Citrus yields are lower but more secured. This decrease is compensated by other fruit production.

- Commercial: fruit trees such as golden apple or mango are less sensitive to diseases and the prices of their fruits are more stable than those of orange and mandarin fruits.

♦ Mono-specific gardens are rather located in Thanh Xuan commune (area of rice production where fruit cultivation is more recent). Moreover, this concerns the oldest gardens renewed recently in the same way because local farmers lack technical information about cultivation of other species and local extension services are not active in matters of fruit cultivation.

As a matter of fact, investing in another type of fruit cultivation requires from farmers to get technical information to succeed, which depends both on their dynamism and on that of the extension department. This explains the different evolution in Nhon Ai and Thanh Xuan communes.

5.4.3 Average fruit output per farm household

In the system of raised beds, only 60% of the area is dedicated to fruit cultivation as the remaining 40% is used for the ditches. Consequently, the average producing area is actually smaller than that given in table Table 77.

By taking into account the main fruit production in the surveyed area, the average yields (see Table 79), the different structure and the average size of fruit gardens, we can calculate the average output of orange and mandarin per household (see Table 80).

TABLE 79: AVERAGE YIELDS OF ORANGE, MANDARIN AND MANGO TREES IN CT PROVINCE

	Orange (sanh and mat)	Mandarin (duong and tieu)	Mango
Yield in the MRD (*)	15 – 27 T/ha	14 – 29 T/ha	20 – 30 T/ha

(*) These figures take into account the reduction of area for garden ditchesas well as the high density of fruit gardens[29]

Source: our survey

TABLE 80: AVERAGE OUTPUT PER HOUSEHOLD ACCORDING TO THE STRUCTURE OF THE ORCHARD (*UNIT : TONS)*

	Mono-specific garden	Oligo-specific gardens		More diversified garden	
	Orange & mandarin	Orange & Mandarin (70 to 90 %)	Other fruits (10 to 30 %) (a)	Orange & Mandarin (50 to 60 %)	Other fruits (40 to 60 %) (b)
0.5 ha	7.25 – 14	5.25 – 12.6	1 – 4.5	3.6 – 8.4	Small quantity of each kind
1 ha	14.5 – 28	10.5 – 25.2	2 – 9	7.25 – 16.8	
1.5 ha	21.7 - 42	15.7 – 37.8	3- 13.5	11 – 25.2	

(a) In oligo specific gardens, when the share of garden dedicated to other fruits is 10%, it concerns only another specie (mango, golden apple or banana) whereas if this one is about 20-30%, it can concern two other species.

(b)In more diversified gardens, farmers usually mix several species resulting in very small output of each kind of fruit (approximately equivalent to the figures given for oligo-specific gardens (column other fruits))

Therefore, if we consider the most frequent size of fruit garden (from 0.5 and 1.5 ha), we can conclude that the farm households can rarely produce more than 42 tons of orange and mandarin per year. Obviously, the largest productions come from the few households which have larger gardens. In the case of the largest garden found in our survey (3.8 ha), the corresponding household has an oligo-specific garden with 75% of the area dedicated to orange and mandarin and 25% to other species. The resulting output is about 41 to 80 tons for a citrus area of 2.85 ha.

Actually, in the survey, 48.1% of mono-specific gardens have a maximum size of 0.5ha and 40.7% are between 0.5 and 1 ha large. The resulting output per household (orange and mandarin) is, in most of the cases, consequently small, i.e. lower than 28 tons per year.

Moreover, within the harvesting season of orange and mandarin, there are approximately five harvests per season, for each type of fruit (see Table 81).

[29] In the MRD, density of fruit trees is very high compared to other countries (600 to 1100 trees /ha for citrus, 400 for mango) which allows farmers to reduce the risk of disease and to increase the income.

TABLE 81: HARVESTING CALENDAR FOR ORANGE AND MANDARIN

Variety of fruits	Harvesting period in the MRD and CT province											
	1	2	3	4	5	6	7	8	9	10	11	12
Sanh Orange	■	■							■	■	■	
Mat Orange				▒	▒	■	■	■	■	■		
Duong Mandarin	▒							■	■	■	■	■
Tieu Mandarin	■										■	■

Legend: ■ Peak of harvest ▒ Season of harvest with smaller quantity

Source: Cong Trinh khoa Hoc Cong Nghe 1993-1997. 1997 & farmers

This implies a smaller quantity of fruit sold by farmers to traders per time and type of fruit, especially at the beginning and the end of the harvesting season.

Conclusions about the cultivation activity:

The main characteristics of fruit cultivation in the MRD are as follows:

- The farm household is the main actor involved in orange and mandarin production, if not the only one, who can derive an income from a very small area;
- Consequently, farmers try to optimise their scarce land resource through diversification of farm activities, namely through fruit cultivation, according to technical constraints and his financial capacity;
- Although the recent tendency has been to turn rice fields into fruit gardens, the fruit area per household remains very small (less than 1.5 ha in most cases); therefore the fruit production is scattered;
- Because of price fluctuations resulting from an instability in supply, fruit cultivation at the farm level tends to be more diversified, which entails that the production per type of fruit is even more scattered.

5.5 Harvesting

Harvesting is mainly done by traders or wholesalers, when farmers sell to them at the farm gate (95 % of the cases). Usually, farmers are used to harvesting themselves if they market the fruits by themselves to the retailers in the market (for very small quantities) or to wholesalers at the floating market. In this case, they hire specialised workers.

In the MRD, farmers do not want to undertake post-harvest activities as mentioned by Mr. Vo Tong Xuan, in an interview in 1999. They think that production is their main responsibility, if not the only one. Indeed, when questioned (in 1999 and 2000) about their involvement in harvesting as well as in marketing their product directly at floating markets, they answered that the difference in the selling price whether they harvest themselves or let traders do it, is not significant enough to justify their doing it themselves.

6 Marketing

6.1 Conceptual framework

6.1.1 Market and marketing system

As the diversification process consists in the development of commodity chains other than those of staple foods, it is strongly linked in many ways to the development of the market for these new productions.

Through the concept of commodity chain, the development of the market takes on a wider signification than the sole development of the final demand. Actually, since a commodity chain is a series of both technical activities and markets, the development of the market refers to the entire marketing system which allows production to be connected with the final consumption.

The market in considered here in a "systems form" i.e. "as multiple and interdependent sequences of industrial and trading activities, decisions, transfers of ownership and price formation"[30]. Thus, for a specific commodity, there are many activities between production and consumption (such as assembly, storage, transformation, redistribution, …) which are carried out by specific actors who exchange the commodity between each other, in a vertical way. This series of markets forms the "skeleton" of the marketing system.

To understand the dynamic of a specific marketing system, it is then necessary to analyse its organisation and the relations between its actors, especially since real markets, such as agricultural markets in developing countries, are far from functioning as the model of the conventional theory.

6.1.2 Theoretical and real markets

In the conventional conception of the economy, the market is considered as the efficient mechanism which coordinates the exchanges and the transactions of rational and individual atomistic agents, only through price adjustment, and under conditions of perfect competition and information. Moreover, institutions are independent, atomistic and impersonal.

Actually, in developing countries and particularly in agriculture, markets may remain incomplete (i.e. not fully developed) and agents generally operate under conditions of limited information, imperfect competition and asymmetric power relations.

Furthermore, markets are embedded in:

- social structures (e.g. kin, gender, relations of class, …);
- the state (as a law-making regulator or as a public-enterprise-managing competitor);
- technical-material properties (soil and climate, infrastructure, physical nature of the marketed commodity)

[30] Barbara Harriss-White "Agricultural markets from Theory to Practice. Field experience in developing countries". Mac Millan Press Ltd. 1999. p. 9.

Therefore, in such a situation, market exchange involves high transaction costs that agents try to minimise through institutional arrangements.

6.1.3 Market exchange and transaction costs

Transactions costs result from the functioning of the market itself. They include marketing costs (storage, transportation, handling, packaging) as well as intangibles such as searching and screening information, monitoring and enforcing contracts[31], bargaining, lags in production…. They vary by products, type of agent in the marketing chain, and individual agent within a category of agents depending on factors such as assets or distribution of cognitive competence.

Under circumstances of uncertainty, risk and bounded rationality, transactions costs are especially high, which is the case of high value-added products such as fruits in Vietnam.

6.1.4 Organisation and dynamic of a marketing system

Therefore, in this logic, a marketing system as a series of markets, is made of "institutionalised interactions between sellers and buyers that include exchange of particular commodities at a mutually agreed (but not necessarily mutually beneficial) exchange rate under conditions of rivalry or a degree of competition"[32].

In this description, there is both a horizontal component and a vertical component:

- The horizontal component refers to structural properties and economic conditions of market exchange such as the number of buyers and sellers, the degree of competition, seasonal and spatial demand-and-supply structures, and prices;
- The vertical component corresponds to the interactions between the buyers and the sellers which often involve formal and informal regulations, contractual arrangements and/or personal relations between them. These market interactions are usually repeated and often build up marketing chains and networks for particular commodities that stretch over time and space. This has been particularly the case for fruit marketing system in the MRD, for many years.

6.2 Main characteristics of the orange-mandarin marketing system

6.2.1 Structure of the marketing system

As indicated earlier, a high percentage of fruits are consumed in fresh in Vietnam (90-94% for all type of fruits, including the almost entire citrus output). As a result, post-harvest activities do not really refer to transformation but rather to assembly, transportation, storage and redistribution (wholesale and retail trades) of fruits, as we have seen in Table 65.

Indeed, the marketing system is dominated by a very large number of private traders who often operate informally and consequently, have no access to formal credit.

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[31] See Francesco Goletti: "Agricultural diversification and rural industrialisation as a strategy for rural income growth and poverty reduction in Indochina and Myanmar". IFPRI. June 1999. p. 12.

[32] Rene Veron: "Real markets and environmental change in Kerala, India. A new understanding of the impact of crops markets on sustainable development". Ashgate Publishing Ltd. 1999. p 35.

Because of high transaction costs and often low assets which limit them in their business, they are usually specialised in a main activity. Thus, depending on their capacities and means (physical and financial capital), traders can be assemblers, wholesalers or retailers.

However, as wholesalers are less numerous than assemblers or retailers, the degree of competition is lower between the former than among assemblers or retailers.

Therefore, the orange-mandarin commodity chain is thereby not vertically integrated.

6.2.2 High transactions costs and social characteristics of exchange

Because of the intrinsic characteristics of fruits (seasonal and very perishable) and conditions proper to Vietnam (high variability of quality, very frequent disaster, absence of insurance, few processing industries or cold chain for fruits,…), fruit markets are characterised by a high ratio of transaction costs to final value all the more because prices and consequently profitability are very fluctuating.

Under all these circumstances, actors in the marketing system have tried to minimise the risks and the transaction costs through personalised forms (relational contracts) of market exchange in which individual are known to one another and engage in repeated dealings. Furthermore, the analysis of the transactions will show that through these personalised relations, buyers often provide services such as information or credit.

Finally, if all the fruit traders[33] are motivated by the high profitability that this kind of trading brings in, their social characteristics clearly demonstrates the embeddedness of markets in social structures:

- the weight of the family's experience: many traders are children of traders (often in rice, sometimes in fruits) as training and information have been easily available for them. Besides, the lack of enough land resources in the family is often another reason to have undertaken this business.
- The predominance of women: the fruit marketing system is highly gendered. Though the reasons of this situation constitute in itself an object of research, it seems that these women have seized an opportunity of rapid income when the economic situation was more difficult and sources of income scarcer, as for instance during or after the war (20 years ago), even if private trading was formally forbidden[34].

6.2.3 Spatial flows and marketing channels

Several marketing channels can coexist within a specific commodity chain, depending on the final destination of the commodity and the size of the channel, i.e. the number of successive operators[35].

[33] We use the term "trader" for assembler or wholesaler or retailer.

[34] The issue of gender and market exchange is relatively new. For more details, see Barbara Harriss-White "Agricultural Markets from theory in Developing countries"… op. cit.

[35] Other factors can be used to determine the different marketing channels which compose a commodity chain such as the degree of integration and the type of processing.

FIGURE 11: SCHEMA OF THE MARKETING CHANNEL FOR ORANGE-MANDARIN FRUITS WITH LOCAL MARKETS FOR FINAL DESTINATION

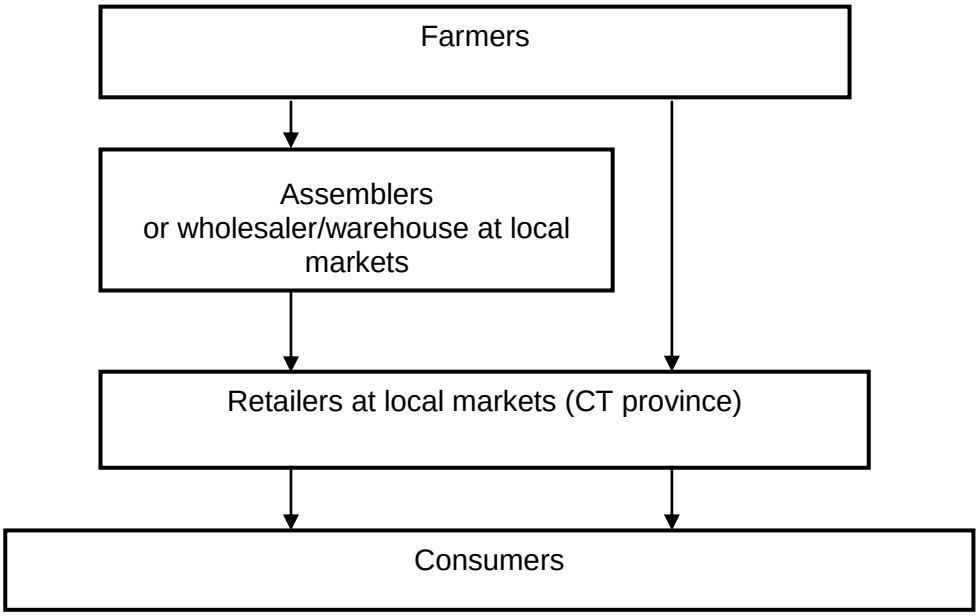


FIGURE 12: SCHEMA OF THE MARKETING CHANNEL FOR ORANGE & MANDARIN FRUITS WITH OTHER PROVINCES FOR FINAL DESTINATION

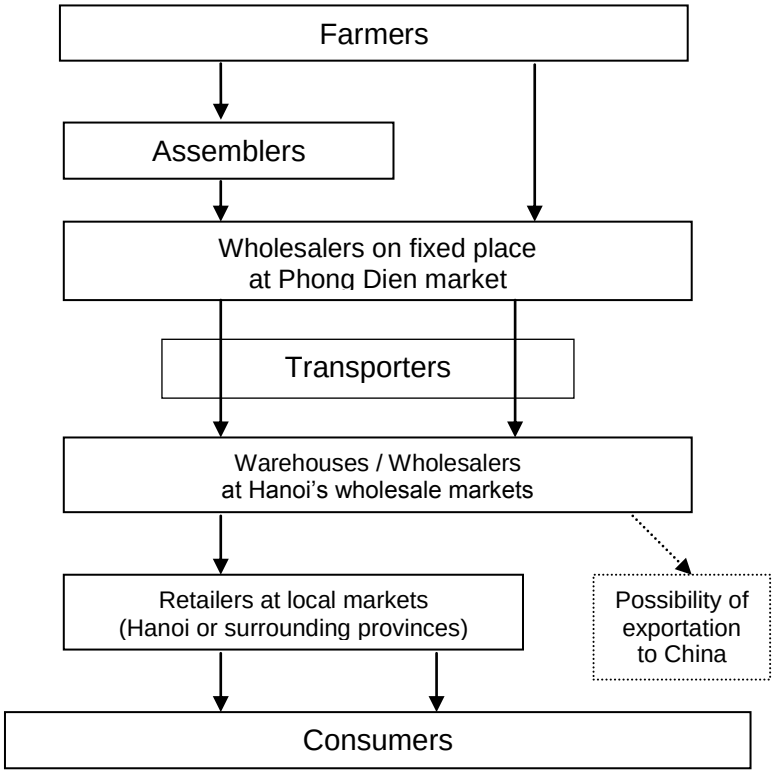


FIGURE 13: SCHEMA OF THE MARKETING CHANNEL FOR ORANGE &MANDARIN FRUITS WITH HANOI MARKETS AND THE NORTHERN PROVINCES FOR FINAL DESTINATION

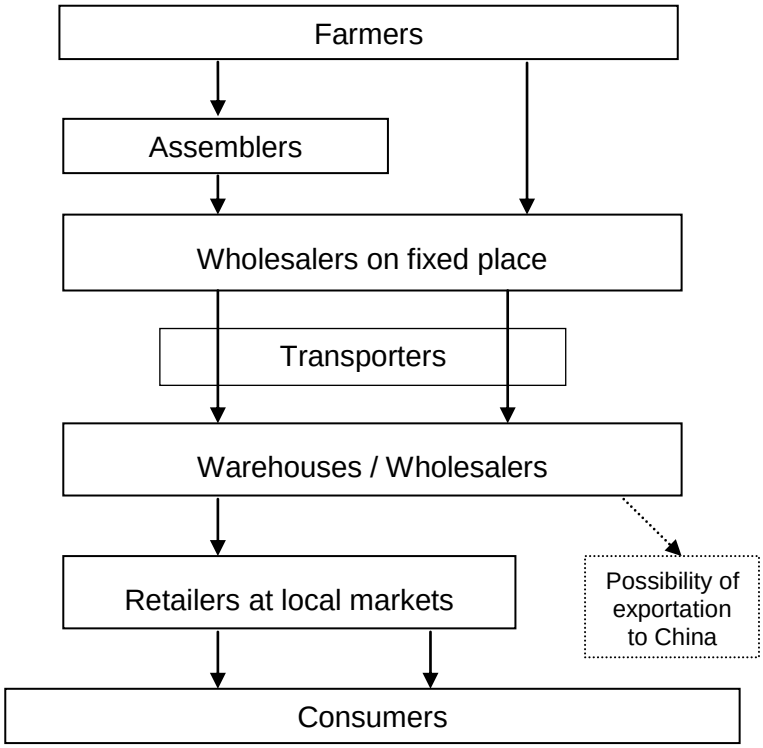


FIGURE 14: SCHEMA OF THE MARKETING CHANNEL FOR ORANGE & MANDARIN FRUITS WITH HCMC MARKETS FOR FINAL DESTINATION

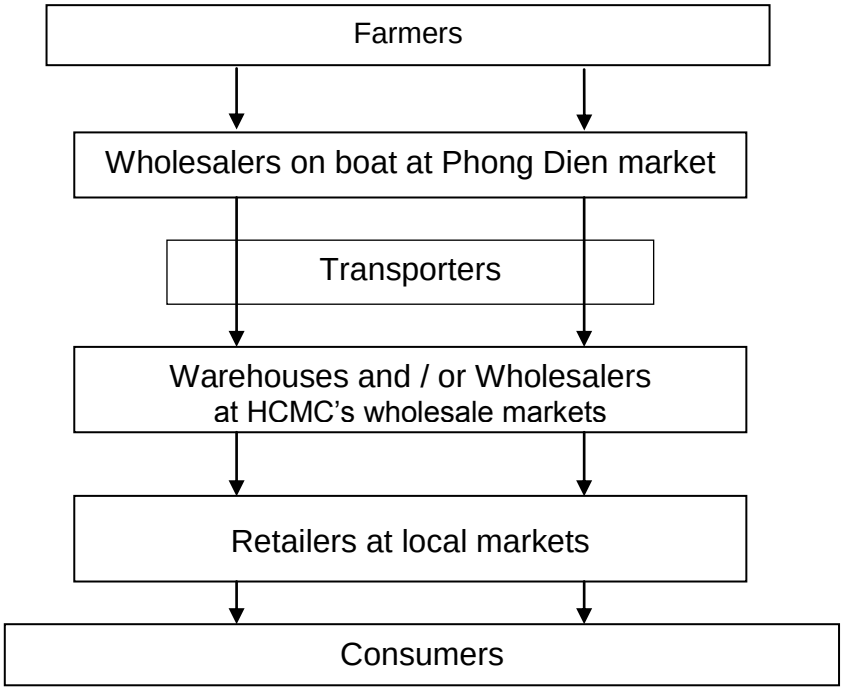
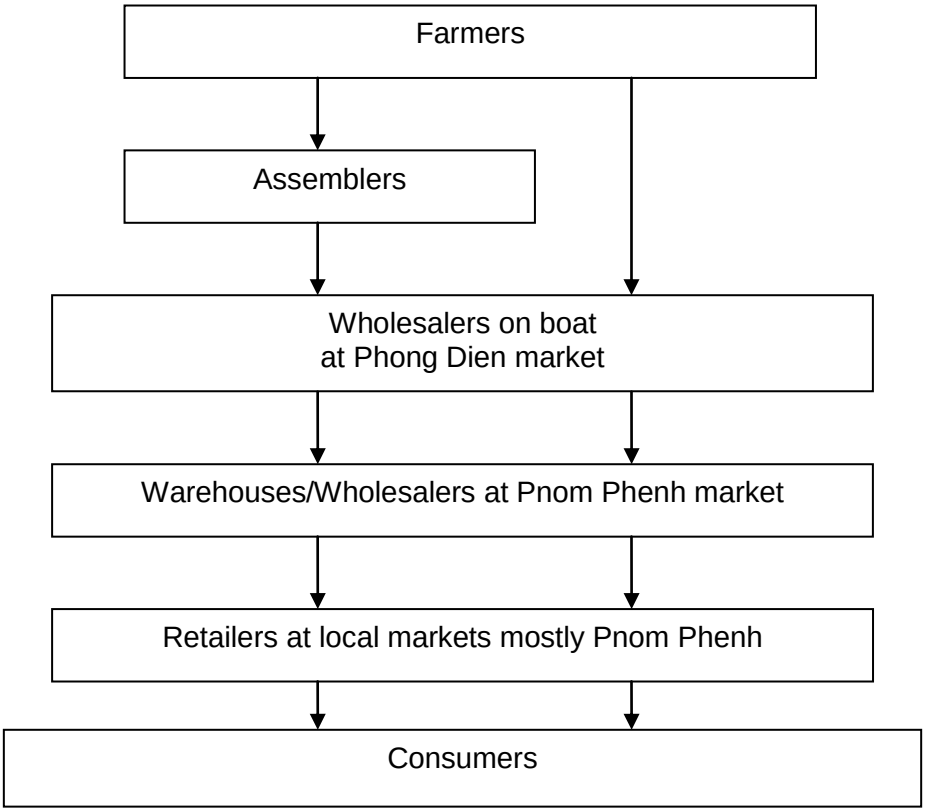


FIGURE 15: SCHEME OF THE MARKETING CHANNEL FOR ORANGE & MANDARIN WITH CAMBODIAN MARKETS FOR FINAL DESTINATION



The partition of the marketing system into marketing channels is interesting in the sense that it can show the dynamic of the whole commodity chain over time and space which results from the evolution of both production and consumption, as well as the adaptation of marketing system to new market conditions and constraints.

At present, within the orange-mandarin marketing system, we have been able to identify five marketing channels (see the following figures) depending on the final destination of the product and the size of each channel, and according to the recent evolution of the orange-mandarin commodity chain.

6.3 Recent evolution of the orange-mandarin marketing system

In the MRD, fruit trading has first and foremost expanded for HCMC markets and in a lesser degree for local markets.

Between 1978 and 1986, private trade was forbidden, however it was still existing and particularly active in the fruit trade. Many fruit traders (about 30% in our survey) operating at present in CT province were already doing this business twenty years ago. For some others, it was their parents.

Until 1995, fruit trade mainly concerned the main regional markets (Cai Be in Tien Giang province and HCMC) and small quantities. Fruits were bought locally (in the village or surrounding villages) and sold by assemblers at Phong Dien market or further at Cai Be market. Traders who had more financial means, such large assemblers or wholesalers, could

directly sell their commodities to Ho Chi Minh city or Phnom Penh (after the war with Cambodia).

Then, as a result of several economic factors, the most enterprising wholesalers looked for other outlets for local production of orange and mandarin. Thereby, the marketing channel from Phong Dien market to Hanoi or central provinces has appeared while that to Cambodia has developed.

The factors that explain this evolution include:

- The huge increase in production of orange and mandarin in the MRD since 1993[36], especially in the provinces surrounding Cai Be market (Tien Giang, Vinh Long then Ben Tre and Dong Thap) which is nearer to HCMC;
- The increase in the number of fruit assemblers and wholesalers in the producing provinces, attracted by this rewarding business;
- The resultant higher risk, for CT assemblers, of not being able to sell at a good price at Cai Be market after two days of transportation and the lower profitability of trading this type of fruits;
- A lesser interest in the HCMC markets for the above reasons as well as because of the high rate of warehousing:15 %, against 5 % in other national markets and 8% in Cambodia; the evolution of the national demand for fruits, namely for orange and mandarin, in distant markets such as Hanoi or Dalat, …which are becoming more and more demanding in quality;
- The increase of peace in Cambodia which has created more opportunities for low quality and cheap orange and mandarin coming from CT province.

Therefore, the evolution of the fruit marketing system, which can be seen through the development of certain marketing channels compared to other ones, demonstrate that fruit marketing for orange and mandarin is rather a spontaneous adaptation of private actors to new economic constraints and opportunities.

A detailed presentation of each category of actors will allow us to understand better their role and their own capacities of adaptation to the present institutional environment.

6.4 Presentation of the actors

Within the marketing system of the orange-mandarin commodity chain, there are three main category of actors between farmers and consumers: assemblers, wholesalers and retailers. We will present them according to the five marketing channels we have identified through our survey at Phong Dien market.

6.4.1 Assemblers

Assemblers are important actors in the marketing system in the sense that they operate between scattered fruit farmers[37] and few wholesalers as well as local retailers, sometimes.

[36] (see table 9 about fruit area in the MRD)

[37] more 22,000 farm households only for Chau Thanh district, in 1998.

1/ Technical and social characteristics

According to our survey, assemblers buy fruits from about 50 to 200 farmers and sell to approximately 15 wholesalers in Phong Dien market. Some of them only sell to the same wholesaler especially when they are newcomers in this market. Between the purchase and the sale, the property of fruits is transferred to them.

Indeed, assemblers undertake the harvest, in most of the cases, as well as the transportation (mostly by boat) to wholesalers or retailers, to whom they resell the fruits.

They are mainly specialised in orange and mandarin and sometimes in golden apple and mango as these fruits are widespread in local farmers' gardens. Actually, in a highly risky market such as fruit markets in Vietnam, a lot of experience for each type of fruit is required for a successful activity, and traders thus try to minimize risk through specialisation in a few fruits, particularly when they have little capital.

They usually live in the production areas where they buy the fruits and have created commercial relations based on trust with farmers as well with wholesalers or retailers. Through this marketing network, assemblers try to reduce the high transaction costs they face.

More than 90% of assemblers are not declared to the local authorities as trading operators because they do not want to pay income tax though they have to pay penalties when they are discovered by the police.

Attracted by the perspective of a higher income and often forced by limited land resources, if any, they have started with a small capital ten to twenty years ago and have slowly increased their business according to their capital and aptitudes.

Many assemblers are women. Some have learned the business from their parents or their husband's family. If their husbands do not work with them, they are farmers or workers for wholesalers (fruit selection or harvest). In the latter case, assembler women could have obtained information for their business from this source. Besides, they may work with another member of the family, depending on the volume processed and the resulting income.

They are characterised by their small quantities, between 100 and 600 tons/ year, as we can see on the following table which must be considered as an average situation.

TABLE 82: TYPE OF ASSEMBLERS BY AVERAGE VOLUME AND WORKING CAPITAL

Type	Capacity of the boat	Annual volume (tons)	Working capital (VND)
Small assemblers	0.5 to 1 ton	100-200	Up to 5 millions
Medium assemblers	2 to 5 tons	200-400	About 10 millions
Large assemblers	7 to 10 tons	400-600	About 15 millions

Source: own survey in 2000

2/ Major constraints

a/ Lack of capital

The major constraint assemblers face is the lack of capital which limits them in the volume of fruits they can buy each time. This constraint often leads assemblers with little working capital to buy only from farmers having small fruit gardens.

Indeed, many assemblers must borrow money to buy farmers' output. In some cases, wholesalers can partly advance the amount of a future purchase. This practice highly depends on the relations between the buyers and the sellers, as the risk of defaulting is high.

Thereby, assemblers have often recourse to money lenders as they lack the collaterals needed to borrow from the banks and are charged a high interest rate (10 to 15% per month).

After having sold fruits to wholesalers, they usually reimburse the lender. Nevertheless, because of rapid changes in market conditions and additional expenses, such as the renting of a boat, assemblers cannot reimburse the loan immediately.

Most of the time, they are permanently in debt, especially since prices become more and more unstable.

b/ Lack of storage capacity

Though many assemblers have a transportation mean such as a small boat, they have no storage facility, beyond keeping fruits on the trees within a limit of ten days after ripening. Therefore, they must sell the fruits as soon as they have harvested them.

This constraint often causes problems of discontent between sellers and buyers as fruits are usually delivered within two or three days, while market conditions can change and lower the resulting purchasing price. This often leads to a new price negotiation between the two parties.

3/ The particular case of producer-assemblers

As a result of the high transaction costs characterizing the fruit commodity chain and the lack of experience as well as transportation means, farmers have been highly dependent of assemblers to sell their production.

While, for a long time, few of them have been keen in going and sell their production by themselves at floating markets, some producers have recently begun to sell their own fruits directly to wholesalers at Phong Dien market. This mainly holds for farmers close to this market who want to avoid middlemen because their farm income have recently reduced due to an increasing price instability.

Though both assemblers and farmers face high transaction costs and corresponding financial losses, there is no effort from both farmers as assemblers to get organised in marketing groups. They do not still cooperate between them in this matter and the market is characterised by a high competition within the two groups.

6.4.2 Wholesalers

Wholesalers are key actors within the marketing system as they allow the distribution of the local production on the national markets and even for exportation (Cambodia for orange, mandarin and golden apple).

They are the link between a large number of farmers or assemblers and retailers.

Indeed, for distant destinations and large markets such as Hanoi and HCMC, there are two type of wholesalers within the chain: wholesalers at the starting point (Phong Dien market) and wholesalers at the delivery point (at wholesale markets). The first one are directly connected to farmers and assemblers, while the second ones are directly connected to retailers.

As they are different in many respects, they are presented separately.

6.4.2.1 Wholesalers at the starting point (Phong Dien market)

1/ Technical and social characteristics

They usually buy 70% of their volume from assemblers (from 30 to 50 persons per wholesaler) and the remaining 30% from farmers (from 50 to 100 households per wholesaler). In this market, they are in position of oligopsony.

Indeed, wholesalers buy from farmers for two reasons:

- First, as just mentioned, some fruit producers come to sell by themselves at the floating market;
- Second, wholesalers who supply demanding markets such as national markets, usually buy from farmers with large fruit gardens and good quality fruits, especially big mandarin which are more expensive.

They undertake many functions such as financing farmers and assemblers, harvesting, storing, packing and transportation by boat or truck to remote markets because of their capital means such as storage facilities[38] and working capital.

[38] The wholesalers' storage facility allow them to store large volumes of fruits but only for a short while (two days maximum) since it is not cold storage.

Like assemblers, wholesalers at Phong Dien market also acquire the property of the fruits when they buy them and keep it until the sale is completed.

They are mainly specialised in orange and mandarin (50 to 90%) but they also sell some other fruits such as golden apple and mango in order to have a continuous income all year round, as orange and mandarin are highly seasonal. Their relative "diversification" depends on their knowledge and aptitudes in fruit trading as well as their customers' demand (see Table 83).

Compared to assemblers, they have more knowledge about quality aspects of fruits and make more selection among the supply. For instance, wholesalers for Hanoi select high quality fruits which are not too ripe, so as to bear transportation during three days and a short storage. On the other hand, wholesalers for Cambodian markets only buy low quality orange (type mat) and mandarin (type Duong).

These wholesalers usually work in couple. Women predominate in negotiation and transactions, while men often undertake the management of technical operations (harvesting, transportation from farmers' gardens to the storage facility, fruit selection, packing…) especially when they hire workers for that purpose (15 to 25 persons depending on the days).

TABLE 83: TYPE OF WHOLESALERS TRADING AT PHONG DIEN MARKET

Destination of the fruits (number of wholesalers)	Storage facility / wholesaler	Working capital (VND)	Annual volume (tons)	Composition of the supply
HANOI (3 wholesalers)	11-15 tons (fixed place)	100-200 millions	2000-3000	- 70-90 % orange and mandarin - golden apple and mango eventually
Central provinces & eventually HCMC and Hanoi (3 wholesalers)	7 tons (fixed place)	20-30 millions	1500-2000	- 50-60 % of orange and mandarin - golden apple, lime and few other fruits
HCMC (few ≅ 30)	10 – 12 tons (boat)	30-40 millions	800-1000	- 80-90 % orange and mandarin - golden apple and lime
Cambodia (few) : 4 large 20 medium	40 tons (boat) 10-12 tons (boat)	50-60 millions 20-25 millions	700-750 200-400	- 90 % orange and mandarin - 10 % golden apple

Source: our survey in 2000

Thereby, according to their capital means and aptitudes, they usually sell large volumes on distant markets where they have an advantageous position (oligopoly).

Though most of them are real micro-enterprises, they are not declared to the local authorities as commercial households because of the income tax. Apparently, the government tolerates this situation so as to facilitate the expansion of private trade. For this purpose, the Authorities have gathered the Phong Dien wholesalers for orange and mandarin in a specific

place of the market, and allowed them to have a fixed place along the river that serves as storage facility and workshop to select, pack and send the fruits by truck to other markets.

However, the local people committee occasionally taxes wholesalers on fixed places for specific reasons such as flooding, the poverty alleviation program,... while wholesalers for Cambodian markets must pay for custom taxes both in Vietnam and Cambodia.

Their family were previously wholesalers, often in rice, sometimes already in fruits. Thus, they have carried on the family business as they could take benefit of the family's experience. Attracted by the perspective of higher profit, those who were in rice trading have turned into fruit trading about 10 years ago and have started with small trading on boat, increasing their business step by step. They were usually selling at near markets such as Cai Be in Tien giang province, Chau Doc in An Giang province, or HCMC markets and have broadened their business to more distant markets (during the last ten years for Cambodia, five years for Hanoi and Central provinces).

At present, there are four kinds of wholesalers in Phong Dien market depending on the customer markets: Hanoi, Central provinces, HCMC and Cambodia.

2/ Major constraints

This is the group of actors who take the most risks mainly since they are strongly dependent upon:

- climatic incidents[39] which could happen during transportation and delay delivery, and adulterate fruits while they still own them;
- increasing competition at the place of delivery, as in HCMC, which can lower their comparative advantage;
- honesty of the buyers (wholesalers or retailers) or warehouse operators: the farther Phong Dien wholesalers are, the more difficulties they have to monitor the enforcement of contracts in good conditions. Moreover, in case of fraud, they cannot appeal to the court because they operate informally.

Though they have more working capital than assemblers and they borrow money less often, they cannot access to formal credit to develop their business.

6.4.2.2 Wholesalers at the point of delivery

Between wholesalers at Phong Dien market and retailers in final markets, there are two types of intermediary agents: the warehouses and the usual wholesalers.

[39] Which are very frequent in central Vietnam in November

6.4.2.2.1 THE WAREHOUSES[40]

Warehouses refer to actors who allow the storage of fruits, at the point of delivery (wholesale markets in HCMC, Hanoi or Phnom Penh), because it is not always possible to sell them immediately to local wholesalers or retailers since they come in significant quantities.

They may have a marketing function by looking for traders (local wholesalers or retailers) who will buy the fruits of Phong Dien wholesalers, and/or a financial function by advancing the latter a part of the selling value, after delivery and until all the fruits are completely sold. This is especially the case in HCMC.

In some other cases, warehouses only serve as storage facility and agent who transmit information about price, quantity and payment between suppliers and buyers when these have previously established a commercial relation between them.

Anyhow, to reduce transaction costs inherent in the distance between them, when Phong Dien wholesalers use warehouses at the point of delivery, they always use the same one.

Warehouses do not buy the fruits, they only take a commission based on the selling value: from 5% for most of the national markets, 8% for Phnom Penh up to 15% for HCMC.

They diversify their offer in order to work all year round but they can be rather specialised by destination, especially the great warehouses at Hanoi or HCMC markets. In these places, they operates on large amounts, (e.g. 6,000 tons for some warehouses in Hanoi) and are often key operators for further markets (exportation to other countries, mainly to China for orange and mandarin in the case of the Hanoi market) as for proximity markets. in the two wholesale markets that sell fruits in HCMC (Cau Ong Lanh and Mai Xuan Thuong markets), warehouses are very widespread: they are more than 130 for a annual total amount of fruits about 130,000 tons, of which 30,000 tons are orange and mandarin.

Like the other wholesalers, warehouses are family business, often run by a couple who have been doing this activity for more than fifteen years. Many are declared to the local authorities as commercial households and pay an income tax as well as a tax for market place.

6.4.2.2.2 USUAL WHOLESALERS

The function of wholesalers at delivery markets is to provide a large number of retailers from local markets[41] for the fruits they buy from the southern provinces. Thus, compared to warehouses, they buy and sell fruits and acquire the property of fruits between the two operations.

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[40] We have translated by warehouse the term “Nha vua” in Vietnamese. Indeed, the warehouse has an important role regarding its function of commercial agent.

[41] Currently, wholesalers mainly provide retailers in not only in the case of orange and mandarin. Whereas for some other fruits, wholesalers may also provide processing facilities according to information collected at the Southern Fruit Research Center.

In contrast with Phong Dien wholesalers, they usually provide a wider range of fruits but limit themselves to the same retailers in order to reduce the risks of non-payment through a relation of trust.

They also often finance retailers in the sense that the latter receive the fruits and pay them back after selling. Eventually, wholesalers can deliver the fruits to retailers.

Only in the two HCMC wholesale markets, there are more than 420 wholesalers dealing diverse quantities. Some of them can sell 200 tons per year of orange and mandarin, while others deal larger annual volumes: about 500 tons. Their storage facility is between 1 to 10 tons.

Rather than selection, which has already been done at the starting point, these wholesalers classify fruits per size class, to which correspond different prices per kilogram. This is especially the case for mandarin.

These types of wholesalers are often family business (couple), who have been operating for more than 15 years in the case of HCMC wholesale markets. Their parents were in the same business and they learnt from them.

Their annual working capital is about VND 2 to 30 million, depending on their average daily volume of fruits. Because of their situation (wholesalers in markets), they are declared as traders to the local authorities and have to pay the usual taxes.

6.4.3 The retailers

As the final intermediary in the fruit marketing system between producers and consumers, this category of actors includes the largest number of operators. Sometimes, in rural markets such as in Can Tho province, they can buy fruits directly from farmers or assemblers.

They sell various fruits including orange, mandarin and golden apple as well as vegetables. Their annual volume is small: 40 to 80 tons of food products, of which 8 to 20 tons of orange and mandarin for those who sell these fruits. Indeed, they have widened their range of products following market opportunities driven by the diversification of the consumers' demand.

At the moment of purchase, retailers usually select fruits according to their type of customers (purchasing power and preferences). Thus, this selection will depend on the retail markets.

Fruits retailers are usually women (90%[42]) who have been operating individually in this business with a little working capital dedicated to orange and mandarin: 200,000 to 300,000 VND per year.

In rural markets, few of them are declared as trader to the local authorities; however, this is less common in city markets.

[42] Characteristics observed in CT province and HCMC retail markets

They often pay the wholesalers after having sold the fruits (usually within 2 days) because their storage capacity is very small (stalls or collective storage facility of retail markets).

Short conclusion:

Through the presentation of the actors operating in the orange-mandarin marketing system, we can see that the increasing MRD output of orange and mandarin has been channelled though a series of markets dominated by the private sector with little intervention of the State.

In the following section, the analysis of the transactions within each market of the marketing system will allow us to understand the transaction costs faced by each kind of actors, as well as the institutions developed by the actors to reduce these costs. Finally, the resulting distribution of the margin between each category of actors will be given.

6.5 Analysis of the transactions

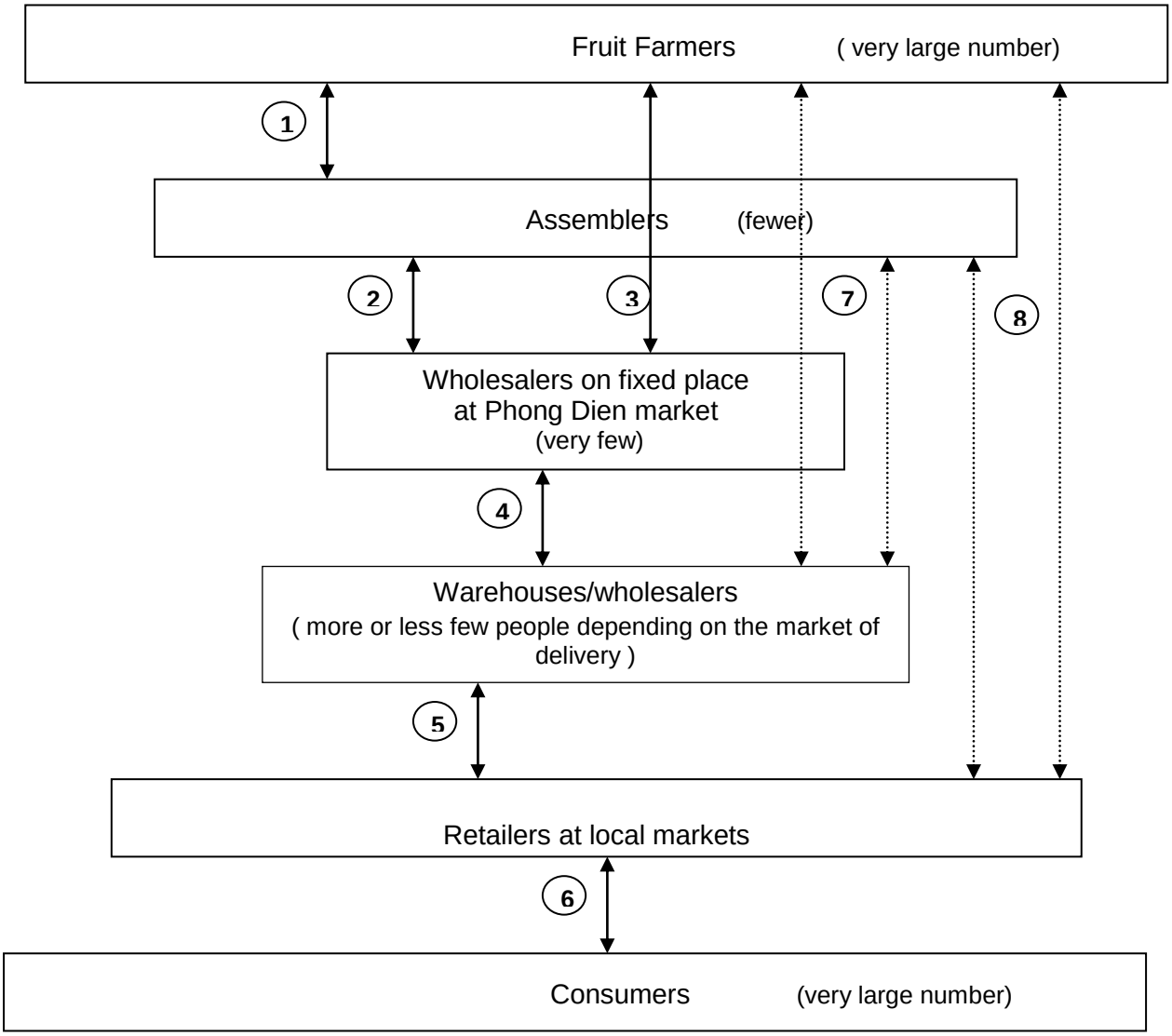
As a series of markets, the marketing system also includes two other kinds of actors on which all the traders highly depend: farmers and consumers. According to this point and the previous analysis, the complete marketing system can be considered as a series of markets from farmers to consumers.

Figure 16 clearly shows all the markets that can exist between the different actors of the marketing system, regardless of the final destination of the fruits.

Each of these real markets are specific, according to the degree of competition between the participants, the contractual arrangements, as well as the formal and informal regulations employed to reduce the transactions costs and the uncertainty of fruit trading.

Thus, in the analysis of each market, we will take into account its structure, the type of products exchanged, the transaction terms, the type of contract, the pricing process, the existence of information asymmetry, the institutional arrangements used by agents to reduce risk.

FIGURE 16: THE SERIES OF MARKETS CONSTITUTING THE MARKETING SYSTEM FOR ORANGE AND MANDARIN



6.5.1 Market 1: Between fruit producers and assemblers

1/ Structure of the market

This market consists in a large number of farmers who can sell their fruit production to a smaller number of assemblers. The latter are therefore in position of oligopsony.

However, given that the fruit area and the quality of the product is somewhat different from one producer to another, the corresponding marker power is more or less weak, depending on the case. Regarding the assemblers, their individual market power differ, depending on their working capital and transportation means.

Thus, the existence of market power on this market does not depend only on the number of buyers and sellers but on other factors which make transactions rather specific.

2/ Transactions terms and type of contract

Assemblers buy the farmers' output either per area or per kilogram. However, in both cases, they do not make any fruit selection in the sense that they equally buy high and lower quality oranges and mandarins.

The first practice consists in proposing to the farmer a total amount of money for the area of ripe fruits. The total output is only estimated and not weighed at the moment of the purchase.

The second practice consists for the assembler in proposing a price per kilogram to the farmer. When the two parties reach an agreement, harvest is done and the output is weighed.

If the first practice had been widespread in the past, more and more farmers now prefer to sell fruits by the kilo. They usually sell per area when they need money as soon as possible (because they are in debt for instance). Moreover, in this case it is more profitable for assemblers because they often underestimate the value of the farmer's output. When they can, farmers try to negotiate or wait for another assembler. More often, they will lose money. Thus, in this situation the farmer's market power is very weak.

In the other case, both parties propose a price per kilo based on their respective information and knowledge, and negotiate until they reach an agreement. At this moment, assemblers usually leave a deposit to seal the deal. It generally amounts to one third of the output value when the two parties do not really know each other, whereas this amount of money is lowered when they have already built a relation of trust.

The kind of contract between farmers and assemblers is only a verbal agreement which specifies the price per kilogram or the value of the total harvested output, the party who undertakes the harvest, the day of harvest, and the terms of payment (deposit, percentage of the remaining value paid at harvest or later).

The transfer of property is not specified in this type of informal contract: it does occur when the assembler takes possession of the farmer's output, even if the latter has not been completely paid for it. Nevertheless, it is not possible for farmers to recover their output in case of fraud by an assembler. Therefore, they usually accept to be paid after harvest only if they know the buyer since a long time. From one harvest to another, a farmer may or may not sell to the same assembler.

3/ Pricing process and asymmetry of information

In developing countries, access to information is very imperfect and unequal between and even within categories of agents, because of the poor information infrastructures.

Therefore in such a situation, farmers and assemblers calculate their selling/purchasing price in accordance with the information they can gather by themselves. This results in asymmetry of information to the benefit of assemblers.

In poractice, farmers are constrained by the time of maturity of fruits and usually contact assemblers within the few weeks before this time. Besides, they make a calculation of the selling price based on the previous year and sometimes on information they could get from their neighbours.

However, it is usually assemblers who propose and determine the price based on the present purchasing price proposed by the wholesalers to which they add their marketing margin.

Assuming that the assemblers' marketing margin tends to be the same over time, the purchasing price proposed by the wholesalers highly depends on the market evolution, which is not always known by farmers. For instance, the evolution of national demand for higher quality oranges and mandarins entails a drop in the price of low quality fruits and an increase in the price of high quality fruits, as supply does not catch up with demand. Thus, farmers with low quality fruits often continue to negotiate their selling price on the basis of the past situation until they accept the new price, because assemblers can still refuse to buy and look for another supplier.

On the other hand, farmers with good quality fruits do not know immediately the change in market price for their products and assemblers often take benefit of this situation to increase their marketing margin.

It is in this sense that assemblers have a relative market power on their suppliers.

4/ Marketing arrangements

As a result of the transaction costs related to this market, the participants have developed marketing institutions to reduce them as follows:

- Farmers tend more and more to sell their fruit output per kilo, even when the pre-harvest arrangement is made per area. Therefore, the sale takes into account the real quantities and the difference in quality within the same harvest;
- Thanks to improvement in communication infrastructures, it is more and more possible to contact assemblers by telephone though few farmers really know their address. Thus, farmers can inform assemblers that they will have soon a new crop as well as gather price information more easily by contacting different traders about the present purchasing price;
- To secure a steady supply in quality and quantity, as well as to reduce the amount of pre-harvest purchase, assemblers tend to buy from the same farmers, especially because they have more and more to supply wholesalers within a short lapse of time (two or three days). Besides, they often give marketing and technical advice to their regular suppliers so that they can improve the quality of their output and match the evolution of demand;
- Though assemblers can dispose of a market power on farmers, they cannot abuse it, even less cheat their suppliers, since this would rapidly lead to their eviction from the market, as they usually live in the area where they buy fruits;

- However, there is still a lot of competition both among farmers and assemblers. None of these group of agents tend to organize in order to reduce transaction costs related to their respective position (individual seller or buyer).

6.5.2 Market 2: Between assemblers and wholesalers (Phong Dien market)

1/ Structure of the market

This market consists of a very small number of wholesalers who buy fruit output from a larger number of assemblers.

Depending on the quality of fruits, assemblers can sell to wholesalers for Hanoi and HCMC markets, or to wholesalers for Cambodia (only for orange type Cam and mandarin type Duong) not without an important difference in price.

Moreover, because of their low working capital and lack of storage facility as well as of information about other profitable markets (such as Hanoi and central provinces), it is difficult for assemblers to sell their output elsewhere.

Wholesalers are therefore in a position of oligospony.

2/ Transaction terms and type of contract

Assemblers sell their output to wholesalers per kilogram, after making a preliminary selection based on the quality of fruits.

Transactions between assemblers and wholesalers take three different forms:

- With wholesalers in fixed places, assemblers often contact them before harvesting the farmers' output to get information about the price per kilo proposed at the moment and the required quantity. If it is suitable for them, assemblers will deliver the fruits at the appointed day (usually within 3 days). Eventually, they come to wholesalers to borrow money related to the future sale, which is only possible if they are regular partners.
- Wholesalers on boats, for HCMC and Cambodia, often contact their regular assemblers to inform them about their arrival day at Phong Dien market, the required quantity of fruits and the proposed purchasing price. Sometimes both parties negotiate the price. When they arrive at an arrangement, assemblers will fulfil the order within two or three days.
- The third case mainly concerns small assemblers with small quantities who often harvest first and go from one wholesaler to another, until they find the one who accept their output and propose them the best price. Exchange and transfer of property are then realised as soon as an agreement is found.

In the first two cases, the transaction consists in a preliminary verbal agreement about the price per kilo, the quantity and the day of delivery for a specific output (high or lower quality, ripe or unripe fruits, according to the wholesalers). At the time of delivery, wholesalers will reduce the price if the quality is lower or if the market price has changed,. Assemblers have little bargaining power and must often accept the new terms. Then, the wholesaler pays for

the remaining part of the output value. The transfer of property from the assembler to the wholesaler is made at this moment.

3/ Pricing process and asymmetry of information

We have just seen that wholesalers in this market have a large market power in the determination of price. Furthermore, assemblers dispose of little information about the final markets; they are rather price takers who try to bargain only on the basis of previous prices.

In turn, wholesalers determine their purchasing price based on a complicated calculation and anticipation of the future selling price which takes into account many factors, such as weather in the final market places and weather in CT province, evolution of demand in the consumer market, information about the competitors' price in those markets, evolution of prices during previous years, and present purchasing prices as given to assemblers by other wholesalers.

4/ Marketing arrangements

Both assemblers and wholesalers rather trade with regular partners for mutual advantages such as:

- Security of transactions, advance on future sale, supply of advice and "training" about technical aspects to improve fruit production, information about the evolution of the national demand, better price for better quality, for the benefit of assemblers;
- Security of steady and high quality fruit output as soon as needed to be able to supply consumer markets more easily, for the benefit of wholesalers.

This last point allows us to understand that even if wholesalers are apparently in an advantageous position compared to assemblers, they do not abuse it in the sense that they rapidly pass on to assemblers an increase in fruit prices in consumer markets because they highly depend on them for their supply.

6.5.3 Market 3: Between farmers and wholesalers at Phong Dien market

1/ Structure of the market

Though this market is in theory composed of a large number of farmers and a very little number of wholesalers, because of the practical constraints mentioned earlier, few farmers can sell their output to wholesalers.

Indeed, there are two situations:

- Farmers who have a small boat and come to the market to sell their output directly to wholesalers. Depending on the quality of fruits, they can sell to wholesalers for national markets or to wholesalers for Cambodia;
- Farmers who have large fruit garden and high quality fruits. They first bring a sample of their output and create a relation of trust with one specific wholesaler (mostly the case with the biggest wholesalers for Hanoi).

Indeed, the wholesalers' market power depends more on their position in the marketing system and on their access to information about final markets places.

2/ Transaction terms and type of contract

In the first case, wholesalers buy the farmers' output as they buy from assemblers at the market, i.e. after selection and when the parties have reached an agreement.

In the second case, wholesalers buy either per area or per kilogram, depending on circumstances that have already been explained. However, wholesalers always make a selection, even if they buy per area.

At present, wholesalers rarely buy the farmers' output of orange and mandarin in advance because of the uncertainty about quality due to the diseases on fruit trees. When they do so, it can be one or two months before harvest at a lower price than the expected price and sealed by a verbal agreement as well as by the payment of a share of the output value. The remaining part is then paid after the harvest. Sometimes, the wholesaler pays the total value when the arrangement is made but this is rarer and rarer, as in the past many farmers have stopped take care of the fruits after a sale had been agreed upon.

In the most common case, wholesalers harvest the selected fruit when an arrangement is reached and sometimes pay two or three days after.

3/ Pricing process and asymmetry of information

Like assemblers, farmers dispose of little information about the final market places and often have less experience than the former about fruit trading at the floating market. Moreover, they often have a distorted opinion of the quality of their output and calculate their selling price based on the local consumer market. Thereby, negotiations are frequent and farmers have to accept the wholesalers' purchasing price if they want to sell to them.

For the same quantity of fruits and the same quality, wholesalers give the same price to both assemblers and farmers based on their usual calculation.

If farmers sell to wholesalers in advance at the farm gate, the latter calculate the present purchasing price at a lower level than the anticipated market price at the moment of the harvest.

In both cases, farmers are price takers and can negotiate on the sole basis of the previous prices and information gathered by going from one wholesaler to another.

4/ Marketing arrangements

Except when wholesalers buy in advance the farmers' output and give them technical advice to improve their output, there is no arrangements in the other cases as farmers coming to Phong Dien market usually sell to any wholesaler who gives them the best price.

Farmers selling in advance at the farm gate, sometimes also recommend a new supplier to their regular wholesaler.

6.5.4 Market 4: Between wholesalers at Phong Dien and warehouses/wholesalers in final market places

Depending on the quantity of fruits and the distance to the final market, the MRD wholesalers can sell directly to a wholesalers or sell through a warehouse operator.

1/ Structure of the market

In this market, if we also take into account the Cai Be wholesalers of orange and mandarin, there can be a great competition among wholesalers. On the other side of the market, warehouses and wholesalers at the delivery point are often numerous (about 550 operators in HCMC wholesale markets). Therefore, the transaction costs result mainly from high uncertainty and asymmetry of information on both sides, as supplier and consumer markets are separated by a great distance.

Indeed, whatever the type of actors, they are all circumscribed within a limited geographic area, they are micro-enterprises which limited means (capital, labour,…).

Thereby, both suppliers and buyers highly depend on each other to access either supply or consumer markets, which is also the case for warehouse operators even if transaction terms are different.

2/ Transaction terms and type of contract

A/ Between Phong Dien wholesalers and warehouses in markets of delivery

As indicated earlier, warehouse operators do not buy the wholesalers' output even when they operate themselves as wholesalers for surrounding consumer markets, but take a commission (from 5 to 15%) on the selling value of the fruits. Thus, as long as the output has not been sold to another trader, it remains the property of the wholesaler.

In some cases (mostly in HCMC wholesale markets), when warehouse operators serve as a trading intermediary, they can advance a part of the selling value to the wholesaler. In this case, the remaining part of the sale is given later, after deduction of the warehouse's commission.

In the other cases, the warehouse operator returns, at each sale, the amount of the sale to the supplier after deduction of his commission.

Transactions between suppliers and warehouse operators are only made through verbal arrangements that specify the percentage of commission and the process of payment.

B/ Between Phong Dien suppliers and wholesalers at markets of delivery

In this case, the transaction is the sale of fruits: sellers and buyers contact each others to determine a quantity to be delivered and negotiate a price. Then a verbal arrangement is made which specifies the day of delivery, in addition to the price.

The transfer of property is made at the time of delivery of fruits and when the buyers pay for them.

However, when there is a relation of trust between suppliers and buyers, fruits can be paid back within 5 days.

3/ Pricing process and asymmetry of information

A/Transactions with warehouse operators

The warehouses' percentage of commission is based on a non-negotiable rule proper to each market, as there is no direct sale.

However, the total amount of commission highly depends on the price fruits are sold to other traders. When a warehouse operator undertakes this function, it is logically in his interest as well as the supplier's interest to sell at the highest price. In this case, for the calculation of the selling price, warehouse operators take into account prices of the previous years, the season and climatic conditions, the expected evolution of demand within a short time and the quality of fruits (small or big, ripe, less ripe,…).

The difficulty lies in the fact that Phong Dien suppliers have no real access to information about the final market, therefore they cannot control the involvement and the honesty of warehouse operators, especially when the Hanoi market is concerned.

As a result, since there is no contractual obligations concerning the level of selling price to other traders, wholesalers are price takers in this market with very little bargaining power.

B/ Transaction with wholesalers

The asymmetry of information is the same than in the case above. Nevertheless, there is always a verbal agreement about the price before forwarding the fruits. The risk of fraud is thus different.

Wholesalers in HCMC markets tend to determine their purchasing price according to their own expected selling price and experience, in order to maintain their marketing margin according to the costs they bear for their market place and use of market handlers.

4/ Marketing arrangements

To reduce the risk inherent in these transactions, suppliers usually make business with only one partner for each destination who has a good reputation and provide them information concerning the factors which condition the evolution of demand (increase in purchasing power, change in consumption, influence of weather, …)

For instance, the largest Phong Dien supplier who sell her fruits through a warehouse operator, has send a member of her family to supervise the operations and give her additional information everyday about the Hanoi market (namely concerning the activity of the competitors). This is interesting because it can constitute in the future a kind of integration of the wholesale activity in the final market, if this correspondent can act as a marketing operator.

Anyhow, as in other markets, abusing his power can lead a warehouse operator to his eviction from the market.

6.5.5 Market 5: Between warehouse operators/wholesalers and retailers in final market places

1/ Structure of the market

Whatever the market (urban or rural), retailers are always more numerous than suppliers. The latter are therefore in position of oligopoly. Their market power can be more or less important depending on the distance from the producing areas. For instance, in CT city market retailers can directly buy fruits from assemblers or even farmers, which is not possible for Hanoi regarding the varieties of orange and mandarin cultivated in the MRD. Thus, the market power of suppliers is more important in Hanoi than in the MRD markets or even HCMC.

2/ Transaction terms and type of contract

Retailers are limited by their storage facility (mostly on stall) and buy fruits almost everyday. They make a selection of fruits depending on the preferences of their customers (big and ripe fruits for “high rank” markets such as Ben Thanh, lower quality for smaller markets).

Depending on the relations they have with the suppliers, some retailers may pay them back for the fruits after they sale them to consumers. Here again, transactions are only based on verbal arrangements and the transfer of property is made when the retailers take the fruits from the suppliers.

3/ Pricing process and asymmetry of information

For the suppliers, the calculation of the selling price for the suppliers has been explained above.

Regarding retailers, these actors have little power of negotiation concerning their purchasing price and are thus rather price takers when they buy from warehouses or wholesalers.

4/ Marketing arrangements

Retailers usually buy from the same warehouse operator or wholesaler to have a relation of trust with them and pay the fruits after the sale to consumers. At the same time, retailers provide their suppliers with information concerning the evolution of the consumers’ preference.

6.5.6 Market 6: Between retailers and consumers

1/ Transaction terms, asymmetry of information, and pricing process

In the calculation of the consumer prices for orange and mandarin, retailers take the purchasing price and apply a fixed margin more or less important depending on the kind of fruits. For instance, they apply a smaller margin to orange type *mat* than to orange type *sanh* and mandarin, as the former are more widespread than the latter.

Thus, by that very fact, consumers are price takers and they often negotiate the market price of food items, especially when they buy from a new retailer or when prices change in a short while.

Retailers take into account this rule when they calculate the selling price of fruits by overvaluing it when they sell to new customers.

2/ Marketing arrangements

When retailers and consumers are usual partners, there is less or no negotiation and “real prices” are given immediately.

6.5.7 Market 7: From farmers/assemblers to warehouses/wholesalers in southern markets

The orange and mandarin marketing system only refer to southern provinces of Vietnam because it is not effective at present for warehouses and wholesalers in Hanoi to buy directly from the MRD farmers and assemblers, because of the very high transactions costs which has been mentioned earlier.

In this market, though farmers coming to the wholesale markets might not be very numerous, they are directly in competition with traders, especially with assemblers who have more experience than them about fruit trading and often more financial means.

Anyhow, both farmers and assemblers are price takers, especially when they come directly with the fruits at the market without any preliminary order.

The practices explained earlier for market 1, 2, 3 and 4 are also valid in this case.

However, the high increase in citrus production within the southern provinces has definitely made less interesting for assemblers to move to distant markets, for instance to Cai Be market from CT province, as they cannot always sell at a profitable price when they arrive at the market, because of rapid change in market conditions.

6.5.8 Market 8: Between Farmers or small assemblers and retailers

As in the previous case, this market exist for markets close to the production areas and mostly in rural markets, all the more because it is concerned with small quantities.

It is advisable for farmers to sell directly to retailers when they have only harvested small quantities, as it is advisable for assemblers to sell to retailers when some fruits are too ripe for more distant markets.

On the other hand, farmers often sell small quantities of their fruit output to local retailers when they need cash.

Furthermore, in rural areas, retailers can easily have personal relations with local farmers as they live close to each other. It is then easy for them to buy directly orange and mandarin from farmers at a lower price than the market wholesaler and to have a larger marketing margin.

However, for the above reasons, retailers must pay the fruits immediately when they procure them. That is why depending on their daily availability of capital, they buy either to the market wholesaler or directly from farmers/assemblers.

6.6 Price evolution and distribution of the margin

According to these observations, the marketing and profit margins depend on many factors such as the existence of market power and transaction costs, as well as the evolution of supply and demand. If market power and transaction costs are proper to the functioning of the market, the evolution of supply and demand and consequently of prices results from other factors.

6.6.1 Price evolution

Supply and demand for orange and mandarin can fluctuate a lot within a season, a year or even within a longer period of time, depending on natural and socio-economic factors.

6.6.1.1 Natural factors

Many fruits are highly seasonal. Therefore, within a year, fluctuations in supply entail fluctuations in market prices. This is especially the case for the supply of orange and mandarin in the MRD according to the crop calendar given earlier (see Table 81). Moreover, for each type of fruits, the supply varies within a season as follows: few fruits to be harvested at the beginning and at the end, whereas plenty are available in the middle of the season. Prices then fluctuate according to this evolution with a ratio from one to two.

Fruits are highly subject to disease which can entail serious loss in quality and even in quantity of output. In the MRD, orange and mandarin are very sensitive to *Greening* and *Tristeza* diseases. A recent epidemic has resulted in high fluctuations in the prices of these fruits compared to other such as grapefruit or mango.

The MRD is more and more often subject to natural disasters such as deep flooding or storms which can destroy a part of the production area. The resulting decrease in total output can provoke price fluctuations.

Finally, weather conditions have a significant influence on fruit demand as well as on trade. For instance, when the weather is sunny and hot, consumers buy more orange and mandarin than when it is raining and cold. In the same way, assemblers work more when the weather is good than the other days. This is another reason for price fluctuations.

6.6.1.2 Socio-economic factors

Fruits are characterised by high income elasticity of demand. As has been indicated earlier, economic growth entails, through an increase in income, a change in patterns of demand to the benefit of food items such as fruits.

Thus, increase in demand for fruits can then result in higher prices if supply does not increase to the same extent. This was the case in Vietnam during the years 1995-1998.

At the same time, as incomes increase, fruit consumption turns to higher quality fruits such as bigger ones, riper,… Prices of this kind of fruits will tend to increase if the supply for these fruits remain limited while demand increases. For instance, the national demand in Vietnam evolves towards more and more high quality orange and mandarin (especially bigger orange type sanh and mandarin as well as riper ones), whereas Cambodia's demand for fruits increases at the same time, generating outlets for the low quality orange cam and mandarin of the MRD. However, this demand will also eventually evolve toward better quality.

Production of orange and mandarin is concentrated in the southern part of Vietnam (mainly in the MRD) while the demand for fruits is spread all over the country, with a high concentration in the two main urban centers (HCMC and Hanoi). As a result, depending on the proximity between production areas and consumer markets, prices for these fruits will be lower or higher. This factor accounts for the difference of wholesale prices between HCMC and Hanoi markets.

Generally, consumption is also subject to fashion effects which can result from the competition with other fruits, either local or imported. At the moment, according to the crop calendar of fruits cultivated in Vietnam, MRD orange and mandarin are not in competition with other type varieties of fruits. However, many farmers have complained about the importation of Thai oranges and mandarins which compete with their fruits.

Finally, consumption depends on cultural aspects. Because of religious reasons (Vietnamese Buddhism), Vietnamese people consume more fruits the 15th and the 30th of the lunar calendar. Within a year, fruit purchases are more important in the mid year (July) because during this month consumers have a more vegetarian diet, as well as before the new year festival (Tet holiday). As a result, the price of mandarin and orange type sanh in those periods are often twice the average usual price.

6.6.2 Distribution of the margin between the actors of the marketing system

Figures represent an average situation which takes into account the four last years. Indeed, the minimum prices refers to the present situation while the maximum prices refers to last years as well as the situation during the new year festival (mainly for orange type *sanh* and mandarin, in this case).

The lowest value is observed for wholesalers for HCMC markets while higher value are observed for wholesalers for Hanoi. Information for HCMC markets must be considered carefully as it has been more difficult to make interviews and get reliable information in these markets than in CT province.

According to the table above, farmers are the actors who can make the largest profit per kilogram from selling fruit, and wholesalers at Phong Dien market for Hanoi and HCMC markets are the traders who make the lower profit per kilogram.

However, these figures must be considered in accordance with the annual quantity of orange and mandarin sold by each type of actors (see Table 30)

TABLE 84: DISTRIBUTION OF THE MARGIN BETWEEN THE ACTORS OF THE ORANGE-MANDARIN MARKETING SYSTEM (*UNIT: VND/KILOGRAM)*

Type of actors	Orange sanh	Orange Mat	Mandarin
♦ Farmers			
Production costs	720 – 860	690 – 700	600 - 750
Selling price	2000 – 6000	1500 – 3500	3000 - 6000
Profit	1280 – 5000	810 – 2800	2400 – 5250
Average profit	1200 – 2200	1300 – 1800	2300 - 3300
♦ Assemblers			
Purchase price	2000 – 6000	1500 - 3500	3000 - 6000
Marketing margin	200 – 500	200 – 500	200 - 500
Profit margin	100 - 300	100 - 300	100 - 300
♦ Wholesalers at Phong Dien market for national markets			
Purchase price	3000 – 6000	2000 – 2500	3000 - 7000
Marketing margin *	600 – 1500	500 – 1100	600 - 1500
Profit margin *	50 – 100	50 – 100	50 - 100
♦ Wholesalers at Phong Dien market for Cambodia			
Purchase price	-	1300 – 2500	1000 – 2000
Marketing margin	-	1000 – 1500	1300 – 1800
Profit margin	-	200	200
♦ Wholesalers at HCMC wholesale markets			
Purchase price	3500 – 7000	2500 - 4000	4000 - 8000
Marketing margin	1000 – 1500	700 - 1000	1000 - 2000
Profit margin	300 – 1000	300	300 - 1000
♦ Retailers at HCMC retail markets			
Purchase price	4000 – 8000	3000 - 5000	5000 - 10000
Marketing margin	1000 – 1500	1000 – 1300	1000 - 2000
Profit margin	600 –1100	600 – 900	700 - 1600
♦ Wholesalers at CT market			
Purchase price	2500 – 3000	2000 – 2500	4000 - 7000
Marketing margin	500 – 1000	500 - 1000	2000 - 3000
Profit margin	300 – 800	300 – 800	1800 - 2800
♦ Retailers at CT markets			
Purchase price	3000 - 4000	2500 – 3500	6000 - 10000
Marketing margin	1000	1000	2000
Profit margin	800	800	1800

Source: Our survey in 2000.

Table 85 provides an order of magnitude of the annual benefit from the different operators, considering average values of both the benefit per ton and the quantity sold per year (indicated in italics in the Table).

TABLE 85: ANNUAL QUANTITY OF FRUITS SOLD PER TYPE OF ACTORS AND CORRESPONDING BENEFITS

Type of actors	Annual volume of orange and mandarin (ton)	Rough estimate of annual benefit (Thousand VND/ton)
Farm households	3.6 – 42 (*10*)	15,000 (*1500*)
Assemblers	100 – 600 (*300*)	60,000 (*200*)
Wholesalers at Phong Dien market (national markets)	800 – 2500 (*1500*)	112,500 (*75*)
Wholesalers at Phong Dien market (Cambodian markets)	200 – 700 (*500*)	80,000 (*200*)
Wholesalers at HCMC wholesale markets	200 – 500 (*350*)	175,000 (*500*)
Retailers at HCMC retail markets	10 – 20 (*15*)	13,500 (*900*)
Wholesalers at CT markets	200 (*200*)	120,000 (*600*)
Retailers at CT markets	8 – 12 (*10*)	10,000 (*1000*)

Source: Our survey in 2000

It can be seen that the benefit per ton is all the smaller as the quantity sold is higher. Consequently, farmers and retailers get comparable incomes but the magnitude of these incomes is approximately 10 times lower than that of the wholesalers.

Independently of price evolutions, the farmers' income depends mainly on their fruit area and their output, whereas that of the retailers depends on the quantity of fruit they can buy and sell, in other terms on their working capital and their marketing strategy (specialisation or diversification in many food items).

Between the two groups of income (low and high), the differential in benefit derives from the fact that wholesalers have to invest more capital, take higher risks than farmers and retailers, and often provide credit services to the latter, as explained earlier.

However, among the group of wholesalers, the differential in benefit does not correspond exactly to the risks incurred. As a matter of fact, wholesalers at Phong Dien market have a lower annual benefit than those in HCMC and Can Tho markets but bear higher transaction costs, as for instance risks of losses due to natural disasters[43] during transportation to Hanoi or central provinces. Moreover, wholesalers in consumption markets constitute an inevitable operator to supply those markets with large quantities of fruit. As they are price-makers both as buyer and supplier, they can obtain a higher benefit than those at Phong Dien market for a lower annual volume. On the other hand, wholesalers at Phong Dien market tend to derive a higher benefit from selling larger volumes.

[43] Natural disasters are common in October-November, especially in central Vietnam. If farmers are also subject to this risk, they can receive special help from local or national authorities to rebuild the gardens while wholesalers in Phong Dien markets never receive any compensation for the losses because they operate informally.

Conclusions about the marketing activity:

The fruit marketing system is dominated by private actors who function as micro-enterprises and bear high transaction costs due to the functioning of the markets in conditions common in countries in transition towards a market economy. The wholesalers at Phong Dien market are key actors for the sale of the MRD farmers' fruit production on national and export markets. Through them transit thousands of tons of orange and mandarin that reach markets as far as China. Nevertheless, their role is not confined to only supplying consumer markets in fruits: through them also transit a flow of information regarding the evolution of demand which comes up down to farmers as well as technical information aimed at improving the quality of the farmers' fruit production.

6.7 Consumption

As mentioned many times in this document, the evolution of fruit consumption is a very strong determinant of the future farmers' choice and income as well as for the other actors of the marketing chain. Much information concerning recent trends has already been given in the previous part.

Furthermore, the annual fruit consumption per capita was 55-60 kg[44] in 1999, compared with 40 kg in 1995.

At present, orange and mandarin are consumed in fresh form and bought in public markets. But the economic development in Vietnam as well as the new opportunities created by the opening and the entry of Vietnam in ASEAN may highly influence the consumption mode towards higher quality orange and mandarin as well as processed items such as juice.

Because of a scattered production highly variable in quality and the complexity of the supply system, a part of the demand for fresh orange and mandarin, as well as related processed items, might in the future be met by other sources than national production. For instance, oranges have recently been imported from China and U.S.A.

With regard to export markets, most of them require high standards of quality and are more and more demanding regarding pesticide residues. The farmers' strategy which consists in producing as many fruits as possible for economic reasons, as well as the lack of capital and technical information, constitute a major constraint for the production of high quality oranges and mandarins.

[44] « Fruits et légumes : perspectives jusqu'en 2010 » Saigon Eco Mai/Juin 2000, pp. 16-17.

7 Support activities

The development of basic activities within a commodity chain also depends on support activities such as input supplying as well as essential services, i.e. research, extension and rural credit.

Concerning the fruit commodity chain in the MRD, particularly the orange-mandarin one, the processing industry is still underdeveloped, and support activities only concern the production and marketing activities, as has been indicated earlier in Table 65.

7.1 Input supplying

The analysis is focused on the supply of input for fruit production as the inputs used by traders are mainly transportation means such as boat and rented trucks, and cases for transportation to Hanoi and baskets for HCMC, depending on the fruits. Indeed, the issue related to input supplying to traders mainly refers to financial services, which will be studied in the next paragraph.

There are two important types of input supply to farm households for fruit production: fertilizers-pesticides and fruit plants or seeds (in addition to water supply which is the object of other studies). Indeed, in the surveyed area, water is supplied through a well developed hydraulic network for which each farmer pay an annual fee corresponding to 30 kg of paddy per hectare[45]. The fee is not considered as a tax in Vietnamese law but as a financial participation of farmers to the maintenance of the system. However to irrigate and drain the ditches of their fruit garden, farmers must buy gasoline for their pump as all the farmers in the surveyed area have a water pump.

7.1.1 Supply of fertilizers and pesticides to farmers

We will focus here on fertilizers, as these products constitute a more important part of production costs than pesticides. Moreover, some farmers use Integrated Pest Management method. Finally, many aspects of pesticide supply in Vietnam is alike that of fertilizers.

7.1.1.1 Consumption of fertilizers by farmers for fruit cultivation

Fertilizers used by farmers in the MRD are very varied, according to the type of production and soil characteristics.

For orange and mandarin production in the surveyed, farmers mainly use two types of fertilizers: NPK (16-16-8) and KCL (constituted of 60-62 % of Potassium Chloride). The following table indicates the respective average quantities of fertilizers used by farmers, according the type of fruit and the period of production.

TABLE 86: AVERAGE QUANTITIES OF FERTILIZERS USED BE FARMERS FOR ORANGE AND MANDARIN CROPS

Unit: kg/plant and kilogram per ha for (…)

[45] This fee corresponds in 1999 to 45,000 VND/ha and 39,000 VND/ha in 2000.

	Orange Mat 600 – 630 trees/ha		Orange Sanh 1000 trees/ha		Mandarin 600-630 trees/ha	
	NPK	KCl	NPK	KCl	NPK	KCl
First year	0.5 (300-315)	0.05 (30-31.5)	0.5 (500)	0.05 (50)	0.5 (300-315)	0.05 (30-31.5)
Second year	1.0 (600-630)	0.05 (30-31.5)	1.0 (1000)	0.05 (50)	1.0 (600-630)	0.05 (30-31.5)
Third year	1.0-1.2 (600-756)	0.05 (30-31.5)	1.0-1.2 (1000-1200)	0.05 (50)	1.0-1.2 (600-756)	0.05 (30-31.5)
Fourth year	1.0-1.6 (600-1008)	0.1-0.18 (60-113)	1.0-1.6 (1000-1600)	0.1-0.15 (100-150)	1.0-1.6 (600-1008)	0.1-0.18 (60-113)
Following years	1.6-1.8 (960-1134)	0.18-0.2 (108-126)	1.6 (1600)	0.18 (180)	1.6-1.8 (960-1134)	0.18-0.2 (108-126)

Source: our survey in 2000

Thus, for a one hectare garden of orange and mandarin trees, farmers usually spread from 300 kg to 1,600 kg of fertilizer NPK as well as from 30 kg to 180 kg of KCl, depending on the year. Indeed, according to the structure of fruit garden in the surveyed area (60-80% of orange mat, 10% of orange sanh, 10-30% of mandarin), the amount of fertilizers applied ranges from 300 to 1,000 kg of NPK per hectare as well as from 30 to 130 kg of KCl per hectare, depending on the year.

The average cost per hectare borne by farmers in the surveyed area is then as follows.

TABLE 87: PRESENT AVERAGE COST OF APPLYING FERTILIZERS TO ONE HECTARE OF ORANGE-MANDARIN GARDEN (*UNIT: VND)*

	NPK	KCl
Average price/kg	2,500	2,000
Average annual cost/ha	750,000 – 2,500,000	60,000 – 260,000

7.1.1.2 Characteristics of the fertilizer marketing system in the MRD

The use of fertilizers in Vietnam has sharply increased (by 250% between 1990 and 1998[46]) with rice intensification and diversification through fruit cultivation.

However, demand for fertilizers in Vietnam has been mainly satisfied through import (91% of the consumed quantity in 1998), as local production has developed slowly (about 126% from 1990 to 1998), mostly through foreign direct investment. The country is therefore highly dependent on outside supply, especially for urea (90% of the national consumed quantity comes from abroad in 1997). On the other hand, the lack of experience about the functioning of the world and domestic markets has resulted in variable imported volumes and consequently in sharp price fluctuations.

At present, there are 27 businesses specializing in agrochemical production in Vietnam, of which six are run by world-renowned agrochemical groups. Among the other companies,

[46] Datas given by AGROSTAT on the Internet site of the FAO. 2000.

many of them import and sell foreign fertilizers in the country. The main origin of imported fertilizers in Vietnam is China, Korea, Philippines for NPK and Canada, China, Russia, for KCL. Fertilizers are mainly imported by state owned enterprises according to a system of license and quarterly quotas, though the Vietnamese government has recently loosened these restrictions.

In the MRD, fertilizers are sold to farmers through the following marketing network (Figure 17). According to this figure there are three levels which correspond to different actors within the fertilizers marketing system.

A/ The first level refers to the origin of fertilizers in Vietnam and three types of actors:

- importing companies (state owned companies) that buy fertilizers from foreign companies;
- importing commissioned agents who do not buy fertilizers but sell them in Vietnam on behalf of foreign companies and take a commission on the sales;
- Vietnamese companies that do not have import license and buy from Vietnamese importers.

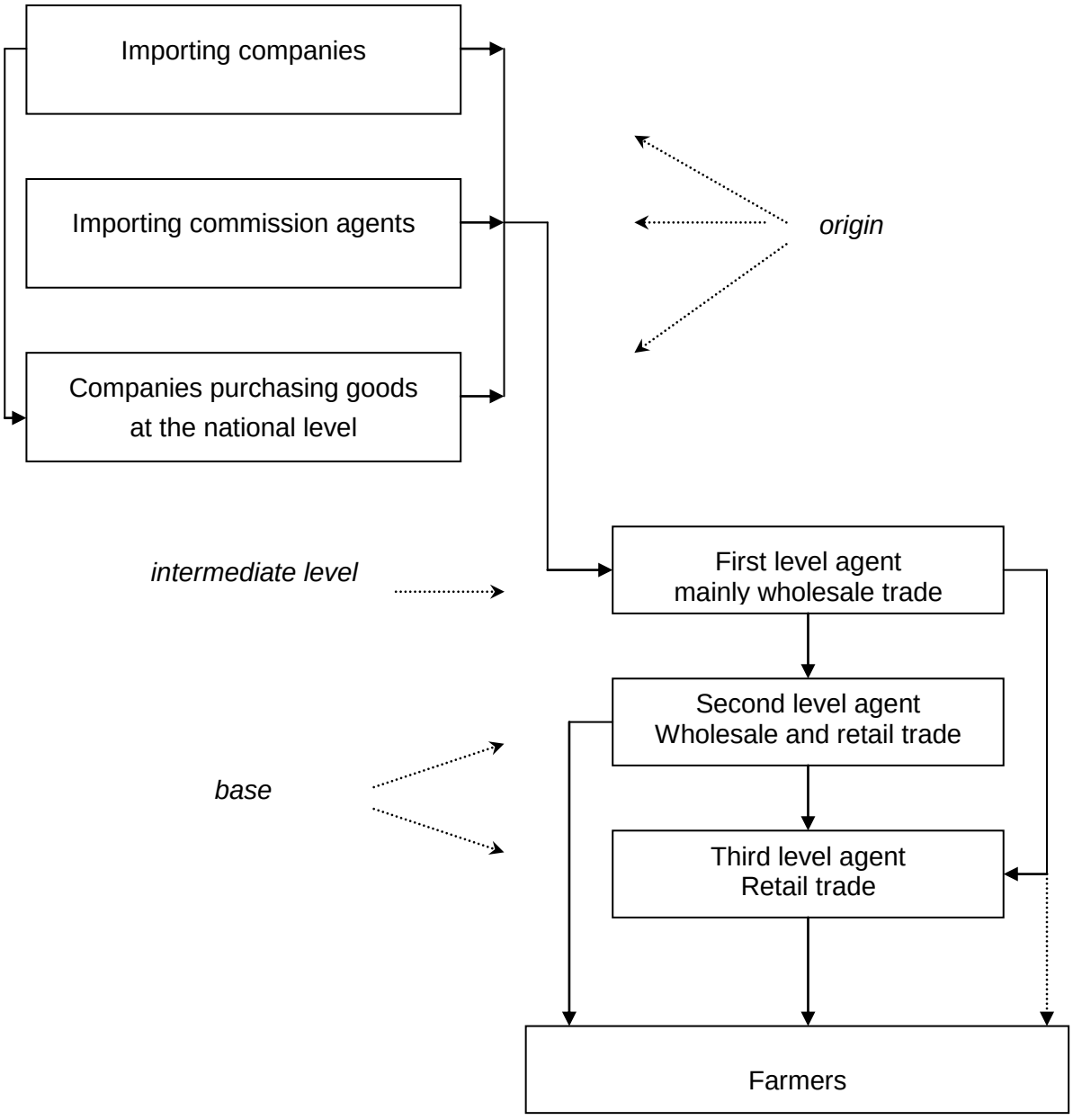
There are approximately 30 companies that are located in HCMC (centrally managed state owned companies) and in provinces (locally managed state owned companies) such as the Can Tho Company of Agricultural and Technical Materials, the Song Hau Farm and Mekofood in Can Tho province. Concerning importing companies and commission agents, each of them import an average quantity of fertilizers per time of about 1,000 to 10,000 tons (of which 18.2 % of NPK and 5.2 % of KCl) according to their respective quarterly quotas.

They resell fertilizers to wholesale agents (shops) located in the HCMC or provinces and districts.

B/ The intermediate level concerns wholesale agents (first level agents) who buy fertilizers from the previous companies and resell them mainly to smaller agents. Their scope is limited to one province and its districts.

They can be private or shops of state owned companies in cities and districts. Each of them can sell an annual volume about 800 to 8,000 tons.

FIGURE 17: THE MARKETING NETWORK FOR FERTILIZERS IN THE SOUTHERN PROVINCES



Source: Ha Thanh Lan: " Thi truong phan bon Dong Bang Song Cuu Long: Nhung nhan to anh huong den mang luoi phan phoi phan bon nhap khau cua vung". DHCT. Khoa Kinh Te. 1998. page 30.

C/ At the base, there are two kinds of agents:

- The shops located in districts and communes that can have a wholesale activity for small retailers and/or sell directly to farmers (second level agents). Those ones compete a lot with the former ones;
- Very small retailers who can sell on fixed place (shops) or traders on boat who bring fertilizers to the farmers' (third level agents). Those are very numerous at the district and commune levels and also sell pesticides as well as food for animal, and tools.

Both types of actors sell annually a small quantity of fertilizers: less than 400 tons.

According to Figure 17, we can see that the distribution system of fertilizers is now well developed.

7.1.1.3 Farmers' constraints related to fertilizers

A/ Fertilizers prices at the farm gate are very unstable. However, the magnitude of prices for fertilizers used in fruit cultivation is not very large (between VND 200 and 500/kg), compared to the price of urea and DAP fertilizers used in rice cultivation (up to VND 1,200 /kg) and compared to the selling price of fruits (see point 6.6.2). In other terms, fluctuations of fertilizer prices are more a constraint for rice cultivation than for fruit cultivation, all the more because farmers who have a VAC system often use organic fertilizers coming from other activities such as pig waste, fish heads, … as well as water hyacinth and mud both coming from the ditches of the fruit garden.

B/ In fact, the main constraints for farmers come more from a misuse of fertilizers and from the lack of capital:

- A misuse of fertilizers: many farmers lack experience about the use of fertilizers in their cultivation, especially in fruit cultivation and they often use more fertilizers than necessary, which results in a bad quality of fruits and a lower profit.
- Farmers have little power of negotiation concerning the prices of fertilizers since they are price takers in this market. As they often lack of capital, they sometimes buy them on credit to their regular traders with a higher price (10% more) and pay for them at the next fruit harvest.

7.1.2 Supply of fruit plants to farmers

In the MRD, at present, fruit garden are mostly planted with layered fruit plants for several reasons already explained, principaly because in this way farmers can begin to harvest earlier than by planting with seeds.

Indeed, farmers may get layered plants from two sources besides their own trees:

- Traders/farmers selling layered plants from other fruit gardens;
- Research centers such as the Southern Fruit Research Institute and Can Tho University. In this case, extension officers often play an important role to help farmers get these plants.

Farmers usually prefer to buy from the first category because the price of the layered plants is cheaper than from the second source (as for instance, VND 3000 per orange or mandarin plant from traders whereas VND 10,000-12,000/plant from the research centers). Moreover, many farmers as well as some extension officers have mentioned that even if farmers use good plants, the risk of rapid contamination is so high that most of them prefer to buy cheaper plants.

Nevertheless, another issue related to this input is the quality of species. Plants from R&D centers result from very important research work aimed at improving the yield, the resistance of trees as well as the quality of fruits. In the MRD, for the production of orange and

mandarin, most farmers still have low yields (about 10-15 tons/ha[47]) though some farmers in the surveyed area can now reach 20-24 tons/ha between the 6th and 10th years of production. In any case, they can seldom reach higher yield and better quality of fruits because of several reasons such as the misuse of fertilizers, inappropriate water management, disease of fruit trees, and certainly also because of the poor quality of plants.

Here again the main constraint is not the organisation of the system but mainly the farmers' lack of capital which compel them to pay less attention to the quality of fruit plant.

Conclusion: All along this work, we have mentioned two types of difficulties often encountered by the main actors of these commodity chain: lack of capital and information, which are closely related to the support services.

7.2 Support services

To improve the competitiveness of a commodity chain, support activities are as much important as the quality of input supplying because they allow to reduce production and transaction costs all along the commodity chain.

Among the usual support services that can accompany the basic activities of a commodity chain, there are: credit, research and development, technical assistance, insurance, transportation, …

At present, in Vietnam, insurance services are not available for farmers, even less for fruit traders as most of the latter do their business informally.

Transportation mainly concerns wholesalers at Phong Dien market who rent trucks from private small companies that have repurchased old trucks from state owned companies. This service is easily available in big rural cities such as Can Tho and the cost of transportation for a truck of 10 tons is about VND 4 millions for HCMC (i.e. VND 400 per kg of fruit) and VND 10 millions for Hanoi (i.e. VND 1000 /kg).

7.2.1 Research and extension

These two closely related activities are very important for the development of an efficient agriculture, but until present times focus has been largely limited to production. Indeed, until recently few research and extension programs considered the issue of the marketing as important. Even now, research about this point is widely focused on rice except for the Southern Fruit Research Institute.

In order to transfer new technologies to farmers, the Vietnamese government has decided in 1993, with the Decree n° 13/C, to develop a new extension system (see annex 2), i.e. managed by the state "from the center down to grass-roots with the Department of Extension for Agriculture and Forestry at the center[48] and the Extension Centers at the provincial and

[47] Figure given by the Southern Fruit Research Institute in 2000 for citrus.

[48] As a part of the Ministry of Agriculture and Rural Development set up in 1993

the grass root levels"[49]. Initially, several units were planned under the provincial extension centers: district extension stations, inter-district extension stations, commune extension group and inter-commune extension group. Since 1995, this system was supposed to integrate rural development in its activities. In Can Tho province, it was organised as shown in Figure 18.

The financial resources of the Agricultural Extension and Rural Development department come from the government (annual national budget) as well as international organisations (FAO, PNUD,…) , NGOs, and private individuals.

In theory, the vocation of this department is to bring information to farmers concerning difficulties they encounter in production as well as to help them to develop more integrated system such as the VAC system.

However, according to interviews we made with extension officers at different levels, researchers and farmers, the following issues arise:

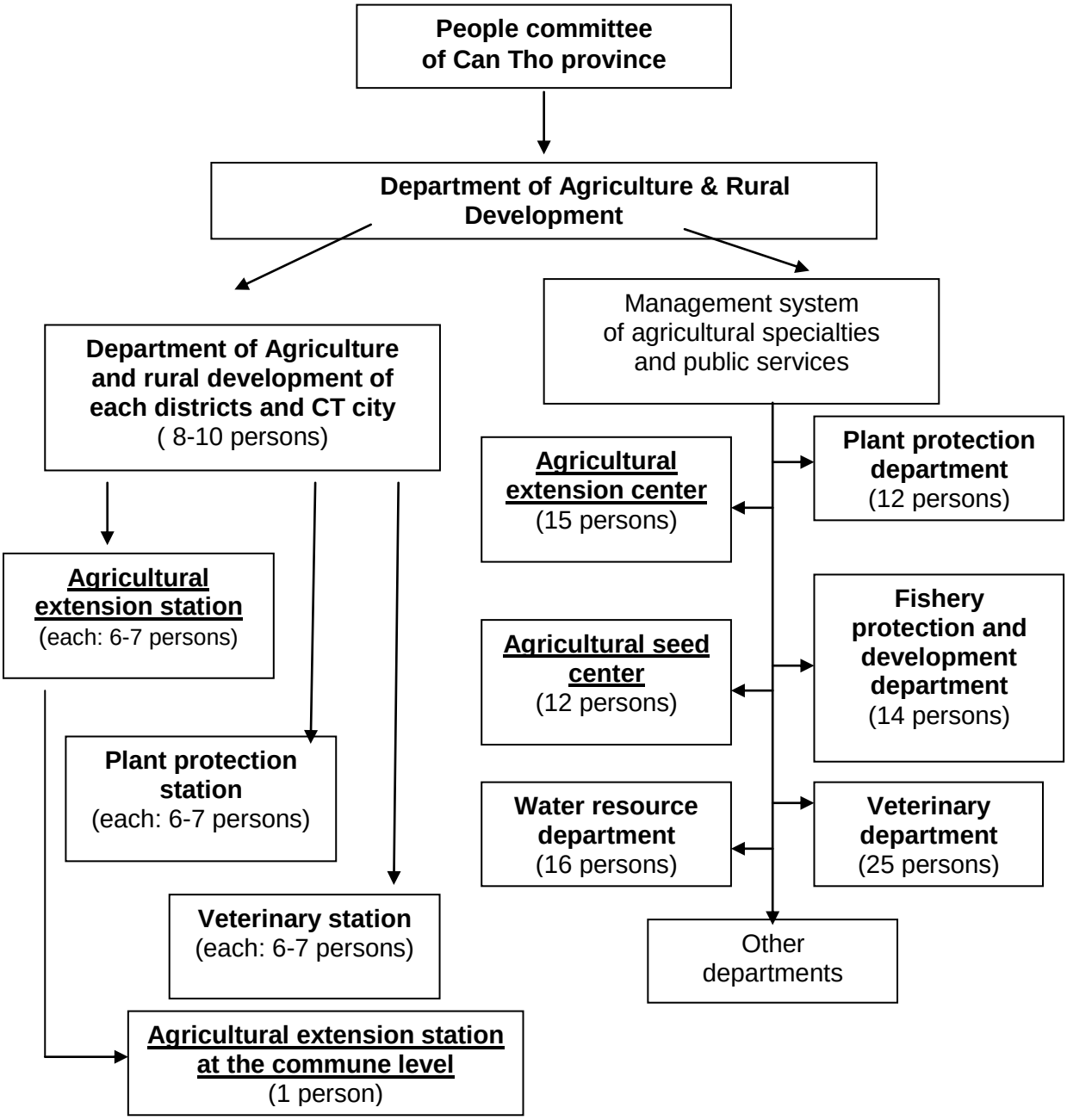
- The real budget for extension at the provincial level do not exceed 1% of the People committee budget;
- As a result, the number of extension officers is very small : 1 officer for 5,000 to 7,500 farmers. Besides, their salary is very low, i.e. VND 200,000/month compared with VND 600,000/month for a worker in CT mills and VND 30,000/day for a farmhand;
- Many extension officers have a low education and they often mention a lack of documents and technical information. Many are farmers and often acquire information by the means of radio, TV or documents they can collect by themselves. However, more efforts are made by the provincial people committee to increase officers' training;
- Extension programs are often not relevant to the farmers' real concerns because they are often made in an office and do not take into account the field (top-down approach). As for instance, programs related to fruit cultivation are very recent and still inexistent in some communes while farmers encounter many problems in production. Thus, the quality of extension services highly depends on the dynamism of the leaders.

Besides the state-managed system, there is second system of extension which brings together various actors such as:

- Research institutes and centers that cooperate with the public system in the field of fruit production at different levels;
- Mass Unions resultant from the socialist system and organised from the top level (national) to the bottom one (commune or hamlet). They are characterised by social type (farmers, women, youth, fruit producers);
- Mass media such as radio, TV, and documents;

[49] FAO : « Follow up to the Agriculture and Food sector review. Vietnam. Main report". Draft for discussion only. FAO. September 1996. page 20.

FIGURE 18: ORGANISATION OF THE EXTENSION SYSTEM IN CT PROVINCE



Source : People committee of Can Tho province. 1999.

- Foreign NGOs;
- Companies supplying farmers in fertilizers and pesticides;
- Assemblers and wholesalers.

7.2.1.1 Research institutes and centers

Nowadays, in the MRD, there are three research organisations which closely depend on the State and are connected to foreign research institutes:

- Can Tho University, created in 1966, bring together several research units in the field on scientific and socio-economic aspects of agriculture and fruit production in the MRD;
- The Cuu Long Rice Research Institute created in 1977 mainly focuses on rice production;
- The Long Dinh Fruit Research Center created in 1994 and upgraded to become the Southern Fruit Research Institute (SOFRI) in 1997.

If Can Tho University and SOFRI play an important role in the development of improved techniques of cultivation and plant protection, only the SOFRI is really involved in research about post-harvest activities (handling, processing and marketing techniques) but only for farmers. For instance, the SOFRI has been editing since November 1998 a bimonthly journal called “Information on fruit markets” which gives many information about the various fruit productions in the southern provinces and in the main producing countries, as well as the last prices for the main fruits of the MRD wholesalers (usually their purchasing prices). However, no interviewed farmers and wholesalers in CT province, knew about this journal.

In fact, both organisations operate at different levels. They cooperate with foreign research centers and NGOs as well as with the local public extension system to implement diversified and integrated farming systems such as VAC and VACR systems with biogas[50] and help farmers in plant protection techniques by working directly with them[51]. Besides, they are active in the training of extension officers.

7.2.1.2 Mass unions

There are four types of mass union in CT province, which are closely connected to the provincial and district branches of the Communist Party, and are expected to orient the activities of the different “social” groups according to the interests of the government:

- Farmers’ union. This organisation is supposed to help farmers, encourage solidarity and cooperation among them as well as to defend the farmers’ interest. However, the director of the Agricultural and Rural Department, and the local extension officer, are among members. According to our interviews, depending on the qualities of the leaders at each level, they are more or less efficient and lack the means to realize their objectives. Most of them are not really efficient in the matter of transfer of technology related to fruit cultivation.
- Women Mass Union: this organisation has become the main target of many support services especially in the development of VAC and VACR systems with biogas and rural credit (mainly through rotating saving groups).
- The Youth Union: this organisation is less active in issues related to agriculture, though there is a collaboration effort with the provincial Department of Agricultural

[50] In Long Tuyen and Long Hoa communes, VAC and VACR systems with biogas have been developed in cooperation with a German NGO (Terre des Hommes Germany) since 1994.

[51] At present, CTU and the SOFRI are testing new techniques to stop the spread of greening disease through the simultaneous use of five pesticides.

and Rural Development to implement specific actions for young farmers in terms of training and creation of mutual aid groups.

- Fruit producers' mass union: this organisation has been created in 1992 in CT province, in response to the development of fruit cultivation. It aims at creating solidarity and mutual aid between farmers regarding fruit cultivation and the development of good technologies as well as more sustainable systems such as VAC or VACR systems. Farmers have a meeting every week or two weeks but they encounter more or less difficulties to implement actions depending on the dynamism of local heads of Agriculture and Extension departments.

According to Vo Tong Xuan and Tran Van Be[52], in an interview in 1999, except for the Women Union, the other organisations are little efficient. Thus, some farmers try to organize informally through the "Farmer field school" where they debate about the difficulties they are experiencing, as for instance the fall in rice and fruit prices in summer 2000, the importation of fruits which compete with them, the lower farming income, etc.

7.2.1.3 Mass media

The radio, TV, and documents fall in this category.

The provincial stations of radio and television have taken an active part in the daily dissemination of information about new farming techniques and experience of advanced farmers. TV programs are made by a TV professional, two specialists (one from CT university and the head of the CLRRI) and a consultant engineer permanently seconded to the TV station. Nevertheless, only 40% of the farmers watch those TV programs because of the still limited access to electricity.

Available documents mainly concern extension officers and are used by them to train the farmers.

7.2.1.4 Foreign NGOs

They cannot operate on the field independently of the state system or research institutes and centers. Their contribution is mainly oriented to poverty alleviation through specific programs such as the development of VAC and VACR systems with biogas in very small farms or by organizing saving groups for women. The main weakness of these actions is that they are very limited in scope and target population.

7.2.1.5 Companies supplying fertilizers and pesticides to farmers

These actors also play a role in extension but this is limited to giving to farmers information related to the use of fertilizers/pesticides they sell. Some researchers of CTU mention that those actions are not always in the interest of farmers since the companies first aim is commercial.

[52] Director and Deputy Director of the Farming System R & D Institute. Can Tho University.

7.2.1.6 Assemblers and wholesalers

As indicated in the chapter dedicated to fruit marketing, assemblers and wholesalers at Phong Dien market often give advice to their regular suppliers regarding the quantity of water and of fertilizers and pesticides to use as well as marketing information. However, this technical advice is not based on scientific experiments but only on empiric observations. Moreover, they only concern a part of the production process.

Conclusion about research and extension services: At present, these two activities only address production activities, mainly rice cultivation (60% of extension programs in Chau Thanh district). The system must still be improved to cope with the farmers' lack of information and training in the field of fruit cultivation.

Furthermore, when interviewed about the difficulties they meet in their activities, many farmers have mentioned that their present worry is their poor ability to cope with the market economy which, coupled with an increasing lack of capital, gives them the feeling that their future situation might be precarious.

No efforts are made for fruit traders. Their activity and their difficulties are completely ignored by the two systems described.

In short, in a context of an economy newly oriented towards the market, few efforts are made concerning the research and development of management and marketing techniques which could help farmers and traders to make their activities more efficient.

7.2.2 Rural credit

Besides the lack of information which limits the development of the whole fruit commodity chain, the lack of capital also constitutes a very severe constraint, as much for farmers as for traders.

At present, in Vietnam, there are two rural credit systems: the formal system and the informal one. According to Nguyen Xuan Lay (Head of the CLRRI), interviewed in May 1999, 60% of the MRD farmers borrow money for their crops and 45% do it from the banking system. From another source[53], 50% of farmers nationwide have access to bank loans.

7.2.2.1 The formal system

In Vietnam, the formal system is represented by:

- The Vietnam Bank of Agriculture and Rural Development (VBA);
- The Rural Joint-Stock Commercial Banks namely the JCB Nhon Ai;
- The Vietnam Bank for the Poor;
- The People's Credit Funds (PFCs).

[53] The Saigon Times Weekly dated the 29th July 2000. "Bound for rural areas: Bank consider farmers their potential customers". page 35.

We will only present the more active organisations in the fruit commodity chain, in Can Tho province. Among all these organisations, the VBA is the largest credit supplier in the rural areas lending the largest loans compared with the others organisations.

7.2.2.1.1 THE VBA

This organisation is a state-owned commercial bank which became operational in December 1990 and has at present more than 2,500 branches all over the country. It is organised in a pyramidal form.

Until recently, this network had not extended to a level lower than the districts, which prevented many farmers to ask for a loan, though in 2000 many rural branches have introduced the "home-service" which allow farmers to receive the visit of credit officers directly at their home after a phone call. But the amount of the loan must be at least VND 100 million…

Being a universal bank, it has given loans to state-owned companies, private companies and households. Indeed, because of the asymmetry of information and high transaction costs incurred by the bank, credit officers always request a collateral from borrowers. As the VBA has made some agreements with the mass unions, it is easier for farm households which have a member in one of these organisations to borrow money from the bank than for other farmers. Furthermore, the Women Union often organizes their members in jointly-responsible groups to have access to the VBA loans. In this system, each member has to be responsible for the default of the others. Actually, in the surveyed areas, it has also been tried with the other unions but in most cases it failed because the purpose of the loans was not the same, i.e. rice or fruit cultivation for farmers' unions and pig husbandry for women.

Regarding farmers, they have to provide the land-use right certificate and must have paid their taxes before making their demand. The amount of the loan depends on the value of the collateral, i.e. cannot exceed 70% of it. Actually, it is about VND 5 to 7 millions per hectare for fruit cultivation compared with VND 3 to 3.5 millions per hectare for rice cultivation. In some cases, the loan is up to VND 10 millions per ha. Three to six months, with a maximum of 12 months (for fruit garden), are the most common durations. The interest rate per month has fallen from 6% in 1990 to 1% in 2000[54], in order to foster agricultural and rural development.

The major constraint of this system is that:

- Though the loan terms fits the usual production cycle, it is more difficult for farmers to borrow for a longer term (the maximum being 24 months) which is the time to establish an orchard;
- Furthermore, farmers are more concerned with the convenience of borrowing than with the interest rates, that is why they often prefer to borrow money from the informal system, namely from the moneylenders, because it is convenient in timing, in amount and in duration.

[54] For terms between 3 to 12 months.

- In theory, traders can also borrow money by using the certificate of ownership of their boat. Actually, this is more difficult for them to access formal credit because of the informality of their business.

7.2.2.1.2 THE RURAL JOINT-STOCK COMMERCIAL BANKS

In the rural areas, these banks are mainly owned by private individuals but borrow money from the VBA for their credit operations.

They have been created after 1988, mostly in 1995, but are very small and limited in geographical coverage. Fruit farmers of Chau Thanh district can mainly borrow money from the joint-stock commercial bank of Nhon Ai.

However, the size of the loans is lower than the VBA (from VND 1 to 3 million per hectare) and only for short-term purposes, with interest rates higher of 0.5 to 1% per month. This kind of financial organisations also asks for collateral (land-use certificate, certificate of ownership for boat, motorbike, …) and sometimes applies non-commercial conditions such as paying for the application form.

In this case, it is better for fruit farmers to apply directly to the VBA.

7.2.2.1.3 THE VIETNAM BANK FOR THE POOR AND THE PEOPLE'S CREDIT FUNDS

A/ The Vietnam Bank for the Poor

Established in August 1995, it is a non-profit bank which intends to alleviate poverty through the supply of credit at preferential conditions to poor households, i.e., those who have a very low monthly income (less the 20 kg of rice per person) and lack of enough collateral.

The average amount of credit per household is not more than VND 1.5 million[55] under the condition that the farm household do not borrow from another formal organisation at the same time.

Fruit farmers are little concerned with this organisation.

B/ The People's Credit Funds

Introduced in 1993 by the State Bank of Vietnam, these organisations are shareholding cooperatives established voluntarily and operating at the commune level for helping its members. For this purpose, they mobilize capital of their members to lend to other members. They are community-based.

The loans are made for a short-term and with an interest rate higher than the VBA's (1.8% per month).

In the surveyed area, apparently no interviewed farmers belongs to this kind of organisation.

[55] The small size of loan results from the lack of financial capacities of this organisation.

7.2.2.2 The informal system

The present ability of the formal financial system to provide credit is limited to 50% of the total estimated rural credit demand due to shortage of capital, especially for medium and long-term loans. As a result, many farmers must borrow from the informal system which constitutes the main source of credit for fruit traders. The informal system comprises various actors such as relatives, neighbours, money lenders, traders…

When farmers or traders borrow from relatives, the interest rates are very low or nil but the amount can be relatively important depending on the relatives' capacities.

Concerning loans from neighbours, there is no interest rates if the amount of money is very small (less than VND 100,000) and the duration is short (few days). In other cases, the interest rates is about 6-10% per month.

When farmers and traders cannot borrow from the previous actors, they resort to moneylenders. These are often rich farmers who live in the local community. Their intimate knowledge about their clients enables money lenders to reduce the common risk inherent in situations of asymmetric information and, consequently, they often do not need to ask for collaterals. Furthermore, the interest rate depends on trust between both parties. It can vary from 6% - 15 % per month to 15% per day for very short term loans. Some wholesalers at Phong Dien market also borrow money from the trucks' owners at the same rate.

Besides those cases, the system of advance between wholesalers, assemblers and farmers represents another form of informal credit as well as the delayed payment of fertilizers to suppliers by the farmers.

Finally, specific programs organised by NGOs with the local Women Unions such as the development of VACB system in some communes of CT city include credit facilities to the members of the project for the purchase of the biodigester and the construction of the fruit garden, besides technical support. However, those programs are still too rare, and concern only a few households.

The main constraint of the informal system is that the amount of the loans are often small and the interest rates high but it is easier and more rapid for both farmers and traders than the formal system.

Conclusion about rural credit: The present formal system for rural credit has been implemented only for few years and is far from being developed enough to satisfy farmers and traders' demand.

8 Conclusion

Agricultural diversification through fruit cultivation has been, after rice intensification, the main response of the MRD farmers to the implementation of a new economic system based on market principles and to the liberalisation of agriculture. Nevertheless, because the prime objective of Vietnam has been, until recently, to reach self-sufficiency in rice as well as to get income from rice exportations, little concern has been given by the State to the development of the fruit commodity chain.

At present, Vietnam has to face a shrinking local demand for rice as well as falling export prices that will result in tough time for rice farmers in the coming decade, especially those of the MRD. Aware of this threat to the rural economy, the Vietnamese Authorities are now considering that the diversification of crops is more important than ever to ensure the development of agriculture and to improve farmers' income. Therefore, they strives to increase fruit production, export and processing, to procure new outlets to the farmers' output as well as to support rural industrialisation and development.

However, the analysis of the present organisation of the main fruit commodity chain in the MRD has revealed the difficulties raised by such an objective. Indeed, until now, fruit diversification has been essentially a spontaneous process resulting from the initiative of an atomistic private sector, driven by market forces. In other words, the MRD farmers have diversified their land use into fruit cultivation depending on the market incentives, their knowledge and constraints. On the other hand, to respond to an increasing demand for fruits, the fruit marketing system has developed through private trading and procured more outlets for the farmers' output. But the complete market development is far from being achieved and the support services to production and marketing in matters of rural credit, research and technical assistance, remain limited and inadequate. As a result, the actors of the fruit commodity chain, i.e. the farmers and the traders, bear high transaction costs.

Furthermore, the present production encounters more and more difficulties to meet the increasing requirements of demand, as the farmers' strategy focuses more on quantity than on quality owing to the lack of capital and information. As a result, the market prices tend to be lower than before and so do, consequently, the incomes of farmers and traders.

In this situation, the furtherance of the diversification process implies important measures to improve fruit production and marketing through better technical and financial support to the actors who are involved in the fruit commodity chain. In particular, the emphasis must be placed on the transfer of management techniques to both farmers and traders in order to improve their ability to face the constraints of the market economy. For that purpose, efficient farmers' organisations as well as the integration of activities in the marketing channel may constitute interesting and relevant solutions.

Besides, to foster rural industrialisation through the development of processing facilities for fruit requires the implementation of an efficient supply of the processed products, i.e. regular in quantity and quality. The main solution proposed at present by the State, is to plan areas of production. However, the recent evolution of fruit cultivation in CT province has showed that there must be high incentives for farmers to remain specialised in the same production.

As a matter of fact, an increase in the production of a given type of fruit often results in a decline in its price if demand does not catch up with supply.

In short, the development and the real success of fruit diversification in the MRD relies largely on the shift from an agricultural policy focused on production to one that also considers post-production and support activities as key elements.

9 Annexes

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ANNEX 1: MAIN DECLARATIONS AND MEASURES FOLLOWING THE 6TH CONGRESS OF THE VIETNAMESE COMMUNIST PARTY AND CONCERNING THE ENTIRE ECONOMIC SYSTEM

♦ Declaration of the 6th Congress. December 1986.

It was decided to:

- liberalize the entire economy,
- develop a three sector economy, i.e. a State sector, a private sector and a household sector,
- abolish the monopoly of the State on the commodity trade,
- make the private sector participate in foreign trade.

♦ Decision 306 of the Politburo. 1986.

End of the State monopoly on transport and less control on inter-provincial barriers.

♦ Directive 11 NQ/TW. 1988.

The State decided to:

- fight against inflation,
- adopt market prices,
- devaluate the Dong with regard to the Dollar.

♦ Resolution 10 of the Politburo. April 1988.

It was decided to:

- recognize durably the private sector,
- give a larger autonomy to districts and communes which become more responsible for the definition of a part of the plan,
- change the management system of the state-owned companies to oblige them to become progressively efficient.

♦ Resolution 16 of the Politburo. August 1988.

Reaffirmation of the State's will to develop the place of the non-state sector in the economy, which has involved specific reforms in agriculture (see Annex 2)

ANNEX 2: MAIN DECLARATIONS AND MEASURES FOLLOWING THE 6TH CONGRESS OF THE COMMUNIST PARTY OF VIETNAM FOR THE RENOVATION OF THE AGRICULTURAL SYSTEM AND THE RURAL SOCIETY

♦ Resolution 10 of the Politburo. April 1988.

It was decided to:

- Recognize the farming household as an autonomous economic unit;
- Allot agricultural land to farm households for a period up to 15 years;
- Abolish the system of compulsory sales at low prices to cooperatives as well as the system that linked redistribution of commodities to work points;
- Resell the means of production not used efficiently by the cooperatives;
- Reduce the compulsory duties for the farmers in the cooperatives;
- Reorient the functions of agricultural cooperatives towards services to farmers (supplying of inputs and distribution of the output);
- Improve the supplying of inputs provided by cooperatives by limiting the necessary administrative intermediaries;
- Increase transfers towards the agricultural sector;
- Put an end to the policy of food self-sufficiency for each province;
- Put an end to collectivisation efforts in the South.

♦ Directive 202-CT. June 1991.

In 1990, it was decided to reorganize the Vietnam Bank of Agriculture as a state commercial bank to provide short and medium term credit to rural public institutions, as well as to farmers and the emerging private sector. Indeed, this organisation really started to lend money to farmers in mid 1991 with the directive 202-CT.

♦ Directive 13-CP. March 1993.

It was decided to introduce a new system for extension.
Before technology transfer was made by cooperatives but in some places, it had completely disappeared.

The new system consists in two forms: publicly managed extension and voluntary extension.

- The publicly managed system is arranged with the Department of Extension for Agriculture and Forestry which is under the responsibility of the Ministry of Agriculture and Rural Development of Vietnam. This system is supposed to be managed at the provincial, district and communal levels.

- The voluntary extension system consists in the services provided by the different research and educational institutions, by mass organisations, and even by individual persons who are voluntarily involved in agricultural extension activities.

♦ Directive 14-CP. March 1993.

This directive was focused on production loans for farming households and constitutes a real development policy of credit towards farmers.

♦ Resolution n° 5 of the Politburo. June 1993.

At the conference of the Central Executive Committee of the Communist Party of Vietnam, strategies for agricultural and rural development were made in the following directions:

- Renovate rural and agricultural economic structure;
- Patiently and consistently implement the policy of assigning long term land use right to farming households;
- Renovate the state's macro policy on agriculture and rural areas.

This resolution focuses on the structural improvement of the rural economy on the basis of the development of rural industries and services, crop diversification towards efficiency and the shifting of agricultural labour force to forestry, fishery and nonagricultural occupations. In addition, the resolution affirms the long term existence of all economic sectors in rural areas: i.e. the autonomous role of household economy is emphasised as well as the renovation of cooperatives and state owned enterprises. Besides, individual and private economy are encouraged in rural areas.

Resolution 5 has been materialised by the newly issued policies:

♦ Decision 155/QD-NH17 issued by the Governor of the State Bank. August 1993.

Establishment of the People's Credit Funds that aim to assist farmers and other members to mobilize funds and to provide loans for production purposes following the cooperative model. The PCFs only give short-term loans and are independent shareholding cooperatives.

♦ Directive 64-CP. July 1993. New Land Law.

The 1988 Land Law (included in Contract 10) still banned the "sale, purchase, seizure and lease for rent" . The land allotted only for 15 years was not transferable or could not be used as collateral.

With the new law, the government has decided to:

- allow private transfers of land use-rights including "exchange, transfer, lease, inherit and mortgage" conditional to payments of tax for such transfers;
- extend the tenure period to twenty years for annual crops and fifty years for perennial croplands with the possible renewal of the land use right if the land user have fulfilled the State's requirements;
- fix the upper limit of land allotted for annual crops to 3 ha.

This law has changed significantly the farmers' institutional environment by securing their choices and their investments. In the same time, it has allowed them to have a collateral to borrow money from the bank: the Land Use Right Certificate.

♦ Directive 73-CP. October 1993.

Following the New Land Law, the system of land taxation was modified through different measures such as the Law on agricultural land classification for tax on agricultural land use (Directive 73-CP).

All these measures aimed at defining the way of classification and taxation of the different kind of land depending on the soils and their use. As a matter of fact, the lands dedicated to rice cultivation are taxed at lower "rate" than those used for fruit cultivation.

Then, according to this directive, the fruit gardens on alluvial soils are taxed as follows:

Soil type	Land use tax in kg of paddy / ha
1	650
2	550

The soil type takes into account the quality, the location, the topography of the soil as well as the irrigation and the climatic conditions. The taxes above corresponds to conditions in the surveyed fruit areas of CT province and their value changed every year depending on the evolution of the paddy price.

Besides, some restrictions were apparently given in the Directive 84-CP in August 1994 and additional taxes were decided for land use over the following limits:

- concerning land used for annual crops, the upper limit allotted per household is 3 ha for the Southern provinces and 2 ha for the others;
- concerning land used for perennial crops, the upper limit is 10 ha in the deltas and 30 ha in the mountains and the midlands.

The objective of such restrictions is to restrict landless situation of a number of peasants without preventing good opportunities for efficient farmers.

♦ Decision n° 525/TTg issued by the Prime Minister on August 1995. Decision n° 230/QD-NH5 on September 1995 of the Governor of the State Bank of Vietnam.

The Vietnam Bank for the Poor was institutionalised by these decisions with a legal capital of 500 billion VND and established in December 1995[56]. It aims at providing credit funds for the poor in preferential conditions to alleviate rural poverty.

[56] Indeed, a report for the FAO in 1996 explains that the Vietnam Bank for the People is the fruit of the reorganisation of a "Fund for Favorable Loans for the Poor" previously created in April 1995 by the government to channel funds to the rural poor and was operated under the responsibility of the Vietnam Bank of Agriculture.

ANNEX 3: MAIN CHARACTERISTICS OF CAN THO PROVINCE RELATED TO OPPORTUNITIES FOR FRUIT CULTIVATION

1 . The physical environment

. Natural area (1997) : 2,963 km², i.e. 296,254 ha (7.54 % of the natural area of the MRD)

Of which:

- Alluvial soils: 146,407 ha (49.33 % of the province)
- Acid sulphate soils: 79,221 ha (26.69 %)
- Area of raised beds: 55,047 ha (18.55 %)
- River and canal area: 11.257 ha (3.59)
- Alluvial soils submitted to saline water intrusion in the dry season: 4,878 ha (1.64 %)

Remark:

- Alluvial soils are located along Hau River (Bassac River) which corresponds to a length of 60 km and extends inland by about 8 to 20 km.
- The highest alluvial soils concerned Thot Not, O mon, Chan Thanh districts and Can Tho town with an average elevation between 0.6 to 1.6 m and no soil toxicity.
- This topography allows to benefit from the tidal effect to irrigate and drain during the dry season and reduce the costs of irrigation (by pumping).
- This area is very suitable for both rice and fruit cultivation

. Climate: (Can Tho station for Chau Thanh district and Can Tho city)

- Annual average temperature: 26.8°C (min: 22.6°C and max: 31.8°C)
- Number of hours of sunshine/year: 2582
- Annual average rainfall: 1,635 mm (min: 1,115 mm and max: 2,304 mm)
- Number of rainy days/year: 125
- Beginning of rainy season: 21/05; End of the rainy season: 29/10
- Average humidity per year: 83%

. Irrigation: Song Hau river is an essential source of water supply in CT province, that serves an hydraulic system that allows the irrigation of 181,805 ha (1997).

. Inundation:

- Duration of the annual flooding: 2-4 months (from 15/07 to 30/11).
- Area where the depth is inferior to 30 cm totals 144,408 ha (49 % of the natural area) to which belongs the almost entire area of raised beds.
- Some area has a depth about 100-150 cm and is not suitable for fruit cultivation.

<u>Remark</u>: For our survey, we have selected Can Tho town and Chau Thanh district because:

- the area of raised bed systems is the highest (41.2 % and 27.34 % respectively of the natural area)
- alluvial soils represent 44 % and 64 % of the natural area
- annual flooding is inferior to 30 cm (along Song Hau and Can Tho rivers for Chau Thanh district) and lasts only 2 months

2. Characteristics of fruit cultivation

. **Agricultural area** in 1997: 250,117 ha (84.43 % of the natural area)

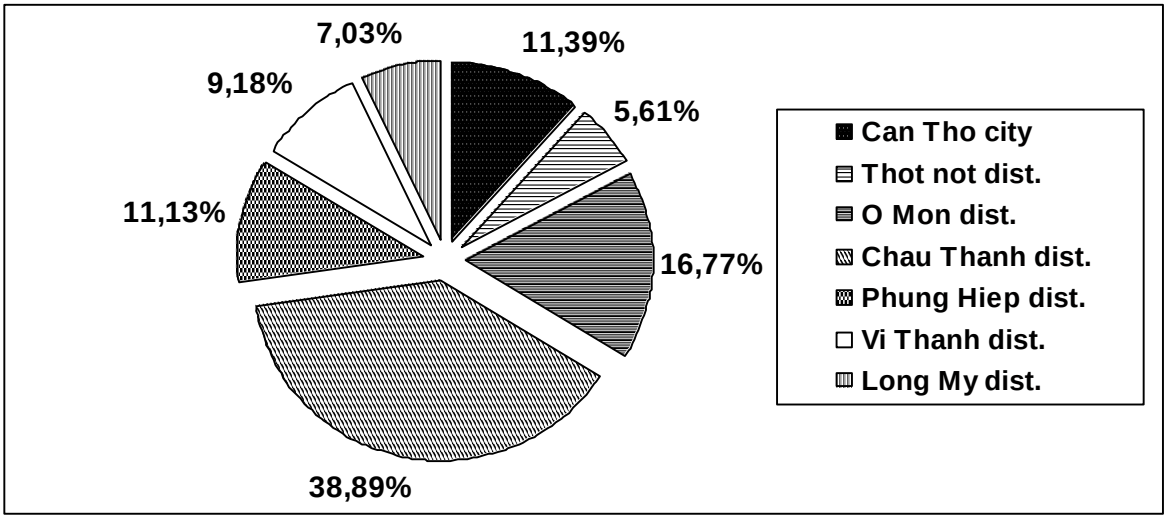
Of which:

- Rice land (1997): 186,800 ha (74.72 % of the agricultural area)
- Fruit land (1997): 30,821 ha (12.33 % of the province agricultural area and 16.57 % of the MRD fruit area)

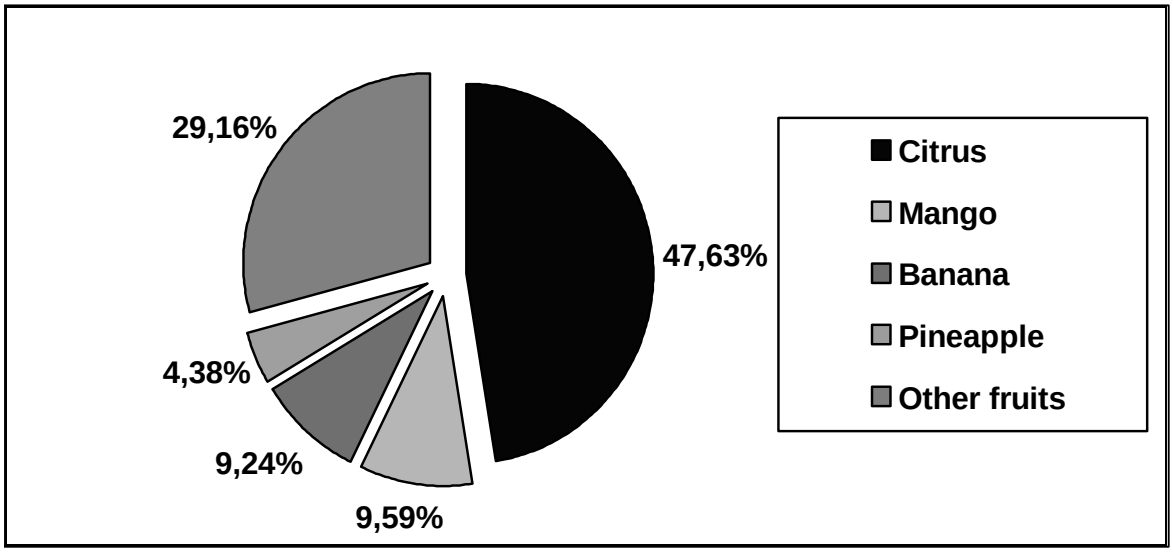
. **Evolution of the fruit area** between 1990 and 1998: **68.8%**

(from 16,506 to 30,821 thousands ha)

. **Distribution of the fruit area within the province:**



. **Composition of the fruit area of the province in 1997:**



. **Evolution of the area dedicated to each type of fruits between 1990 and 1998:**

- Citrus: 309%
- Mango: 598%
- Banana: - 36.7%

. **Distribution of citrus and mango area within CT province in 1997:**

- ***Citrus****:* 54% in Chau Thanh district (of which 80% of orange mat, 10% of orange sanh and 10% of mandarin), 22% in O Mon district, 10% in Phung Hiep district and 10% in Can Tho city;
- ***Mango***: 18% in Chau Thanh district, 10% in O Mon district, 12% in Phung Hiep district and 2% in Can Tho city.

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