

CHAPTER 5

COMPARATIVE ANALYSIS OF CONVENTIONAL AND ORGANIC TEA PRODUCTION SYSTEMS

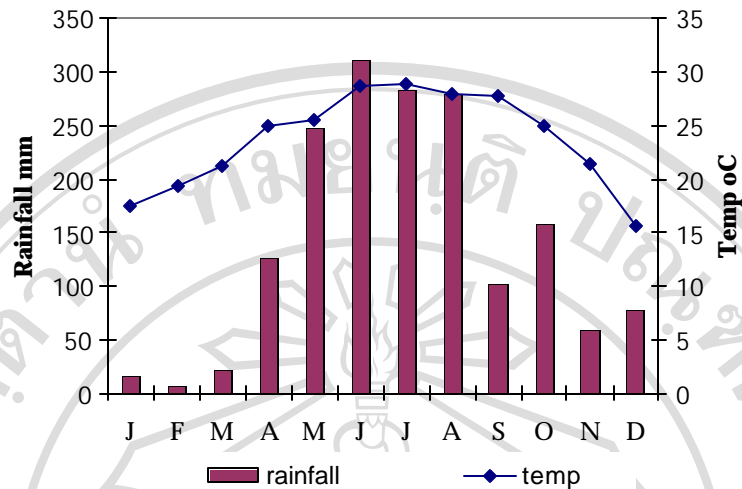
The chapter deals with to describe and compare tea systems in study sites, Thai Nguyen and Phu Tho province. These study sites were outlined in terms of geographical location, climate, economy, in particular, tea sector development. In tea industry, both conventional and organic tea productions were discussed based on comparison. The comparison focuses on human resources of tea farms, farming practices, i.e., manuring, irrigation, crop protection. In addition, marketing practices i.e., processing, packaging, etc. as well as marketing characteristics of the tea products also studied comparatively.

5.1 Study sites characteristics

5.1.1 Thai Nguyen province, North Mountainous Region (NMR)

Thai Nguyen, as the Northern gate of Hanoi, is one of provinces in the North Mountainous Region in Vietnam. It is 108 km far from Ha Noi to the north direction. It has the total area of 3,541 sq. km and the population of 1.1 million persons (Thai Nguyen Statistical Department, 2002), grouped into 8 ethnic minorities, in which, most of them are Kinh ethnic group (Vietnamese people).

The province is located in the monsoonal tropical zone. Major climatic characteristics are as follows- Annual mean temperature ranges between 22 and 23°C, sunshine hours ranges from 1400 to 1600 hours, and yearly rainfall is from 1400 to 1600 mm. Heavy rainy occurs from May to August, and moderate rainfall takes place in the remaining months of the year. Rainfall and average temperature in Thai Nguyen is shown in Figure 5.



Source: Statistical Department of Thai Nguyen, 2002

Figure 5 Temperature and rainfall in Thai Nguyen

Economy of the province is heavily relied on agriculture. In the Renovation ‘Doi Moi’ years, economic structure has gradually been transformed towards orientation of commodity production. In 2001, gross agricultural product value was accounted for 38.1% of GDP, changed 4% compared to year 1990 (Table 5). In general, economic structure of the province is balance considerably, illustrating that the province develops all sectors with the same roles.

Numbers of persons involving in agricultural production, mainly in tea production, covered high percentage of total labor force, while labors involved by other sectors, i.e., steel industry, food and foodstuff processing, are not as many as agricultural labors.

Table 5 Economic structure of Thai Nguyen province

--%--

	1990	1995	2001
Agriculture	34.2	36.91	38.12
Industry, construction	31.4	33.23	30.37
Services	34.4	29.86	31.51

Source: Thai Nguyen Statistical Department, 2002.

In the provincial agriculture, major existing systems are food crops (rice, sweet potatoes, manioc, corn, vegetable), industrial crops (sugarcane, peanut, tobacco, soybean, tea, fruit), forestry and agro- forestry combination, livestock (cattle, pig and poultry), and agricultural services (fertilizer supplies, agro-product and foodstuff process). It is realized that cultivation is playing an important role in agriculture. In 2001, it shared 73.5 % of gross agricultural product value, increased 8.1 % compared to the year 1990. In which, tea plant is main crop contributing dramatically into such achievement. So, at present and in the future, it is still major crop in living and economy of the province. Agricultural structure is depicted in Table 6.

Table 6 Agricultural structure of Thai Nguyen province --%--

	1990	1995	2001
Cultivation	65.4	68.4	73.5
Livestock	32.6	28.5	24.1
Services	2.0	3.1	2.4

Source: Statistical Department of Thai Nguyen, 2002

The nature has granted Thai Nguyen a favorable soil and environmental conditions for the development of tea. Thus, tea has a comparative advantage compared with other crops in terms of ecological conditions. In addition, labors in tea sector of the province are skillful and in experience.

Consequently, Thai Nguyen is one of the provinces having the largest tea area and the highest tea productivity nationwide. This is a result of several efficient measures of local authority. Local authority has encouraged farmers to develop tea. It is proved that it has formulated the projects of tea development in areas in the province. Thanks to the projects, advanced technologies have been applied in tea production and processing, i.e., high yielding tea varieties, irrigating tea in winter, equipping household with a drying and curling machines, planting a shadow trees in tea gardens, and applying IPM in clean and organic tea production.

Up to now, Thai Nguyen has the land area under tea of 12,000 ha, producing 67,000 tons of fresh tea (Thai Nguyen Statistical Office, 2002). According to the forecast, by the year 2010, land area under tea and output are obtaining 20,000 ha and 100,000 tons of fresh tea, respectively (Ly, 2001). During from 1995 to 2001, tea area, productivity and produce were dramatically increased. It is proved that the annual growth rate of land area under tea, productivity and output in the period were 4.2, 20.5 and 17.4 %, respectively (Table 7). Spectacular growth of these criteria is evident for investment efforts of the province in recent last years.

Table 7 Tea production in Thai Nguyen province (NMR)

Year	Conventional tea ^b			Organic tea ^c		
	Tea area ---ha---	Harvest area ---ha---	Product- -ivity -quintal/ha-	Output ^d --tons--	Organic farms --farms--	Organic tea area ---ha--
1995	9749	8601	24.16	20781	-	-
1996	10579	9249	29.09	26909	-	-
1997	10843	9656	39.65	38284	20	3.0
1998	11518	10297	51.38	52906	24	3.5
1999	11993	10779	57.58	62066	47	3.7
2000	12000	10890	60.23	65590	48	3.9
2001	12401	11000	60.36	67000	83	8.4
G.R. ^a	4.2	4.06	20.5	17.4	13.9	16.4

Source: Thai Nguyen Statistical Department, 2002.

Note: ^a Growth annual rate (%) ^b calculated for period 1995 - 2001, ^c calculated for period 1997 - 2001. ^d in fresh tea.

Besides developing conventional tea, the province also pays a notice of developing organic tea production based on converting conventional tea gardens and newplanting tea. Thus, both conventional and organic tea systems have been existed in parallel in recent years. Organic farming techniques have been introduced to farmers for 5 years by CIDSE. Initially, the techniques are applied for tea. Through it, new production alternative is created for tea growers to raise income. Furthermore, new alternative may catch the attention of government to launch development of organic agriculture.

Number of organic tea farms has been rapidly increased with the annual growth rate of 13.9% (Table 7). Likewise, area under organic tea had the same growth (16.4%). It is proved that there is being a tendency of organic tea development in the province. The conventional and organic tea production situation is shown in Table 7.

Regarding tea marketing aspects, tea products of Thai Nguyen, mainly green tea, are widely and popularly being exchanged and traded in the markets, which are from State and private tea factories, and small processing units of tea farmers. Tea factories under Kim Anh Tea Company, Hoang Long Tea Company, Thai Nguyen Tourism Company, at present, are producing most products in the markets. Their tea products have diversified labels and styles. In regards with label, Tan Cuong-Thai Nguyen, Thien Thanh, Hoang Long are famous labels; likewise, diversification is apparent by packaging, i.e., tea packed in boxes made of paper and tin. Beside of above normal tea products, there are other special kinds of black and green tea, and aromatic tea for exporting. They are also processed in tea factories under the Kim Anh Tea Company. Tea products from small tea processing units of farmers often are at lower grades compared to tea processed in tea factories.

Following the processed conventional tea, processed organic tea has been present in the market, but none of consumers reckon its presence, except for some high-income persons and foreigners. The product is made in family-scaled processing units, and then is sold to Hanoi Organics organization and free market. In Thai Nguyen, a half of processed organic tea has been purchased by the Hanoi Organics organization according to the guaranteed contract with premium price. The remaining part tea farmers sell to free market at lower price.

5.1.2 Phu Tho province, North Mid-hill Region (MHR)

Phu Tho, one of four provinces in Mid-hill region, has specific topography including mountain, hill and lowland. It has the total land area of 35 km², and has population of 1.3 million persons (population density of 370 persons km⁻²).

The province is in monsoonal tropical zone, whose climate is characterized by temperateness and coolness. Annual rainfall ranges from 1,700 to 1800 mm and temperature is from 24°C to 25°C.

Three big rivers, namely Red River, Da River and Lo River run across the province's location, generating plentiful runoff (18,000 cubic meters). This is main sources of water, which are satisfying demand for water of living and industry.

In the Renovation 'Doi Moi' years, the province's economy is rapidly growing. Furthermore, its economic structure has gradually been transformed. Annual growth rate of GDP throughout 1990 - 2001 was 8%, in which, growth rate of agriculture, forestry and aquatic sector was 3.7%, of industry, construction sector was 11.3%, and of tourism, service sector was 9.8%. In agriculture, rural face and life have dramatically been changed since having the Contract 10 Resolution "allocating forestry and agricultural land to farmers". Share of agriculture in economy was 32.1 % in 2001, 10 % decreased in comparison with it was in 1990 (Table 8), but gross agricultural value was still increased in absolute value.

Table 8 Economic structure by sectors in Phu Tho

Sectors	1990	1995	2001
Agriculture	42.2	35.9	32.1
Industry, construction	28.0	31.3	36.4
Tourism, services	29.8	32.8	31.5

Source: Phu Tho Statistical Department, 2001.

Evidently, agriculture is dramatically grown, contributing into food security, modernization and industrialization of the province in Reform 'Doi Moi' period (Phu Tho Department of Agriculture and Rural Development, 2001). In agriculture, land has an important role in agricultural production, which can bring community welfare and farmers much benefit if it is properly allocated and utilized. Current land use of the province is summarized in Table 9.

Table 9 Land use of Phu tho in 1999

Category	Area --ha--	Percentage --%--
Total natural area	350,634	100
Agricultural land	89,491	25.5
Forestry land	115,106	32.0
Special use land	20,074	5.7
Residential land	8,417	2.4
Unused land	117,546	33.4

Source: Phu Tho Department of Agricultural and Rural Development, 1999.

Phu Tho has proportion of agricultural land in total land area (57.5%) is higher than other provinces have. Land expansion and farming intensification is creating the new alternative of agriculture development in the province. Major current systems are existed following food crops, sugarcane, soybean, fruit tree, tea, livestock, aquatic raising and forestry. In which, the provincial authority pays a much notice to develop tea because tea is traditional and exporting crop.

It was known that tea had been introduced into the province since 1890. Up to present, land area under tea is 7,600 ha, in which, area under harvest is 6,700 ha, and output is 30,000 tons fresh tea. Tea productivity has noticeably been increased. State farms have higher yield than tea smallholders. Tea farmers have experience on tea production whose tea productivity is higher than others have less experience. In the areas, namely Ha Hoa, Thanh Ba, Song Thao districts, tea productivity are 10 - 15 tons ha⁻¹ fresh tea.

Tea production situation in period 1997 –2001 is summarized in Table 10. The figure indicated that land area under tea increased from 7446 ha to 8436 ha, furthermore, tea yield is also raised from 3.0 tons ha⁻¹ to 43.8 tons ha⁻¹.

To expand tea area and equip tea factories with new assembly lines is one of measurements to promote a tea sector. Tea area has, currently, been expanded in Doan Hung, Thanh Ba, Ha Hoa and Song Thao districts where climatic and soil conditions are favorable for tea.

Table 10 Conventional and organic tea production in Phu Tho province (MHR)

Year	Conv. tea ^a			Org. tea ^b		
	Tea area --ha--	Harvest area --ha--	Producti- vity --tons/ha--	Output ^c --tons--	Organic farms -farm--	Organic tea area --ha--
1995	7446.0	6098.0	3.0	18407.0	-	-
1996	7114.0	6091.0	3.4	20872.3	-	-
1997	7166.0	6545.0	3.5	23155.4	10	1.0
1998	7651.0	6721.8	4.4	29393.0	16	1.9
1999	7885.8	6910.8	3.8	26410.5	31	3.6
2000	7893.0	6749.5	4.4	29346.0	38	4.2
2001	8436.8	7152.9	4.4	31322.6	44	8.6
G.R. ^d	2.1	2.7	6.6	9.3	44.8	71.2

Source: Phu Tho Statistical Department, 2002.

Note: ^a calculated for period of 1995 – 2001, ^b calculated for period of 1997 – 2001,
^d annual growth rate in %, ^c in fresh tea weight.

Regarding tea processing, fresh tea needs to be processed to achieve the highest quality tea products. The province has had modern and advanced tea processing assemblies to satisfy the target. In the province, there is existence of two ownership forms for processing, State and private. Regarding State tea processing, there are 8 tea-processing enterprises equipped with Russian and Indian assemblies under technologies of CTC and OTD, having total capacity of 210 ton day⁻¹ or 28,400 tons year⁻¹ (Phu Tho Department of Agriculture and Rural Development, 1999). These enterprises are under management of VINATEA, a short name of Vietnam Tea Corporation. In aspect of private tea processing, each district has several small tea processing assemblies with equipments and machines made in China and Vietnam. These units employ family labors or sometimes hired- labor when their production capacity is expanded. After having been processed, processed tea is sold to traders and consumers.

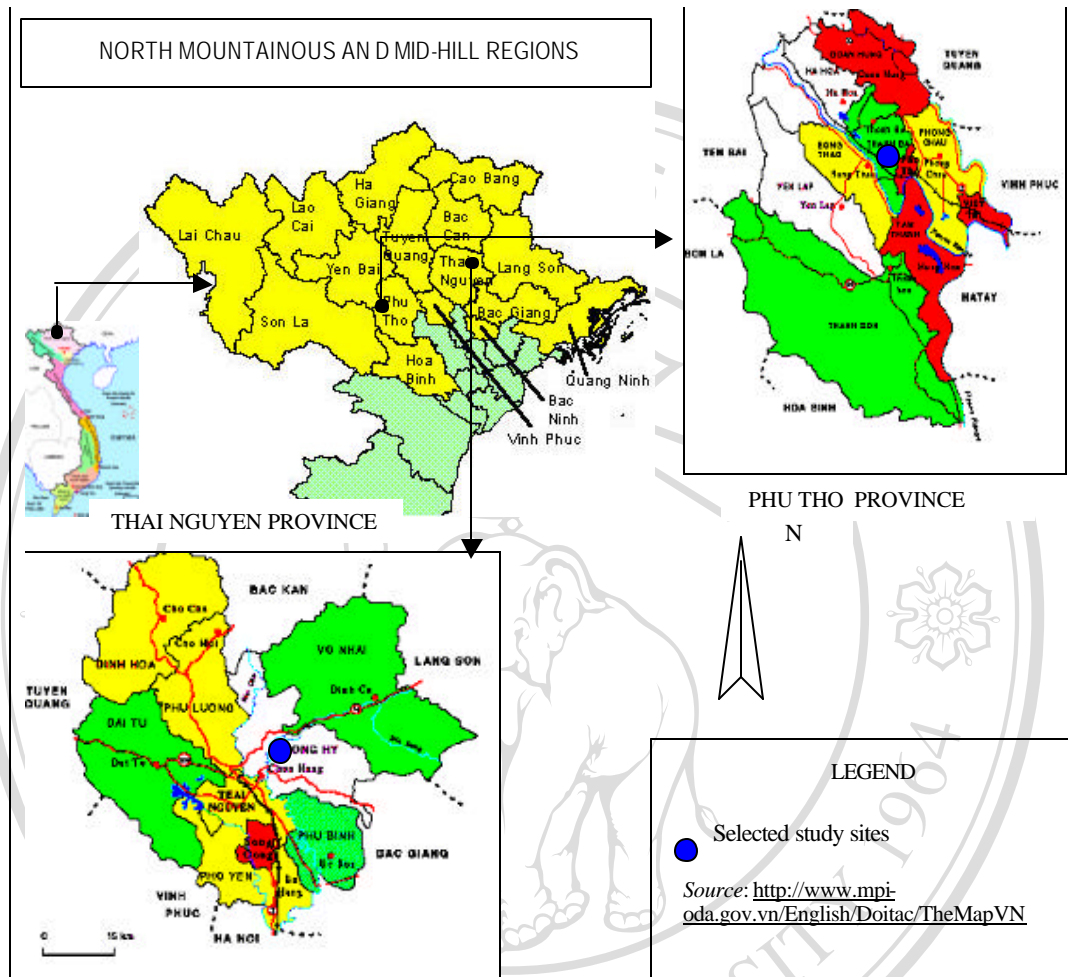


Figure 6 Map of study sites

As reflected in Table 10, number of organic tea farms in Phu Tho province was rapidly increased throughout from 1997 to 2001 (45 % a year); likewise, areas were increased as much as 71 % a year, however, absolute figure was shown inconsiderable increase (34 tea farms and 7.6 ha increased more, respectively). Anyway, it is proved that tendency of organic tea development is being existed in the province.

Organic tea production in Phu Tho province was developed more hardly than it was in Thai Nguyen because of its unstable output market. The sampled organic tea farmers, at present, sell tea products to free markets at unfruitful price, while price paid by the Hanoi Organics organization is so high.

Recognition on this product of majority consumers is so poor, it was proved that only small group of consumers, i.e., high-income people and foreigners, is interested in the products. In general, organic tea has currently been considered to be similar to conventional tea, thus consumers only pay higher a bit price than conventional tea.

5.2 Tea production

5.2.1 Perception and definition of tea growers

Tea farmers had knowledge and experience on conventional tea production. Tea farming practices, i.e., applying synthesized chemical fertilizers, and employing pesticide and insecticide in crop protection, were skillfully applied. Furthermore, they have, in recent years, known about organic farming practices by a project of CIDSE.

In general, perceptions on organic agriculture are newly for tea farmers in selected study sites. It has, in recent years, been introduced into these areas. In selected study areas, number of tea farmers knowing more or less about organic tea production was inconsiderable, except for tea farmers participating in projects of the CIDSE.

Selected organic tea farmers supposed that organic tea production was friendly with environment and raising farm income, while conventional tea farmers reported that organic tea production was risk, in particular, for the beginning of process converting conventional tea production to organic tea production.

Organic tea farms were inconsiderable (83 farms in Thai Nguyen and 44 farms in Phu Tho). Number of organic farms has gradually been increasing since 1997, because the conversion tea farms (account for 89% out of tea farms) were certified organically. But process of certifying conversion tea farms has been slowly taken place. Thus, to overcome this, Ministry of Agriculture and Rural Development completes the legislation conditions to establish one more certifying organization for the products. Number of tea farms, converted tea farms and certified organic tea farms are summarized in Table 11.

Table 11 Number of conventional, converted tea and organic farms by study sites

Study sites	Conventional tea farms	Converted tea farms	Organic tea farms	Tea land size ^a
Thai Nguyen	7500	721	83	1,974
Phu Tho	4430	453	44	2,310

Source : survey, 2002.

Note: ^a average for all organic tea farm, not sampled tea farms.

Conventional tea farmers neither need nor allow obtained any certificate for their tea farms, but organic tea farmers were stark necessary to receive the organic certificate for their organic tea farms. The certificate was from certifying organizations when certifying organization's officials has strictly controlled inputs. Final purpose is to in sure high quality of fresh tea.

Conventional tea farms that want to switch off organic farming need time to converse within 1 - 3 years, next the certifying organizations would come to inspect if obtain their standards, then these tea farms would be certified organically. However, after that, the tea farms are still periodically checked and controlled inputs used by the certifying organizations. At present, two organic certifying organizations in Vietnam are FoodLink (Vietnam) and ACT (Thailand). These organizations offer organic certification based on the standards of IFOAM. Vietnam is a member of IFOAM.

5.2.2 Characteristics of conventional and organic tea farms

Members and labors in family in conventional and organic farms were slightly different, average 5.3 and 5.0 persons, 2.3 and 2.7 labors in conventional and organic farm, respectively. Although sampled organic farm had more average labors than sampled conventional farm, but it still lacked of both skilled and unskilled labor for production. It was because a labor requirement in organic tea production was more than this in conventional tea production.

Table 12 Social characteristics of sample by systems

	Conventional		Organic		Difference (+/-) (3=2-1)
	Mean (1)	SD	Mean (2)	SD	
PERS ^a	5.3	1.0	4.9	1.1	-0.3 ^{**}
LAB ^b	2.3	0.7	2.5	0.8	0.3 ^{ns}
AGE ^c (years old)	44.1	6.3	42.3	6.9	-1.8 ^{**}
EDU ^d (school years)	5.9	1.8	7.9	2.7	2.0 ^{**}
EXP ^e (years)	15.3	2.4	4.7	1.4	-10.6 ^{**}

Source: survey, 2002.

Note: ^{**}, ^{*}, ^{*}, and ^{ns} : statistical significance at 0.01, 0.05, 0.10 and non significance, respectively, SD standard deviation. ^a person/family, ^b labors/family, ^c age of family head, ^d education level, ^e experience of family head.

Tea farmers for both systems are similar to each other in terms of having experienced to plant tea. However, as compared, surveyed organic tea farmers had not as experience years as conventional farmers, 4.7 and 15.3 years, respectively. Family head in organic tea farm was, in average, younger than conventional tea farm, 45.8 and 43.9 years old, respectively. These differences had statistically significance at the 0.05 and 0.1 levels (Appendix 2).

Table 13 Age, experience, and training courses of tea farmers by systems responding study sites

	Age ----years old----		Experience ----years----		Training ----times----	
	CTS ^a	OTS ^b	CTS ^a	OTS ^b	CTS ^a	OTS ^b
ThaiNguyen	45.1	42.7	15.7	4.3	3.0	12.1
PhuTho	46.3	37.6	14.9	3.7	5.0	11.7

Source: survey, 2002.

Note: ^a conventional tea system, ^b organic tea system

As compared between two selected study areas, average age of family head in Thai Nguyen (NMR) was higher than one in Phu Tho (MHR), 42.7 and 37.6 years old, respectively, and experience of farmers in both conventional and organic tea production in Thai Nguyen was better than one in Phu Tho. Organic farmer got more training courses on tea farming practices than conventional farmers because most of

them were under project of CIDSE. The sampled organic farmers attended averagely 12.1 and 11.7 times in Thai Nguyen and Phu Tho, respectively (Table 13).

5.2.3 Income of tea farm

Most of surveyed tea farms had some production activities, i.e., food crops, tea, fruit and livestock. Besides, some tea farms were engaged in off-farm activities such as tailoring, mechanical repairs, retired wage, handicraft, etc.

Table 14 Mean values and proportion of income in conventional and organic tea farms

	Conventional		Organic	
	Income --'000 VND--	Proportion --%--	Income --'000 VND--	Proportion --%--
<i>Thai Nguyen (NMR)</i>	9003	100	11541	100
Food production	1620.5	18.0	1292.6	11.2
Livestock	1593.5	17.7	2065.8	17.9
Fruit tree	1233.4	13.7	807.9	7.0
Tea	3520.2	39.1	5020.3	43.5
Others	1035.3	11.5	2354.4	20.4
<i>Phu Tho (MHR)</i>	8770	100	9650	100
Food production	1903.1	21.7	1823.9	18.9
Livestock	1604.9	18.3	1698.4	17.6
Fruit tree	1473.4	16.8	1032.6	10.7
Tea	2859.0	32.6	3734.6	38.7
Others	938.4	10.7	1360.7	14.1

Source: survey 2002.

As shown in Table 14, almost surveyed tea farms produce tea and earn the income from tea production activity in two systems, 39.1 and 43.5% of farm income in respecting to conventional and organic systems in Thai Nguyen, and 32.6 and 38.7% in Phu Tho. In conventional farms, proportion income from food production

was greater than that in organic system, i.e., 18.0% and 11.2 % in conventional and organic system, respectively.

Average income of tea farm in both conventional and organic was around VND 10 million per annum. However, income was ranged very large, from VND 1.2 million to VND25.0 million.

Table 15 Income class of tea smallholders in both systems

Income class --in VND--	% conventional tea farms (n = 56)	% organic tea farms (n=54)
4 – 7 million	30.4	24.1
8 – 10 million	35.7	25.9
11- 13 million	14.3	35.2
Above 13 million	19.6	14.8

Source: survey 2002.

Note: n =number of sampled farms.

The percentage of conventional and organic tea smallholders in each income group was summarized in Table 15. It was noted that 30 - 40 % of conventional tea respondents earn less than US\$ 800 annum, whereas, organic tea households was clustered in income group US\$ 1,000 annum.

5.2.4 Tea area, age of tea bushes and productivity

5.2.4.1. Tea land size and production relationships

In selected study sites, farm size was considerably larger than other in low land areas, i.e., each farm owned 2000 - 3000 square meter of land, where some food crops, fruit crop, and tea were grown. Average tea land size of the selected organic farms was 1,100 sq. m in Phu Tho and 1,245 sq. m in Thai Nguyen. With current tea area, tea farmers in both systems tried to obtain the highest yield. Average yield of fresh tea at conventional tea farms was 611.0 kg per farm, and at organic tea farms was 514 kg per farm, or around 6.02 tons and 5.2 tons of fresh tea per ha. Tea area was different from each other between systems and among farms, ranged from 370 m² to over 3000 m².

Table 16 Tea farm classified by tea land size.

	Conventional		Organic	
	Farms (n = 56)	Proportion --%--	Farms (n=54)	Proportion --%--
< 500 m ²	6	10.7	11	20.4
500- 700 m ²	15	26.8	13	24.1
700 – 1100 m ²	20	35.7	20	37.0
> 1100 m ²	15	26.8	10	18.5

Source: survey, 2002.

Note: n =number of sampled farm.

As shown in Table 16, most of conventional tea farms were clustered in group of above 900 m², while organic tea farms were concentrated in group of 700-1100 m². Tea farmers who own more tea areas have advantages more than others because they can apply new farm practices and get much yield. Furthermore, with the New Land Law, they have the land utilization right for long term (40 years for perennial crop land). Besides, tea farms obtained the supports from government in farm development program. These have encouraged the m to invest more and more into tea production.

5.2.4.2. Age of tea bushes and productivity

Related to the issue, most tea fields has been planted by seeds for 14 - 15 years, e.g., proportions were 35.7 % and 25 % in Thai Nguyen and Phu Tho, respectively. In conventional tea production, age of surveyed tea gardens ranged from 12 to 17 years, in contrast, years of tea gardens certified organically ranged from 2 to 5 years.

Table 17 The sampled tea farms classified by age, systems responding to study sites

	Conventional				Organic*		
	--years-- < 8	8-12	12 - 16	> 16	1	1-3	3-5
TN ^a	5 (17.9)	6 (21.4)	10 (35.7)	7 (25.0)	4 (14.8)	13(48.1)	10(37.0)
PT ^b	6 (21.4)	8 (28.6)	7 (25.0)	7 (25.0)	9(33.3)	11(40.7)	7(25.9)

Source: survey, 2002.

Note: ^a Thai Nguyen, ^b Phu Tho, * determined by organic certified starting time, number in parenthesis was % of surveyed tea farms.

Though these organic tea gardens had as many years as conventional tea gardens. It was because most of surveyed organic tea gardens were converted from conventional tea gardens. However, there were also some organic tea fields new-planted. Organic tea farmers have harvested little fresh tea for two years. Proportions of tea farms having 1 – 3 years' organic tea gardens were 48.1 % and 40.7 % in Thai Nguyen and Phu Tho, respectively.

5.2.5 Tea varieties

Tea is perennial crop being popular in North Mountain and Mid-hill Region, with growth cycle of 25 - 30 years, even can harvest for 50 years if tea fields can be maintained and taken care well. It has fundamental period of 3 years. They are relatively to low temperatures but are also fairly low yielding. There were diversified tea varieties such as Trung Du, PH1, LPD1, LPD2, TRI777, etc. employed by surveyed tea farmers. In which, 'Trung Du' was local variety, and the remaining varieties were hybrid tea. These hybrid varieties brought high productivity in both conventional and organic tea systems. Most of them are belonged China tea forms.

Table 18 Tea varieties used by tea smallholder --% respondents--

	Conventional		Organic	
	Local ^a	Hybrid ^b	Local ^a	Hybrid ^b
Thai Nguyen	75.0	25.0	70.37	29.63
Phu Tho	77.6	22.4	74.07	25.93

Source: Survey 2002.

Note: ^a Trung du, ^b PH1, A1, PDP1, LDP2.

As shown in Table 18, most of the surveyed tea farmers employed local tea varieties (Trung du) in tea production, i.e., 75 % and 77.6 % of tea farm under Trung Du tea clone in Thai Nguyen and Phu Tho, respectively. Because some years ago there was a few hybrid and improved tea varieties that tea farmers had known and accepted in their tea farms.

Percentage of tea farmers employed a hybrid tea in new-planting and replanting was low. It shown the process of replacement of old and low yielding tea gardens has been occurred slowly.

Thanks to TRI, there were many hybrid tea varieties to be introduced to tea growers, namely PH1, LDP1, LDP2, TRI777. They have contributed into raising yield of fresh tea. Hybrid tea has advantages of high yield, drought tolerance, and pest resistance. Distribution of tea varieties was diversified. Extension Stations, TRI, and DARD were the main tea varieties suppliers in inputs markets. In addition, tea farmers also can make and keep tea seed themselves.

Table 19 Percent of respondent received tea varieties by different sources

	From DARD ^a	From TRI ^b	Self-made	Others
Organic	22.2	18.5	50.0	9.3
Conventional	17.9	30.4	42.9	8.9

Source: survey, 2002.

Note: ^a Department of Agriculture and Rural Development, ^b Tea Researching Institute

As reflected in the Table 19, most of tea varieties for new-planting was self-made by tea growers, 50 % and 42.9 % of surveyed tea farms using tea seeds which were kept from past seasons in organic and conventional systems, respectively.

5.2.6 Types of propagating materials

There are two types of propagating materials in tea new-planting, i.e., by seed and vegetation propagation (by cuttings). Plant raised from seed (tea seedlings) remained the favored planting material on commercial plantations in NMR. Plants propagated vegetatively (VP) from original plant are collectively called "clones" They are genetic copies of a single parent plant. It was in 1980s that the use of vegetative propagated high yielding tea bushes was recommended for replanting and new planting in tea state farms as well as in tea smallholders' farms.

Clonal tea generally has a higher yield potential than seedling tea due to its high density of harvesting points, strong spreading bush frame, evenness of flush, absence of tendency to dormancy or free flowering, and rapid growth. Most of tea small farmers new-planted tea in the past, so new-planting was by seed type, it led to last more 3 - 4 years long to harvest for first year.

Table 20 Conventional and organic farms classified by type of propagating materials
--% --

	Conv. tea		Org. tea	
	Seed	VP	Seed	VP
Thai Nguyen	82.1	17.9	70.4	29.6
Phu Tho	85.7	14.3	81.5	18.5

Source: survey, 2002.

In Thai Nguyen, proportion of conventional tea farms owning tea gardens under seedling tea was higher than this of organic tea farms doing this (82.1 % and 70.4 %, respectively).

5.2.7 Farm practices

Tea new-plantation

Tea can be new-planted by seedling and clones on the soil bed or furrows. After having finished to put it into soil, tea seedling need to be watered and provided nutrient for growth. To grow tea seedling throughout the time, chemical fertilization and manure has been applied in conventional tea production and bio fertilizer and compost, green manure were been applied in organic tea production with different doses. For planting tea seedling, land need to be prepared.

Like other countries producing tea worldwide, tea in Vietnam is grown on relatively steeply sloping sites where crops have not previously been grown, the forest, secondary bush or grassland should be cleared and all stumps and roots removed, preferably by burning. On steeply sloping sites, contour terracing will be essential and in valley bottom areas drainage may be required. They made seed beds and then put seedling into the holes, next watering for tea seedling. At that time, they can plant shading trees in tea gardens.

Shading trees

Shading techniques were to use for protecting tea seedling as well as matured tea bushes, and reducing the rate of transpiration, in other hand, insure the

microclimate in the tea gardens. Shading tree intercropped in the tea garden improved the yield of tea and quality of fresh tea.

Planting of shade trees has been associated with tea cultivation from its inception because tea was assumed to be a shade-loving plant. The trees generally used belonged to the family *Leguminosae* due to their advantageous characteristics of fixing atmospheric nitrogen in their roots. Both high and medium forms of trees species were used to simulate forest conditions, which were thought to be natural habitat of tea. Evidently, a majority of shade trials showed that their removal resulted in an immediate increase in tea yields. Conventional and organic tea gardens had shading trees; most of tea farmers planted shading trees that were suggested by agriculture department, however, there were so many shading species. Therefore, there were differences of employing shading trees in terms of species.

Table 21 Tea farms classified by systems and shading trees

	Conv. tea				Org. tea	
	<i>albizza</i>	<i>dap</i>	<i>pawllia</i>	others	<i>albizza</i>	others
ThaiNguyen	21	3	3	1	24	3
Phu Tho	22	2	2	2	22	5

Source: survey, 2002.

Table 21 presented that most conventional tea farms had shading trees of *albizza*, i.e., 21 and 22 tea farms in Thai Nguyen and Phu Tho, and organic tea had, too, the figures were 24 and 22 tea farms in Thai Nguyen and Phu Tho, respectively.

Most of conventional and organic tea garden intercropped with *albizza* shading trees, some were intercropped with forest trees (*pawllia*) or *grevillea robusta* (*poteaceae*) in some tea fields. *Grevillea* is large, evergreen, hardy tree that grows to a high of 20 - 30 m. When lopped at a height of 5 - 6 m, it spreads out at the top, forming a good canopy of foliage.

Pruning

Pruning techniques were conducted for both conventional tea and organic tea systems, and there was no difference in terms of pruning methods. The purpose of

pruning is to make the best table for pluckers and harvesting; and pruning period depended on tea shoots growth and tea plant height. Basically, there are some types of pruning such as collar pruning, medium pruning, top pruning, lung-pruning and skiffing.

Time of pruning was suggested that was definitely in winter season, in particular for Assam. One indicated that the best time for pruning is during a dormant period and also shown that pruning in the rains is disadvantageous. However, pruning can be conducted in dry weather, but should be at the early stage when the growth has slowed down.

Table 22 Classification of tea farms by systems responding to pruning interval

	Conventional		Organic	
	--Farms--	--%--	--Farms--	--%--
Annual	45	80.4	41	75.9
1 – 3 years	2	3.4	6	11.1
3 – 6 years	4	7.1	5	9.3
> 6 years	5	8.9	2	3.7

Source: survey, 2002.

A tea plant if allowed to grow naturally, would grow into a multi-stemmed tree about 5 - 6 m in height. But for commercial exploitation it is pruned periodically for easy harvesting purposes; for the maintenance of vegetative vigor; for bush sanitation by removal of weak decaying and dead branches, the shorter interval days being used for low - grow teas the higher ones for the higher grown teas. There was difference between both system in term of pruning time interval due to tea bushes age, and desire of tea farmers. As shown in Table 22, most conventional and organic tea farmers used pruning measures with interval of one year (45 % of surveyed conventional tea farms, 75.9% of surveyed organic tea farms), whereas in other countries, pruning occurred with interval of 3 – 6 years.

Mulching

Mulching measure protects the humidity for soil where micro- organism can be existed and generate the porosity of soil. Principle, mulching means covering the unprotected soil surface with a layer of organic materials. In selected study sites, tea farmers mulched soil surface in tea gardens by straws, forestry tree leaves, tea- leaf and branches after having pruning. Most of conventional and organic tea farmers who applied mulching measures to use different materials, however, there were not differences between both systems in the aspect of technique, and only different from each other in materials. There was no data in detail for the issue, and the results were from observation in field survey.

Irrigation management

Tea farmers have irrigated tea bushes to raise yields of fresh tea. They used electric pumps to irrigate tea. However, proportion of tea farms in both system use pump to water was not so much, 28.57 % of conventional tea farms and 37.95% of organic tea farms irrigated tea in a dried season Thanks to water, tea was rapidly grown and tea farmers harvested more rounds a year. Table 23 was summarized for the topic.

Table 23 Tea farms classified by irrigating conditions --% surveyed farms--

	Conventional		Organic	
	Watered	Non-watered	Watered	Non-watered
Thai Nguyen	32.14	67.86	40.70	59.30
Phu Tho	25.00	75.00	35.20	64.80
The whole	28.57	71.43	37.95	62.05

Source: survey, 2002

The surveyed tea farmers supposed that they liked to irrigate their tea gardens, but they could not afford because of constraints such as empty water sources and difficulty in exploiting underground water, and too far distances from the streams. Most of the tea farmers realized the water and tea yield had close association. They said that irrigating tea in dried season made tea yield improved and tea leaf greener.

To assist tea farmers, some projects for irrigating tea, at present, was being conducted by the DARD.

Manuring

Tea farmers in both tea systems applied kinds of fertilization to supplement a nutrient for soil where tea was planted and uptake the nutrient from. For conventional tea production, conventional tea farmers applied synthesized chemical fertilizers such as nitrogen, potassium, and phosphate according to suggestions of fertilization dose from extension and agricultural division of the locality, while organic tea farmers applied organic fertilizer, compost, and manure for their tea gardens. The difference was because of different characteristics and standards between two tea systems. Average inputs used were summarized in Table 24.

Table 24 Comparison of average input used between tea systems (*per farm*)

	Unit	Conventional		Organic		Difference (+/-) (3-2-1)
		Mean (1)	SD	Mean (2)	SD	
Urea	kg	40.2	48.7	0.0	0.0	-40.2
Potassium	kg	26.7	28.7	0.0	0.0	-26.7
Phosphate	kg	7.8	11.6	0.0	0.0	-7.8
Org. fertilizer	kg	0.0	0.0	1001.8	824.0	1001.8
Manure	kg	1291.3	1056.3	944.9	1173.4	-346.4**
Compost	kg	0.0	0.0	935.3	438.8	935.3
Chemical	'000 VND	38.9	39.1	0.0	0.0	-38.9
Labor	man-day	74.2	41.5	120.1	70.6	46.0**

Source: Survey, 2002.

Note: SD standard deviation, ***, **, *, ns: statistical significance at 0.01, 0.05, 0.10 and non significance levels.

The sampled conventional tea farmers applied averagely 40.2 kg urea, 26.7 kg potassium, 7.8 kg phosphate per farm (average tea area of 1,324 m²), while organic tea farmers applied averagely 1001.8 kg organic fertilizer, 944.9 kg manure, 935.3 kg compost for farm (average tea area of 1,042 m²). The chemical fertilizers were purchased from agricultural material shops. At survey time, their prices were VND

2,000 per kg urea, VND 1100 per kg potassium, VND900 per kg phosphate. Organic tea farmers purchased organic fertilizer (in case of surveyed organic tea farmers in Thai Nguyen) at price of VND700 per kg. Organic fertilizer, i.e., bio-urea, was produced by the Micro-Biological Fertilizer Center in University of Science and Social, Humanitarian.

Some organic tea farmers purchased waste from livestock farmers to compost. After that compost were applied in their tea fields. In Phu Tho, organic farmers was not accessed supplier of to organic fertilizer i.e. bio urea, so they only used green manure and compost to apply into their organic tea gardens. Average amount of fertilizer applied per ha also was summarized in Table 25.

Table 25 Comparison of average input used by tea systems (*per ha*)

Items	Unit	Conv. Tea		Org. tea		Difference (+/-) (3=2-1)
		Mean (1)	SD	Mean (2)	SD	
Urea	<i>kg</i>	266.0	231.1	0.0	0.0	-266.0
Org-fertilizer	<i>kg</i>	0.0	0.0	8328.1	4630.9	8328.1
Potassium	<i>kg</i>	232.0	200.1	0.0	0.0	-232.0
Phosphate	<i>kg</i>	62.2	64.5	0.0	0.0	-62.2
Manure	<i>tons</i>	9.9	4.7	8.0	7.4	-1.9**
Compost	<i>tons</i>	0.0	0.0	10.1	4.1	10.1
Chemical cost	<i>'000VND</i>	318.7	287.2	0.0	0.0	-318.7
Labor	<i>man-day</i>	581.8	179.3	1102.6	411.6	520.8**

Source: survey, 2002.

Note: SD standard deviation, ***, **, *, ns : statistical significance at 0.01, 0.05, 0.10 and non significance levels.

As converted equivalently, the result indicated that average rate of manure applied in organic production was less 2.7 tons per ha than conventional production, average labor employed per ha in organic tea production were more 420.8 man – days than this in conventional tea production.

Crop protection

There was basic difference between both systems in terms of crop protection. Conventional farmers used a pesticide to control pest, namely Trebon 10EC, Padan 95SP, Sherpa 25EC, Danitol 10EC, while organic farmers used herbal content, botanical, soft soap, *derris*, *pyrethrum* to control pest. In addition, organic tea farmers spent many hours to capture pest by hand or traps. In conventional system, most tea growers used chemical to cure tea diseases, i.e., tea branch disease, while organic tea farmers used herbal contents to do this.

Derris, natural contact insecticides, was used in pest control was reported in study areas. Tea farmers applied fluently the IPM techniques to support, too. Major pests in tea fields reported by tea farmers were mosquito mite, and red spider mite, spider. It was reported that tea diseases occurred popular for tea plants were blister blight (*exobasidium vexans*), red root disease (*poria hypolateritia*).

Other practices

As principled, organic farming concentrates all enterprises in the farm, except for the beginning stage of organic production. Therefore, in the sampled organic tea farms, some activities were not applied organic farming practices. The non-organic activities can affect organic tea production environment due to its chemical toxic and content of inputs used.

Table 26 Width of buffer zones between organic and non-organic activities

	Conventional tea	Organic tea
Thai Nguyen	min: 0.8m max: 3.4 m	min: 10.4m max 12.5m
Phu Tho	min: 0.5 m max :3.9m	min: 10.2m max 13.1m

Source: Survey, 2002.

Likewise, non-organic production farms neighboring organic tea farm causes contamination of water and soil. Consequently, organic tea farmers made the "living" fences among non-organic of at least 10 meters' buffer zone. These fences, i.e., Stylo grass and green manure crops helped organic tea production activity keep away from

the contamination of pesticides or fertilizers through run-off water. Width of buffer zones between organic and non-organic activities observed and reported by organic tea farmers were summarized in Table 26.

Harvesting

As observed in field survey, in most tea plantations, both organic and conventional tea gardens, tea was harvested by hand with group of female pluckers, even male pluckers. Process of harvesting tea was described the following. Two leaves and a bud were removed by twisting the shoot between the thumb and forefinger, then the shoots were thrown into baskets suspended on the back by a band around the forehead. Harvesting usually begins after three years, for bushes propagated from seeds but vegetatively propagated plants may come to maturity somewhat earlier. Due to the variation in maturity and rate of growth of the many lateral branches of which the plucking table is composed, it is generally possible to harvest tea every 5 to 10 days at low elevation. At higher elevation this period may extend to 14 days. In study sites, the sampled tea farmers harvested averagely 7 - 10 rounds a year or interval of ten days' plucking.

For each round, they obtained average 100 - 120 kg of fresh tea if they owned tea area of 1,000 - 1200 m². Average yield of fresh tea in conventional tea farms attained averagely 5 tons of fresh tea per ha while organic tea farms did averagely 4.2 tons of fresh tea per ha (Table 27). As compared, organic tea farm obtained average yield and tea land size less than conventional tea did.

Table 27 Comparison of the average output per farm, tea size of farms by systems

Items	Unit	Conventional		Organic		Difference (+/-) (3=2-1)
		Mean (1)	SD	Mean (2)	SD	
Output/farm	kg	603.3	433.2	519.1	377.6	-96.7*
Tea size/farm	m ²	1324.0	679.8	1042.3	429.7	-194.3*
Yield/ha	kg	4389.1	1812.9	4253.6	1968.3	-136.5*

Source: survey, 2002.

Note: SD= standard deviation, * statistical significance at a 0.10 level.

The differences between average of two samples, conventional and organic tea farmers in terms of output, area, had statistically significance at the 0.1 level (Appendix 2).

5.2.8 Labor employed

In tea production, labor is also considered as input of production process. The surveyed organic tea farm, in average, employed more man- days than conventional tea farms, 1102 man days per ha as compared with 581 man-days per ha (Table 25). This was for the reason that organic tea farmers consumed more time or human days for activities, i.e., catching insects, transporting a manure and compost to the tea fields.

Generally, in peak seasons, the sampled conventional and organic tea farms either hired or exchanged labors to assured smoothly operating farm activities. Organic tea farms hired labor more than conventional tea farm did because of a bit difference between family labors in conventional and organic tea farms. It was proved that 60% of the surveyed organic tea farms hired labor while only 40% of the sampled conventional tea farms did such.

5.2.9 Tea production cost

Major financial indicators such as expenses for inputs, total cost, gross return, were calculated in short term (tea season year 2001). Tea production cost was different from each other between two systems in terms of variable cost, fixed cost.

In bearing period, organic tea production invested initially more VND 700 thousand ha⁻¹ than conventional tea production. The deviation was explained by higher cost for tea clone and maintaining the tea garden in first year (survival rate of tea seedlings in organic tea production was lower than that in conventional tea production). Depreciation value, one section of fixed cost, was the same between two production systems (VND 600 thousand ha⁻¹). The comment was from calculation of depreciation for above initial investment (for 40 years in conventional system and for 45 years in organic system).

Table 28 Comparison of tea production cost by conventional vs. organic systems ^a

Item	Conventional		Organic		Diff (+/-) (3=2-1)
	Quantity(1)	Value	Quantity(2)	Value	
	--kg--	--'000VND--	--kg--	--'000VND--	
A. Bearing period		26,010		26,710	700
B. Harvest period					
Direct cost		15,451.5		25,638.5	10,186.0
Urea	266	639.4			
Organic fertilizer			8328.1	4,727.5	
Potassium	231.07	369.8			
Phosphate	62.2	73.4			
Compost	-	-	10.1	707.0	
Manure	9.9	525.0	8.3	420.0	
Chemical		320.0			
Labor	581.8	13,472.0	1102	19,784.0	
Fixed cost		1,450.0		1,600.0	150.0
Depreciation ^b		600.0		600.0	
Taxation		600.0		600.0	
B.1 Total cost		16,901.5		27,238.5	10,336.9
B.2 Gross revenue	4,390.0	22,500.0	4200.0	29,400.0	6,900.0
B.3 Gross margin		7,048.5		3,761.5	-3,286.9
B.4 Net return ha ⁻¹		5,598.5		2,161.5	-3,436.9
B.5. Net return ton ⁻¹		1,272		514.0	

Source: survey, 2002.

Note: ^a average for 1 ha, ^b calculated from initial investment in A. section.

Total cost of organic tea production was more VND 10336.99 ha⁻¹ than that of conventional tea production. The deviation was expressed by major contribution of difference in the direct cost (direct cost had proportion of 90 % and 87 % of the total cost in conventional and organic tea production, respectively), especially in labor cost.

Gross return was calculated at farm gate price of VND 4,500 per kg of fresh tea and VND 7,000 per kg of fresh organic tea. Although gross return of organic tea production was as much as 6,900 thousand VND ha⁻¹ higher than that of conventional

tea, but due to total production cost of organic was much higher than this of conventional, therefore, net margin and net return were lower than these of conventional tea, VND 3.3 and 3.4 million ha⁻¹, respectively. Thus, organic tea growers sold their fresh tea, they obtained lower net margin and net return than the conventional tea growers did. Therefore, the organic tea growers should sell processed tea to get the highest profit. This would be discussed more in next section.

5.3 Tea processing

5.3.1 Ownership, products, and processing stages

Fresh tea is considered as material/input of tea factories. Both conventional and organic fresh tea needs to be experienced the processing stages to output as processed tea. There were difference between two systems in terms of ownership, capacity, kind of machine and equipment, source of provision, as well as final products (Table 29). Commonly, there are key two methods or technologies for processing tea, namely CTC (crushing, tear, curl), and OTD (orthodox). Conventional tea was processed by both methods, while organic tea was processed under CTC method. The CTC is different from OTD that need 'crushing' and tea processed under CTC can make more cups of tea than tea processed under OTD.

Regarding structure of tea processors, there were some types of processing ownerships such as state, joint-ventured and private (mini processing workshops) for processing conventional fresh tea, in contrast, family scaled processing workshops for processing organic green tea. For conventional system, tea was processed at big scale with two kinds of products namely black and green tea that satisfied the requirements of export, while fresh tea is processed into organic green tea in organic system.

The processing consisted of various stages to obtain the final products. The process from fresh tea leaves to processed tea can be expressed (1) processing stages of black and semi-fermented tea include withering, rolling, fermentation, firing, grading, and (2) processing stages for green tea include firing, rolling, drying and sorting. It was found there was no difference between systems in term of processing stages.

Table 29 Descriptive comparisons of kind and capacity of machines and equipment conventional versus organic tea systems

Criteria	Conventional	Organic
Equipment sources of provision	Modern assembly lines, OTC and CTC, from India, Japan.	Common, CTC method, from Vietnam and China engineering
Operational size	High capacity, medium sized, required over 3 tons material of fresh tea per day	Small scaled, in household, required under 1 ton of material of fresh tea per day
Generate of employment	Involve many labors	Some labors involvement
Economic performance	High processing cost	Low cost
Classification grade	OP, OPA	OPA, fannings
Products	Black and green tea	Organic green tea
Ownership	State, private	Family, member of co – op

Source: survey, 2002

5.3.2 Capacity, machine and equipment

For conventional system, most fresh tea was processed tea factory, having high and medium capacity, i.e., 8 - 10,000 tons per day, 3 - 5 tons per day, respectively, under processing modern assembly lines from India, Russia, and Japan, while organic tea was processed at small- scaled processing unit, requiring 700 - 1000 kg fresh tea per day. The units' equipment and machines were made by Vietnam or Chinese engineering sectors. Final product was organic green tea. Currently, there is less area and output, so it was hardly to process tea with high capacity tea factory. In coming years, if the area of organic tea is expanded, tea factory specialized on processing organic tea should be established.

Table 30 Number of processing units in the sample

	Conventional		Organic	
	Quantity	%	Quantity	%
Thai Nguyen	6	21.4	8	29.6
Phu Tho	5	17.8	7	25.9

Source: survey, 2002.

Processing organic tea is not different from processing conventional tea. Tea was processed at farms, and processing included sections, i.e., withering, curling, drying, aroma, and packeting. Processing machines and equipment included steel drying oval, and manual or electric-run roll. Drying was using energy of electric and firewood. As shown in Table 30, there was no difference in number of processing units even though organic tea was processed in family-scaled size more than conventional tea was.

5.3.3 Grading tea

The black teas are divided into three major categories: whole leaf teas, broken leaf teas, and powdered leaf teas. These categories are subdivided into several grades, depending on the type of harvesting and treatment they undergo. Nevertheless, the quality of a tea does not depend on the size of its leaves, but rather on its provenance, and the type of plucking. It should be noted that a powdered leaf will give a stronger tea than a broken leaf, and that the latter will be more robust than a whole leaf tea. The classification is basically similar for the green teas. In selected study areas, final products were classified into some kinds, for conventional tea, there were OP and OPA in black tea, gunpowder for green tea, in turn for organic tea, there were kinds of OPA, gunpowder and fannings.

5.3.4 Packaging, labeling and trading

Packaging was different from each other among purposes and systems, i.e., for storing or transporting or trading; likewise, organic or conventional tea.

For storing and transporting: processed tea is often packed and wrapped with nylon and metal paper, or in jute bags, in wooden box in order to store in good conditions after they leaved from processing units. In tea enterprises, the products can be packed in jute bags of 50 kg, 100 kg according to TCVN standards; thereafter they can be transported and exported.

Table 31 Packaging kinds of conventional versus organic tea

Conventional	Organic
Jute bags, nylon bags, carton box, wooden box, weight 50 kg, 100 kg for storing and transport. ✓	
Nylon bags, weight 20 kg, 50 kg, 100 kg for storing and transport.	✓
Products : 100 gram, 250 gram, 1 kg in paper box, tin box, metal paper sachet ✓	
Products : packed in 250 gram and 500 gram in metal paper	✓

Source: survey, 2002

For selling: the products from trade companies can be packed in metal box and carton box with trade labels that attract the consumers. For conventional tea trading, experience and capability is better than this for organic tea. As regard with organic tea, it was observed at farm level, organic tea farmers stored processed tea in a room with areas of 10 - 15 sq. m., and packed it in nylon and jute bags not according to any standards. It means that there were bags of 15, 17, 20, 150 kg, however for selling product, organic green tea was packed in box or bag made of metal paper with weight of 250 gram and 500 gram. There were trade labels of company or cooperative on bag surface.

5.3.5 Tea processing cost

Comparison between average expenses in kind for 1 tons processed tea in each system was shown in Table 32. The same output of 1 ton processed tea, the results showed that average fresh tea used for processing was different from each other, organic green tea used 3.5 tons for 1 tons of processed tea, while in tea factory, used 3.9 tons for 1 tons processed tea.

Table 32 Comparison of inputs used in kind for processing 1 tons of processed tea

Category	Unit	Conventional (n=7)				Organic (n=16)	
		Black tea		Green tea		Organic tea	
		mean	SD	mean	SD	mean	SD
Fresh tea	<i>tons</i>	4.8	2.1	3.9	1.8	3.5	1.7
Material used							
Fire wood	<i>STE</i>	8	3	7	2	6	2
Fire coal	<i>kg</i>	-	-	10	2	4	1
Electric	<i>kW</i>	1000	150	600	120	600	120
Water	<i>m³</i>	4	1	2	0.8	2	0.7
Diesel	<i>kg</i>	-	-	150	27	120	26
Auxiliary oil	<i>kg</i>	1	0.3	1	0.3	1	0.3
Labor	<i>manday</i>	57	19	57	19	52	14
Packs	<i>pieces</i>	30	12	30	12	20	11

Source: survey, 2002.

Note: n = surveyed tea processors

Labor expense on processing organic green tea was less than this on processing conventional green tea, 52 man –days/tons of product as compared to 57 man – days/tons of product.

Direct costs for processing tea in tea factory as well as in family households encompassed all costs or expenses to get the final product, processed tea. They included expenses for firewood, fodder, water, electricity, labor, etc.

Table 33 Budget analysis for processing 1 tons of processed tea

--1000VND--

Category	Conventional		Organic	
	black tea	green tea	green tea ^a	green tea ^b
Total cost (TC)	24539.2	20705.6	25135.6	25135.6
<i>Direct cost(VC)</i>	23896.2	20015.6	24765.6	24765.6
Fresh tea	21600	17550	22550	22550
Material used	2296.2	2465.6	2215.6	2215.6
Fire wood	280	280	280	280
Electric	700	420	420	420
Water	1.2	0.6	0.6	0.6
Diesel		450	450	450
Auxiliary oil	10	10	10	10
Labor	855	855	855	855
Packs	450	450	200	200
<i>Fixed cost(FC)</i>	643	690	370	370
Depreciation	263	270	50	50
Maintenance	100	300	300	300
Management fee	280	120	20	20
Total return (TR)	28000	24500	45000	30000
Net return (NR)	3460.8	3794.4	19864.4	4864.4
NR/Labor(times)	4.0	4.4	23.2	5.7
NR/TC (times)	0.1	0.2	0.8	0.2
NR/VC (times)	0.1	0.2	0.8	0.2

Source: survey, 2002.

Note: ^a calculate at price 45,000 by prior contract of Hanoi Organics organization, ^b at price 30,000 VND/ kg by selling to free market.

Fixed cost included management fees, depreciation of machines and equipments. The cost for processing was differed from both systems and type of processing, processing units. Comparison of gross margin for both systems is shown in Table 33.

Total processing cost of conventional and organic green tea rather differed from each other because in tea factories, management fee, machine depreciation were much more than these in the small- scaled processing units. Net margin of processed organic tea was higher than processed conventional tea (VND 19.8 million per tons as compared to VND 3.8 million per tons) because organic processed tea obtained at premium price, when organic tea growers sold to Hanoi Organics organization, in another case, when they sold to free market, net margin of processed tea was also higher than this of conventional tea, VND 4.9 million per tons as compared to VND 3.8 million per tons.

As shown in Table 33, if fresh tea was processed, and then sold to free market, net return was VND 19.8 million per tons. In tea production, net return per 4 tons fresh tea was VND 2.2 million (Table 28), as calculated equivalently for 1 tons processed tea without processing cost. Due to slight difference in price of fresh tea (VND 5,000 per kg of conventional fresh tea and 7,000 per kg organic fresh tea), organic tea farmers choose the processing alternative for obtaining the highest net return. Because share of local demand for the product was small, therefore, most organic tea farmers were in searching the ways to sell organic green tea to free urban markets or Hanoi Organics organization by prior contracts, to get high profit. This also pointed out that if conventional tea farmer likes to switch conventional tea gardens off organic tea gardens, they would process tea before selling.

5.4. MARKETING

5.4.1 Marketing channels

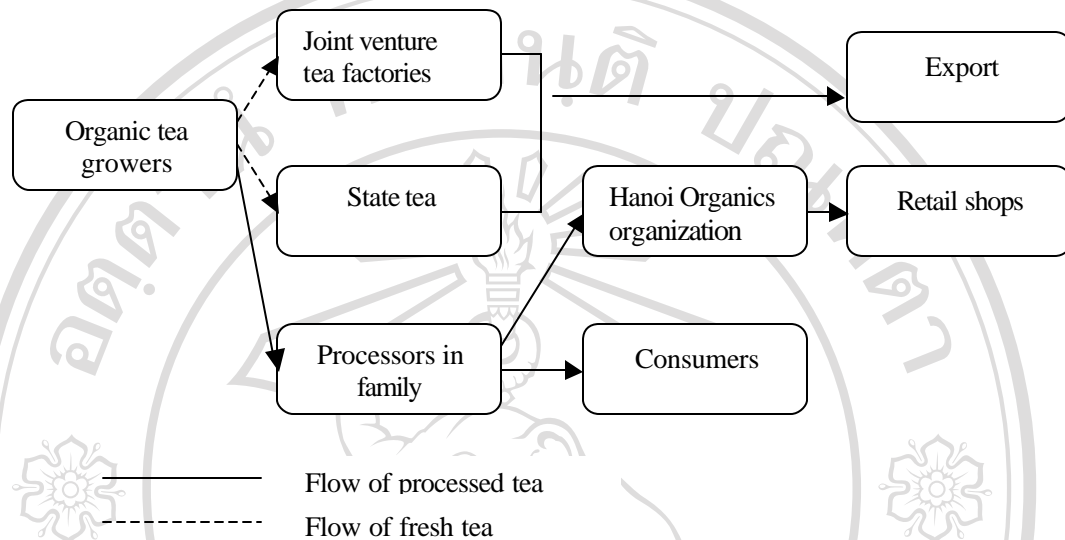
Channels of organic tea

Organic tea growers processed the fresh tea, then sold processed tea to Hanoi Organics organization with 50% of products which they produced, the remaining was sold to free market in case of Thai Nguyen organic farmers, in contrast, 10% of organic tea products was sold by prior contract, remain was sold to tea factories in fresh tea and to free market in processed tea in case of organic tea farmers in Phu Tho.

Hanoi Organics organization is one of NGOs that has business on organic products such as vegetable, fruit, and tea. The organization has organic shops scattered in Hanoi that are shown the organic products to consumers. It has also taken part in Organic fair trades, which are often organized in Hanoi. Last time, the organization was taking part in exhibition of drinking products in Giang Vo, considerable customer came and have an interest in new products i.e. organic tea, but before they only heard about clean and safe-chemical tea i.e. Shan tea, Suoi Giang tea, tea with IPM management practice. Hanoi Organics organization was established in September 1999 as a non-profit company to promote Organic Agriculture. It supports small farmers in converting their farms to Organic Agriculture and delivers the products from these farms to individual consumers through a subscription scheme. Retail to restaurants, hotels, shops and supermarkets is possible as well.

At the end of 2001, its staff included five Vietnamese and one expatriate advisor. The main focus in terms of crops is fresh vegetables, herbs and fruits, rice and green tea. Most products are sold on the domestic market in Hanoi, but small amounts of green tea were exported to Germany in 2001. In Hanoi around 40% of customers are Vietnamese, the rest are expatriates. The products have applied for certification through ACT Thailand.

Its objectives are: a) to serve as marketing channel for small-scale organic and "natural" farmers, following fair trade principles in its marketing activities, b) to provide linkages between consumers and producers for better understanding and co-operation between rural-urban communities, c) to provide technical assistance to other organizations on issues related to organic farming, organic fertilizers, waste recycling and trade issues in agriculture, d) to engage in sustainable development activities, especially those concerned with fair trade, organic food production and processing, conservation and promotion of local crops and varieties, community enterprise development, and the learning processes of producers, e) to provide services to local producer groups and to (potential) buyers in Western countries for the export of organic and/or fair trade goods, f) to support the sustainable/organic agricultural movement within Vietnam, the Asian region and world-wide.



Source: survey, 2002

Figure 7 Marketing channel for organic tea products

Other partners also purchasing fresh tea from organic tea growers were private processors and tea factories. The private processors would process organic green tea and sell their products to Hanoi Organics organization and urban cities consumers. State tea factories purchased fresh tea and processed high quality tea; however, they did not sort separately with name of organic tea. The price, which was relatively fixed by state tea factories' collectors, was around VND 6,000 and equivalent to first grade of fresh conventional tea that was used to sell to tea factories.

Other consumers of dried organic tea were relatives and friends of tea organic farmers. These people came to visit organic farmers and knew about the product which was good and assured for health due to no chemical residue existed in tea.

In short, marketing channel of organic tea is simple, at present, because consumers is few, in particular in rural it is hardly consumed since income of farmers is low, US\$108 - 130 per capita annum, though it has premium price but number of urban consumers is also limited and tea farmers had to sell by intermediate, Hanoi Organics organization. However, those are temporary constraints, the tendency is

promised because high-income class people have been increased more and more in recent years, the problem is poor recognition even unknown about the products.

Table 34 Percentage of tea farms sold tea by systems and objects

	Conventional	Organic
<i>Fresh tea</i>		
Sold to tea factories	50	20
Sold to factories+ free market	20	-
Sold to mini tea workshops	20	-
Self-processing and pay service fees	10	80
<i>Processed tea</i>		
Sold to free market	10	30
Sold by prior contracts	-	50
Sold to mid – men	-	20
Sold to wholesale	-	-

Source: survey, 2002.

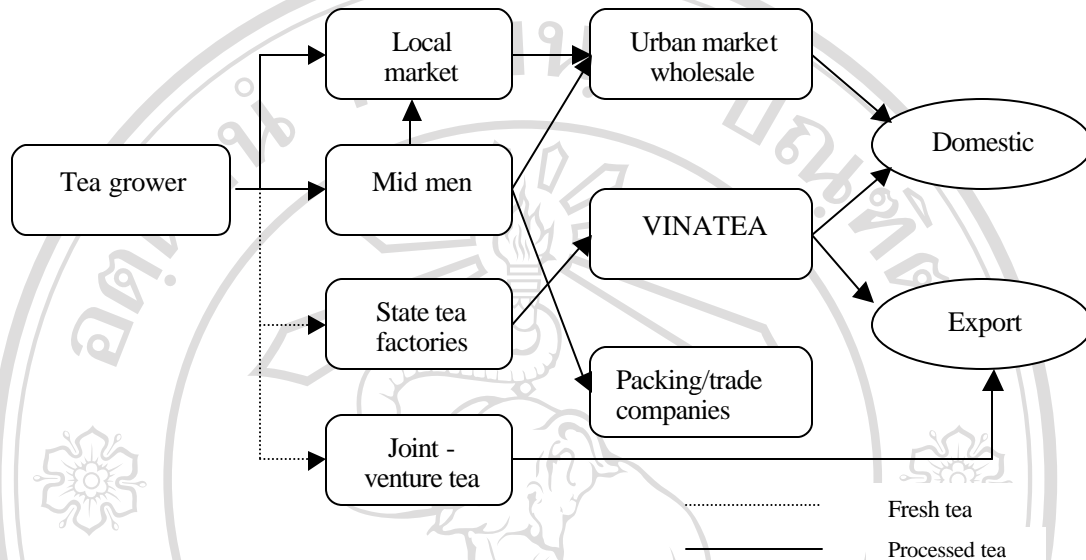
Channels of conventional tea

Not limited and narrow market like organic tea, conventional tea can be consumed more widely than organic tea because they have dominated both domestic and exporting tea markets for a long time, likewise consumers is more familiar with drinking conventional tea than organic tea.

Conventional tea farmers sold most fresh tea to tea factories and spare little bit for processing to consume in family. In both sites, Thai Nguyen and Phu Tho, this happened similarly. Major consumers were mid-men, tea factories' collectors, including State and joint ventured tea factories' ones.

State tea enterprises, private tea factories, and family processing workshops produce conventional tea. As for tea enterprises, their products mainly are for exporting and exchanging goods-to-goods with countries throughout the world. Minority of processed tea can be consumed domestically, for instance, Thai Nguyen

tea can flow to urban cities such as Hanoi, HCMC, Vinh, while Phu Tho tea can be consumed in Mountainous provinces such as Cao Bang, Lang son, etc.



Source: survey, 2002

Figure 8 Marketing channel of (conventional) tea.

At lower level, commonly, processed tea marketing flow can be arranged as follows: (i) Tea farmer → mid men → wholesale → retailer → consumers (processed tea), (ii) Tea farmers → collectors → enterprises → export (fresh tea).

In summary, it were found that there were differences between conventional and organic tea marketing in term of channels and flows, most of tea surplus that was produced by tea growers that were sold to tea factories around their homes, organic fresh tea mostly were processed in family - scaled units.

5.4.2 Price of tea

Price of conventional tea

Conventional tea farmers sold most fresh tea to tea factories, i.e., Song Cau tea factory in Thai Nguyen, and Thanh Ba tea factory, Phu Ben tea factory in Phu Tho at price of VND 5000 - 5,500 at survey time. With the prices, tea farmers cover the cost for tea production and obtain some profit. They also processed a part of fresh tea for

consumption in their family and to sell to free market at price VND 20,000 - 23,000 per kg providing tea quality and peak season. Prices of organic and conventional tea in both fresh tea or fresh tea and processed tea are presented in Table 35.

Table 35 Prices of tea products in selected study sites

	Conventional tea	Organic tea
<i>Fresh tea</i>		
Farm gate price	4,500-5,500 VND/kg	5,500 –7,000 VND/kg
Wholesale price	-	
Retail price	6,000 VND/kg	7,500 VND/kg
<i>Processed tea</i>		
Farm gate price	18,000 VND/kg	
Wholesale price	19,000 VND/kg	55,000 VND/kg
Retail price	21,000 – 23,000 VND/kg	80,000 – 100000 VND/kg

Source: survey, 2002

Price of organic tea

There are differentiations of tea prices providing of consumers and processor, or wholesale or retail. Fresh organic tea was sold to tea factories at VND 6,000 and 6,500 per kg, and to private organic tea processors at VND 7,000 per kg. Even in the peak season, fresh tea may be amounted of VND 10,000 per kg.

Regarding prices of dried organic green tea, it was found that price in case organic farmers sold to Hanoi Organics organization is VND 55,000, even to VND 70,000 per kg, while is only VND 35,000 per kg conventional tea for familiar consumers such as relatives, friends, neighbors which is higher VND 10,000 than conventional tea. Hanoi Organics organization would distribute with retailing shops to serve high-income class such as foreigners, tourists. Retailing price can be attained averagely US\$ 4.3 - 5 kg⁻¹ for diversified tea products and various types of packaging such as using metal paper, nylon with paper box, nylon in tin box. In general, its price is relatively stable when organic tea farmers have an opportunity to wholesale by prior contracts to Hanoi Organics organization.

Table 36 Aggregate comparison of marketing conventional versus organic

	Conventional	Organic
Sorting	Many	Least
Packaging		
For transport and storage	Standard	Not standard
For selling	Standard	Standard
Price	Medium, flexibility	Premium, relative fixed
Market	Wide	Narrow, limited, niche
Consumers	Many, many income class	Less, high income class
Market entry	Easy	Difficult
Marketing structure	Competition	Monopoly (Hanoi Organics organization)
Marketing channel	Well established	Loose
Possibility of farmers involved in marketing	Likely	Unlikely

Source: survey, 2002

In general, price of organic tea in fresh or dried is higher than this of conventional tea, VND 7,000 per kg as compared with VND 5,000 per kg of fresh tea, respectively. Likewise, retail prices of organic are more premium than these of conventional tea, VND 7,500 and 6,000 per kg in fresh tea, and VND 23,000 and 100,000 per kg in dried, respectively. However, if only considering price, there is no clearly conclusion on efficient, loss and profit for each system. The financial and budget analysis for tea products by each system is addressed in previous section. Finally, aggregate comparisons in description of marketing practices of two systems were considered and analyzed in Table 36.