Chapter V

Results and discussion

5.1 Change in governmental policy during 1976-2000

Policy and economic development of Vietnam were divided into two periods as 1976-1986 and 1986 –2000.

5.1.1 The first decade after reunification 1976-1986

Concretely, government had some major policies to develop socio-economic as after reunification 1975, the government had policy about the compulsory collectivization of land and labour, and the concentration of peasant-owned farming machines under centralized control. This was the main, brought about a severe stagnation and deterioration in agricultural production throughout the whole country. Results from 1976 to 1980, Vietnam had to import 5.6 million tons of food. As agriculture accounted for nearly 50 percent of GDP, and as over 80 percent of the population were living in the countryside, any deterioration in agriculture and disturbance in the rural sector was bound to have a significant negative socio-economic impact on the whole country and the agricultural production remained at a standstill to until renovation policy in 1986 (Nam *et al.*, 1998).

5.1.2 The Doi Moi or economic renovation 1986 –2000

Policy aspects

December 1986, the government for overcoming the worsening socio-economic crisis launched the renovation policy. The Sixth National Congress adopted as its guideline the comprehensive renovation of the country's economic system in

December 1986. Since then, many institutional reforms have been carried out, of which the landmark for rural development was the Party Politburo's Resolution 10 at April 1988 on "Renovation of management of agricultural economy". Then came the Politburo Resolution 22 at November 1989 and Government Decision 72 at March 1990 on "Strategy of socio-economic development 1991-2000", and several other documents of legal validity that were successively promulgated. The essential contents and effects of the above-mentioned reforms were as follows

- To recognize the objective of co-existence of various economic sectors equal before the law.
- To return the decision on the use of labour and funds, and the right to long-term use of land, to peasant households, recognized as autonomous economic units.
- Regarding those cooperatives or production groups which still function well, to streamline their management apparatus, to focus on specific services, such as irrigation, pest control etc, that individual households cannot undertake effectively.
- To shift agriculture and rural economy from autarky to commodity production, depending on the characteristics and comparative advantages of each region.
- Besides the land use tax, peasants were no longer obliged to sell produce to the state at stipulated prices, but were free to sell them in the free market at mutually consented prices.
- To increase state investment in major irrigation works, to found credit banks to assist needy people with funds, and to promote agricultural extension work.
- To give guidance and assist in expanding education, health services, communication lines, power networks in the countryside on the basis of "joint efforts between the state and the people (Nam *et al.,* 1998).

The Land law at 1993 and the Labor law 1994 were legal validated and radically altered land tenure practices in Vietnam. Those laws given farmers the right to inherit, mortgage, transfer, exchange and lease land. These new property rights

have created an increased commitment on the part of the farming families to improve productivity through increasing investment, labors, machine and so on (FAO, 2000).

Economy aspects

In 1986 the Government of Vietnam embarked on the process of Doi Moi or economic renovation, which encouraged the development of the private sector and the market system. The market opportunities created by Doi Moi have stimulated the diversification of agricultural production. Agricultural diversification had resulted both in a reduction of poverty among agricultural households.

Doi Moi had produced impressive results in Vietnamese agriculture; in particular, four aspects of agriculture have been affected by the introduction of free-market mechanisms land tenure, rice production, diversification of agricultural production, and domestic and international trade of agricultural products.

5.1.3 The resolution and decision of Tra Cu district during 1976-2000

Tra Cu district had built the Resolution and Decision for development based on capacity and activities which suited local natural conditions but followed resolution and decision of central and provincial government.

5.1.3.1 1986-1990 period

Tra Cu Party Committee identified that expanded agricultural potential of district would be based on natural condition, as soil improvement was not good; irrigation systems were less developed and agriculture was less mechanized. Tra Cu district had many Khmer people groups with less knowledge in agricultural production most of people of district had poor standard of living.

During 1986-1990, Tra Cu district had launched strategies for agriculture development as flows:

Developing multiple crops to substitute mono traditional rice

Tra Cu district activity expanded efficiency upland crop models on the loamy-sand area of rice-based fields, established multiple and extensional crop models, especially as two seasons of modern rice, one rice – two upland crops. Applied dry direct seed method substituted traditional rice. Same problems were mentioned above, contributed for increased of total rice produces of whole district. Applied and expanded efficiency farming systems were successful, contributed for development of household economic.

Empowering landuse rights for farmers

This strategy of government looked back biggest successfully for Tra Cu district and whole country about agricultural development. That strategy affected for many social aspects such as encouraged farmers' investment about capital, labor force and so on into production. Results increased farming tools, agro-machines, etc.

Improving services and infrastructure for production and rural livelihoods

Tra Cu district had invested so many infrastructures as electricity line grids, irrigation systems, road systems, service stations that continued to stimulate to creating new productivities for rural and increasing product capacity of region.

Strengthen and perfection relationship socialism produce improved product distribution, closely linking between collectivity economy and household economy. This term, Tra Cu district had emigrational strategy, removed poorly people, who were landless, had no tools for agro-production to in where had tillage and divided for them to produce. That strategy was important solution, for go to meet established the goals about stable and improve life of poor people.

5.1.3.2 1991-1995 period

Some governmental workers identified this term was period of economic development and increased standard of living of rural people, Tra Cu district had strategy for the suitable developed with local natural condition as

Rural development

The fishery had closely linked with processing industry and rural jobs. Develop economic oriented diversity goods and many participation parts. Established and developed agriculture production models that were efficiency and suitable for each micro-ecosystem.

Expanded markets

Opening domestic market, increasing exchanged goods with other places for the stimulating of the production development and increased purchase of people, prevented monopolization of business to farmers.

Exchanged management mechanism into market mechanism under management of government. Supported poor households and multiply efficiency farming systems for developing community economy.

Established new rural goes on parallel with economic development

Tra Cu decided life of rural people that needs to improve and develop about many faces as rural road systems, electricity net, local markets, and local culture. All of reasons were mentioned above that were important factors, Direct affected, contributed and stimulated economic development.

5.2 Agricultural transformation in partially irrigated lowland rice-based farming systems during 1975-2000

Besides, the rapidly developmental steps of the regions in the Mekong delta as mentioned above, the maintaining of large areas of region that is slow changed overtime.

5.2.1 Change in the rice technology and production during 1975-2000

Technological change in rice production in Tra Vinh province during 1975 – 2000 was assessed through key informant interview and could be summarized as follows:

5.2.1.1 Transplanting methods

In Tra Vinh province, farmers had produced traditional rice more than hundreds years ago. Traditional rice had been considered as the rice that was special suitability with local conditions. The initiative time of rice farmers, who has started with simplify method without insects, diseases and fertilizer applied. But in that time, yield of the rice was very low about 1- 2 tons per hectare (District Statistic Department, 1995). The most of farmers in the study site used two time-transplanted method, it was used heavy labor forces for the production. The step by step, two time-transplanted method was substituted by one time-transplanting method, with this transformation in the traditional rice production was evaluated be developmental step in agricultural production of region (District Statistic Department, 1995). Because this method helps farmers to reduce production cost about labors, shorted time crop for limiting a damage of the crop on their field and sown of nursery and transplanted of seedlings at the optimum time were important for obtaining high paddy yields (TelMedPak, 2004).

The major reasons affected the substitution for two times transplanting by one time transplanting that were the results of aspects as irrigation systems of region

was better than last time; knowledge of farmers about crop management were improved and were increased more than year to year and so on.

Table 5.1 showed that two time-planting method was substituted one time-planting method, started in the term 1975-1985 was 80 percent and decreased to 10 percent in the 1986-1995 and 0 percent in the term 1996-2000. That also tells us to know the farmers' knowledge in the agricultural production had been enhanced overtime from 1975 to 2000.

Table 5.1 Change in transplanting methods in Tra Cu district before and during 1975 to 2000 (percentage)

Transplanting method	Before 1975	1975-1985	1986-1995	1996-2000
Two time-transplanting	100	80	10	0
One time-transplanting	0	20	90	100
Total	100	100	100	100

Source: District Statistic Department, 2002; survey, 2003

5.2.1.2 Methods of direct seeding (direct dry seeding or direct wet seeding)

Limited problems of modern rice production in study site were found that were many risking factors as: drought in the dry season; the intrusion of seawater; the destruction of mice or birds and etc. Some scientifics accorded direct dry seeding method was suitable than direct wet seeding for less fresh water for rice production, appropriate means to cover the dry seeds helps protecting the seeds from bird, rats and drought damage that were great reason for the encouraging of the farmers to change direct wet seeding by direct dry seeding.

The direct wet seeding had been decreased from 90 percent in the period 1975-1985 to 75 percent in the period 1986-1995 and 40 percent in the period 1996-2000 by the direct seed seeding that means the adaptation of new technique also update over year from 1975 to 2000 (Table 5.2).

Table 5.2 Change in direct seeding methods in Tra Cu district during 1975 to 2000 (percentage)

Direct seeding method	1975-1985	1986-1995	1996-2000
Direct wet seeding	90	75	40
Direct dry seeding	10	25	60
Total	100	100	100

Source: District Statistic Department, 2002; survey, 2003

5.2.1.3 Fertilization

The fertilizer using of rice farmers in the region had had so much limitation, transferred from using without the fertilizer in the traditional rice production to heavy using the fertilizers for nutrition commending of the modern rice. That reason makes farmers to see so much difficulty in their practices. The results of survey told us to know the first time of using the fertilizer farmers mistaken many misused as time apply, kinds of fertilizers used, specially this time farmers uses heavy urea than phosphorous and potassium reduce to break down balance between three macro elements were nitrogen, phosphorous and potassium (District Statistic Department, 2002; survey, 2003).

The fertilization of direct dry seeding remains an important research issue for rainfed agriculture, especially for direct dry seeding, minimize losses of nutrients and optimize yield will depend on the timing of fertilizer application and the kind of fertilizer materials. Adequate and timely application of fertilizer was a prerequisite for good yields, although the optimum quantity of fertilizer needed depends on the nutritional status of the concerned fields.

Table 5.3 showed the most farmers in study site misused the fertilizer with high percentage at 85 percent in the period 1975-1985 and decreased to 68 percent in the period 1986-1995 and to 25 percent in the period 1996-2000. That means the farmers' used fertilizers increased to better than from 1975 to 2000.

Table 5.3 Change in fertilizer use in Tra Cu district during 1975 to 2000 (percentage)

Using fertilizers	1975-1985	1986-1995	1996-2000
Misuse	85	68	25
Good use	15	32	75
Total	100	100	100

Source: District Statistic Department, 2002; survey, 2003

5.2.1.4 Pest management

When the farmers begun the shifting mono traditional rice to double rice, and other farming systems into an intensification, increased inputs, specially synthetic agro-chemical used that had broken down balance of natural ecosystem, sine then many kinds of insects and diseases attacked the crops, farmers had to face so much difficult appearing on their fields. The most of them misusing fewer than four aspects insecticides were applied at wrong time, wrong the way, no-correct insecticides or pesticides and farmers could not identify the economic threshold of their fields, and they used chemical control when the diseases appeared. Since then, chemical resident flowed into cannel systems, polluted water resources and natural ecosystem had been broken down and so on (District Statistic Department, 1995; District Statistic Department, 2000).

In the pest management on the fields, same Scientifics accord that, two problems can happen when farmers to use a chemical for controlling pest that was successful or no successful. In term the chemical using to need the farmers have high experiences in the identifying out four aspects as the time spray, the way using, the kinds and dosage of the insecticides and right kinds of diseases. Table 5.4 showed that, the farmers have identified the wrong time of application with 75 percent in the period 1975-1985 and it decreased overtime, to 62 percent in the period 1986-1995 and to 32 percent in the period 1996-2000. As other, the wrong method of application, the using wrong chemicals and the recognizing wrong diseases happened the same way with the wrong time of application in the control or management pest on the farms. That means the farmers' experiences have been improved following the time to

time. Other important aspects for us to evaluate farmers' technological knowledge in the practices, that was resistant seeding used in the production and apply integrated pest management (IPM) because resistant seeds have importantly role to prevent in the attacking of diseases on the crops and IPM method need the farmers to have high skill and experiences on the field. Table 5.4 showed number of farmers have applied IPM method and used resistant seeds the increasing from 0 percent in 1975 to 55 percent in 2000 and 25 percent in 1975 to 62 percent in 2000. That means the farmers in the study site to increase their skill and experience in term 1975-2000.

Table 5.4 Change in pest management practices of farmers in Tra Cu district during 1975 to 2000 (percentage)

	Pest management	1975-1985		1986-1995		1996-2000	
		Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Diseases	Wrong time of application	75	25	62	38	32	68
	Wrong method of application	54	46	35	65	21	79
	Used wrong chemicals	82	18	72	28	48	52
	Recognizing wrong diseases	85	15	52	48	17	83
IPM		0	100	25	75	55	45
Resistant seeds		25	65	45	55	62	38

Source: District Statistic Department, 1995; District Statistic Department, 2000

5.2.1.5 Weed control

The farmers in the study site have exchanged the weed control by hand to use herbicides, the percentages of the using the herbicides for controlling the weeds increasing from 0 percent in the period 1975-1985 to 15 percent in the 1986-1995 and to 75 percent in the period 1996-2000 (Table 5.5). Meanwhile, the weed control by hand decreasing in term 1975 to 2000 from 100 percent to 74 percent (Table 5.5). Because in the period 1975-1985, the most farmers grew traditional rice, that means traditional rice have highly capacity to compete with the weeds, some kinds of weeds will die or can not compete with traditional rice, but weeks grow faster than the

modern rice field and the modern rice have less capacity to compete with the weeds (FAO, 1997b). That was major reason to answer why the farmers increase the using of herbicides in the term 1975 to 2000. Other one the weed control by water, this way usually uses by good farmers with good irrigation systems (FAO, 1997b). Table 5.5 showed that the farmers use the water to control the weeds of the increasing from 35 percent in the period 1975-1985 to 55 percent in the period 1986-1995 and to 56 percent in the period 1996-2000. That means the farmers' knowledge about the weed control increasing year to year.

Table 5.5 Change in weed control practice in Tra Cu district during 1975 to 2000 (percentage)

Weed control	1975-1985		1986-1995		1996-2000	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Herbicides	0	100	15	85	75	25
By hand	100	0	85	15	74	26
Water	35	65	55	45	56	44
Average	45.00	55.00	51.67	48.33	68.33	31.67

Source: District Statistic Department, 1995; District Statistic Department, 2000

5.2.1.6 Water management

Judicious used of water was essential for obtaining good yields. For example at transplanting and until one week later, the depth of water in the field should be 3-4 cm. Higher water depths submerge the seedlings at this stage, and lower depths result in their drying. Seven days after transplanting, the water depth should be increased to about 8 cm. Water should remain standing in the fields continuously for 25-30 days after transplanting, otherwise weeds will grow profusely (TelMedPak, 2004). But in the study site, the agricultural production depends on unstable rainfall. Other one, after irrigation systems have been built. Especially, local cannel systems were perfected, but it only supplies water for about 45 percent area of community and 6

months of year was adequate water for their production. Some reports of local government, farmers of Tra Cu district have the knowledge in the water management lower than farmers living irrigated systems of the Mekong Delta (District Statistic Department, 1995; District Statistic Department, 2000).

5.2.1.7 Land preparation

The prepared land in the agricultural production that was important role to improve the efficiency using of fertilizers, limitation of weed population, soil texture, and so on (FAO, 1997b). Three methods to prepare land had been used in the study site little bit fluctuated between three periods 1975-1985, 1986-1995 and 1996-2000 that were the plough, the harrow and land leveling, but once plough and dry fallow period methods was transformed from 28 percent before 1975 to 84 percent in the period 1996-2000 (Table 5.6).

Table 5.6 Change in land preparation in Tra Cu district before and during 1975 to 2000 (percentage)

Land preparation	Before 1975		1975-1985		1986-1995		1996-2000	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Plough and dry fallow period	28	72	35	65	66	34	84	16
Plough	74	26	65	35	85	15	82	18
Harrow	65	35	55	45	56	44	61	39
Land leveling	46	54	36	64	58	42	48	52
Average	53.25	46.75	47.75	52.25	66.25	33.75	68.75	31.25

Source: District Statistic Department, 1995; District Statistic Department, 2000

5.2.1.8 Farmer training

Number of the farmers participate the training about the new techniques for producing of the agriculture that had increased from 0 percent before 1995 to 93 percent in the period 1996-2000 (Table 5.7) that told us to know a part of reason of

transformational process about the farmers' agriculture production knowledge into an increasing overtime.

Table 5.7 Increasing farmer participating in training in Tra Cu district during 1975 to 2000 (percentage)

Number of time	Before 1975 (%)	1975-1985 (%)	1986-1995 (%)	1995-2000 (%)
0	100	75	54	7
1– 2	0	15	29	61
3-4	0	10	17	25
>4	0	0	0	7
Total	100	100	100	100

5.3 Results of the process of agricultural transformation in partially irrigated lowland rice-based farming system during 1975-2000

5.3.1 Irrigation system

The farm households design their cropping structure of farming system upon some factors as fertile, sunlight and so on. Especially, the water is the most important factor.

Figure 5.1 showed, almost 10 folds increase during the last 25 years between 1976 and 2000; the irrigation systems were increased watering capacity from 2,700 in 1990 to 25,000ha in 2000. Through that, we can say the developmental irrigation system was main factor to affect on the transformation of the farming systems of region, that helped farmers to reduce the depending of rainfall in cropping seasons and expand time for their produce, was the same meaning with the increasing of the cropping season per time.

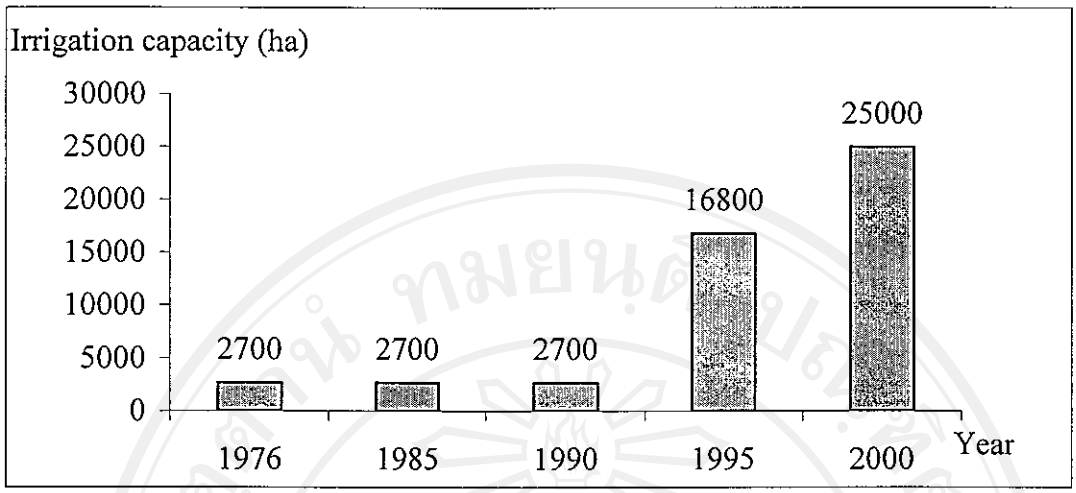

Figure 5.1 Irrigating capacity of the irrigation systems of Tra Cu district during 1976-2000

Source: District Statistic Department, 1995; District Statistic Department, 2000

5.3.2 The irrigation system in Tra Cu district in 1976-2000

The irrigation system of the study area was considered development at three levels such as lateral canal No. 1, lateral canal No. 2 and local canals. Table 5.8 showed that the lateral canal number one was not changed overtime at about length of 88.9 km from 1976 to 2000, the lateral canal number two were dug in 1995 and increased from length of 198.2 km in 1995 to length of 385.6 km in 2000 and expending local canals with total length of 1187 in 2000. That was main factor to expand the local canals irrigation facilities by building lateral number two and the local canals since 1995 to present.

Table 5.8 Development of irrigation system in Tra Cu District in 1976-2000

Year	Lateral No. 1	Lateral No.2	Local canals
1976	88.9	0	184
1985	88.9	0	184
1990	88.9	0	184
1995	88.9	198.2	866
2000	88.9	385.6	1,187

Source: District Statistic Department, 2000

5.3.3 Credit supported by government

The credit is important factor to develop Tra Vinh was poor province; the most people of communities had not enough cash for the produced. Especially, some communities have high density of Khmer ethnic group as Dai An village. The credits provided by government that was important cash to support farmers to invest into their production such as prepare lands, buy fertilizers, insecticides; take care on the field and etc. Table 5.9 showed that number of households were supported credit by government increasing to 6,654 in 1992 to 30,286 in 2000 with average credit that were also increased to 79 in 1992 to 736 in 2000 that was equivalent 9 folds. We can understand that the farmers receive the credit supported of government that was initiative factor to support them to improve their farms and change their production into intensification, extension and diversity production.

Table 5.9 Credit provided by government during 1992 to 2000

Year	No. Household	Total credit provided by government (1000VND)	Average credit/household (1000VND)
1992	6,654	525,500	79
1994	15,936	1,719,800	108
1995	21,279	10,000,000	470
2000	30,286	22,280,000	736

Source: District Statistic Department, 1995; District Statistic Department, 2000

5.4 Increase in planted area and production

Received the supporting of government about same aspects such as mentioned above, the response for those investment were the agricultural development at many faces as expanded agricultural area, increased yield and etc with steadily and rapidly development overtime. Table 5.10 proved about that, rice planted area increased 17 percent from 1976 to 2000, total rice production increased 164 percent in the last 25 years and yield increased 60 percent in the same time.

Table 5.10 Change in rice planted area in Tra Cu district during 1976-2000

Year	Rice planted area (ha)	Total rice product (tone)	Yield (tone/ha)
1976	26,793	55,484	2.480
1985	28,712	59,230	2.910
1995	28,712	80,306	3.260
2000	31,313	146,314	3.970
Increased %	17	164	60

Source: District Statistic Department, 1995; District Statistic Department, 2000