Chapter III

Research methods

To understand and analyse the factors that affect transformation of farming systems of the study site during 1975-2000. I divided those into two kinds of factors:

- Firstly, external factors were the changing technologies, infrastructures, governmental policy, markets and natural conditions.
- Secondly, internal factors were the farmers' current practices, crop yield inputs and outputs of each components in each farming system which an emphasis on characteristics of each farming system, the system performance and income.

3.1 Scope of the study

I carried out my study in Dai An village of Tra Cu district in Tra Vinh province. Dai An village was located along left bank of Hau river, it has been effected by many natural conditions as: drought, poor soil fertile, intrusion of seawater every year and fresh water shortage in the crop production season. Dai An village's agricultural development is developed very slowly, is typical village of Tra Vinh province with less economic development, poorest community, heavily dependent on agriculture, its irrigation systems are partial, agriculture has depended on the rain water.

3.2 Major farming systems

The farming systems of Dai An village were divided into four majority farming systems base on among areas of each farming system that has been planted in the real time of Dai An village as: Mono traditional rice system (MTRS), Modern rice- traditional rice system (MR-TRS), Mung Bean-traditional rice system (MB-TRS) and Taro- traditional rice system (T-TRS).

The study on transformation of rice farming systems in the partially irrigated lowland of Tra Vinh province and its consequences had the framework as Figure 3.1.

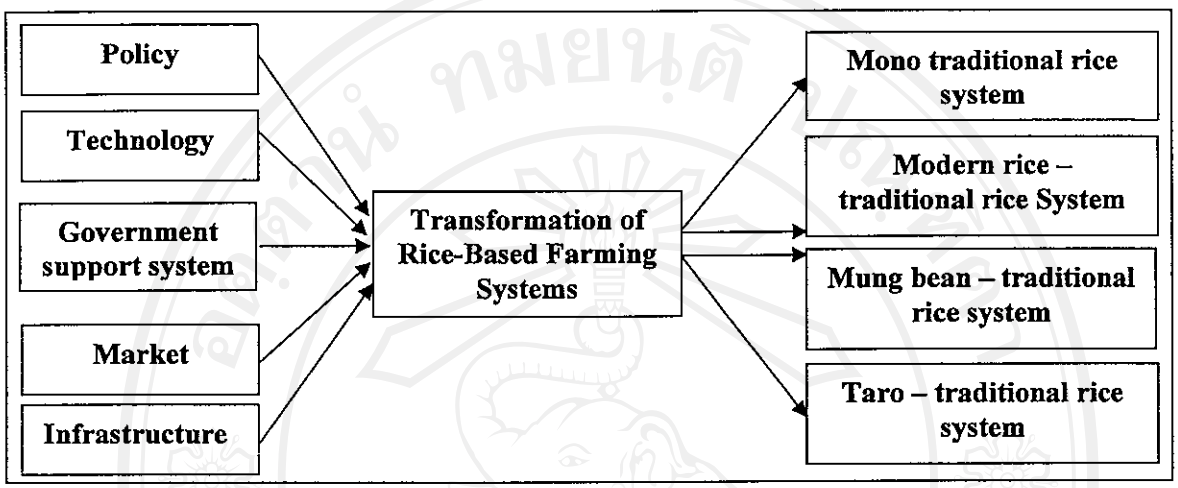

Figure 3.1 Research conceptual framework

3.3 Survey design

I used an unstructured interview approach to gain new insight and examine phenomena from different perspectives from key informants. The informal interviews were useful for providing background information for determining the issues to be addressed by the formal survey and as a guide for development of more structured questionnaire. The study was based on the primary and secondary data.

3.4 Sample collection

I selected purposive samples of 120 from 1,700 households in the study site with 30 each in 4 different cropping systems as: MTRS, MR-TRS, MB-TRS and T-TRS.

3.5 Data collection

Secondary data

The secondary data on government documents, provincial statistics, about policy, technology, market, infrastructure, and government support systems parameter in periods of 1975–1985, 1986-1995 and 1996- 2000 were collected.

Primary data

Farmer workshop

Before implemented the interview of individual household with the questionnaire, the group interviews were held in each relevant village in order to encourage the target farmers to discuss about constraints and opportunities of each landuse system for each period. Each interview involved a group of people who discussed a common farming system for each period. The discussion was recorded and used as qualitative data. In addition, village leaders and senior farmers with much experience were included.

Individual interview

Individual interview was conducted in each landuse system in each period. Individual interview was done with questionnaires, and in combination field observations.

Sampling technique

As mentioned above, farmer samples/each landuse system for interview/survey in the study area were identified through asking local officers, village leaders, and farmers who were senior people with much experience. And then the list of farmers/each landuse system for further survey was determined. Random

sampling from these groups of households/each landuse system carried out data collection.

3.6 Data analysis

Household survey analysis

Results of data collected from the household survey were coded, tabulated, and calculated by Microsoft Excel 2000. The descriptive statistic was calculated such as percentage, mean, frequency distribution, standard deviation and coefficient of variation.

To achieve the objective 1, the following data collected and analysis to find out the process of transformations:

- Changed in rice technology and production during 1975 to 2000
- Infrastructure changed from 1975 to 2000
- Market changed from 1975 to 2000
- Government support system changed from 1975 to 2000

To achieve objective 2, the following analysis was used:

- Productivity by crop productivity per unit area
- Stability by Coefficient of Variation, denoted by CV, which expresses the standard deviation, denoted by SD, or positive square root of the variance (V) of a sample of observations on a variable X as a percentage of the sample's mean value X. thus

$$CV = 100\left(SD / \overline{X}\right)$$

$$= 100\left(\frac{\sqrt{V}}{\overline{X}}\right)$$

$$= 100\left[\sum_{i=1}^{n}(X_i - \overline{X})^2/(n-1)\right]^{\frac{1}{2}} / \left(\sum_{i=1}^{n} X_i / n\right)$$

Where n is the number of observations, X_i is the i-th observation and W denotes the sum of the following values for i from 1 to n. the set of observations X_1, $X_2,\ldots, X_n$ may come from a simple generated across time or space or both.

o Profitability by gross margin analysis

o Diversity by use of DI (Simpson's diversity index) to measure the diversity of farm and farm related activities and income diversity ratio, denoted by R.

+ Simpson's diversity index, this is defined as

$$DI = 1 - \sum_{i=1}^{S}(n_i / N)^2$$

Where S is the number of species or activities that are present; n_i (for i = 1 to S) is the number of individuals in the i-th species or activities, or income or value of the i-th species or activity; and N $(= \sum n_i)$ is the total population of all individuals, or total area across all activities, or total farm income or value across all species or activities (McConnell, 1997).

+ Another convenient measure of income diversity is given by the income diversity ratio (R). It is defined as

$$R = \left(\sum_{i=1}^{n} R_i\right)^2 / \sum_{i=1}^{n} R_i^2$$

Where R_i (i = 1 to n) was the income from the i-th activity. Note that $1 \le R \le n$ for $R_i \ge 0$ and the larger the value of R, the higher the degree of income diversity (McConnell, 1997).

o Sustainability

The indicators for sustainability assessment at farm level that are (1) yield per land unit, (2) fertilizers used, (3) disease control, (4) weed control, (5) water management and (6) soil nutrition management. Based on the perception of the farming, the indicators of the sustainability will be assessed by scoring method (1 –3 – 5) with 3 indicates no significant impact, 1 indicates negative impact and 5 indicates positive impact.

The rating method (Malczewski, 1999) was used for comparison of four rice-farming systems based on the indicators: productivity, stability, profitability, diversity, and sustainability. In this point allocation approach based on predetermined scale of 100 points will be used (Malczewski, 1999).

The indicators for sustainability assessment at farm level that were (1) yield per land unit: if the yield of farm was between 2 and 3 tones per hectare that farm got number 1, between greater than 3 and 4 tones per hectare got number 3 and greater than 4 tones per hectare got number 5.

(2) fertilization: based on number kilograms of used fertilizer if the farm used between 0 and 100 kg per hectare, got number 5; between 100 kg and 200 kg per hectare, got number 3 and greater than 200 kg per hectare, got number 1.

(3) disease control and (4) weed control, I based on number of time used insecticides or herbicides. If farm used between 0 and 1 for insecticides or herbicides, got number 5; between 1 and 3, got number 3 and greater than 3, got number 1.

(5) water management: based on planting methods of farmer: if farmer used dry direct seeds, got number 5; transplanted, got number 3 and wet direct seeds, got number 1 and

(6) soil nutrition management was coded at three levels: Lowest was 1, medium was 3 and highest level was 5 for each indicator that depended on land prepared methods of each farmer.