

## CHAPTER V

### PLAN OF THE AGRICULTURAL INVESTIGATION AND TECHNIQUES OF ANALYSIS

#### Sources of Data

The following two chapters are concerned with the role of feeder roads in agricultural development, especially from the viewpoint of farm income. This chapter deals with the procedures employed and methods of analysis. Data which are of concern in these two chapters have been separated into two categories: (1) those pertaining to each project area,<sup>1</sup> and (2) those pertaining to the remainder of the area of influence of each of the two study feeder roads, after subtracting the land represented by item (1). Data pertaining to the project areas (Nong Plub and Cha Am) were gathered by the economists who have been involved with those projects. Data for the second category--land which is outside the project areas that is believed to have been influenced by the presence of the feeder roads--was surveyed by a group of interviewers employed especially for the present research. These field surveys began on the 1st June 1975 and were concluded on the 8th June 1975 for both feeder road areas. The questionnaires that

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The Huptapong Rural Development Project in Cha Am District, and the Hua Ein Land Development Project in NongPlub Sub-District. Descriptions are given in Chapter II.

were used to interview the non-project farmers contained more detail than those that had been used in the project areas. The reason for this difference is that the conditions of the farmer outside the project areas are much different to those of the project farmers. Land tenancy, farm size, transportation facilities, marketing arrangements, and financial borrowing capacity and loan facilities are some of the fields in which significant differences are evident.

#### Hypothesis and Primary Agreement

Even though project farmers and non-project farmers alike used the same feeder roads, the degree of accessibility and the level of transport facilities available may be quite different. Thus, transportation must be taken as one factor that influences the development of agriculture. Increased efficiency of transportation, which facilitates the movement of people and goods, increases opportunities for residents of the affected region to amplify social and business contacts with their neighbours. However, this is not the only factor that can contribute to increasing the personal income of farm families. Better transportation may stimulate people to improve farms, businesses, homes, and sanitation; to improve educational opportunities, and to combat sickness and disease.

The present research defined annual net farm income (baht/rai) as the sole dependent variable. Transportation, land

value, number of residents in dwelling unit, water, finance, markets, prices, and agricultural advisory services are primary variables that are usually not under the control of the farmer himself but are governed by others. The main secondary variables are: fertilizer, pesticide, seed, farm labor, credit, debt, cultivated area, and farming equipment. Within limits, these can be controlled by the farmer himself. This hypothesis is shown in functional form:

$$\text{NFI} = F (T, V, R, W, L, M, P, A, f, p, s, l, c, d, a, e)$$

where NFI = annual net farm income, baht/rai;

F = function;

T = transportation facilities;

V = land value;

R = numbers of residents in dwelling unit;

W = availability of water;

L = funds for investment and expenditures;

M = markets;

P = prices for products;

A = agricultural advisory services;

f = fertilizer;

p = pesticide;

s = seed;

l = farm labour;

c = credit;

d = debt;

a = cultivated area; and

e = farming equipment.

One important factor that is not taken into consideration in the above function is "quality of farming". Besides being difficult to measure, the level of quality may vary widely with time and conditions. An index that may represent it is the amount of work expended, in man-day units, but it would take a long time to survey properly the variables that could lead to an evaluation of quality of farming. Subsequently, in the present study, an attempt to evaluate this elusive factor is shown.

In this study, the author postulated the following:

1. The farmers who were interviewed told the truth about their income and expenditures.
2. The farmers remembered and disclosed information regarding all of their income and expenditures of the year previous to that in which they were interviewed.
3. The differences between groups of farmers due to the survey periods being slightly different were deemed not to be significant.
4. Other factors which may be operative--such as educational attainment of farmers, quality of farming, soil and terrain conditions, etc.--were initially taken as constants.
5. Small differences in surveying methods, such as slightly different wording, between groups of farmers were not considered to be significant.

6. The survey sample represented the whole population of farmers resident outside the project areas, but who were farming within the zone of influence of the feeder roads being studied.

#### Method of Data Sampling

As this study is a pilot project, the questionnaires that were used to observe the agricultural development in the area of influence of the feeder road were tested on two farmers before the field survey began. The preliminary testing was done to determine the duration of time that would be needed to conduct an interview, and to abandon or re-phrase those questions that proved to be invalid, unimportant, or in need of refurbishment. However, after the main field survey had been completed, there still appeared to be some questions that were invalid. These questions were subsequently eliminated from the analysis.

To represent the population of farmers outside the project areas, a stratified sample of farmers from each influenced area was interviewed; the characteristics of these samples are shown in Tables 34 and 35. These interviews amounted to a sample of 5.9 percent on the Hua Hin-Nong Plub feeder road, and 15.7 percent of the non-project farmers in the area of influence of the Huptapong feeder road. The number of samples in each village depended upon the number of farm families of a village. The sample was stratified by the wealth of farm families into **three** levels:

Table 34 - Sampling Array for the Non-Project Area in Hua Hin

Zone	Village	Number of farm families				Size of sample				Sampling rate, percent of farm families
		R <sup>1</sup>	M <sup>2</sup>	P <sup>3</sup>	Total	R	M	P	Total	
A	Walai	36	20	64	120	2	1	5	8	6.7
B	Huei Pak Ngam	10	69	59	138	1	6	5	12	8.7
	Huei Sai Yam	-	-	-	147	-	-	-	0	0
C	Nong Khon	25	75	98	198	2	6	7	15	7.6
	Nong Saw	10	60	20	90	1	6	2	9	10.0
	Nong Tapow	10	75	20	105	1	5	2	8	7.6
D	Nong Pan Pluk	9	20	159	188	1	2	10	13	6.9
	Wang Bot	20	40	115	175	2	4	7	13	7.4
	Nong Khra	0	30	48	78	0	3	4	7	9.0
	Huei Mongkhon	-	-	-	198	-	-	-	0	0
Total		120	389	583	1,437	10	33	42	85	5.9 <sup>4</sup>

1  
Richer group

2  
Median group

3  
Poorer group

4  
Weighted average

Table 35 - Sampling Array for the Non-Project Area in Cha Am

Zone	Village	Number of farm families				Size of sample				Sampling rate, percent of farm families
		R <sup>1</sup>	M <sup>2</sup>	P <sup>3</sup>	Total	R	M	P	Total	
E	Nong Yao	10	57	20	87	Randomized			10	11.5
	Nong Sone	5	15	40	60	Randomized			21	35.0
F	Nong Kloa Nok	5	66	15	86	Randomized			30	34.9
	Don Ma Kok	-	-	-	65	-	-	-	0	0
	Chang Tang Krachat	-	-	-	91	-	-	-	0	0
Total		20	138	75	389	-	-	-	61	15.7 <sup>4</sup>

1  
Richer group

2  
Median group

3  
Poorer group

4  
Weighted average

the richer group, a median group, and the poorer group. Assignment to one of these groups was made for the survey by the head of each village. The reason was to distribute the samples so as to approach the characteristics of the population of farmers being surveyed. The numbers of samples in each group were obtained by proportion to represent effectively the prosperity of farm families in the study area. Appointments for interviews, establishing the time and place of the interview, were made with the cooperation of the head of each village before the field survey began. Four interviewers (including the author) asked farmers the questions individually, and proceeded village by village. The daily survey period began early in the morning and continued into the late afternoon before finishing with the last farmer. Most of the interviews were conducted at a well known place in each village, such as the school or a local coffee shop; a few interviews were made at the farmers' homes. The duration of the interview with each farmer was about an hour and quarter. A car was hired to be used to meet the farmers at the appointed time, as there was considerable distance between the temporary quarters of the interviewers at a hotel in Hua Hin town and the village area.

#### Method of Data Analysis

A method of "comparative analysis" was used to compare the net farm income and net total income<sup>1</sup> of the project-area

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<sup>1</sup>

Net total income = net farm income + non-farm income.



farmers with those of the non-project areas. The distributions and their cumulative incomes were taken into consideration. All the principal variables that affect those incomes were studied to understand their degree of influence.

Those farmers that have their net farm incomes near the maximum were considered to be representative of the "potential development" of that area. The mean net farm income of each other farm family divided into the potential-development value of income is called the "achievement quotient". All the principal variables that affect those incomes were studied to understand their roles. The achievement quotients of the non-project areas were used to compare the sensitivity of the uncertainty of each of the principal variables.

The mobility of farmers, agricultural input-output transport activities, and their problems were studied to become aware of the existing transport facilities of the non-project areas' farmers. These factors were compared with those of the project areas' farmers.

#### Comparative Analysis

In order to compare the net farm income and net total income distributions of each area, the Student's t test, as shown by the following formula, was used.

$$t = \frac{|M_1 - M_2|}{\sqrt{\frac{(n_1+n_2) (n_1 S_1^2 + n_2 S_2^2)}{(n_1 n_2) (n_1 + n_2 - 2)}}$$

where  $M_1$  = mean income of the project area;  
 $M_2$  = mean income of the non-project area;  
 $S_1$  = standard deviation of the income of the project area;  
 $S_2$  = standard deviation of the income of the non-project area;  
 $n_1$  = number of interviewed farmers in the project area;  
 $n_2$  = number of interviewed farmers in the non-project area;  
 $t$  = Student's  $t$  value.

The standard deviation, standard error of the mean, coefficient of variance, and coefficient of variance of the mean of each type of study area to be subsequently calculated are tabulated in Table 36. Also shown is the  $t$ -test comparison to be performed for each pair of study areas.

#### Potential Development and Achievement Quotient

The high achievement group of farmers was considered as the farmers whose net farm income was above the 85th percentile of the cumulative net farm-income curve. These farmers were

Table 36 - Format for Comparison of the Income Distributions of Farmers in Each Type of Study Area

Type of Comparison	Area of study	Type of study area	Income					Student's t value
			Mean	Standard deviation	Standard error of the mean	Coefficient of Variance	Coefficient of variance of the mean	
Net farm income	Cha Am	Project	M1	S1	SE <sub>M1</sub>	CV1	CV <sub>M1</sub>	t <sub>1</sub>
		Non-project	M2	S2	SE <sub>M2</sub>	CV2	CV <sub>M2</sub>	
	Hua Hin	Project	M3	S3	SE <sub>M3</sub>	CV3	CV <sub>M3</sub>	t <sub>2</sub>
		Non-project	M4	S4	SE <sub>M4</sub>	CV4	CV <sub>M4</sub>	
	Cha Am vs Hua Hin	Project	M1	S1	SE <sub>M1</sub>	CV1	CV <sub>M1</sub>	t <sub>3</sub>
		Project	M3	S3	SE <sub>M3</sub>	CV3	CV <sub>M3</sub>	
	Cha Am vs Hua Hin	Non-project	M2	S2	SE <sub>M2</sub>	CV2	CV <sub>M2</sub>	t <sub>4</sub>
		Non-project	M4	S4	SE <sub>M4</sub>	CV4	CV <sub>M4</sub>	
Net total income	Cha Am	Project	M5	S5	SE <sub>M5</sub>	CV5	CV <sub>M5</sub>	t <sub>5</sub>
		Non-project	M6	S6	SE <sub>M6</sub>	CV6	CV <sub>M6</sub>	
	Hua Hin	Project	M7	S7	SE <sub>M7</sub>	CV7	CV <sub>M7</sub>	t <sub>6</sub>
		Non-project	M8	S8	SE <sub>M8</sub>	CV8	CV <sub>M8</sub>	
	Cha Am vs Hua Hin	Project	M5	S5	SE <sub>M5</sub>	CV5	CV <sub>M5</sub>	t <sub>7</sub>
		Project	M7	S7	SE <sub>M7</sub>	CV7	CV <sub>M7</sub>	
	Cha Am vs Hua Hin	Non-project	M6	S6	SE <sub>M6</sub>	CV6	CV <sub>M6</sub>	t <sub>8</sub>
		Non-project	M8	S8	SE <sub>M8</sub>	CV8	CV <sub>M8</sub>	

considered to be the farmers who achieved the near maximum of all groups of farmers in that area. The farmers whose net farm income was equal to or below the 85th percentile of the cumulative net farm-income curve were considered to constitute the "rest of the farmers". The mean income of the rest of the farmers divided by the 85th percentile level of net farm income and is called the "achievement quotient".

The final results of the mean net farm income of each of the two categories--potential development, and the rest of the farmers--and the achievement quotient of each type of study area will be analysed as shown in Table 37. The achievement quotients of the non-project areas were used to compare the sensitivity to the uncertainty of each of the principal variables.

Table 37 - Format for Analysis of the Potential Development and Achievement Quotient of the Net Farm Income of Each Type of Study Area to Test Their Sensitivity

Area of study	Type of study area	Mean net farm income		Achievement quotient <sup>1</sup>
		Potential development	The rest of the farmers	
Cha Am	Project	X <sub>1</sub>	Y <sub>1</sub>	Z <sub>1</sub>
	Non-project	X <sub>2</sub>	Y <sub>2</sub>	Z <sub>2</sub>
Hua Hin	Project	X <sub>3</sub>	Y <sub>3</sub>	Z <sub>3</sub>
	Non-project	X <sub>4</sub>	Y <sub>4</sub>	Z <sub>4</sub>

$$^1 Z_i = Y_i/X_i$$