

## **Part II**

### **Regional Development through Respective Sector Projects**



## **Chapter 4**

### **Impact of Local Roads and Bridges Projects on Regional Development**

#### 4.1 Preface

#### 4.2 Post Evaluation of the “Project for Bridge Construction in Rural Region in Northeast Thailand”

##### 4.2.1 Overview of the Project

##### 4.2.2 Evaluation reports of the past

##### 4.2.3 Perspective and method of evaluation

##### 4.2.4 Evaluation results

##### 4.2.5 Conclusion

#### 4.3 Post Evaluation of the “Project For Road Maintenance and Construction in North-eastern Region (phase 1)” and “Project For Road Maintenance and Construction in North-eastern Region (phase 2)”

##### 4.3.1 Overview of the development investigation

##### 4.3.2 Evaluation results so far

##### 4.3.3 Viewpoint and method of evaluation

##### 4.3.4 Evaluation results based on the “PDM evaluation method (draft)”

##### 4.3.5 Results of detailed evaluation of validity

##### 4.3.6 Conclusion



## **Chapter 4**

### **Impact of Local Roads and Bridges Projects on Regional Development**

#### **4.1 Preface**

Among the infrastructure reports that JICA has conducted on Northeastern Region, this report will conduct a post evaluation of the 3 projects below.

- (1) Project for bridge construction in rural region in Northeast Thailand
- (2) Phase 1 of the road maintenance construction plan of North-eastern Region
- (3) Phase 2 of the road maintenance construction plan of North-eastern Region

Among these projects, (1) is a grant aid cooperation project and (2) and (3) are development investigations. Starting with the master plan (M/P), a feasibility study (F/S) was conducted afterwards. Therefore, it is considered appropriate that (2) and (3) are evaluated together. 4.2 will consist of the evaluation results of the grant aid cooperation project and 4.3 will consist of the evaluation results of the 2 development investigations.

The objective of this evaluation process is to learn a lesson about what kind of strategy JICA projects should have in order to alleviate and rectify regional disparities in middle-income countries such as Thailand, through evaluation of individual agendas. It goes without saying that there is an extremely important role that the infrastructure plays in rectifying disparity. In this report we consider through evaluation how the targeted individual grant aid cooperation project, M/P and F/S should be in order to have effectiveness in regional development. If the regional development effects of these projects are great, regional efforts to rectify disparities within the region will become active and then we can expect economical and social activities of Northeastern Region to prosper.

In the case of development investigations recently, the importance to conduct evaluations are being strongly recognized, but there still is no well-established evaluation method. For these reasons it is one of the objectives in 4.3 to conduct an investigation on the method for evaluation.

#### **4.2 Post Evaluation of the “Project for Bridge Construction in Rural Region Northeast Thailand”**

##### **4.2.1 Overview of the Project**

Based on the “Basic design study report on the project for bridge construction in rural region in Northeast Thailand” (JICA) (“study report” in the following), published in March 1989, the overview of the project will be stated below. (Wherever there is no particular source stated in the following it will be from the “study report”)

### (1) Background of the Project

In accordance with the 6<sup>th</sup> National Development Project, which advocates 3 pillars of efficiency improvement, development, reorganization of the structure of production and sales and assistance of distribution and prosperity of income, the Department of the Interior has laid down the 4<sup>th</sup> Master Plan (1987-91) for the regional development program. As a part of this plan, the Public Works Department (PWD) has undertaken a regional road improvement program of approximately 3000km. On the other hand, the government of Thailand considers the development of Northeastern Region, the poorest region in Thailand, of great importance. From such background, the government of Thailand has asked for grant aid cooperation to the Japanese government for the 68 bridges that need urgent replacement among the 234 wooden bridges along the roads of Northeastern Region where PWD has jurisdiction.

### (2) Replacement bridges request

As a result of detailed examination including on-site investigation of a total of 84 bridges that include the 68 bridges mentioned above and the 16 bridges that were requested additionally during the basic design study, 51 bridges were proposed as the target of grant aid cooperation. The priority was determined by considering the urgency of replacement, influence to population due to replacement, connection between the site and major cities and future improvement projects of the concerned roads.

The government of Thailand demanded replacement by steel bridges. Because of the shortage of wood in Thailand, the difficulty of reconstructing wooden bridges, the anticipation of early replacement, the importance of shortening the construction period, and the desire of technology transfer of steel bridge construction by the government of Thailand, the research group decided that steel bridges were appropriate.

The 51 bridges were divided into 2 groups; ones that are under 40m that can be constructed by Thailand (group 1) and the second group of bridges that are over 40m and that need to be constructed by Japan (group 2). For the bridges that are under 40m, only the steel necessary for construction of the upper part of the bridge will be provided by Japan.<sup>1</sup> Furthermore, the construction of the bridge will be conducted over 2 years and the first year will be phase 1 and the second year phase 2. The lists of the designated 51 bridges by phase and by group are indicated in Table 4-1. And the summary by phase and by group is shown in Table 4-2.

### (3) Overview of the bridges

Considering the weather conditions of Thailand, which has dry seasons and rainy seasons, a process which constructs the lower part in dry seasons and the upper part in the rainy seasons is suitable. And steel girders were chosen to shorten the period of construction.

Table 4-1 List of Bridges

S.N.	Bridge No.	Group	Phase	Name of Bridge	Bridge Length (m)	Bridge Width (m)	Location	Province
1	2.02	I	I	Huai Nong Ben	25.89	7	Km. 5.200, Ban Kham Bong-Ban Non Dong Man Road(A.Nam Phong)	Khon Kaen
2	2.03	I	I	Huai Yang	29.89	7	Km. 5.950 ,Ban Kham Bong-Ban Non dong Mon Road (A.Nam Phong)	Khon Kaen
3	4.04	I	I	Huai Na Khoi	20.46	7	Km. 1.150, Ban Na KHoi-Ban Un Na Road (A. Na Wa)	Nakhon Phanom
4	4.05	I	I	Huai Na Krathum	20.46	7	Km. 2.550, Ban Na Khoi-Ban Un Na Road (A. Na Wa)	Nakhon Phanom
5	11.03	I	I	Ban Na Kae	30.89	7	Ban Phon Kangpla- Ban Na Oi Road	Sakon Nakhon
6	13.01	I	I	Huai Siew No. 1	24.89	7	Ban Thewi-Ban Dua Road (A. Tha Bo)	Nong Khai
7	13.02	I	I	Huai Siew No. 2	19.46	7	Ban Thewi-Ban Dua Road (A. Tha Bo)	Nong Khai
8	13.03	I	I	Huai Ban Mui	30.89	7	Ban Na Chang Nam-Ban Nong Waeng Road (A. Tha Bo)	Nong Khai
9	13.04	I	I	Huai Ran	22.89	7	Km. Ban Na Chang Nam-Ban Nong Waeng Road (A. Tha Bo)	Nong Khai
10	13.05	I	I	Huai Bang Phuan No. 1	20.46	4	Km. 0.400, Ban That-Ban Chuk Road (A. Muang)	Nong Khai
11	13.06	I	I	Huai Bang Phuan No. 2	20.46	4	Km. 0.775, Ban That-Ban Chuak Road (A. Muang)	Nong Khai
12	14.04	I	I	Nong Bung Mo No. 1	18.46	7	Ban Chaing Yun-Ban Chiang Pheng Road(A. Kut Chap)	Udon Thani
13	14.05	I	I	Nong Bung Mo No. 2	18.46	7	Ban Chaing Yun-Ban Chiang Pheng Road(A. Kut Chap)	Udon Thani
14	14.06	I	I	Nong Bung Mo No. 3	25.89	7	Ban Chiang Yun-Ban Chiang Pheng Road(A. Kut Chap)	Udon Thani
15	14.07	I	I	Nong Bung Mo No. 4	20.46	7	Ban Chaing Yun-Ban Chiang Pheng Road(A. Kut Chap)	Udon Thani
16	3.01	I	II	Huai Khon Tha	20.46	7	Km 1.100, A. Kaeng Khlo-Ban Nong Khu Road	Chaiya Phum
17	3.02	I	II	Huai Yai	29.89	7	Km. 5.950, A Kaeng Khlo-Ban nong Khu Road	Chaiya Phum
18	3.03	I	II	Huai Phai No. 1	20.46	7	Km. 18.500, A.Kaeng Khlo-Ban Nong Khu Road (A. Ban Thaen)	Chaiya Phum
19	3.04	I	II	Huai Phai No. 2	19.46	7	Km. 18.700 ,A.Kaen Khlo-Ban Nong Khu Road (A. Ban Thaen)	Chaiya Phum
20	5.04	I	II	Lam Ta Khong No. 1	19.46	4	Ban Nam Mao (Lat Boa Khao, Sikhui)	Nakhon
21	5.05	I	II	Lam Ta Khong No. 2	30.89	4	Ban Mai Samrong (Mai Samrong, Sikhui)	Nakhon
22	6.01	I	II	Huai siew	33.89	7	Km. 0.450, Ban Daeng-Ban Bon Thung Road (A. Wapipathum)	Maha Sarakham
23	6.03	I	II	Huai Lom Khom No.2	19.46	7	Ban Lom Khom-Ban Don Daeng Road	Maha Sarakham
24	6.04	I	II	Huai Na	16.46	7	Km. 4.950 Ban Khok-Ban Kok Road (A. Wapipathum)	Maha Sarakham
25	7.07	I	II	Huai Po	20.46	7	Km. 0.450, Rt. No. 212-Ban Kham Mek Road (A. Muang)	Mukhdhum
26	7.08	I	II	Huai Ngui	30.89	7	Km. 0.850, Rt. No. 212-Ban Kham Mek Road (A. Muang)	Mukhdhum
27	8.01	I	II	Huai Wang Pla Sium	25.89	7	Km. 0.950, A.Sai Mun-Ban Na Pong Road (A. Sai Mun)	Yosothon

Table 4-1 List of Bridges (Cont'd)

S.N.	Bridge No.	Group	Phase	Name of Bridge	Bridge Length (m)	Bridge Width (m)	Location	Province
28	8.02	I	II	Huai Na Pong	20.46	7	Km. 2.450, A.Sai Mun-Ban Na Pong Road (A. Sai Mun)	Yosothon
29	8.03	I	II	Huai Khaen	20.46	7	Km. 0.800, A.Kut Chum- Ban Khok Sung Road ( A. Kut Chum)	Yosothon
30	8.04	I	II	Huai Khaen Long No. 1	20.46	7	Km. 0.650, A.Kut Chum- Ban Khok Sung Road (A. Kut Chum)	Yosothon
31	8.05	I	II	Huai Khaen Long No. 2	23.89	7	Km. 1.000, A.Kut Chum- Ban Khok Sung Road (A. Kut Chum)	Yosothon
32	9.01	I	II	Huai Pla Pong	25.89	7	Km. 1.700, Ban Non Yang-Ban Sathon Road(A. Selaphum) Ban Nong Chok (A. Selaphum)	Roi Et
33	9.03	I	II	Huai Siao No. 1	34.89	7	Km. 1.725, Rt. No. 214- Ban Hua Nong Road (A. Kaset Wisai)	Roi Et
34	9.04	I	II	Huai Siao No. 2	25.89	7	Km. 1.215, Ban I-Knot-Ban Hua Nong Road (A. Kaset Wisai)	Roi Et
35	10.01	I	II	Huai Palan Muang	25.89	7	Ban Sikhunhan- Ban Nong Phu Road	Si Sa Ket
36	10.02	I	II	Huai Kantruat	20.46	7	Ban Sikhunhan- Ban Nong Phu Road (A. Khun Han)	Si Sa Ket
37	12.02	I	II	Huai Thamo	20.46	7	5.625 Ban Prasat Beng-Ban Khu Tan Roada (A. Kap Choeng)	Surin
38	15.03	I	II	Huai Sa Do	30.89	7	Km. 3.375, Rt. No. 2172- Ban Nong Hai Road (A. Phibun Mang Sahan)	Ubon Ratchathani
39	15.04	I	II	Huai So Phra	27.89	7	Ban Na Wa- Ban Khok Phra Road	Ubon Ratchathani
40	15.05	I	II	Huai Choek	30.89	7	Km. 0.350, Ban Nong Hai (Rt. No. 2178)-Ban Na Kae Road (A. Samrong)	Ubon Ratchathani
41	15.06	I	II	Huai Khaen	32.89	7	Km. 4.800, Ban Nong Hai (Rt. No. 2178)- Ban Na Kae Road (A. Samrong)	Ubon Ratchathani
42	1.01	II	II	Huai Khaen	40.89	7	Ban Kut Khlong-Ban Dan Tae Road	Kalasin
43	2.05	II	I	Huai Khum Mum	47.09	7	Km. 6+250, Ban Huai Sai-Ban Kut Chiang Mee Road (A. Ubol Rattana)	Khon Koen
44	4.01	II	I	Huai Soeng No. 1	40.89	7	Km. 0+750, Rt. No. 2031-Ban Bo Dok Son Road (A. Na Kae)	Nakhon Phanom
45	4.02	II	I	Huai Soeng No.2	40.89	7	Km. 1+150, Rt. No. 2031-Ban Bo Dok Son Road (A. Na Kae)	Nakhon Phanom
46	5.01	II	II	Lam klang	51.32	7	Ban Dan Khon Khob	Nakhon
47	5.02	II	II	Lam Nam Mum	81.75	6	Ban Kham Klang	Nakhon
48	5.03	II	II	Lam Phra Phleoeng	61.32	7	Ban Pak Thong Chai	Nakhon
49	11.01	II	I	Lam Nam Kam	56.42	7	Km. 3+200 , Ban Khok Kong- Ban Phon Road (A. Muang)	Sakon Nakhon
50	14.02	II	I	Lam Nam Phuai	112.38	6	Km.5+650 A.Si Bun Ruang-Ban Pa Kha Road (A. Si Bun Ruang)	Udon Thani
51	15.07	II	II	Lam Som No. 1	51.32	7	Km. 1+225, Ban Na Kae (Rt. No. 2171)-Ban Sao Lao Road (A. Det Udom)	Ubon Ratchathani



Also non-synthetic girders, which do not need shear-connecters that are often damaged during long distance transportation, were adopted and were made in a simple girder form that is easy to build. And maintenance-free weatherproof steel was adopted as the structural steel.

Table 4-2 Chart of bridges targeted for grant aid cooperation

	Phase 1	Phase 2	Total
Group 1	350m	649m	999m
Group 2	298m	287m	585m

(4) Allotment of the government of the 2 countries

Japan's responsibility for grant aid cooperation includes supply of building materials for bridges of group 1 and construction of bridges of group 2, connecting roads and shores surrounding the poles of the bridge. On the other hand, the responsibility for Thailand includes construction of the bridges in group 1 (including the shores), maintenance of the road approaching bridges of group 2 and maintenance of the stockyard. Also provision and purchase of land necessary for the project, removal of obstacles (including houses) within the land, securing and storing the transportation route for granted building material and maintenance of the bridge are matters that Thailand is responsible for.

Construction fee

Japan

Group 1                      Approximately 700 million yen

Group 2                      Approximately 1.5 billion yen

Thailand

Group 1                      Approximately 400 million yen

Group 2                      Approximately 100 million yen

**4.2.2 Evaluation reports of the past**

So far the following post evaluations have been made concerning this project.

Evaluation scheme	Evaluation date	Evaluator	Records	Targeted project
Evaluation by overseas agencies of the Ministry of Foreign Affairs	November 1992	Embassy of Thailand in Japan	Evaluation report of economic cooperation by the Ministry of Foreign Affairs	Lam Nam Buai bridge
Evaluation by overseas agencies of the Ministry of Foreign Affairs	February 1993	Embassy of Thailand in Japan	Evaluation report of economic cooperation by the Ministry of Foreign Affairs	Lamsom bridge

Evaluation by counter parts	February 1996	Prime Minister's Office of Thailand Technical and Economical Cooperation Bureau First Department Nipon Shirivat, Chief of Japan Division	Evaluation report of economic cooperation by the Ministry of Foreign Affairs	Huai Choku and 6 other bridges
Evaluation by third parties	August 1993 - December 1994	Yomiuri Shimibun Deputy Director of Commentary Department Tsuneo Sugishita	Post evaluation report by JICA	Huei Kun Mun bridge

(1) Results of evaluation by diplomatic establishments abroad

Only 2 years have passed since completion of both of the bridges that were the subject of evaluation. The conditions were extremely good and they were not in a condition that requires repair. However, the necessity for adequate monitoring was pointed out for long term rust of steel frames and damage by floods. In case of appropriateness of the selection of the project it was evaluated to be appropriate because of the role it played for the society and the economy of the surrounding regions, the importance of the regional roads that the bridge connects, the technical difficulty of building bridges, and the necessity of endurance to prepare for floods. For both of the 2 bridges that were subjects of evaluation, not only cars, but trucks became able to pass, and after the construction of Lam Nam Buai bridge even buses began to cover the area, leading to the improvement of transportation and contribution to the economical and social development of the region. Bad influence to the surrounding environment after the construction of Lamsom bridge has hardly been recognized. (In case of the evaluation of Lam Nam Buai bridge, there were no references relating to the environment)

(2) Results of evaluation by counter partners

6 years has past since the completion and some red rust appeared on the surface of the steel girder, but it was reported that it is not much of a problem and the maintenance conditions were generally good. In case of appropriateness of selection and formation of the project, it was evaluated to be appropriate because of demands from the villagers, it's social effect and the fact that bridges damaged by floods were given the highest priority for repair. After the completion of the bridge, trucks that could not pass during the rainy seasons became able to pass and the benefit that the villagers enjoyed was very big. It was evaluated that the objective set in the beginning was highly achieved. And this project has encouraged repairs of other wooden bridges by the self-help effort of Thailand. It had a very good effect in this aspect also. There were no reports of bad influence on the environment. Appropriate and sustainable maintenance by Thailand and the necessity of maintenance of access roads are being pointed out.

### (3) Results of evaluation by third parties

Beginning with the village chief of Ban Khun Chen Mi, which is the nearest village to the bridge in concern, they have been conducting investigations of the changes in the lives of the villagers after the construction of the bridge by interviewing many of the users of the bridge. The following are the major results.

- 1) Activation of distribution. Crops, stock farm products and silk goods of the village became easier to transport to nearby cities and markets. On the other hand, beer, detergents, clothing and merchandise from the cities were sold in the village at lower prices. As a result, the average annual salary of a family rose by 10 times.
- 2) Health control of the villagers improved remarkably. It used to take 5 hours to the hospital in the nearest city, but after the completion of the bridge it only takes 20 minutes.
- 3) School buses started service and the ratio of students who enter junior high school rose to 90% from 20%.
- 4) It became possible to commute to Khon Kaen by car and working opportunities for youths have increased.
- 5) The distance between Ubon Raht and Nambon became 20 km shorter by the opening of the bridge and distribution trucks that travel long distances started to use the bridge often. However, this has not led to destruction of the environment or the occurrence of traffic accidents.

Other benefits, such as being able to gain income by being employed as construction workers during construction of the bridge, were also introduced. Also the villagers knew very well that the bridge was constructed generally by the aid of Japanese and this point was also highly evaluated.

### **4.2.3 Perspective and method of evaluation**

#### (1) Beginning

In this report, based on the description in the “study report”, firstly “investment”, “result”, “objective”, “higher-level objective 1” and “higher-level objective 2” of the project will be investigated and evaluated. Based on this, evaluation will be made for the 5 items of “efficiency”, “effectiveness”, “impact”, “validity” and “sustainability”. Evaluation for each item was made in Thailand based on information obtained at interviews and on-site investigation. Also, the evaluation results of the above were used for reference.

- 1) Interviews conducted at the central office of PWD in Bangkok.
- 2) Interviews conducted at prefectural offices of Nakhon Ratchasima, Khon kaen and Surin of PWD.
- 3) Interview conducted to local residents in the vicinity of the 6 bridges that were

constructed by this project, located in Nakhon Ratchasima and Khon Kaen.

The bridges that were targets of this on-site investigation are as follows. Also, photographs of the present situation of these bridges (Appendix 4-1) will be included in the Appendix and interview records (Reference 1-2) in the Reference.

Nakhon Ratchasima

Lam Ta Khon No.1 Bridge (#5.04)

Lam Ta Khon No.2 Bridge (#5.05)

Lam Klang Bridge (#5.01)

Khon Kaen

Huai Nong Be Bridge (#2.02)

Huai Yang Bridge (#2.03)

Huai Khum Mum Bridge (#2.05)

(2) Evaluation points

The “study report” has raised the following 2 objectives of the project (p.17).

- 1) That it connects to secure transportation measures in regional areas
- 2) That it has a great effect in promoting development in the regions and development of the society and economy

These objectives are said to be actualized by “actualizing reduction of time and cutting cost of transportation and distribution; as a result leading to advancement of smooth transportation and distribution, and greatly contributing to promoting development of the society and economy of the region in concern”.

It is also stated in the conclusion of the “study report” (p.91) that “it aims to secure transportation measures of the isolated area by outflow of the bridge during rainy seasons and, at the same time, improve transportation situations in the strategic points of regional roads”. Also it is stated in the same point that “it greatly contributes to the promotion of development in regional areas, solves regional disparities, enlarges employment opportunities, eliminates poverty and promotes sustainable economic development as well”. Other effects that are expected are stated as follows:

“It becomes possible to secure mass transportation of crops and safe transportation of 580,000 regional citizens during both rainy and dry seasons. On the other hand, through the construction of wooden bridges, there was direct participation of regional workers and consideration of effects of transferring construction technology...(extracted from the original)”

From what is stated above and in the overview of the project, the “investment”, “result”, “objective”, “higher-level objective 1” and “higher-level objective 2” will be something like the following:

Investment	1.1 billion yen for a total of 41 bridges of group 1 totaling 999m
------------	--

	(700 million yen for Japan) 1.6 billion yen for a total of 10 bridges of group 2 totaling 585m (1.5 billion yen for Japan)
Result	51 bridges will be constructed Technology of steel girder bridge construction and maintenance will be transferred
Objective	People and any kind of vehicle can pass by safely independent of the season: rainy or dry.
Higher-level objective 1	Carrying out crops and sending out materials will become easier leading to higher productivity of agriculture Increase in working opportunities Increase in income of the residents Improvement of health control and education opportunities leading to the improvement of life for the residents Improvement of opportunities for the residents to participate in society
Higher-level objective 2	Sustainable economic development will be accomplished Poverty will be eradicated Reduction of the income disparity between those in the Metropolitan area and provinces

In the above chart, the second point in the “result” column is usually not specified as a result in grant aid cooperation. However, if the result is limited to “the construction of the bridge”, there is a possibility that grant aid cooperation, for which the construction fee is apt to be rather expensive, will not be evaluated properly. Along with “efficiency”, quality that is required in assistance differs, such as “aid with assistance” and to consider technology transfer as a part of the result is from the attempt to evaluate “the quality of assistance” correctly. Secondly, the 3<sup>rd</sup> point in “higher-level objective 2” is not specified in the “study report”. Even though the reason for examining this point is because the big objective for the entire evaluation project is to investigate how this project has contributed in reducing the income disparity between those in the Metropolitan area and the province and what should be done in order to make a greater contribution, regardless of if it was specifically intended or not.

#### **4.2.4 Evaluation results**

##### **(1) Efficiency**

The construction of the designated 51 bridges has been completed within the scheduled period. Also the allotment of cost for Japan was 2.281 billion yen (evaluation report by the embassy), which was roughly within the estimated amount. However, the cost allotment for Thailand is still vague in this evaluation. It is desired that cost allotment for the counter partner should be investigated in case of evaluation immediately after the completion by

overseas agencies of the Ministry of Foreign Affairs.

The reasons for adopting steel bridges is only stated as “the government of Thailand (•••) demands repair by steel bridges. As a result of inspection of steel bridges by the research group, they have determined steel bridges to be appropriate because of lack of wooden material within the country and the fact that it is difficult to reconstruct by wooden bridges. In addition, steel bridges can shorten the period for construction since repair in an early stage was required. Thailand (•••) desires technology transfer (•••) predicting the future steel bridge projects.” in the summary of the “study report”. And there is neither technical nor economical comparison and investigation made between other possible bridge forms such as concrete bridges. For this reason, conducting a close examination of whether the steel bridge (steel girder bridge to be exact) was the optimum form or not will be an important point for evaluating efficiency.

According to interviews conducted by central and regional PWD engineers, steel bridges are much more expensive compared to concrete bridges in Thailand. According to the “concrete bridge standard pricing for 1993/94 (\*)” cost per 1m is as following.

1 span bridge	66000B/m
2 span bridge	56650B/m
3 span bridge	53000B/m

(\*) Data from PWD. Usage of 0.35m x 0.35m x 15m piles. The length for 1 span is assumed to be 10m, width of the roadway 7m and width of the sidewalk 1m.

Also according to chart 7.1-1 of the “study report” the construction cost for bridges used by PWD during 1984~1988 is 34125B/m~41705B/m. On the other hand, calculating 1B as 5.1 yen (calculated based on the description in the “study report” p.85) if one calculates the total cost per 1m steel bridge and cost allotment of Thailand (the numbers stated in the “study report” will be used) from the invested material stated above, it would be as follows

(Total cost)

Group 1 bridge	215902B/m
Group 2 bridge	536282B/m

(Cost allotment for Thailand)

Group 1 bridge	78509B/m
Group 2 bridge	33517B/m

The life and lifecycle maintenance control cost differs between steel bridges and concrete bridges so they can't be simply compared. This result indicates that steel bridges of group 1 cost 3~6 times and steel bridges of group 2 cost 8~15 times as much as concrete ones. Also looking only at the cost allotment of Thailand, it was equal to the highest unit cost for group 1 bridges and the lowest unit cost for group 2 bridges. (The numbers written here are over the periods of 1984 to 1994 and a price revision from the difference of the year has not been conducted. However, even if a revision were made, the difference in price between steel bridges and concrete bridges would not have differed that much from what is

written in the above statement.) Therefore, in case of considering efficiency along the lines of “whether the outcome was adequate and reflects the amount invested” and if the result stated here only considers the construction of the bridge it will be judged to be very doubtful.

As stated above, if technology transfer is considered to be a part of the outcome, it is an important point of evaluating efficiency to look at whether technology transfer has been performed well or not. In case of technology transfer, from the fact that engineers and workers of Thailand constructed 41 bridges in group 1, it can be evaluated that at least at the point of construction the expected results in case of execution could be accomplished. In p.16 of the “study report” it is described as follows.

“The number of bridge technicians are very few and many of them are technicians of concrete bridges. Therefore, not many have experience in steel bridges. For this reason a construction manual needs to be created for group 1 bridges.”

However, the design for the upper part of the bridge that uses steel was carried out by Japan also for group 1 bridges, and technology transfer of this field has not been achieved. Technology transfer for maintenance control concluded that it did not work out well and will be explained in the chapter on sustainability.

There are many external factors such as steel industries and other related industries not developing as expected in Thailand for the reason of failure in transferring the technology of steel bridges. Therefore, in case of evaluating this project in this aspect, a close inspection of many factors such as the accurateness of the prospect of development of the steel industry at the point of preparing this project is necessary. In this investigation there will be no further examination made of these points.

The success of technology transfer does not supplement the excessive amount of the bridge construction cost so comprehensively that it is judged that there was a problem in the efficiency of this project. For similar projects in the future, in order to improve efficiency it is necessary to conduct technical and economical investigation (in other words, feasibility study) for possible alternatives. In that case it is essential to examine the easiness of technical transfer to the counterpart (C/P). Also as stated in the third party evaluation, many of those who benefited from this project know that the bridges were constructed by the support of Japan (the logo of the rising-sun on a plate with the phrase “Thai-Japan Friendship bridges” is posted on each bridge were attention is easily attracted). In this aspect, it can be evaluated that there was an effect of aid with assistance.

In the “study report” there are several inconsistent statements in case of cost. They are as follows.

- 1) On p.87 it is stated that the total project cost is 2.71 billion yen. On the other hand, the total cost allotment for Japan is 2.28 billion yen and 470 million yen for Thailand. (The total does not match)
- 2) On p.85 it is stated that the construction fee that Thailand was responsible for was 510 million yen, but 470 million yen on p.87.

- 3) In the beginning of p.87 it is stated that the total cost allotment for Japan is 2.28 billion yen, but it does not match the total of the cost broken down in groups 1 and 2.
- 4) On p.99 the investment in the cash flow analysis should mean the total construction cost, but it does not match the number stated in either p.85 nor p.87.

(Annotation: comment by JICA)

- 1) The standard cost of concrete bridges that the government of Thailand seems to have suggested does not clarify preconditions such as contents included in the estimation and construction conditions. In case of conducting a cost comparison it is necessary that these preconditions are made clear.
- 2) The cost comparison carried out was a comparison of steel bridge construction cost enforced under the grant aid cooperation system and concrete bridge construction cost enforced by direct management by the government of Thailand. In case of evaluating efficiency, a cost comparison of concrete bridge and steel bridge construction cost under the same system of grant aid cooperation is appropriate.
- 3) Since the construction by steel bridges was demanded in this project by Thailand, an economical comparison with concrete bridges was not conducted in the prior investigation, but recently in case of projects which demand construction of steel bridges, a comparison between steel bridges and concrete bridges is conducted together with an economical comparison between alternatives.

## (2) Effectiveness

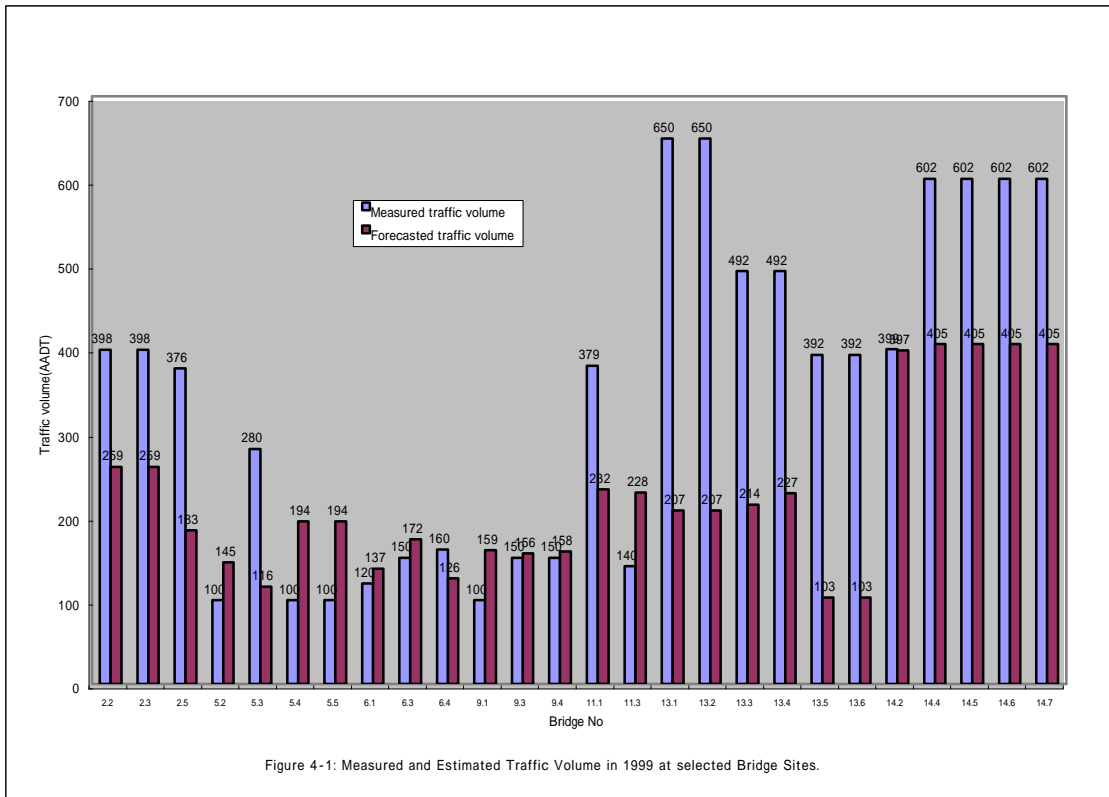
An evaluation that after the construction of the bridge people and cars became able to cross the river safely regardless of the season and transportation, being very convenient, was also pointed out in the evaluation reports of the past and it was also confirmed in the investigation conducted this time. If it is a route with a lot of traffic, the benefit received by replacement of a meager wooden bridge that is dangerous to cross in case of flood by a first-class steel bridge is obvious. Furthermore the benefit of improvement of traffic convenience does not only occur for residents, but, as is indicated in the third party evaluation, is believed to reach a wider area by drastically shortening the traffic distance of long-distance detour transportation.

Figure 4-1 and Table 4-3 is a comparison between the volume of traffic for 26 bridges that was measured in 1999 and the forecasted traffic volume for 1999 of the “study report”. From this comparison it is shown that in almost 70% of the places the measured traffic volume has exceeded the forecast by more than 50%.

If the objective for this project was to “achieve safe transportation for people and all sorts of vehicles regardless of the season” then it can be evaluated that the objective was accomplished.



(Figure 4-1) Comparison between the forecasted traffic volume and measured traffic volume (1999)



### (3) Impact

The results of the interviews conducted with residents will be included in the appendix (appendix 1-2). Among these, the ones related to this evaluation item will be as follows.

- 1) Transportation costs for people and commodities have decreased.
- 2) Benefits that the farmers enjoyed were the greatest. Transportation of agricultural products and investing materials became easier. For that reason productivity has risen and products were shipped to markets where they can be sold at higher prices.
- 3) Agricultural production has realized a greater profit so productivity has increased. Also cultivation of cash products such as vegetables and sugarcanes became active and diversification of planting has occurred.
- 4) Since transportation in the rainy seasons became easier, the price of consumed goods at nearby stores became lower.
- 5) Traffic to schools, hospitals, markets and administrative services became convenient and life has improved.
- 6) Access to work has improved and working opportunities have increased.
- 7) From the increase of agricultural production and working opportunities, the disparity between relatively undeveloped regions in Northeastern Region and other regions has decreased.

**Table 4-3 Measured and Estimated Traffic Volume in 1999 at Selected Bridge Sites.**

S.N.	Bridge No.	Group	Phase	Bridge length	Name of Bridge	Traffic Volume in 1988 <sup>1/</sup>					Estimated Traffic Volume for 1999 <sup>2/</sup>					Traffic volume comparison		
						Car/pickup	E-tan	Bus	Truck	Total	Car/pickup	E-tan	Bus	Truck	Total	Measured traffic volume <sup>3/</sup>	Forecasted traffic volume in the study report for 1999 <sup>4/</sup>	Type of Vehicle <sup>5/</sup>
1	2.2	I	I	25.89	Huai Nong Ben	76	72	44	20	212	144	111	84	31	369	398	259	4-10 wheel
2	2.3	I	I	29.89	Huai Yang	76	72	44	20	212	144	111	84	31	369	398	259	4-10 wheel
3	2.5	II	I	47.09	Huai Khum	47	51	16	41	155	89	79	30	63	261	376	183	4-10 wheel
4	5.2	II	II	81.75	Lam Nam Mum	29	25	19	10	83	55	38	36	15	145	100	145	2-10 wheel
5	5.3	II	II	61.32	Lam Phra Phleong	23	22	18	3	66	44	34	34	5	116	280	116	2-10 wheel
6	5.4	I	II	19.46	Lam Ta Khong No. 1	52	45	9	6	112	99	69	17	9	194	100	194	2-10 wheel
7	5.5	I	II	30.89	Lam Ta Khong No. 2	52	45	9	6	112	99	69	17	9	194	100	194	2-10 wheel
8	6.1	I	II	33.89	Huai sieo	37	30	19	20	106	70	46	36	31	183	120	137	Assumed 4-10 wheel
9	6.3	I	II	19.46	Huai Lom Khom	46	53	26	23	148	87	82	49	35	254	150	172	Assumed 4-10 wheel
10	6.4	I	II	16.46	Huai Na	47	50	8	14	119	89	77	15	22	203	160	126	Assumed 4-10 wheel
11	9.1	I	II	25.89	Huai Pla Pong	61	39	10	16	126	116	60	19	25	219	100	159	Assumed 4-10 wheel
12	9.3	I	II	34.89	Huai Siao No. 1	58	17	15	11	101	110	26	28	17	182	150	156	Assumed 4-10 wheel
13	9.4	I	II	25.89	Huai Siao No. 2	60	39	10	16	125	114	60	19	25	218	150	158	Assumed 4-10 wheel
14	11.1	II	I	56.42	Lam Nam Kam	98	26	11	16	151	186	40	21	25	272	379	232	>4 wheel
15	11.3	I	I	30.89	Ban Na	98	26	9	16	149	186	40	17	25	268	140	228	>4 wheel
16	13.1	I	I	24.89	Huai Siao No. 1	76	40	20	16	152	144	62	38	25	268	650	207	4-10 wheel
17	13.2	I	I	19.46	Huai Siao No. 2	76	40	20	16	152	144	62	38	25	268	650	207	4-10 wheel
18	13.3	I	I	30.89	Huai Ban Mui	90	45	8	18	161	171	69	15	28	283	492	214	4-10 wheel
19	13.4	I	I	22.89	Huai Ran	97	46	8	18	169	184	71	15	28	298	492	227	4-10 wheel
20	13.5	I	I	20.46	Huai Bang Phuan No. 1	46	24	4	5	79	87	37	8	8	140	392	103	4-10 wheel
21	13.6	I	I	20.46	Huai Bang Phuan No. 2	46	24	4	5	79	87	37	8	8	140	392	103	4-10 wheel
22	14.2	II	I	112.38	Lam Nam Phuai	102	89	53	67	311	194	137	101	103	534	399	397	>4 wheel
23	14.4	I	I	18.46	Nong Bung Mo	106	89	53	67	315	201	137	101	103	542	602	405	4-10 wheel
24	14.5	I	I	18.46	Nong Bung Mo	106	89	53	67	315	201	137	101	103	542	602	405	4-10 wheel
25	14.6	I	I	25.89	Nong Bung Mo	106	89	53	67	315	201	137	101	103	542	602	405	4-10 wheel
26	14.7	I	I	20.46	Nong Bung Mo	106	89	53	67	315	201	137	101	103	542	602	405	4-10 wheel
Total																8578	5534	

<sup>1/</sup> Source: Basic Design Study Report

<sup>2/</sup> Traffic Volume estimated with the annual traffic growth rates of 6 % for car/pickup and bus and 4 % for E-tan and truck given in the Basic Design Study Report.

<sup>3/</sup> Source: Public Work Department. Each traffic volume covers those vehicle types as listed in the right-most column

<sup>4/</sup> Estimated traffic volume for 1999 that corresponds to the vehicle types as listed in the right-most column. E-tan is assumed as a three wheeler.

<sup>5/</sup> Type of vehicles measured by PWD at each site.

The interview results of this investigation show that the evaluation of impact in this project is very high as is also stated in past evaluation results.

#### (4) Validity

The evaluation of validity of the project means to evaluate if the project was adequate in comparison with a higher objective. This project repaired many bridges to contribute to regional roads, especially those that were behind in development in Northeastern Region, in accordance with the policy agenda to promote regional development, which was an overriding priority in the 6<sup>th</sup> national development plan and it can be evaluated that validity at the time of

drawing the plan was high. Also presently, from the standpoint of redressing income disparity between provinces and the BMA, the development of the Northeastern Region is an important point of the national land development policy and the level of validity does not change.

However, in selecting the 51 target bridges, high priority was given to regions that were relatively behind in the Northeastern Region, but strategic importance to raise the income of the Northeastern Region as a whole was not considered. Therefore, there is still a question left of whether it was successful project in terms of rectification of income disparities between the Northeastern Region and Bangkok.

However, as it is indicated in section 4.2, this project does not aim to redress the income disparity between the province and the Metropolitan area, so this point is more a lesson for similar projects in the future rather than an evaluation. In other words, even in projects like this, a stratagem that contributes to a greater policy target such as redressing the income disparity between the Metropolitan area and the province should be prepared.

#### (5) Sustainability

Sustainability of this project will be discussed from 3 points, namely 1) maintenance control situation of the 51 bridges, 2) sustainability of bridge repairing projects of regional roads and 3) sustainability of transferred bridge construction technology,

##### 1) Maintenance control situation of the 51 bridges

About the girder of the steel bridge, it is stated that “emphasis is put on maintenance free and adaptation of weather proof steel” (p.30 of the “study report), but the evaluation by overseas agencies of the Ministry of Foreign Affairs and the evaluation by C/Ps refers to the necessity of periodical monitoring and maintenance control. In this investigation it was confirmed that among the 51 bridges, at least for the 26 bridges shown in Table 4-3, monitoring has been conducted once a year. However, investigation that is carried out “about twice a year at the end of the rainy season and at the time of road examination”, which the “study report” assumes, is not practiced. Also the presumed form of conducting “investigation based on a questionnaire and the results being judged by experienced technicians of engineering” has not been carried out. According to one of the PWD staff, since there are not many engineers that have knowledge about steel bridges, it was difficult to conduct accurate monitoring. Also in one of the bridges that on-site investigation was conducted, there was a story that after there was a flood the local residents cooperated and buried the bottom of the river around the eroded pier with sandbags. This was an example that showed the interest of the local residents about maintenance control, but, on the other hand, it showed a lack of proper maintenance control structure in the PWD.

##### 2) Sustainability of bridge repairing projects of regional roads

Since the evaluation of the C/P states that “with this project as a impetus, replacements

of other wooden bridges have progressed by the self-help effort of Thailand” it can be evaluated that sustainability was achieved in this sense.

### 3) Sustainability of transferred bridge construction technology

41 bridges of group 1 were executed by Thailand and it is evaluated that a certain amount of technology transfer has been conducted at the time of construction, but afterwards there were no similar steel bridges constructed by the PWD and we can not help but say that sustainability of technology transfer has not been achieved. As a reason for this a staff member of the PWD has stated that steel bridges are much expensive than concrete bridges in Thailand and that there are no engineers that can design and construct steel bridges.

#### 4.2.5 Conclusion

In the regions where the 51 steel girder bridges were constructed, a safe and smooth traffic route has been established for people and every kind of vehicle, including heavy-duty trucks, regardless of the weather and because of that the residents are enjoying both a social and economic benefit. The impact is judged to be very big. However, the construction cost of steel bridges seemed to be nearly 10 times more than concrete bridges and there is a problem in efficiency. If concrete bridges were constructed, 10 times more people could have enjoyed the same impact. However, in case of this project, we need to consider that from the viewpoint of it being an emergency and a case of technology transfer Thailand demanded construction of steel bridges. Also the reason for construction technology of the steel girder bridge not taking root in Thailand is due to many external factors such as industrial policies of Thailand and it is unfair to conclude that the reason for failure of technology transfer was all because of this project.

Because the construction technology of steel girder bridges did not take root in Thailand it is a concern whether sufficient maintenance control can be carried out 10 years after the construction. It is fundamental to carry out a project after ascertaining the maintenance control structure, but if there are further obstacles in maintenance control in the future, it will be necessary to consider additional technology cooperation such as maintenance of manuals and training of maintenance control technology.

In the background of the occurrence of such problems, it can be said that enough technical and economical examination was not conducted before basic construction investigation was carried out. It is desired that sufficient feasibility study is practiced also in the grant aid cooperation field.

A lesson in how to produce a greater contribution by rectifying regional disparities between the Metropolitan area and Northeastern Region emerges from the evaluation of validity. To rectify disparities it is necessary before anything that the project greatly contributes to the economical and social development of the targeted region, but that is not enough. A strategic approach to rapidly develop the Northeastern Region to rectify disparities from a nationwide point of view is essential. It may be obvious but through this

evaluation it became clear once more that it is difficult to incorporate such approaches in individual projects such as this project. Therefore, in order for individual projects such as this project to greatly contribute to rectifying regional disparity it is necessary that firstly a strategy with a nationwide point of view is established and the individual project has to be one that could be clearly placed within it.

### **4.3 Post Evaluation of the “Project For Road Maintenance and Construction in North-eastern Region (phase 1)” and “Project For Road Maintenance and Construction in North-eastern Region (phase 2)”**

#### **4.3.1 Overview of the development investigation**

The overview of this development investigation will be based on the “Project for road maintenance and construction in North-eastern Region study report vol.1 Main report” published by JICA (March 1993) (M/P from now on) and “Report of the project for road maintenance and construction in North-eastern Region (phase 2) text” (July 1995) (F/S from now on).

#### (1) Overview of M/P

##### 1) Background and objective of the M/P

In conformity with the national policy to disperse social service facilities to provinces, in case of road development policies, emphasis was put on maintenance of regional roads. From such background, this investigation has set the following as two major objectives.

- i) Select high priority routes that require repair.
- ii) Conduct a pre-feasibility study of the selected routes and propose an enforcement plan according to each stage.

And the following points were also set as an objective:

- iii) Examine the development needs and maintenance situation of roads in the Northeastern Region and clarify the necessity of road maintenance of the same area from a long-term point of view.
- iv) Conduct technology transfer to C/Ps in Thailand through the M/P.

##### 2) Characteristics of the Northeastern Region

It is essential to promote agricultural development for the development of this region where agriculture is the central industry. The necessary measures for these are to improve physical conditions for farming and at the same time provide incentives to the farmers. The urgent task for the road section is to connect cities and villages and reform roads connecting markets and production districts.

##### 3) Focus of the plan

- i) Improvement of local road systems considering the contribution towards eliminating poverty and promoting agricultural and social activities.
- ii) Reinforcement of connection between villages and cities and establishment of more efficient and effective local road networks through a well supplied national road.
- iii) Selection of routes that should be given priority for repair among the existing paved roads.

#### 4) Selection of routes that require improvement and establishment

Selection of prioritized links that require establishment or improvement were selected based on social and economic demands of the region and the necessity of road network maintenance. Thirty three routes totaling 183.6km were selected as routes that should be given priority.

#### 5) Selection of links that require repair

A correlation analysis of predicted traffic volume and deflection was conducted for all of the paved roads and 44 routes totaling 774km which were selected for routes that should be given priority for repair.

#### 6) Evaluation of repaired and newly established routes

##### i) Cost economic analysis

Internal rate of return (IRR) was calculated by conducting an estimation of the future traffic volume and construction cost, and the related curtailment of vehicle travel expense, agricultural development benefit and curtailment of road maintenance cost as benefits.

##### ii) Social impact analysis

Eight indexes were selected from the four categories of alleviation of social and political isolation, improvement of health services, improvement of education services and redressing income disparities, and analysis was conducted.

#### 7) Evaluation of repaired routes

Construction cost was calculated by planning overlay thickness based on correlation analysis between standard axis load and deflection. Also the section that needs reconstruction was identified. Cost benefit analysis was conducted by curtailed travel expense calculated by the relation formula of roughness of the road surface and travel expense as a benefit.

#### 8) Order of priority and enforcement plan according to each stage

For improved and newly established routes, 15 routes were selected as the highest priority group (stage 1 program) from an economical angle. Secondly, 3 routes were added after reexamination from the angle of social impact. The remaining 15 routes were to be included in the stage 2 program. It was recommended that a feasibility study should be

conducted for the former routes immediately.

The priorities of the routes that require repair were judged by the degree of deterioration of the present paved surface. As a result, 25 routes totaling 468km in length were classified in the stage 1 program and the remaining routes were grouped in stage 2.

The suggested enforcement plan, according to each stage, is shown in Table 4-4.

Table 4-4 Establishment, improvement and repair projects of roads suggested by M/P

Category	Number of projects	Length (km)	Necessary investment (1million B)
Stage1			
Improved • Newly established	18 routes	666.9	1,269.8
Repair	25	468.0	560.09
(Overlay)	(20)	(370.0)	(331.2)
(Reconstruction)	(5)	(98.0)	(229.7)
Total	-	-	1,830.7
Stage2			
Improved • Newly established	15	479.4	
Repair	19	306.0	

## (2) Overview of F/S

### 1) Background and objective of the investigation

The government of Thailand has selected some routes from the routes designated high priority by M/P and demanded the enforcement of F/S to the Japanese government. To answer this request, investigation was carried out from June 1984 until March of next year as the “Report of the project for road maintenance and construction in North-eastern Region (phase 2)”. The objectives of the investigation provided in the Scope of Works (S/W), which was concluded between the government of Thailand and Japan, are as follows:

- i) Feasibility study will be carried out for the routes with high priority in the Northeastern Region that was selected in the phase 1 study.
- ii) In the process of the project, technology transfer will be conducted with C/Ps in Thailand.

### 2) Range of investigation

Investigation was conducted of 15 routes totaling 502.1km in length for routes that will be improved or newly established. For routes that will be repaired, 8 routes totaling 90km in length were selected and investigated as a section for case study. These road sections will be indicated in Table 4-5.

Table 4-5 JICA proposed road projects for the Feasibility Study

S.N.	Province	Route No	Origin	Destination	Length(Km.)
(A) Improvement and new construction					
1	Khon kaen	2199	A.Chonnabot (J.R.2057)	B.Donhan	23.6
2	Khon kaen	2183	A.Nam Phong(J.R.2039)	B.Nong Kuen	27.92
3	Udon Thani	<b>2313</b>	B. Lao	B.Thai Yom (J.R.2316)	41.87
4	Udon Thani	2025	B.Huai Koeng	A.Kumphawapi	14.21
5	Udon Thani	2350	A.Nong Han (J.R.22)	A.Kumphawapi	34.3
6					
7	Nakhon Ratchasim	between 2&24	J.R.2	A.Chock Chai (J.R.24)	29.57
8					
9	Yasothon/Si Sa Ket	2351	A.Maha Chana Chai(J.R.208)	A.Yang Chum Noi (J.R.2168)	24.5
10					
11	Roi Et	2259	A.SelaPhum (J.R.23)	B.Kham Phon Sung (J.R.2136)	46.29
12					
13	Buri Ram	2208	A.Prakhon Chai(J.R.24)	A.KraSang	41.13
14					
15	Surin/Si Sa Khet	2076	B. Som Poi Noi	B. Muang Mak	28.43
(B) Rehabilitation					
16	Nakhon Ratchasim	201	A.Sikhui	B.Nong Bua Koke	48.3
17	Nakhon Ratchasim	207	A.Prathai	B. Wat	36.785
18	Khon Kaen	214	A.Kalasin	B. Lum Chai	28
20	Udon Thani	2023	B.Nam Kong	A. Kumbhawapi	9.86
21					
22	Nakhon Ratchasim	2160	B.Wat	A. Kong	18.78
23	Nakhon Ratchasim	224	Nakhon Ratchasima	Chock Chai	1.78



### 3) Points of investigation provided in S/W

Close inspection of phase 1 study

Social and economic investigation

Investigation of traffic volume conducted in the shoulder, investigation of the starting and ending point, traffic investigation including interviews conducted at shoulders.

Selection of routes and preparatory plans

Calculation of construction cost with accuracy of between  $\pm 20\%$

Prediction of traffic volume and calculation of benefit

Net present value, cost benefit comparison and economic evaluation by IRR and its sensitivity analysis

Suggestion of the best time of year for enforcement (excluding routes that require repair)

### 4) Investigation method of routes which will be improved or newly established

A feasibility study was conducted from the aspect of technology, society and economy by using the same basic method used in M/P and using the results of the various detailed investigations stated above.

- i) Selected the region (range of influence) that will have influence due to the improvement for every route under investigation.
- ii) Gathered materials of planted acreage, yield, garden price and production cost for prediction of future agricultural development and production, and predicted the agricultural development for the area within the range of influence for both cases of whether the project was conducted or not.
- iii) Economic benefit due to road improvement was calculated based on benefit of agricultural development after 15 years from construction, curtailment of vehicle traveling expense and curtailment of road maintenance and repair costs. The following factors were considered in calculating benefit of agricultural development.
  - Increase of planted acreage ratio in existing farmland
  - Newly developed cultivated land (only the newly established road (IM-33))
  - Increase of crop yield and garden price
  - Conversion of plant species
  - Decrease of production cost
- iv) As is stated in the M/P, the social impact due to improvement of the roads included: alleviation of social and political isolation, improvement of health services, improvement of education services and redressing income disparities, and a detailed quantitative evaluation was conducted.
- v) Construction cost was calculated by drawing a design for road improvement and establishment based on the results of the technical investigation stated above and planning standards of the National Road Department of Thailand.
- vi) The priorities of the 15 routes under investigation were determined by synthesizing economical evaluation and social impact and the following suggestions were made

concerning enforcement:

- Aim to open all of the investigated routes in 1988, and start preparing the allowance for necessary construction funds.
- If the IRR limits are 12% then set the opening year as the year that the 4 routes below will reach 12% of the IRR. (That means setting the targeted year for IM-25 1989, IM-7 and IM-26 1990 and IM-27 1993)

#### 5) Investigation method for routes that require repair

This investigation has focused on the elucidation of design, construction, repair and technical problems of curtailment of vehicle traveling expenses. The following are the primary investigation items.

- i) The serviceability of the paved surface was evaluated by measurement by instruments, judgment by PSI by eye and the roughness. Correlation analyses of the measured value were conducted according to types of pavement.
- ii) Deflection measurement, CBR tests out in the fields and indoors and experiments of stiffness of the pavement were conducted to determine the deterioration of the paved structure.
- iii) In order to select the appropriate overlay designing method, several methods used in various countries were selected and a comparative investigation was conducted. Also, a preparative design for repair of the case study section was enforced using a method selected by this investigation.
- iv) Benefits due to repair are curtailment of vehicle traveling expense and curtailment of maintenance repair expense, and the former benefit is estimated by using an estimation formula with roughness that was figured out in this investigation as an explanatory valuable.
- v) Technical suggestions of evaluation methods for pavement surface and pavement structure were made. Method of designing construction for repair were suggested and important points in case of construction were pointed out.

#### 4.3.2 Evaluation results so far

Systematic post evaluation for development investigation projects has not been conducted so far and this project is not an exception. However, the “follow up investigation (investigation of the present situation for development investigation projects that have already been enforced)” conducted by JICA has been carried out for both M/P and F/S in 1988 and 1990. Based on the chart of the summary of individual projects, an overview can be given as follows:

##### (1) About M/P

- i) Number of staff of the research group: 11 people, Investigation period: March 1982~March 1983 (12 months), Total human labor: 79.2 man/months (14.6 are

domestic and 64.6 are local)

ii) Cost: Total 227,413 (thousand yen), Consulting expense 216,437 (thousand yen)

iii) Technology transfer

1 On-the-job Training (OJT): Method for selecting high priority routes and new technology such as quantification of social impact.

2 Accepting trainees: 2 people, consultation of how to complete a draft final report.

3 Cooperative work: Conducted sufficient consultation and on-site inspection, creation of M/P and important matters such as creation of reports.

iv) Next step investigation

F/S (project for road maintenance and construction in North-eastern Region (phase 2) (1985)) was carried out for 15 routes that will be newly established and improved (502.1km) and 8 routes that will be repaired within the high priority project.

v) Usage situation

(Investigation conducted by overseas office in 1997)

The investigation results were integrated into the 5<sup>th</sup> (1982~86), 6<sup>th</sup> (1987~91) and 7<sup>th</sup> (1992~96) National Development Project.

## (2) About F/S

i) Number of staff in the research group: 12 people, Investigation period: June 1984~July 1985 (14 months), Total human labor: 57.6 (5.00 are domestic and 52.56 are local)

ii) Cost: Total 208,231 (thousand yen), Consulting expense 183,479 (thousand yen)

iii) Technology transfer

1 OJT: Carried out seminars of investigation methods for C/Ps.

2 Accepting trainees: Taught the F/S method to C/Ps that participated in JICA trainings.

3 Use of local consultants: Applied in traffic volume investigation, survey, geological research and measurement of deflection.

4 Supply of machinery, materials and instruction: Investigated the surface condition of the pavement by fuel consuming cars and the relationship of fuel efficiency and taught the method.

iv) Usage situation

(Domestic investigation conducted in 1997)

The project is based on the 8<sup>th</sup> road maintenance project (1997~2001) and enforced by the national budget of Thailand and loans. For fiscal 1998 the original budget was cut by 20% so presently it relies significantly on loans. The general situation for this F/S related project of Overseas Economic Cooperation Fund (OECF) and International Bank for Reconstruction and Development (IBRD) are as indicated in Table 4-6. Also the source of funds and completion date of construction for each targeted section of F/S is shown in Table 4-7.

Table 4-6

## (1) OECF project

Highway sector project (November 1988 L/A 4.085 billion yen)

\*Of the loan, 1.008 billion yen will be applied to the establishment and improvement of 7 routes (235.1km) in the Northeastern Region.

\*Details of the project: Asphalt pavement of 6 routes totaling 204km in Northeastern Region and 3 routes totaling 4km in central Thailand, replacement of aging bridges and expansion and repair of roads.

Highway sector project (2) (March 1993 L/A 2.184 billion yen)

\*Details of the project: Northeastern Region, 1 prefectural road in central Thailand and 2 local roads.

## (2) IBRD project

February 11, 1988 L/A 406,450,000 B

\*Details of the project: Northern highway, expansion to a two-lane road and by-pass.

\*Situation of enforcement

- 1 Route No.1: Chenmai Chiangmai by-pass completed, a section of Lampang ~ Chiangmai is still under construction.
- 2 Route No. 318: a section of Doi Saket ~ Chenrai Chiangrai is still under construction and the other sections are partially under construction.

Table 4-7

Implementation of Road Projects Recommended by JICA Feasibility Study

S.N	Province	Route No	Origin	Destination	Length (Km.)	Financing Source <sup>1/</sup>	Cost (Mil. Baht)	Year of Completion
<b>(A) Improvement and new construction</b>								
1	Khon kaen	2199	A.Chonnabot (J.R.2057)	B. Khut Ru (J.R. 2065)	24	IBRD	50.1	1994
2	Khon kaen	2183	A.Nam Phong(J.R.2039)	J.R.209	28	OECF	90.9	1995.5
3	Udon Thani	2316	B.Khok Lat (J.R. 2313)	B.Thu Yom (J.R.2316)	40.7	OECF	122.9	1996.3
4	Udon Thani	2025	B.Huai Koeng (J.R.2)	A.KumphaWapi (J.R.2023)	14.2	OECF	40.6	1995.9
5	Udon Thani	2350	A.Nong Han (J.R.22)	A.KumphaWapi (J.R.2023)	34.3	OECF	119.8	1993.9
6	Sakon Nakhon	2342	A.Sawang Daen Din (J.R.22)	A.Song Dao	19.1	DOH	19.2	1988
7	Nakhon Ratchasima	2824	J.R.2	A.Chock Chai (J.R.24)	51.4	IBRD	242.5	1993.8
8	Nakhon Ratchasima/ChaiyaPhum	2160	A.Khong (J.R.2150,2160)	J.R.2180	46.8	DOH	30.9	1987
9	Yasothon/Si Sa Ket	2351	A.Maha Chana Chai(J.R.2083)	A.Yang Chum Noi (J.R.2168)	24.5	OECF	98.9	1993.12
10	Ubon Ratchathani	2213	B.Na Suang(J.R.24)	B.Na Yia	13.6	DOH	15	1991
11	Roi Et	2259	A.SelaPhum(J.R.23)	B.Kham Phon Sung (J.R.2136)	46.3	OECF	184.7	1993.12
12	Buri Ram	2166	A.Lam PhaiMat(J.R.2073)	A.Nong Ki (J.R.24)	52.6	DOH	30.7	1991
13	Buri Ram	2208	A.Prakhon Chai(J.R.24)	A.KraSang	47.1	OECF	142.7	1994.9
14	Surin/BuriRam	2334	B.Nong Khao(J.R.2079)	A.Chom Phra(J.R.214)	31.1	DOH	21.8	1989
15	Surin/Si Sa Khet	2076	B.Nong Dang(J.R.2080,2083,2084)	A.Rattanna Buri	28.4	DOH	54.5	1984
Sub total (A)					502.1		1265.2	
<b>(B) Rehabilitation</b>								
16	Nakhon Ratchasima	201	A.Sikhui	A. Dan Khun Thot	19	IBRD	187.2	1993.8
17	Nakhon Ratchasima	207	A.Prathai	A. Khok Chik	10	DOH	52.2	1991.2
18	Khon Kaen, Kalasin	214	A.Kalasin	B. Lum Chai	10	IBRD	75.5	1991.4
19	Nakhon Ratchasima	304	A.Pak Thong Chai	(Route 2)	13	DOH	60.9	1993.2
20	Udon Thani	2023	B.Nam Kong	A.Si That	8	DOH	134.4	1993.4
21	Nakhon Ratchasima	2071	A. Chokchai	A.Khonburi	10	DOH	40	1991.3
22	Nakhon Ratchasima	2160	B.Wat	A. Kong	10	DOH	52.3	1995.2
23	Nakhon Ratchasima	224	Nakhon Ratchasima	Chock Chai	10	DOH	60.9	1990.9
Sub Total (B)					90		663.4	
Total					592.1		1928.6	

<sup>1/</sup> Projects financed by OECF and IBRD are partly financed by DOH.

Source: Follow-up Study, JICA 1997

### 4.3.3 Viewpoint and method of evaluation

#### (1) Preface

While improvement of transparency is being demanded of ODA, the importance of conducting an evaluation of the “study report” is beginning to be recognized. However, evaluation that considers the cooperation in “development investigation” as a single form has only started experimentally by JICA since 2 years ago and a well-established evaluation method still does not exist. Under such circumstances, last year, JICA conducted evaluation targeting the 9 development investigation projects carried out in Thailand and the Philippines. Through this project evaluation, methods of the development investigation were studied and concluded in the “Follow-up Investigation (evaluation of development investigation impacts) evaluation investigation report” (August 2000).

Firstly, in this report we will consider whether the evaluation method (“Project Design Matrix (PDM) evaluation method (draft)” from now on) suggested in the above report can apply to the M/P and F/S evaluation process and clarify the framework of this evaluation process through it. Also at the same time the limits of the “PDM evaluation method (draft)” will be clarified in case of conducting an evaluation of development investigation such as this project, and examine the way to improve it. The following are the results of investigation of the framework of this evaluation process and the evaluation conducted based on the framework.

#### (2) Evaluation framework of the “PDM evaluation method (draft)”

The “follow-up investigation (evaluation of development investigation impacts) evaluation investigation report” (August 2000) breaks down the development investigation into the following 3 patterns and presents a PDM model for each pattern.

- 1) Investigation models that aim to transfer technology for designing and creating plans for project enforcement (technology transfer type M/P investigation)
- 2) Investigation models that aim to work out development projects and plans for project enforcement (planning type M/P investigation)
- 3) Investigation models that aim to start business for specific projects (project type F/S investigation)

The model that is suggested in the “planning type M/P investigation” and “project type F/S investigation”, which corresponds to the targeted development investigation project of this evaluation, is indicated in Table 4-2 and 4.3.

Table 4-2 PDM model of the planning type M/P investigation

	Summary of the project	Index	Method to obtain the data of index	External conditions
--	------------------------	-------	------------------------------------	---------------------

Implementation and post implementation stage	Higher-level objective 2 (Implementation and post implementation stage) Project will be conducted based on the results of next stage investigation (F/S and D/D). Also this project will achieve the anticipated objectives.			
Preparation stage	Higher-level objective 1 (Preparation stage) Enforcement of next stage investigation (F/S and D/D) based on the framework suggested by the government of the cooperating country.			
Stage of enforcement of development and application	Objective: Japanese team and the team of the cooperating country plan an X development project in Y region through joint cooperation.			
	Results Get hold of the situation of X in Y region. Team of the cooperating country obtain technology related to M/P.			
	Activities Enactment of investigation Technology transfer	Investment (Japanese team) Dispatch experts Receive trainees Provide machinery and materials Hold seminars (Team of the cooperating country) C/P Establishment of research offices		Precondition

Table 4-3 PDM model of the project type F/S investigation

	Summary of the project	Index	Method to obtain the data of index	External conditions
Implementation and post implementation stage	Higher-level objective 2 (Implementation and post implementation stage) Project in target of the F/S was enforced and it's objective was achieved			
Preparation stage	Higher-level objective 1 (Preparation stage) The cooperating country conducts concrete preparation towards enforcement of business.			

Stage of enforcement of development and application	Objective: Japanese team and the team of the cooperating country plan an X development project in Y region through enforcement of F/S by joint cooperation.			
	Results Get hold of the situation of X in Y region. Team of the cooperating country obtain technology related to F/P.			
	Activities Enactment of investigation Technology transfer	Investment (Japanese team) Dispatch experts Receive trainees Provide machinery and materials Hold seminars (Team of the cooperating country) C/P Establishment of research offices		Precondition

Furthermore, based on these models, the “PDM evaluation method (draft)” indicates the evaluation ranges of the 5 items of evaluation (efficiency, effectiveness, impact, validity and sustainability) as in Figure 4-4.

Figure 4-4 The logical composition and basic position of the 5 items of evaluation of PDM

	Efficiency	Effectiveness	Impact	Validity	Sustainability
Higher-level objective					
Objective of the project					
Results					
Activity and investment					

The items that will be checked for each evaluation item according to the type of development investigation are as follows:

1) Efficiency

(Common for both planning type M/P and project type F/S)

Was the development investigation enforced according to the scope of S/W?

Was there enough investment?

- Was there enough technology transfer?
- Was there enough communication?
- Was there enough data?
- Was there enough adjustment made between other investigations and projects?

2) Effectiveness of the project

(Common for both planning type M/P and project type F/S)

- Was the suggestion made after enough examination?
- Is the composition and content of the report sufficient?

3) Impact

Preparation stage

(Planning type M/P)

- What kind of progress was achieved towards enactment of projects and next stage investigation by the suggestion of the development investigation?

(Project type F/S)

- Was the suggestion made by the development investigation fully applied in case of enacting projects?

4) Validity

(Common for both planning type M/P and project type F/S)

- Was the development investigation in line with the needs of the benefited people, activity of other donors, and the development plan of the country concerned, region and institution in the stage of implementation of the development investigation?

- Is the framework suggested in the development investigation project still valid at the time of the evaluation investigation?

5) Sustainability

(Common for both planning type M/P and project type F/S)

- Is the project suggested in the development investigation independent and developing?

(3) Framework of this evaluation

The above points for checking the “PDM evaluation method (draft)” are not necessarily suitable for each case because they were created to evaluate wide ranges of development investigations such as those shortly after enactment, those in preparation for next stage usage, those after a certain period of time presently in use or after use and even those that were not applied. For this reason, for example, the checkpoints for evaluation of validity are devised so that validity can be evaluated even if the project suggested by the development investigation was not executed. On the other hand, it is stated in Figure 4-2 and 4.3 that “the



project is carried out and its objective should be achieved” so it is rather inconsistent. As is indicated in Figure 4-4, the evaluation of validity evaluates the connection between the results of the development investigation and higher-level objectives, so the way to comprehend the higher-level objective becomes important.

This evaluation targets of F/S that led to eventual implementation of F/S and enactment of projects, respectively. Therefore, the components of the evaluation framework are thought to be as indicated in Figure 4-5. The primary objective of the M/P is to create the M/P so it is natural and its immediate higher-level objective (higher-level objective 1) is to enact F/S based on M/P. (If it is considered this way, M/P that did not link to the enforcement of F/S will not be able to be evaluated, but in such cases a different evaluation framework needs to be considered) Also, furthermore, validity of the M/P compared with the higher-level objective (higher-level objective 2) is, in other words, the validity of the F/S (mentioned later). Since the application is completed in this stage of evaluation there is no need to evaluate impact of the stage of preparation.

Secondly, when considering the F/S, the direct objective of the F/S is to create a project plan. Therefore, impact means how it is connected to the implementation of the project (higher-level objective 1). Unlike the M/P there is not much meaning in considering impact in the stage of preparation. Therefore, logically, evaluating the validity of the F/S (consequently the validity of M/P) means to evaluate the “impact” and “validity” of the implemented project. However, to consider “validity” of the project does not depend on the degree of the objective envisioned in the case of evaluating M/P and F/S.

From the above considerations, in case of evaluating consecutive M/P and F/S like this, it can be understood that it is insufficient to evaluate each in a single form. Furthermore, it is also insufficient to evaluate both at the same time. Especially in case of evaluating “validity”, it is believed that it is necessary to conduct an evaluation of “impact” and “validity” of the implemented project together with the two.

Firstly, a general evaluation according to the checkpoints of the “PDM evaluation method (draft)” will be indicated below. However, evaluation of “validity” should be distinguished from evaluation of the project itself, so it will be evaluated in detail in the next chapter.

Figure 4-5 Framework of this evaluation

Investment	(M/P) 230million yen Total human labor: 79.2 (14.6 are domestic and 64.6 are local) (F/S) 210million yen Total human labor: 57.6 (5.0 are domestic and 52.6 are local)
Results	(Common for both M/P and F/S) Grasp the present condition on the regional roads in the Northeastern Region Technology transfer: Receive trainees and conduct OJT of methods of M/P and F/S. Enforce guidance and provide machinery and materials.

Objective of the project	(M/P) Suggest high priority projects of establishment, improvement and repair for road maintenance in the Northeastern Region. (F/S) Draw up a project plan for establishment, improvement and repair of the targeted routes.
Higher-level objective 1	(M/P) Enforce F/S based on the framework suggested by the government of Thailand. (F/S) Government of Thailand enforces maintenance projects to the targeted roads of F/S.
Higher-level objective 1 (stage of application and after application)	(Common for both M/P and F/S) Achievement of the project by the enforced project.

#### 4.3.4 Evaluation results based on the “PDM evaluation method (draft)”

##### (1) Efficiency

###### Was the development investigation enforced according to the scope of S/W?

There is a partial description of the S/W in the F/S report, but both the M/P report and the F/S report do not mention the S/W itself. Also, S/W and other manuals could not be obtained from JICA in conducting this evaluation. For this reason it is impossible to evaluate this point. S/W and other manuals are essential in order to conduct a fair evaluation of the work so from now on these documents should be recorded as part of the report and be available to refer to any time.

###### Was there enough investment?

There are records of investigation cost and required human labor domestically and locally (follow up investigation), but details such as personnel arrangement according to rank could not be obtained. In order to evaluate if investment was sufficient or not, accurate information of working instructions and S/W is necessary along with detailed information about investment. When these are identified, it can be evaluated for the first time whether investment was sufficient for the labor requested in the S/W. Since these documents could not be obtained it is impossible to conduct an evaluation. However, even though the details of investment are not clear, if the S/W and manuals are distinct it is believed that a brief judgment (relative evaluation) of this point is possible because it can be compared to investment in similar projects.

###### Was there enough technology transfer?

Both the M/P and F/S hold technology transfer as one of the principal objectives in the investigation, but there are hardly any records related to technology transfer in the report. There seem to be many matters that need to be recorded such as the profile and working hours of the employed local consultants, contents of the training in Japan, number of participants,

period, and times of the lecture held on investigation methods. However, like the above-mentioned, even if these details became clear it is impossible to evaluate if they were sufficient. That is because a comparison between the objectives indicated (should be indicated) in the S/W becomes necessary.

Was there enough communication?

Same as above. It is difficult to obtain both the objective and achievements. In order to conduct effective technology transfer good communication is essential, but for that it is desirable that there is a description of the form and frequency of the communication that should be held in S/W. There is doubt in how detailed the description was in the report. Since the development investigation holds technology transfer as one of the objectives to a greater or lesser extent, from now on it is desirable that the value and volume of the communication that should be conducted is clarified in the S/W.

Was there enough data?

There are many data included in the report. Especially in F/S, many investigations were conducted such as social and economic investigations, various traffic investigations and technology investigations (measurement, geological investigation, construction material investigation, water investigation) and data are accumulated. However, if that was sufficient or not depends on what S/W required. S/W should specifically indicate the necessary items of data, method of measurement, accumulation and volume. However, if the data was sufficient or not is reflected by the output of the report so that aspect is included in the evaluation, of whether the report was appropriate or not. (Refer to the effectiveness of the project below)

Was there enough adjustment made between other investigations and projects?

Adjustment between investigation and projects related to road maintenance was conducted very well. The investigation circumstances of DOH and other road maintenance departments are stated in the report. However, even though promotion of agriculture and improvement of public welfare are held as an objective for road maintenance, there are no signs of adjustment seen in these fields. The benefits of road maintenance are measured by the improvement of the ratio of planting area in existing farmland, development of new farmland (only for newly established roads), increase of crop yield, garden price and transfer of planted crops. However, the volume of these benefits differ greatly according to the way agriculture promotion measures are carried out. Therefore, it is more efficient to link the road maintenance project with the agriculture promotion plan. Also since the social impact is grasped by the improvement of security and education services, in the development investigation it is desirable that adjustment was made with the maintenance plan of these fields.

It is presumed that there were no statements about the necessity of adjustment to other

projects in agriculture and public welfare fields in S/W. For similar development investigations in the future it is desirable that S/W is fulfilled in such angles so that these adjustments are certain to be conducted.

(2) Effectiveness of the project

Was the suggestion made after enough examination?

For both M/P and F/S, the contents of investigation include many things. The benefits of road maintenance are not only comprehended as economic benefits of benefit to agricultural development, Curtailment of vehicle traveling expense and road maintenance and repair cost, but also the social impact of the following 4 items: mitigation of social and political isolation, improvement of health services, improvement of education services and revision of income disparity. An evaluation for each of these 4 items must be carried out.

Is the composition and content of the report sufficient?

Since S/W is not available the contents and structure of the report will be discussed in comparison with the objective of F/S stated in 4.3.1 (1) and the objective of M/P stated in 4.3.1 (2).

About M/P

In order to select high priority routes that require maintenance it is necessary to first of all clarify the direction that the development of the entire Northeastern Region is heading. For that, it is desirable that the master plan of regional development of the Northeastern Region is planned before the creation of this M/P. Within it, not only agriculture, but also strategies such as development of tourism and promotion of village industrialization that reflects the characteristics of the region should be examined. The master plan of road maintenance should be designed from the standpoint of how to actualize the roles that these fields play in road maintenance. In order to find a solution to the task of how to pursue road maintenance to rectify regional disparity between Northeastern Region and Bangkok, it is a precondition that the regional development strategy has this as an aim and road maintenance as a method to actualize this should be pursued.

There is no doubt that agriculture plays a central role in the development of the Northeastern Region. If so, then it is obvious that the examination of how agricultural development should be pursued should be conducted before planning the maintenance of the road. It is clear that promotion of agriculture can't be pursued only by road maintenance, and it is obvious that it will not be an agriculture promotion plan to pursue road maintenance where other conditions are not prepared. This M/P lacks such sort of view. If "it is vital to promote agricultural development for the development of the Northeastern Region that centers on agriculture" then firstly the strategy for agricultural development should be investigated. However, this M/P jumps illogically to the conclusion that "the improvement of connection

between the city and villages and connection between the producing center and market is a task of importance in order to give incentives to the farmers". Furthermore there is no viewpoint stated of how to promote industrialization of villages and development of tourism.

At least from the standpoint of promoting development of the Northeastern Region, it is desirable to promote maintenance of the road as much as possible. Therefore, the task for M/P of road maintenance is not to enumerate routes that require maintenance (most routes require maintenance), but it is to closely examine how much of the road maintenance budget in Thailand is distributed to the Northeastern Region, what kind of alternative road maintenance is possible under the limited budget, and which of them have most possibility of achieving the objectives. It is unreliable if it is just simply stated that the total length of roads that require establishment, improvement and repair are X km without such examination. And the point of how much of the budget is distributed to the Northeastern Region among the total road maintenance budget of the country directly connects to the task of how to reduce the regional disparity between the Northeastern Region and Bangkok. However, it is almost meaningless to consider regional distribution by just separating the road budget and it should be investigated as a part of the regional development strategy mentioned above.

Another important viewpoint for M/P of road maintenance is how to efficiently control the entire road system using limited road maintenance finances. How should improvement and maintenance control of existing road systems be balanced with establishment of new roads? What level should the standard of maintenance control of existing roads be? What is the scale of necessary road budget in the short-term and mid-term? How will the financial resources be obtained? This M/P does not attempt to answer any of these questions.

Furthermore this M/P does not conduct an environmental impact assessment, i.e., does not include the social impact evaluation, that should be included in the investigation if it is a modern M/P. (It was in 1993 when JICA created the guidelines for environmental impact assessment and it seems that it was not included in the S/W of this M/P.) Are there any negative impacts in environmental and social aspects due to the road maintenance? Among the alternatives, which one has the lightest effect? If there is no way to avoid negative impacts then what kind of alleviation measures can reduce them? There was no investigation of such conducted.

Since the S/W appears to be not very specific about environmental considerations, it is unfair to conclude that the above observations are directly the evaluation of this M/P. However, it is clear that either the S/W or M/P or maybe even both of them were insufficient.

In the analysis method used during the creation of the M/P there is one point that is doubtful.

When evaluating the social impact, the indicator "amount of time reduced per person in the village" is used, but it seems that "amount of time reduced for all the people in the village", in other words, "population of the village" x "amount of time reduced" should be used.

### About F/S

The M/P selected 18 routes totaling 670km in length for roads that require establishment and improvement and 25 routes totaling 470km in length for roads that require repair as projects with the highest priority, and recommended that a feasibility study should be conducted immediately. However, the F/S conducted after this recommendation only conducted investigation of road project plans for 15 routes totaling 480km in length. The details of why the proposed section for establishment and improvement was reduced by 25% are only stated as “the results of discussion with Thailand” and there are no concrete reasons stated. For repair, only roads of length 90km were targeted for case study, and investigation of the measurement method of surface condition, pavement intensity and technical investigation of the overlay construction was conducted. There was no investigation of the original implementation of the F/S. In the S/W quoted in the report it is deliberately stated that “suggestion of the most suitable timing of implementation (excluding the route that requires repair)” (underline added). There are no descriptions of why it was narrowed to 90km and also there was no investigation conducted on how to implement the 470km section that requires repair, which the M/P states as the highest priority section using the results of technological investigation. The road maintenance project plan is, in other words, a budget control plan. Therefore a project plan that only includes establishment and improvement without repair plans is extremely distorted. Also a project plan that does not consider budget limitations does not have efficacy.

The F/S requires a further detailed environmental and social impact assessment, which was not conducted in this F/S.

As it was for the M/P, it is unfair to conclude that the above observations are directly the evaluation of the F/S. However, at the same time it is clear that either the S/W or the M/P or maybe even both were insufficient.

### (3) Impact

(Preparation stage)

- 1 After the suggestion made by the development investigation, was there any kind of progress towards the next stage investigation and implementation? (M/P)
- 2 After the suggestion made by the development investigation, was there any kind of progress towards implementation? (F/S)

Presently it is in the stage after application so these items do not apply.

(Stage of Application and after application)

- 1 Was the suggestion made by the development investigation fully utilized in the next stage investigation and implementation? (M/P)
- 2 Was the suggestion made by the development investigation fully utilized in the implementation? (F/S)

F/S was conducted based on M/P and all projects for which F/S was conducted were implemented. However, as mentioned above, the results of the M/P were not fully utilized in case of conducting F/S. Also, it was recommended that the opening target for most of the routes that require establishment and improvement be 1988 in the F/S, but as indicated in Table 4-7, the actual year of completion ranged from 1988 to 1996. In this case there is no relationship found between the order of completion and the size of the IRR calculated in the F/S. Also the year of completion for the routes that required repair ranges from 1990 to 1995. However, most of the road projects in both categories were completed by loans from OECF and IBRD so the role that F/S played in obtaining such loans was big.

#### (4) Validity

Did the development investigation have consistency in the needs of the benefited people, activity of other donors and the development plan of the country concerned, region and institution in the stage of implementation of the development investigation?

It is consistent with the national policy to promote development of underdeveloped regions in order to eradicate poverty. However, in order to respond to the other policy of rectifying the disparity of regions in case of development a national viewpoint such as distribution of investment among regions will become necessary. Therefore there is inconsistency in this point. However, it is a precondition for rectifying regional disparities that development is promoted in the Northeastern Region, so it is not necessarily contradictory.

If the checkpoints of the “PDM evaluation method (draft)” are going to be used it is necessary to clarify “development plan”, “activities of other donors” and “needs of the ones that benefit”, which are the target of comparison when conducting an evaluation. However, in many cases these are vague and it is difficult to understand them. It is not desirable to put grounds of evaluation on such matters and at least for the ones that have been conducted as a project, it seems that considering if the project carried out has directly or indirectly achieved the expected effect or not is more realistic as a standard for evaluating validity.

Did the framework suggested in the development investigation meet the needs in the stage of performing the evaluation investigation?

The development investigation was based on the 8<sup>th</sup> road maintenance plan and the suggested project plan was enforced by the budget of Thailand, and loans by aid organizations. Therefore it can be evaluated that the framework suggested in the development investigation and the needs for road maintenance are consistent with each other. However, for the needs of rectifying disparity between Bangkok and the Northeastern Region, the framework of development investigation should be judged as incomplete as it is stated above. Also, for social and environmental aspects, which are another big issue, in case of conducting a comparison between alternative projects, it has only evaluated the social and environmental characteristics of each alternative and is also insufficient. It is necessary that a social and

environmental impact reduction plan is examined for each project.

Similar to the above, since it is difficult to evaluate the needs, there is a necessity to reconsider the evaluation frame of the “PDM evaluation method (draft)”.

#### (5) Sustainability

Is the project suggested in the development investigation independent and developing?

It is possible to comprehend the “suggested project” as the road maintenance project itself and also as the planning of regional road maintenance. In case of the latter point, it can be evaluated as having high sustainability from the circumstances of enforcement of road maintenance projects of a different category. However, planning work is conducted to promote road maintenance projects so ultimately there is not much meaning to evaluate the planning work itself without ascertaining the sustainability of the road maintenance project. Which means that the evaluation of sustainability of the M/P and F/S is simply the evaluation of sustainability of the enforced project and therefore, as in the case of “validity”, it is believed that evaluation should be conducted at the same time that the project is carried out.

Sustainability of the road project means whether the maintained road is preserved and controlled well and whether the conditions to continue appropriate maintenance and control are arranged. These conditions extend over people (technology and management ability), material (material and machinery for maintenance management), funds and systems. In order to conduct detailed investigation, it is necessary to have data of the number of engineers who have knowledge of pavement management systems (PMS); number of staff who have direct control over daily maintenance management; number and scale of construction companies that undertake large-scale maintenance and repair construction; types and amount of machinery that monitor the surface conditions, computers that control and analyze data, machines that conduct appropriate. It is also necessary to know the scale of the budget for maintenance management and have decision making systems to decide the scale and distribution of maintenance management budget. Also data of the surface condition of road systems of the whole country (for example the percentage of satisfactory • within permissible range • poor roads for each section) that shows the transition by time is necessary.

As it is clear in the results of the follow up investigation that DOH has at least completed repair of the 90km section which the F/S has targeted and since it has applied for loans from the World Bank for part of the project cost it can be observed that DOH has been devoted to maintenance management and repair and not only the establishment and repair of road systems. There will be no further interference made about sustainability of road projects in this investigation report.

### **4.3.5 Results of detailed evaluation of validity**

#### (1) Preface

As it is stated in 4.3.3 (3), in order to evaluate validity of M/P and F/S, it is necessary to evaluate the impact and validity of the project. Among those, in this investigation a detailed



interview was conducted with local people about the impact of the project. First of all, the framework for evaluation of road maintenance projects for targeted roads will be investigated and in that investigation the checkpoints of evaluation of impact will be revealed. Secondly, based on the results, evaluation of the impact on the targeted projects will be conducted and the validity of M/P and F/S considered.

Local investigation was conducted between January 29~February 10, 2001. The overview of the investigation is as indicated in Table 4-8. The interview results that were the direct target for analysis are included in the appendix (material 3). In this interview, other than information about impacts due to the project, there was much information that can be useful when conducting similar development investigations to create M/P and F/S such as wide-ranging influences of the project and evaluation of the project by residents. Interview records that were not target of analysis about project impacts (material 5), and the summary of the entire interview (material 4) will be recorded in the appendix.

(Table 4-8)

Type	Place	
Central government office	DOH, NESDB	
Prefectural office	Nakhon Ratchasima, Khon Kaen, Surin, Buri Ram	
DOH regional office	Nakhon Ratchasima, Surin, Khon Kaen, Si Sa Ket	
Local residence	Assembly	3 villages in Nakhon Ratchasima, 2 villages in Khon Kaen
	Individual	3 villages in Nakhon Ratchasima, 2 villages in Surin, 1 village in Si Sa Ket
Others	2 manufacturing industries, rice mill, NGO and governmental association	

## (2) Framework for road maintenance project evaluation

The framework for the targeted road maintenance project evaluation is as indicated in Table 4-9. And the 5 checkpoints for evaluation based on this are in Table 4-10.

Table 4-9 Framework for road construction project evaluation

Investment	Newly established and improvement: total of 12.7 billion Baht Breakdown: DOH (170 billion Baht), OECF (800 million Baht), IBRD (290 million Baht) Repair: total of 660 million Baht Breakdown: IBRD (260 million Baht), DOH (200 million Baht)
Result	Complete the road construction project (Establishment or improvement of 15 routes totaling 502km, and repair of 8 routes totaling 90km) Technology transfer: transfer knowledge and technology about road construction

Objective	Accommodate the designated traffic smoothly Reduce the traveling time and cost. Improve reliability and safety. Reduce the lifecycle cost which is a combination of initial investment and maintenance repair cost for road systems.
Higher-level objective 1	Improve public welfare and regional economy.
Higher-level objective 2	Achieve sustainable economic development. Reduce income disparity between the Metropolitan area and the Northeastern Region.

Table 4-10 Checkpoints for road construction project evaluation

Efficiency	Was the construction project conducted according to the scope of S/W? Was there enough investment? Was there enough technology transfer? Was there enough adjustment made between other investigations and the project?
Effectiveness the objective	Was the construction project enforced under sufficient investigation? Is the finishing of the maintained road sufficient?
Impact	Are the designated traffic using the maintained road without problem? Has the traveling time and cost decreased? Has the reliability of traffic improved? Has the regional economy improved due to road maintenance? Has the welfare of local residents improved due to road maintenance? Has the lifecycle cost of road systems decreased?
Validity	Has the enforcement of road maintenance projects contributed to a balanced development of the country? Has the enforcement of road maintenance projects contributed to the rectification of income disparities between the Northeastern Region and the Metropolitan area?
Sustainability	Has a sustainable maintenance management system (technology, system, finance) for road systems been established?

The checkpoints of impact indicated above are consistent with the social impact and direct effects indicated below, effects which this project is assumed to produce by the M/P and F/S.

Direct effect

- 1 Decrease vehicle traveling expense
- 2 Benefit agricultural development

### 3 Curtailment of road maintenance and repair costs

#### Social impact

- 1 Reduction of social and political isolation
- 2 Improvement of health services
- 3 Improvement of education services
- 4 Rectification of income disparity within the region

The M/P and F/S consider the factors indicated below for the estimation of agricultural development benefits:

- 1 Increase of planted acreage ratio in existing farmland
- 2 Expansion of newly developed cultivated land
- 3 Increase of crop yield and garden price
- 4 Conversion of plant species
- 5 Decrease of production cost

Using the investigation results from above, evaluation of maintenance projects for targeted road systems will be conducted based on the information obtained from the results of the interviews in the next chapter. However, since data concerning lifecycle cost of road systems and traveling expense of vehicles could not be obtained, impact evaluation related to these matters will not be carried out in this investigation.

### (3) Impact evaluation of maintenance project for road systems

#### 1) Results of interviews

Many questions related to social impact and agricultural development benefits were conducted in the local interviews. Table 4-11 has classified the answers of the interviews in 3 groups of “agree”, “can’t say which” and “disagree” for each checkpoint. Among the agricultural development benefit, the result for reduction of productivity seemed disappointing. Looking at the results of the interview it can be observed that as a result of usage of chemical fertilizers in the Northeastern Region of Thailand along with the road maintenance, productivity increased at first. However, because of the lack of knowledge of fertilizers, land has become impoverished by excessive use of fertilizers and productivity has started to decrease. And now people are explaining unanimously that the cost for fertilizers does not match the increase of production and it is only increasing the productivity cost. Also it was revealed that this phenomenon has encouraged some innovative farmers to transfer to organic agriculture, which not only reduced the cost for chemical fertilizers, but also raised the added value of farm products and increased profit, which was something that M/P and F/S had not expected at all.

Also the increase of planted acreage did not shift as M/P and F/S had expected. In the regions along I-33 a large-scale agricultural development was anticipated because it was a newly established route, but instead the new road led to land speculation and existing

farmlands were sold as target for speculation and planting was no longer practiced. Also there was a case reported that because of road maintenance the number of migrant workers that go to Bangkok and Taiwan increased in many regions and the agricultural population decreased and, which led to the decrease of agricultural production.

However, there are many reports of cases that M/P and F/S assumed, such as the transfer to cash products such as sugarcane as a result of easier transportation of products due to the road maintenance and increase of garden price of products as a result of expansion of selling markets.

Compared to the vague emergence of agricultural development benefit the results of the interview of social impact have proved that at least qualitatively the perspective of M/P and F/S was correct. As a result of road maintenance, traffic conditions have improved without doubt and as a result many social benefits were obtained. It was not predicted in the M/P and F/S, but there was a characteristic that in many places water and electricity maintenance progressed accompanied by the road maintenance. Occasionally, road maintenance is a precondition of infrastructure maintenance such as water and there are many cases where maintenance of other infrastructure was promoted by taking advantage of road maintenance. Also there are cases where greater social impact was achieved because of enrichment of public transportation facility services due to the advancement of road maintenance.

The results stated above indicate that the impact of the road maintenance project has, at least in the aspect of social life, actualized what M/P and F/S assumed. Therefore, the validity of the development investigation that has created them can be evaluated as a success from this aspect. However in the case of agricultural development and, furthermore, the impact on income improvement and industrial promotion, the results of road maintenance are extremely complicated and the development investigation did not sufficiently foresee this. Also there was no investigation conducted of the measures to promote economic development and of the measures to prevent negative effects so we cannot help but say that the validity was low.

Table 4-11 Evaluation of impact of road maintenance projects based on the results of the interview

	Interview No									Average
	I-1	I-2	I-3	I-4	I-5	I-6	I-7	I-8	I-9	
Benefit of agricultural development										
1) Did the planted acreage increase?	C	C	B/C	A	B					B/C
2) Did the amount of production increase?	C	C	C	A	B	C	A	A	A	B

3) Did the garden price rise?	A		B	A	A			A	A	A/B
4) Did the transfer to cash products occur?	A	A	A	B/C	C	A		A	A	A/B
5) Did production cost decrease?		C	C			C			C	C
Social impact										
1) Did administrative services improve?	A	A	A	A	A	A	A	A	A	A
2) Did the educational services improve?	B	A	A	A	A			A	A	A
3) Did medical services improve?	A	A	A	A	A			A	A	A
4) Did the income disparity within the region decrease?	B	B	B	A	B/C	B/C				B

(Notice)

A: Agree, B: Can't say which, C: Disagree, Blank: Not clear

The interview numbers are the same as the numbers of the interview numbers recorded in material 3.

A=3, B=2, C=1 and the result is the average of the evaluation, excluding the ones that are not clear.

2) Evaluation based on the volume of traffic

The actual traffic volume in the 33 newly established and improved sections that were given high priority by the M/P are indicated in Table 4-12 together with the forecasted value of M/P and F/S.

In all of the sections, the actual traffic volume exceeded the predicted traffic volume of the M/P and F/S, and, moreover, it is indicated that in most of the sections they were far superior to this. This signifies that induced traffic was far greater than expected. The F/S applies a method to directly associate induced traffic benefit with agricultural development benefit but this result means that if induced traffic is calculated as a consumer surplus this maintenance project has created remarkable benefit. Therefore, if it is not related to agricultural development benefit (since the results above indicate that there is doubt if agricultural development benefit was obtained as expected) then it means that there was a big development benefit brought out and, in that sense, the validity of the development investigation is high. However, on the other hand, traffic volume that exceeds the expected volume produces a heavy load on the maintenance and management of the road so it is doubtful whether the construction standards at the beginning were appropriate. This requires close examination of whether the reduction of lifecycle cost of the road system is produced as anticipated. However, as indicated above, sufficient data to conduct these examinations was not obtained in this investigation.

Table 4-12 The forecasted traffic volume and actual traffic volume within the sections that were given high priority by the M/P

Traffic volume Comparison for the Improvement and New Construction Routes									
S.N.	Origin	Destination	Route No	1994			1999		
				Forecasted Traffic Volume <sup>1/</sup>	Actual Traffic Volume <sup>2/</sup>	Ratio <sup>3/</sup>	Forecasted Traffic Volume <sup>1/</sup>	Actual Traffic Volume <sup>2/</sup>	Ratio <sup>3/</sup>
1	A.Chonnabot (J.R.2057)	B. Khut Ru (J.R. 2065)	2199	628	1222	1.9	799	2159	2.7
2	A.Nam Phong(J.R.2039)	J.R.209	2183	548	1593	2.9	783	1209	1.5
3	J.R. 2301	A.Na Chuak (J.R. 219)	2297	186	1326	7.1	232	1306	5.6
4	B.Khok Lat (J.R. 2313)	B.Thu Yom (J.R.2316)	2316	173	1059	6.1	230	1255	5.5
5	B.Huai Koeng (J.R.2)	A.KumphaWapi (J.R.2023)	2025	390	447	1.1	499	1848	3.7
6	A.Nong Han (J.R.22)	A.KumphaWapi (J.R.2023)	2350	368	1226	3.3	473	2333	4.9
7	B.Thung Yai (J.R.2096)	K.A.Thung Fon	no R.NO. <sup>4/</sup>	124	1192	9.6	155	2249	14.5
8	B.Sok Chan (J.R.2146)	Ubolrattana Dam (J.R.2109)	no R.NO. <sup>4/</sup>	184	781	4.2	234	1213	5.2
9	A.Phen (J.R. 2022)	J.R.212	2022	238	562	2.4	287	860	3.0
10	A. RenuNakhon (J.R.2031)	B.Ku Ru Khu (J.R.22)	2276&2105	181	837	4.6	229	1871	8.2
11	(J.R. 212)	A. Whan Yai	no R.NO.	110	610	5.5	133	1178	8.9
12	A.Sawang Daen Din (J.R.22)	A.Song Dao	2342	341	902	2.6	419	2110	5.0
13	J.R.223	K.A.Tao Ngai	no R.NO. <sup>4/</sup>	168	524	3.1	207	698	3.4
14	B.Chuam (J.R.2094)	A.Na Wha	no R.NO. <sup>4/</sup>	130	784	6.0	162	825	5.1
15	A.Kuchinarai (J.R.2043, 2030)	B.Na Khu	2291	222	1767	8.0	276	2941	10.7
16	C.Kalasin	B.Khok Nong Bua (J.R.2116)	no R.NO. <sup>4/</sup>	197	7980	40.5	244	9149	37.5
17	J.R.2	A.Chock Chai (J.R.24)	between 2&24	1940	3246	1.7	2413	7429	3.1
18	B.YokKham (J.R.2309)	A.Soeng Sang (J.R.2119)	2309	92	616	6.7	119	842	7.1
19	A.Khong(J.R.2160,2160)	J.R.2180	2160	384	1129	2.9	494	908	1.8
20	A.Maha Chana Chai(J.R.2083)	A.Yang Chum Noi (J.R.2168)	2351	256	641	2.5	392	583	1.5
21	B.Na Hai (J.R.2049)	A.Kut Khao Pun	2197	178	1427	8.0	220	3342	15.2
22	A.Trakhan Phut Phon (J.R.2049)	A.Khemarat(J.R.202)	2050	670	2055	3.1	904	3806	4.2
23	A.Khemarat	B.Huasa Phan(J.R.217)	2112	181	1201	6.6	243	1257	5.2
24	B. Don Chik(J.R.217)	B.Non Rieng (J. R. 2182)	2172	355	376	1.1	504	2277	4.5
25	B.Na Suang(J.R.24)	B.Na Yia	2213	445	2620	5.9	660	1230	1.9
26	A.SelaPhum(J.R.23)	B.Kham Phon Sung (J.R.2136)	2259	303	2287	7.5	383	1888	4.9
27	B.Wao(J.R.202)	K.A.Na Pho	no R.NO. <sup>4/</sup>	354	1447	4.1	458	1793	3.9
28	A.Lam PlaiMat(J.R.2073)	A.Nong Ki (J.R.24)	2166	472	1219	2.6	680	1437	2.1
29	C.BuriRam	Lam Chi(River)(J.R.2078)	226	1316	3213	2.4	1769	5138	2.9
30	A.Prakhon Chai(J.R.24)	A.KraSang	2208	475	1953	4.1	745	3559	4.8
31	A.Huai Thalaeng	B.KaSang (J.R.218)	2162	669	1605	2.4	884	1771	2.0
32	B.Nong Khao(J.R.2079)	A.Chom Phra(J.R.214)	2334	368	594	1.6	499	965	1.9
33	B.Nong	A.Rattanna Buri	2076	308	1549	5.0	426	2097	4.9
Total				12954	49990	3.9	17155	73526	4.3

<sup>1/</sup>Forecasted traffic volumes for 1994 and 1999 are estimated using the traffic volumes forecasted in Feasibility Study wherever such are available and using those forecasted in Master Plan Study if such are not. Note that forecast is done only for 15 routes in feasibility Study. These studies predicted traffic volumes for 1993 and 2001, and 1994 and 2002 respectively, and these forecasts are interpolated to estimate 1994 and 1999 traffic volumes.

<sup>2/</sup> Actual traffic volume are the volume measured by the DOH.

<sup>3/</sup> Ratio= Actual traffic volume/ Forecasted traffic volume

<sup>4/</sup> For road section where no traffic count point is placed, traffic volumes are taken from the nearest traffic count point.

### 4.3.6 Conclusion

Most of the suggestions made by the M/P and F/S that were targeted for evaluation were enacted as projects. In order to conduct post evaluations of impact, validity and sustainability of such development investigation it is necessary to conduct evaluation of the enacted project. In this investigation a detailed investigation of the validity of the targeted development investigation was conducted through an impact evaluation of the enacted project.

In order to evaluate the efficiency and effectiveness it is essential to have S/W and other manuals, but in this investigation those documents could not be obtained. In order to prevent such incidents, it is preferable to record these documents as part of the report for further development investigations. Also the targeted development investigation has held technology transfer as one of the major objectives, but there were hardly any descriptions of

how technology transfer was to be conducted through development investigation in the report. It is desirable that the results of those implementations are described in detail in future reports.

The lesson of how to create a greater contribution by rectifying regional disparities between the Metropolitan area and Northeastern Region in projects like this development investigation emerges from the evaluation of some of the evaluation items. As is mentioned in chapter 1, to rectify disparities, first of all it is necessary that the development investigation and the construction project enforced by it contribute greatly to the economic and social development of the targeted region, but that is not enough. A strategic approach to rapidly develop the Northeastern Region to rectify disparities from a nationwide point of view is essential. Therefore it is obvious that the problem of rectifying disparities cannot be tackled by taking an approach to investigate the situation of road maintenance only by taking account of the Northeastern Region. The way that a strategic approach ought to proceed in the case of rectifying disparities, as well as effectiveness of the development investigation, is stated in detail in evaluation of the contents and structure of the report.

Even if it is limited to the necessary conditions of rectifying disparities such as the economic and social impact of the development investigation and the construction project that was enforced by it, there is still great scope for improvement in the approach taken in this development investigation. The points that will become a lesson for enacting of similar investigations in the future became clear in this evaluation. The most important point among those is that adjustment was not made between projects in the fields of agricultural promotion and improvement of public welfare, which was stated in adjustment between other investigations and projects. In case of enactment of F/S and planning infrastructure maintenance plans aiming to improve public welfare and promote agriculture, it is not only necessary to make adjustments with other projects in this field, but also to make efforts to clarify the new needs of maintenance in these fields to make the best use of new conditions produced by infrastructure maintenance as much as possible. Also it is an important role for development investigations to take measures to prevent negative effects such as increase of traffic accidents and land speculation outbreaks by infrastructure maintenance.

Development investigations do not have a very long history and there still is not an established evaluation method. This evaluation process was conducted based on the framework of “PDM evaluation method (draft)” and the following points became clear about evaluation methods.

- 1) The “PDM evaluation method (draft)” considers an evaluation framework with wide application that can conduct an evaluation in case the project recommended by the development investigation was enacted and in case it was not. However, it has a danger that it does not apply for either case and there is a difficulty in application. Two types of frameworks should be created depending on whether the project was enforced.
- 2) An evaluation of the development investigation of when the recommended project has been enacted should be conducted together with a post evaluation of the project

itself. Especially, validity and sustainability of the development investigation can be evaluated for the first time when evaluation of the project itself is conducted.

- 3) Even though there is plenty of room for improving the framework, the PDM evaluation method has been extremely useful in conducting the evaluation of the development investigation and it was also very helpful for this evaluation process.

---

<sup>1</sup> Since this is a financing cooperation project, to be more precise it should be stated “financing cooperation necessary to supply ~”. Same for the following.



Appendix 4-1 Present Situation of the Project Sites



1. Huai Khum Mum



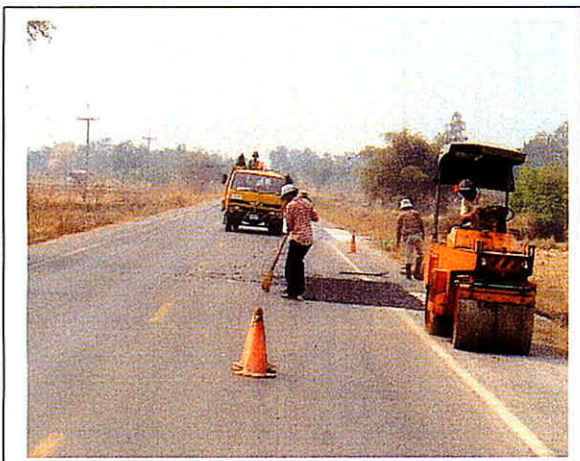
2. Lam Klang (1)



3. Lam Klang (2)



4. Lam Ta Khon No.1



5. Rt. 2199 (during maintenance)



6. Interview with residents living around Rt. 2183



## **Chapter 5**

### **Contribution toward the Development of Agriculture and Forestry: By Encouraging Sustainable Use of Resources and People's Self-Help Activity**

#### 5.1 Introduction

5.1.1 Agriculture and Forestry in the Northeastern Region of Thailand

5.1.2 Selecting Target Projects for Evaluation and Evaluation Criteria

#### 5.2 Activities and Evaluation of “Reforestation and Extension Project in the Northeastern Region of Thailand”

5.2.1 Outline of the Project and Up-to-date Evaluation

5.2.2 Achievements of Transfer of Technologies for Large-scale Nursery Management and Dissemination Activities

5.2.3 Community Forest and Dissemination Activities

5.2.4 Activities and Strategies of REX

#### 5.3 Activities and Evaluation of “Agricultural Cooperative Promotion Project in Thailand”

5.3.1 Structure and Characteristics of the Project

5.3.2 Various Impacts on the Model Agricultural Cooperatives

5.3.3 Disputed Areas in the ACPP: Effect and Limits

#### 5.4 Conclusion

5.4.1 Contribution to Regional Society



## Chapter 5

### **Contribution toward the Development of Agriculture and Forestry: By Encouraging Sustainable Use of Resources and People's Self-Help Activity**

#### **5.1 Introduction**

##### **5.1.1 Agriculture and Forestry in the Northeastern Region of Thailand**

The Northeastern Region in Thailand

Although its ratio to the GDP is low, the Northeastern Region of Thailand's contribution to the overall Thai economy is much larger than what actually appears in statistics or figures. The Northeast Region of Thailand, in particular, has played an important role as a frontier for development. It has contributed to the increase in agricultural production by expanding the agricultural frontier through the cultivation of vast underdeveloped areas and forests. The region has been able to play a role as a development frontier due to the existence of exploitable land resources. However, as the region faces harsher environmental conditions than other regions, capital investment in agricultural infrastructure, such as irrigation systems, has also been held up. Low levels of agricultural productivity persisted for many years in this region due to this low level of investment.

What sustained the low productivity level was the abundant labour force. Cheap labour was an essential factor in the expansion of the agricultural frontier. The reason for the increase in cultivation of labour-intensive agricultural products no longer profitable in other regions, such as sugarcane cultivation that requires vast amounts of labour for harvesting, was that it was relatively easy to acquire cheap labour in this region.

The surplus population of rural villages in the Northeastern Region of Thailand has been the major supply base of labour to the urban economies, mainly in Bangkok, and has supported the competitiveness of export-oriented primary industry; the principal source of earning foreign currency. Up until the mid-1990s, most of the crew of the middle to large scale fishing boats were farmers from the Northeastern Region who came for temporary labour. Besides, they were the ones who have undertaken the heavy labour required by the American businesses. In the 1990s urban economies started to rapidly absorb the rural labour force due to high level economic growth, and this pressured the demand and supply of labor in the primary industry sector which was supported by the temporary workers from the Northeastern Region, and as a consequence, this sharply raised the wage standard. The gap caused by this shortage in cheap labour was, in many cases, filled by the migrants and temporary workers from the neighboring countries, but on the whole, the international competitiveness of the labour intensive forestry and fishery industry sectors sharply declined. As a matter of fact, exports sharply declined in

these sectors.

Currently rural villages in the Northeastern Region of Thailand are undergoing rapid transition in terms of employment and industry structure. While more and more farmers are finding employment outside of the agriculture sector, the ratio of aging population in rural households is on a rise. In some parts of the region, populations have rapidly declined due to the drift of population away from the rural to urban areas.

### **5.1.2 Selecting Target Projects for Evaluation and Evaluation Criteria**

#### Rural Villages in Northeastern Region and the JICA Projects

JICA's projects aimed at the agriculture and forestry sectors directly and indirectly face problems of local poverty brought about by the low level of agricultural productivity. The way in which these problems were dealt with differs from project to project or the period in which these projects were undertaken. In the Northeastern Region of Thailand, not only the structure of the agricultural production but the local employment structure itself is rapidly changing. What were the effects of the JICA cooperation projects implemented between the mid-1980s to the 1990s on these rapidly changing agricultural communities? Were they useful in improving the poverty situation of the local communities? Were the projects flexible enough to adapt to the agricultural communities and systems that were under transition? Did they contribute to increasing the income level of the people in the Northeastern Region of Thailand and decreasing regional disparity?

#### Two Projects Selected for Evaluation

The evaluation team in charge of the agriculture and forestry sector chose two projects carried out between mid-1980s to the 1990s for evaluation. In fact, all projects should be evaluated, but because of time and financial constraints, the team selected the following two projects: the Agricultural Cooperative Promotion Project and the Reforestation and Extension projects in the Northeast of Thailand (REX). Each project was implemented together with a provision of infrastructure facilities to be used as a base for developmental research and technology transfer. One Agricultural Cooperative Training Center and four Large-scale Nursery Centers were established, respectively, under each project with assistance from the Japanese government.

The Agricultural Cooperative Promotion Project aimed at the advancement of agricultural cooperatives and was carried out between the mid-1980s to the 1990s. The project embarked on the improvement of the organizations, projects and management of agricultural cooperatives, focusing on the issue of how cooperative farmers' organizations should contribute to the development of regional agriculture. REX, on the other hand, was a reforestation project aimed at transferring technologies related to the development and management of nurseries, and included activities such as distributing seedlings to local communities as well as awareness-building and educational activities related to reforestation.

The Agricultural Cooperative Promotion Project was implemented in the 1980s when

the structural changes in rural villages started to take off. Five agricultural cooperatives in Nakhonratchasima province were chosen as model cooperatives, but in those days the region still had enough capacity to deal with agricultural development. However in the 1990s, when the REX was implemented, a reduction in agricultural production also started in the Northeastern Region of Thailand. REX was a reforestation project and its aims differed from those of the Agricultural Cooperative Promotion Project, but the target group in promoting reforestation was mainly farmers. At this time, the farmers started to move out from the agricultural sector, and this movement also influenced the reforestation activities. It is possible that the difference in the time period in which the two projects were implemented revealed the contrastive characteristics of the two projects.

Although the amount of emphases put on the two projects differs, both of the projects involved disseminative activities within technology transfer programs. The seedlings produced in REX were distributed to target villages and enhanced farmers' reforestation activities. This was a highly localized program aimed at poor rural villages. The Agricultural Cooperative Promotion Project aimed at developing an agricultural production base through the advancement of profit-oriented agricultural organizations as part of the agricultural cooperatives development plan. The activities included education for farmers on cooperatives development, technology transfer to governmental organizations as well as agricultural cooperatives, and utilizing these technologies in the actual fields.

#### Projects with Disseminative Activities

In selecting the projects to be evaluated, the team focused on the disseminative aspects of the projects. JICA has implemented many projects focused on disseminative activities aimed at the local population in the agriculture, forestry and fishery industry sectors as well as various other fields. Dissemination can not only be a criterion for measuring the specific practicality of technology transfer, but also its effects and results influence to the local population directly. It is not possible, however, to specify these effects and results with definite indexes all the time. In regards to the objective of the Agricultural Cooperative Promotion Project, which is to strengthen the organizational aspects of agricultural cooperatives, it is difficult to specifically measure the achievement of mental change that occurred in the minds of cooperative members. When measured by the numbers of seedlings distributed, then the degree of achievement becomes more measurable and specific. Nevertheless, though it is possible to count the numbers of the educational and training activities which took place, the process of changing local peoples' attitude towards environment through the reforestation activities involves longer term perspectives, and the degree of dissemination to the local people can only be measured after a certain time period.

In times when specific indexes for measuring project results are in strong demand, disseminative activities which cannot be indicated by specific indexes might be disregarded. Moreover, there are cases in which the evaluation indexes are too specific. For example, when the promoted agricultural product did not take root, that project tends to receive negative

assessment. However, it is natural that change in farmers' preference in selecting products to be planted happens, especially for those agricultural commodities for which market conditions can change rapidly. The real issues are whether the farmers or the communities are constantly seeking potential products, species and technologies that lead to the formation of production bases by themselves without sticking to the promoted products of the project, and whether the project has given incentive to the local people to take such initiatives. Disseminative activities involve the process of strengthening the farmers' adaptability to technologies and markets as well as strengthening their organizational bases.

#### What are the Characteristics of the Projects?

The two projects selected for the evaluation purpose have already been completed and their achievements are being assessed from various points of view using various methods. The achievement and problems of their activities have been pointed out even outside the evaluation circle. Little can be said about the two projects by conventional evaluation methodologies. The evaluation team, therefore, decided to examine the projects focusing on the following points.

Firstly, the team decided not to evaluate the project by setting clear evaluation standards, but instead extracted the points considered to be characteristic of the projects and tried to judge what has made the biggest impacts on local society. There are cases in which the chosen characteristics were not necessarily the main activities of the projects. The team might have selected issues that may be considered minor from a budgetary distribution and expert arrangement point of view. Nevertheless, the evaluation team decided to clarify the individual characteristics of the projects from the impressions acquired by visiting the project sites, by in-depth discussions and thoughts that came up by interviewing the people involved in the project and the local people, and the knowledge obtained by analyzing collected documents and information.

Secondly, the team decided to examine the appropriateness of the implementation period, methodology, targeted area and targeted sector of the projects, taking into account the socio-economic environment in which the project was undertaken. In addition, the team examined the social conditions in which the project started and whether these conditions were the same as what had been originally hypothesized.

Thirdly, the team decided to conduct interviews with local villagers in the area concerned mainly for the Agricultural Cooperative Promotion Project which the dissemination effects were considered to be relatively easy to recognize. Interviews were conducted in Phimai and Pakthongchai districts of the Nakhonratchasima province. Interviews mainly consisted of how the villagers evaluate various technology guidance and assistance aimed at model cooperatives, and how the livestock and agricultural products introduced and disseminated by the project took root in the region. Although only a part of the region, interviews were also conducted for the REX evaluation.



## Field Research and Evaluation Activities

Masahiro Yamao, Mariko Harada and Mizuho Kuga conducted preliminary research from 14-19<sup>th</sup> November, 2001 and the main research in 16-27<sup>th</sup> December, 2001.

During the preliminary and the main research, the team visited governmental organizations in charge of the two projects and talked to people who were responsible for the projects at the time, administrative officers of the target areas of the projects, local people in the region and many other people. They also generously provided the team with relevant materials.

Interviews with farmers within the project areas were entrusted to a group led by Dr. Saroj Aungsumalin and Mr. Nugool Kornyuenyong, assistant professor and lecture of the Faculty of Economics, Kasetsart University. A report entitled "Socio-Economic Impacts of JICA Projects" has been submitted. Both of them belong to the Department of Cooperatives and have conducted research on Thailand's rural development for many years. Evaluations from Thai experts seem to be valuable for planning future methods for technology transfer.

Materials and reports collected by the evaluation team were brought back to Japan to be analyzed. Since many of them were written in Thai and because of the limited Thai language capability and time constraints, the team could not complete a detail and thorough analysis. Nevertheless, we tried to go through as much of the materials as possible.

## Structure of the Chapter

This chapter was written by the evaluation team from the Japanese side. "Socio-Economic Impacts of JICA Projects", kindly submitted by the team led by Dr. Aungsumalin will be published as a separate volume. In this report, outcomes of field research, farmers' opinions, assessments and impacts of the project activities, mainly focusing on the Agricultural Cooperative Promotion Project, are reported in detail. In the beginning, the team planned to insert this original paper in a forest industry report, but because of space limitation, this could not be done. Of course, the team referred to this paper when writing its part, but for more details, please read the original "Socio-Economic Impacts of JICA Projects".

Most members of the evaluation team from the Japan side had neither experience in dealing with technology transfer nor operating projects. Honestly speaking, the team does feel a little uncomfortable with the fact that such people are conducting the evaluation and making suggestion for future planning of the project. Nevertheless, among the vast amounts of information that the team received from actually entering project sites and talking to many stakeholders, it was possible to find valuable evidence, achievements, problems as well as local peoples' hopes of JICA and its projects. The team will be more than happy if it is possible to show at least part of these points.

## **5.2 Activities and Evaluation of “Reforestation and Extension Project in the Northeastern Region of Thailand”**

### **5.2.1 Outline of the Project and Up-to-date Evaluation**

#### **(1) Project Framework**

The ratio of forestry area in However, has decreased year by year. Even in the 1980s, the forestry area in every province in the region continued to decrease. Decrease in forestry resources will cause the deterioration of regional natural environmental conditions, and will continue to have various impacts on farmers who have depended on forestry within their living areas. Meanwhile land used for farming has become impoverished because of continuous cropping, and the areas of land which can no longer be economically used for farming continue to expand. There has been a continuous population drain to the urban areas, and abandoned farming land was starting to become a serious problem. It was necessary to conduct reforestation activities in this kind of area together with forestry restoration activities, and reutilize the resources in a profitable way in order to improve the environmental condition of the region. In 1988, the Government of Thailand formulated a “Greening of the Northeastern Region of Thailand (E-san) Project” and got down to starting reforestation activities.

In order to enhance the reforestation activities of the Northeastern Region of Thailand, it is necessary to build nurseries that have the capacity to sufficiently meet the demands of the local society and to establish technology that enables large-scale production. Large-scale nursery centers were established with Japanese grant aid cooperation and this was a significant movement since these centers were utilized as bases for conducting various activities starting from the transfer of technologies for seedling management. The following five areas were agreed as JICA’s cooperation area in the Record of Discussion (R/D):

- 1) implementation of Base Line Survey
- 2) development of Large-scale Nursery Management Technologies
- 3) development and Enhancement of Dissemination Methodologies and Systems
- 4) formulation of Training Programs Aimed at Local Residents Including Women, and Development of Teaching Materials
- 5) development of Exhibition Forests and Model Forests to Strengthen the Reforestation, Technical Training and Dissemination Activities.

#### **(2) Up-to-date Evaluation Activities**

In regards to REX Phase I (the current on-going project is Phase II), JICA’s evaluation team has already compiled a final evaluation report. Many researchers inside and outside Thailand working on forestry issues have also conducted research from various perspectives, and REX’s activities have been widely reported in the form of papers and at academic conferences. Moreover, The Ministry of Foreign Affairs in collaboration with the Food and Agriculture Organization of the United Nations sent an evaluation mission in March 2000 and their report will be publicized in the near future. It seems that in regards to REX, third-party

evaluations are almost unnecessary any more. Yet, the agriculture and forestry project carried out in the Northeastern Region of Thailand was not only unexceptionally large in its cooperative scale but is also epochal in the sense that its activities involve a dissemination process aimed at local people. It is certainly not worthless making efforts to disseminate REX's achievements and lessons to a wider population.

The "Evaluation Report on the Completion of the Reforestation and Extension Project of the Kingdom of Thailand in the Northeast of Thailand" ["the REX Evaluation Report"] was done by analyzing 5 categories based on the JPCM methodology. It is reported that during the cooperation period, reforestation activities were revitalized with an increase in demand of timber, and the project has contributed to the expansion of the possibility of the utilization of seedlings by local people, promotion of local peoples' willingness to get involved in the reforestation activities and improvement in local peoples' technologies and knowledge about reforestation. Investment for reforestation activities was used efficiently and made achievements in areas such as the effectiveness of model forests and technologies. Restoration of environmental conditions and living standards of the local people cannot be judged easily, but it is anticipated that they will become obvious in the near future. In short, the REX evaluation report can be summarized as follows; the REX project was highly appropriate and its objectives were adequately met.

Evaluation of the five area of activities recognized by the R/D was also positive as a whole. In area one, Base Line Survey, various information was collected over the vast area of the Northeastern Region of Thailand utilizing a range of basic data and research methods. Although analysis on the inter-relationships between the collected data and in-depth analysis has not been sufficient, it was possible to compile a relatively large amount of information related to the current situation of the target areas of the project. In area two, Development of Management Technology for Large-scale Seedlings Field, transfer of technologies required for the production and management of seedlings was successfully completed. Also the project not only established conditions which allowed timely mass-production of high quality seedlings, but also managed to produce and distribute 160 million seedlings, which was more than 1.5 times larger than the initial five-year projection of 100 million seedlings. Improvements were made also in the area of securing seeds, developing and enhancing technologies

In regards to the third area; development of dissemination methods and strengthening of the dissemination system, many dissemination activities took place utilizing various methodologies and seedlings were distributed without charge. 7,300 seedlings were distributed to 1,668 target villages and made a large contribution to the reforestation activities of the Northeastern Region of Thailand. Collaboration with other organizations in order to establish the dissemination system has been completed but there are many issues left outstanding in this area. In the fourth area, the development of training program and teaching materials aimed at local people and officials, research was conducted to identify the needs for training and a training curriculum was fully developed based on these needs.

In the fifth area; development of exhibition or model forestry, environmental and

economic objectives were mostly met but, the project of model forestry for village forestry has not been fully accomplished. Villages' model forestry in public areas has been developed and expanded to 77 sites. The objective of establishing a methodology of development has been mostly met. The next task is to compile data from those villages with superior model forestry and utilize them for dissemination activities.

It can be considered that for the five areas, evaluation can be concluded as above. Taking this evaluation into consideration, a two-year follow-up program was planned and implemented. The overall evaluation results, including this two-year follow-up program were also positive as a whole.

### (3) Modern and Innovative Aspects of REX

As can be seen from its objectives, the project of REX Phase I deals with quite a wide area. It is not possible to identify the priorities and importance of the five areas from just looking at the agendas. Nevertheless, considering the fact that large-scale nursery centers were established in four areas, it is obvious that the activities were focused on technology transfer and development to produce seedlings in a large amount and widely promoted the reforestation activities by distributing the produced seedlings around the region.

Compared to conventional agricultural and forestry projects, REX is endowed with the following modern and innovative characteristics. Firstly, technology transfer and the dissemination of its achievements were set as two inseparable factors, like two wheels on both sides of a cart. Various types of technology transfer have been made in the agriculture, forestry and fisheries sector in the past, but there have been few projects like REX in which the achievements from the transfer of technology have been actually utilized: distributing the seedlings to the targeted area and promoting the reforestation activities of the region in order to increase the farmers' income. It has been indeed a dynamic project.

Secondly, those objectives and activities of REX which have been especially designed to maximize the economic benefits of the projects through reforestation activities also had the potential to promote agriculture, forestry and to ultimately change the industrial structure in the Northeastern Region of Thailand. Considered together, with the establishment of the four large-scale nursery centers, the socio-economic repercussions of REX were outstanding. Therefore, it was a project that indeed had a great social influence.

Thirdly, it can be pointed out that the project was unique in the sense that it aimed at both exhibition and economic effects through the promotion of "Communal Property" by embarking on forestry development projects in common areas such as villages, schools, and temples. Royal Forest Department of Thailand (RFD) had also been working on activities involving developing common forestry, and therefore the project was neither restricted to nor original to REX. Moreover, judging from its contents and scale, it was definitely not one of REX's main activities. Nevertheless it was distinctive in the sense that JICA's agriculture and forestry project has directly been involved with the activities of conserving and expanding communal property. In addition, it is worth noting that the project was not just aimed at

conserving the environment, but aimed at direct economic effects by bringing in incomes to villages and schools.

REX covered such a wide spectrum of activities and its projects were so multi-faced that it is difficult to evaluate only from economic indicators. Therefore, in conducting an external evaluation, three characteristics of REX as a technology transfer project have been pointed out, as mentioned above. This paper will now move to the evaluations base on these points.

### **5.2.2 Achievements of Transfer of Technologies for Large-scale Nursery Management and Dissemination Activities**

#### **(1) Establishing Large-scale Seedling Production System in the Centers**

##### **Introduction and Establishment of New Technology for Producing Seedlings**

REX's main activities were to transfer technologies for large-scale production of seedlings. This area of activity has been concluded to be successful since it has established a seedling production system in the Northeastern Region of Thailand where the forestry area was rapidly decreasing and seedling production insufficient to carry on reforestation activities. It has been said that before the nursery centers were established, the yearly production capacity of each center was around 100,000 or so. Thanks to the launch of the large-scale centers, supply of seedlings dramatically increased, and during the five (Thai) fiscal years of 1992-96, the total production of seedling from the four centers reached 160 million. 7,300 were distributed to the target villages of REX and the rest were used for reforestation projects such as those of RFD.

REX has contributed in various areas to improving technologies for nursery development management. REX has embarked on projects in securing seeds, developing technologies for pot seedlings and even started the production of seedlings using new material and developed ,“REX-TRAY” which was suitable for local species. The utility ratio is not very high because of the high initial cost, but within two years (from 1997-98), two million REX-TRAYS were produced, which was more than ten percent of the total production. The seedlings produced by “REX-TRAY” have a high ratio of root taking. Trays can be used repeatedly and the productivity was very high. It is said to be much more economical than ordinary pots. On the whole, REX has played an important role in establishing technologies for large-scale production in nursery centers.

#### **Effects of Technologies for Large-scale Production**

So what kind of social and economic impact did this large scale production and distribution of seedlings have on the local people? These points do not have clear indicators for assessment in the final and post-project evaluation study, but several issues have been pointed out by researchers who have conducted interviews in the target villages. Though there are some researchers who refer to the weakness of the project in diffusing the activities to non-target villages,<sup>1</sup> taking into account that there were many villagers who understood REX as part of the reforestation project of RFD, it seems that there were quite a few local people

Table 5-1. Seedling Production Plan and Output by Centers

Year	N.C.1		N.C.2		N.C.3		N.C.4		Unit seedling	
	Plan	Result	Plan	Result	Plan	Result	Plan	Result	Plan	Result
1991	965,900	1,124,064	965,000	1,174,891	965,000	965,000	965,000	999,844	3,860,900	4,263,799
1992	3,000,000	3,277,500	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,284,200	12,000,000	12,561,700
1993	3,000,000	3,046,027	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,139,204	12,000,000	12,185,231
1994	3,557,500	3,559,807	3,557,500	3,633,218	3,557,500	3,567,800	3,557,500	3,560,980	14,230,000	14,321,805
1995	3,500,000	3,513,614	3,500,000	3,502,500	3,500,000	3,500,000	3,500,000	3,500,000	14,000,000	14,016,114
1996	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	20,000,000	20,000,000
1997	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	8,000,000	8,000,000
1998	1,000,000	1,003,443	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	4,000,000	4,003,443
<b>Total</b>	<b>22,023,400</b>	<b>22,524,455</b>	<b>22,022,500</b>	<b>22,310,609</b>	<b>22,022,500</b>	<b>22,032,800</b>	<b>22,022,500</b>	<b>22,484,228</b>	<b>88,090,900</b>	<b>89,352,092</b>

注 N.C.=Nursery Center,

N.C.1 = Mahasarakham Center, N.C.2=Udonthani Center, N.C.3=Yasothon Center, N.C.4=Nakhonratchasima Center  
Source :JICA, Final Report of The Reforestation and Extension Project in the Northeast of Thailand (REX), 1992-1998

Table 5-2. Production Share by Major Varieties (1992-96)

		1992	1993	1994	1995	1996	1992-96
Fast growing spp	Eucalyptus spp	36.9	52.3	42.6	27.0	21.9	34.7
	Acacia spp.	10.4	7.8	10.0	2.5	2.8	6.4
	others	18.0	12.2	6.1	11.3	4.1	8.7
	sub-total	65.3	72.3	58.7	40.8	28.8	49.8
Local spp	Ptercorarpus macrocartus	6.6	3.6	12.7	19.6	9.0	13.1
	Alzeila xylocarpa	1.6	0.7	7.2	8.3	6.9	6.6
	Dalbergia cochinchinensl	1.5	3.2	4.4	4.0	3.3	3.8
	Tectona grandls	0.1	0.8	0.6	1.8	2.3	1.2
	others	9.4	3.6	11.7	15.2	33.2	15.6
	sub-total	19.2	12.0	36.6	48.9	54.9	40.2
Others	15.6	15.7	4.7	10.3	16.3	10.0	

Source :JICA, Evaluation Report on the Completion of The Reforestation and Extension Project in the Northeast of Thailand (REX), 1

who were aware of the effectiveness of the project through participation in establishing the technology for the nursery development. However, whether it has contributed to an increase in the ratio of forest land in the Northeastern Region of Thailand, remains to be examined.

## (2) Achievements from the Establishment of the Nursery Centers

### Pump-Priming Effects of Building Infrastructure

Although not indicated in figures in this paper, tracing the records of the ratio of the forest land area in the nursery centers from 1980 to 1998, it can be found that it decreased dramatically in the 1980s but started to level off in the 1990s. It can not be concluded that this was the direct contribution of REX, but it can be anticipated that the ratio started to increase because the government started to put effort into reforestation activities after the completion of the nursery centers. The nursery centers established in four areas by grant aid cooperation have played an important role (See Table 5-1. Seedling Production Plan and Output by Centers). As will be discussed later, the Thai government started to implement several reforestation projects with the establishment of the centers.<sup>2</sup> Although not all seedlings were produced at the centers, it has been obvious that the centers have provided an infrastructure base for the government projects.

Table 5-3. Production Share by Centers (1991-98)

Species	(Number of Seedling ,%)					
	Seedlings Production and Distribution					
	N.C.1	N.C.2	N.C.3	N.C.4	Total	%
Fast growing spp						
Acacia spp	686,637	592,660	1,487,309	2,838,911	5,711,717	6.4
Eucalyptus spp	9,912,167	9,274,364	7,076,983	6,438,327	32,701,842	36.6
Local spp						
Pterocarpus macrocaupus	3,539,918	3,011,780	1,539,540	1,699,457	9,790,695	11.0
Afzelia xylocarpa	431,875	1,099,880	1,205,310	643,325	3,380,390	3.8
Dalbergia cochinchinensis	652,647	789,820	700,475	317,704	2,460,646	2.8
Tectona grandis	182,288	119,550	76,922	597,791	976,551	1.1
<b>Total</b>	<b>15,405,532</b>	<b>14,888,054</b>	<b>12,086,539</b>	<b>12,535,515</b>	<b>55,021,841</b>	<b>61.6</b>

Source :JICA ,Final Report of The Reforestation and Extension Project in the Northeast of Thailand (REX), 199

#### Aiming at the Diffusion of Specific Varieties

More than 120 types of seedlings were grown at the nursery centers. Early maturing varieties included Eucalyptus (34.7%) and Acacia (6.4%) and local varieties included Petrocarpus macrocarpus (13.1%) and Aizella xylocarpa (6.6%). **( See Table 5-2. Production Share by Major Varieties (1992-96).** The same phenomenon is seen in the ratio of production to total production by major varieties during the 1991-1998 period. **(See Table 5-3. Production Share by Centers (1991-98)).**

Production technology, especially for the early maturing varieties, rapidly developed due to the nurseries and REX. There were many hopes in the early maturing varieties such as Eucalyptus because of their rapid economic effects. REX has contributed to the diffusion of specific varieties.

#### Mobile Units and Diffusion

Each center established mobile units at several locations and established a system to distribute seedlings to the target regions that were remote from the centers. This mobile unit system was established to distribute seedlings to the widely scattered target village. **(See Table 5-4. Location of Mobile Nursery Units).** Seedling production at these mobile units varies with demand from the target area and locations. Within the areas of Center No.1, the annual output per mobile center was 300,000 seedlings. After the completion of a cycle of distribution to the targeted village, the mobile center would then be moved to the next location within one or two years. However, in Center No.1, the relocation interval has been extended year by year and there are cases in which the mobile center has been in the same location for three years. The main reasons are the difficulties of securing water supply and the burden of cost for the relocation. Mobile centers cover more than two districts (Amphur) and an area of more than 30 ray km. The production cost for one seedling is estimated at 1.93 Bahts (in November 2000). Though detail cost estimation is not possible, taking into account the operational cost for facilities and labor cost, it is possible that the cost of production at the mobile units was cheaper than those at the centers.

Table 5-4. Location of Mobile Nursery Units

Nursery Center	Nursery Unit	Location			
		Province	Amphur	Tambol	Ban
N.C.1.		Mahasarakham	Chiang Yeun	Kuthong	
	1	Mahasarakham	Kantarawichai	Nasinuan	
	2	Mahasarakham	Borabeu	Borebeu	
	3	KhonKaen	Namphong	Buayai	
	4	KhonKaen	Phrayeun	Phra Yeun	
	5	Roi-et	Phoechai	Kham pai	
	6	Kalasin	Yangtalat	Nong-ei tao	
N.C.2.		Udonthani	Muang	Banchan	Kamkling
	1	Udonthani	Muang	Banchan	Kamkling
	2	Nongbualamphu	Nawang	Threpkeeree	Thepkeeree
	4	Loei	Wangsapung	Pakpuan	Pakpuan
	6	Mukdahan	Muang	Bangsaiyai	Nongaxe
N.C.3.		Yasothon	Muang	Duthung	
	1	Sisaket	Utoomprnpisai	Nonghai	Nonghai
	2	Surin	Prasart	Bansai	Sai
	3	Ubonratchathani	Khemmarat	Khampom	Saimoon
	4	Yasothon	Patiew	Krajai	Chiangkreua
	5	Amnartcharoen	Huatapan	Sangthonoi	Nonkan
N.C.4.		Nakhonratchasima	Muang	Pruyai	
	1	Nakhonratchasima	Muang	Pruyai	
	2	Nakhonratchasima	Caumpuang	Thalat	
	3	Nakhonratchasima	Pakchony	Nongsarhai	
	4	Chaiyaphum	Muang	Banlao	
	5	Burirum	Khumuang	Hinlegfai	
	6	Burirum	Lahansai	Tajong	

Source .Same as Table 3.

Mobile units distributed seedlings to other areas besides the target villages. Presumably, during the Phase I period of REX, the distribution ratio to target villages was higher than those to other areas, but after a round of distribution had been completed, the ratio to other areas started to increase. The distribution ratio of the target village to the non-target area in a mobile center at Na Si Nuan village (Mubaan) was 4 to 6. This mobile center had been functioning as support to the bases of the whole RFD diffusion activity area, including REX, and its existence and activities were highly valued. In particular it is playing an important role in accurately recognizing and reflecting farmers' demand for reforestation and acting as a local agency responsible for the diffusion of technologies.

### (3) Achievements of Base-line Surveys and Dissemination Projects

#### Implementing a Participatory and Local Demand-led Approach

The basic approach of REX's dissemination activities is to recognize the demands for reforestation in the target villages and produce and distribute seedlings based on these



Table 5-5 Target Villages to which Seedlings were Distributed (1991-98)

Nursery Center	Province	Target villages
N.C.1	Maharakham	241
	Khon Kaen	186
	Kalasin	92
	Roi-et	105
Total	4	623
N.C.2	Udonthani	345
	Loei	23
	Nong Khai	59
	Sakon Nakhon	0
	Nakhonphanom	30
	Mukdahan	37
	Nong Bua Lampu	51
Total	7	545
N.C.3	Yasothon	208
	Ubonratchathani	123
	Surin	119
	Amnatcharoen	67
	Sisaket	102
Total	5	619
N.C.4	Nakhonsatchasima	422
	Chaiyaphum	115
	Burium	86
Total	3	623
TOTAL	19	2,410

Source :Same as Table 3.

demands. (See Table 5-5. Target Villages to which Seedlings were Distributed (1991-98)).

The activities were based on the recognition that the actual reforestation activities were to be carried out by the farmers themselves and therefore enhancing dissemination activities would be impossible without identifying their demands. Demand trend surveys conducted by the RFD with cooperation by the members of the JICA were quite effective. REX was a local-participatory type of project from the point of view that technology transfer and dissemination projects were based on the local reforestation demands of the target villages. The overall evaluation was positive in the sense that REX's local demand-led approach had made certain achievements. It can possibly become a model for projects which accompany technology diffusion.

Table 5-6 Breakdown of the Numbers of People and Organizations Receiving Seedlings (1991-98)  
(Number of Seedlings ,%)

Group	N.c.1	N.c.2	N.c.3	N.c.4	Total	%
Villages or Faemer	25,976	26,463	30,977	17,847	101,263	85.1
Government and state enterprise	1,007	1,052	1,257	3,747	7,063	5.9
Temple and religious place	754	703	1,222	1,037	3,716	3.1
School and educational institute	867	953	1,313	1,603	4,736	4.0
Other project	202	159	793	1,010	2,164	1.8
<b>Total</b>	<b>28,806</b>	<b>29,330</b>	<b>35,562</b>	<b>25,244</b>	<b>118,942</b>	<b>100</b>

Source :Same as Table 3.

#### Externality and Transparency in Selecting the Target Villages

The villages that REX selected are scattered all over the Northeastern region totaling 1668 villages. Target villages were selected by amending and analyzing the village data produced by the Department of the Interior. Both impartiality and transparency in the selecting process of the target villages were highly valued. Recently technical cooperation activities in the areas of agriculture, forestry and fishery increasingly accompany activities in the pilot area or technology diffusion directly aimed at the local people. In selecting the target areas, objective indicators and a fair selection process have to be employed as much as possible. The REX experience can become a reference to project management that accompanies dissemination activities. REX experts, C/P, research institutes in Thailand and JICA members have conducted detailed investigation of actual conditions of the targeted areas. The appropriateness and the effectiveness of REX's dissemination activities were recognized from these investigations.<sup>3</sup> The objective of transferring seedling production management technology accompanied by the dissemination projects, has caught the interest of the individuals and groups that deal with the sustainable utility of forestry resources and conserving the environment in Japan, and site inspection and research were conducted repeatedly (by these people) in the REX target areas. Some of the research has been publicized as reports and the actual conditions of the receiving side of the diffusion program were revealed quite substantially.<sup>4</sup> They have supplemented the base-line survey.

#### (4) Manifold Aspects of the Dissemination Activities and Quantitative Expansion of Seedling Distribution

##### Aiming at a Multivalent Dissemination Project

REX's dissemination activities were indeed diversified: development of dissemination methods; strengthening of the system; systematization of the training program, development of the teaching materials, as well as the creation of exhibition and model forests. Its major characteristic lies in the fact that it covered almost all areas related to dissemination. The creation of the exhibition and model forests, the technical guidance, and the supply of seedlings and other necessary goods for them were highly related to rural development

activities. Therefore it can be concluded that REX was a multi-dimensional project centered around reforestation activities. In the final Evaluation Report, it has been concluded that the numbers of model forests are not sufficient given the vast area of the Northeastern Region of Thailand, but when evaluated as a JICA cooperative project, its areas are more than enough. Through the establishment of large-scale Nursery Centers, Mobile Units, dissemination and training activities, as well as pilot reforestation projects, the number of local people who received the seedlings during the Phase I period reached 100,000, and the numbers of governmental agencies, temples and schools that were involved was nearly 1,700. (**See Table 5-6. Breakdown of the Numbers of People and Organizations Receiving Seedlings (1991-98)**).

Model /Exhibition forests within the national forest area are mostly managed and implemented by the Thai budget, but Japan also supplies part of the fund. High exhibition effects were acknowledged in the reforestation activity areas in the regional (villages') common lands called community forests. A system has been established in which the planning and management of community forests was carried out by the participation of the local people and REX as well as the nursery centers, which technically and educationally support these activities. It is worth noting the socio-developmental system in which the regional resource management was carried out in a participatory manner and has established, as well as utilized, the "communal property" in a sustainable way.

#### (5) Expansion of Farmers' Reforestation and its Economic Effect

##### Contents of the Dissemination Effects

REX was a large-scale project in which the technology for managing and producing seedlings was transferred by using the nursery centers as bases, and distributing the produced seedlings to the target villages. It ultimately involved as many local people as possible within the reforestation activity. Noteworthy points in regard to its dissemination effects are: first, the fact that farmers in the Northeastern Region of Thailand started to actively take part in the reforestation activities, and were able to gain social and economic benefits following from these activities; secondly, it has enabled the growth of the pulp industry by strengthening the supply base of the raw materials; and finally, it has enhanced local awareness of environmental issues such as deforestation through participation in reforestation activities and has diffused practical methods of conducting activities to conserve regional resources.

One characteristic of the reforestation project in the Northeastern Region of Thailand was that the core actors were the farmers and the activities evolved as a farmers' reforestation project. The assessment of the economic effectiveness of REX was therefore done mainly from perspective of what extent the project responded to farmers' economic demand and to what extent REX dissemination activities involved farmers.

##### Patterns of Farmers' Reforestation

Eucalyptus was mainly used for farmers' reforestation activities. At the beginning of the project, REX produced eucalyptus seedlings in large quantities and distributed them to the farmers. There were several patterns in which the farmers planted the seedlings. (**See Chart 5-1. Patterns of REX and Farmers' Reforestation Activities**). The first pattern was to plant the eucalyptus seedlings supplied by the nursery center on desolated land. There were two types of desolated land. The first was barren from the beginning and had neither been used as farm land or forest. The other type is reutilized land which has been used as farm land in the past but has been abandoned because of the low productivity ratio. The amount of abandoned land was getting increasingly high in regions where sequential cropping of cassava had continued for many years. The advent of early maturing varieties such as eucalyptus has enabled the reutilization of land which had been used as farm land in the past. The economic effectiveness achieved from the distribution of REX's seedlings or from the increase in productivity of seedlings was extremely high in the first pattern.

#### Case Study at Nong Bun Choo Village, Mahasarakham Province

An interview was conducted with a small-scale farmer who cultivated 41 rai of land in Nong Bun Choo Village of Mahasarakham Province. This farm was cultivating 36 rai of Khaw Hong Mari (Hong Mari variety rice 105) and Glutinous rice (Kho.Kho 6) in a rice paddy field. 5 rai of Cassava used to be planted besides rice but the land had been abandoned because of low market price and profit margin of Cassava. It was four years ago when the farmer started to plant the eucalyptus distributed by REX in the abandoned land. At home, the farm was earning a small amount of cash from growing small livestock, poultry and fresh-water fish, but the eucalyptus plantation in the abandoned land was quite attractive. Direct cost was only 1,000 Bahts for buying four bags (200kg) of fertilizers to be used for the plantation. The first harvest was completed in 1999 and the farmer was able to sell the production from the entire 5 rai area. The timber product collector's purchase price was very low and was only 5,000 Baht. Nevertheless, the farmer values the project as enabling the farm to earn an extra 4,000 Baht by utilizing abandoned land, assuming the only cost was the 1,000 Baht spent for the fertilizer. As the interviewed farmer was quite young, the eucalyptus forest was taken care of relatively well.

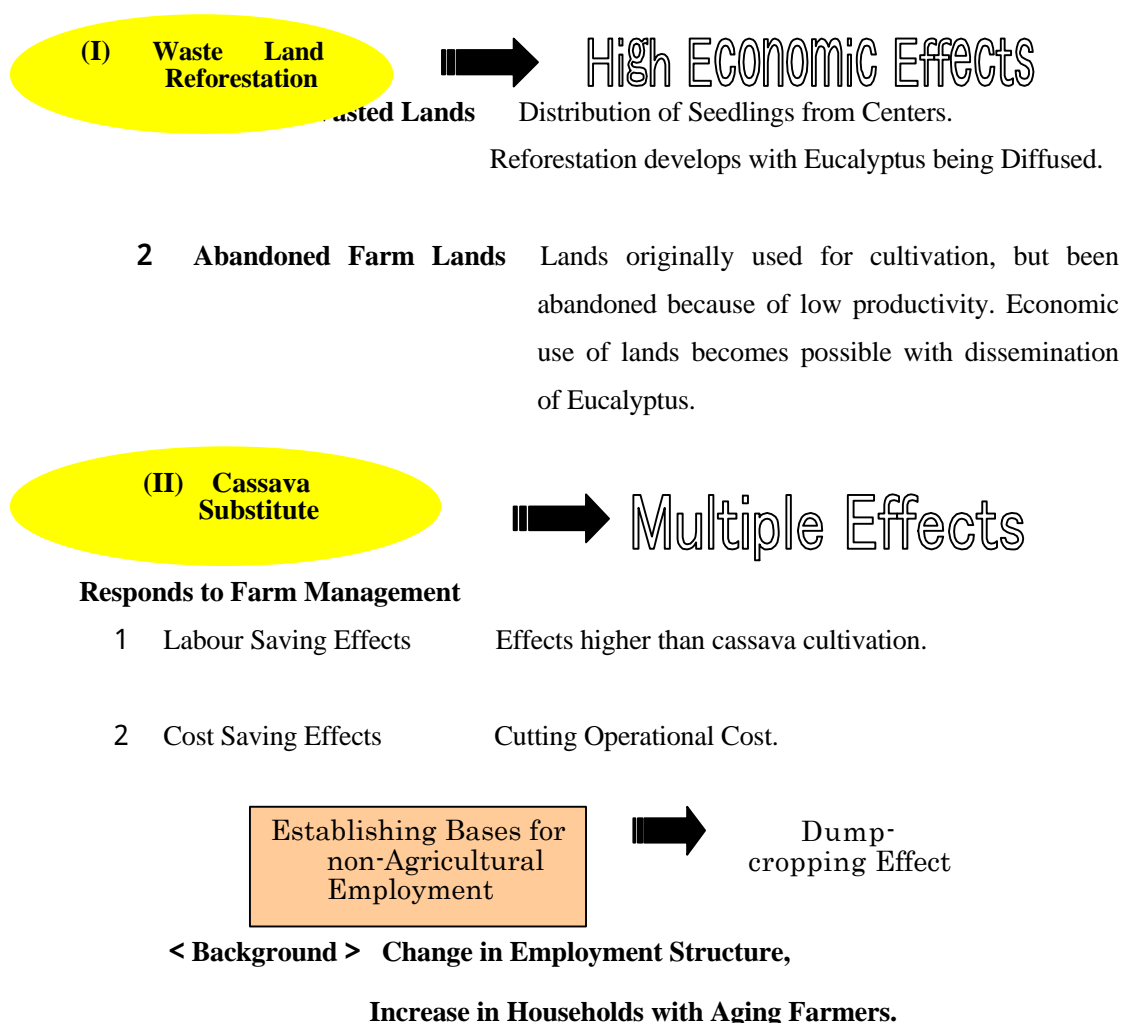
Farmers categorized in the first pattern were able to get high economic benefits. Being able to reuse land which had been abandoned because of inappropriate cultivation had a large impact on farmers. The interviewed farmer had received 2,000 seedlings without charge. If farmers had had to buy the seedlings themselves, there was the possibility that there would be no profit at all when the selling price was low. REX's project of distributing free seedlings for poor farmers was effective in this sense.

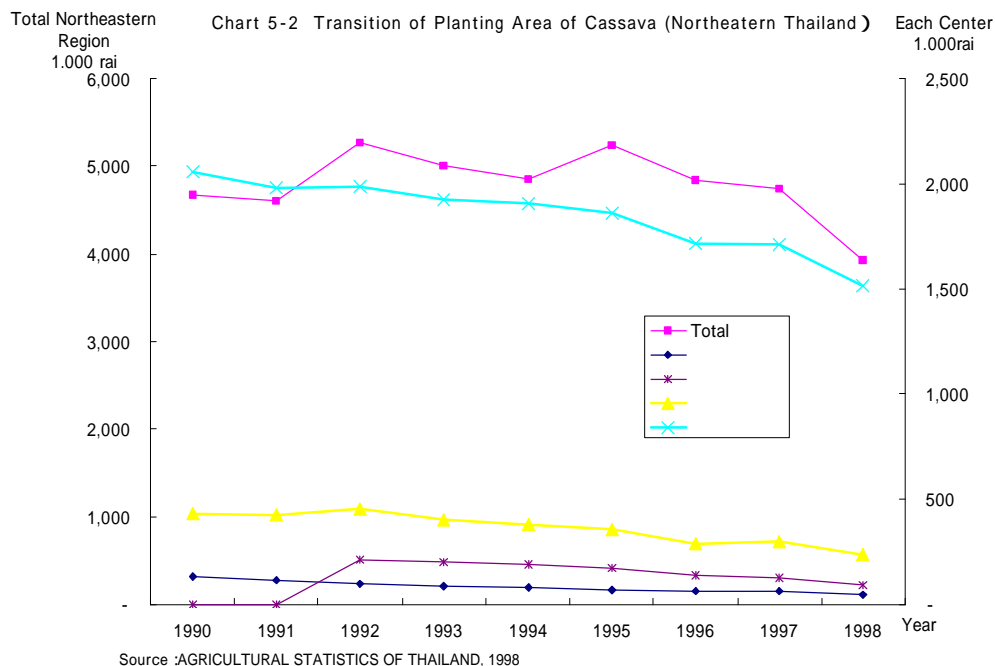
#### Impact of Substituting for Cassava: Inclination Towards Dump Yard Cropping

The second pattern is when the eucalyptus becomes a direct substitute of cassava. As many research reports have pointed out, quite a number of farmers who used to cultivate

cassava have increasingly shifted to the cultivation of early maturing trees; mainly eucalyptus. REX's production and distribution activities of eucalyptus seedlings enhanced and expanded this movement through out the whole Northeastern Region. From the mid-1990s, cassava cultivation in the provinces under the jurisdiction of the large-scale nursery centers has also started to decrease, and the same trend can be seen in the whole Northeastern Region (See **Figure 5-2. Transition of Acreage Under Cassava Cultivation**). The actual acreage of cassava cultivated land that had been converted to eucalyptus forests is not available, but at Nong Bun Choo village, where the interview was undertaken, there were 1,279 rai of rice paddy fields, and 1,100 rai of crop fields, of which 70% was used for eucalyptus plantation. Most of the eucalyptus plantation was done in the land where farmers used to cultivate cassava. The remaining 30% of the fields are used for growing mulberries and fruit trees. Upland crops which once concentrated on the cultivation of cassava have been substituted for eucalyptus plantations.

**Chart 5-1. Patterns of REX and Farmers' Reforestation Activities**





There was a strong tendency among farmers to make early maturing cash crops; mainly eucalyptus, as a substitute for cassava. Cassava is a long term crop that can be planted in conditionally disadvantaged land. Since eucalyptus requires three years or more to fully grow and to be cut down, the farmers tended to consider them as a highly long term crop, more so than cassava. The main elements that the farmers had hoped for in the eucalyptus plantations were its effects on saving labor. Compared to cassava, eucalyptus plantation requires fewer working hours. Moreover, compared to cassava, in which the market price was continuously falling, eucalyptus requires less fertilizer and thus is very cost-effective. Eucalyptus is also easy to plant on conditionally disadvantaged lands and therefore many farmers started to choose eucalyptus instead of cassava. Evidence was found from research undertaken by Dr. Aungsumalin of Kasetsart University, that there were farmers who have shifted to eucalyptus plantation to avoid the risk accompanied by cassava cultivation.

#### Change in the Employment Structure of Rural Villages as a Background Factor

One reason behind the increasing shift towards the fast maturing varieties and cash crops such as eucalyptus is the change in the employment structure of agriculture and rural villages in the Northeastern Region of Thailand. In the 1990s the Thai economy was growing rapidly and historically, large numbers of people moved out from rural villages to urban areas. As a consequence, demand for agriculture labor became increasingly strained and labor cost kept rising. Rapid diffusion of eucalyptus plantation reflects this change in the rural employment structure. Farmers gave up cultivating cassava where profitability was worsening, and tried to develop “dump yard cropping” in crop fields including disadvantaged land. This is a reflection

of a strong desire among farmers and family members to seek employment outside the agriculture sector.

#### Dump Yard Cropping of Eucalyptus by Aging Households

Another reason that the eucalyptus plantations spread so rapidly was because of the aging of farmers' households. Population drain from rural villages to urban areas was at its peak during the 1970s and the 80s. In the 1990s, the ratio of aging population in rural villages became higher than ever. It has been said that after the economic crises, many laborers including, the younger generation, went back to the rural villages to become farmers again. Nevertheless, the trend in increasing aging population in rural areas has not ceased. These aging households strongly supported eucalyptus plantation. An interview was conducted with a 75 year old farmer in the Ban Bia village of Mahasarakham province on views towards eucalyptus plantation. The farmer had not received seedlings from REX but had already converted 10 rai of cassava field into a eucalyptus forest six years ago. The farmer employed some people to undertake the planting, management and selling. There is a strong preference for eucalyptus plantation among aged farmers given its relative ease of maintenance. There has been a tendency that the aging households do not take their jobs seriously. Young farmers take care of the forest after it is first cut down but old farmers tend to cut corners. It was said that the forest becomes susceptible to fire and the land can be wasted rapidly. In recent years, as the fall in eucalyptus' selling price continues the tendency of "dump cropping" is strengthening.

Early maturing varieties such as eucalyptus have a 'dump cropping' effect. The regional agricultural sectors consider farmers' plantation activity as one practical means to deal with the rising problems of the increase in the cost of agricultural labor, the shortage of labor supply, increasing trends of seasonal workers and agriculture becoming a side-business.

Considering from the point of view of effective use of regional agricultural resources, eucalyptus plantation may have negative effects when developed as a substitute for cassava cultivation. In the Northeastern Region of Thailand, most of the water field rice cultivation depends on rainwater and this is especially true in areas where there are extensive eucalyptus forests. Eucalyptus are planted next to the paddy fields and there are cases in which negatively conditioned lands are converted to forestry lands. The extensity of such movement is not clear, but a tendency towards extensive land use is gradually expanding.

#### Ease in Obtaining Fuel wood

As RFD and REX had originally intended, it became easier for farmers to obtain fuel wood as a result of the reforestation activities. This is pointed out by every farmer interviewed. In places where there are self-owned plantations near farmers' homes, constant use of fire wood discards became possible, and the burden to collect fire wood together with the economic burden decreased. It seemed that farmers who only planted several rai were hoping to use them for fire wood for household use rather than selling them to earn cash.

Table 5-7. Operational Balance of Eucalyptus Plantation

Items	(baht/rai)				
	First year	Second year	Third year	Fourth year	First-fourth year
Variable cost	1,549.38	...	...	...	1,549.38
1. Labor cost	1,010.25	...	...	...	1,010.25
planting and maintaining cost	1,010.25	...	...	...	1,010.25
soil preparation and preventing fence costs (200 baht/machine/ hr.)	350.00	...	...	...	350.00
seed transporting cost(50 baht/tree)	88.50	...	...	...	88.50
planting (60baht/person/day)	205.00	...	...	...	205.00
maintaining- added fertilizer (60baht/person/day)	154.00	...	...	...	154.00
water	...	...	...	...	...
spraying insecticide	...	...	...	...	...
cutting grass (60baht/person/day)	132.75	...	...	...	132.75
branch decoration (60/ baht/person/day)	80.00	...	...	...	80.00
2. Material cost	411.20	...	...	...	411.20
3. Other cost	127.93	...	...	...	127.93
depreciation cost of producing cost (9% and 6.5%)	127.93	...	...	...	127.93
Fixed cost	5.00	5.00	5.00	5.00	5.00
Producing cost in a Rai	1,554.80	5.00	5.00	5.00	1,554.80
production/rai (tree)					13.50
Tree price at farm (baht/tree)					500.00
Income (baht/rai)					6,750.00
Net income (baht/rai)					5,180.62
Net income in a year (baht/rai)					1,295.15

Source RFD

### Weakening Economic Impacts

Early maturing varieties such as eucalyptus have been strongly incorporated into the farmers' land use system. In the early 1990s, economic profit from the eucalyptus plantation was estimated as 5,180 Baht per rai when cut down on the fourth year after initial plantation (See Table 5-7. **Operational Balance of Eucalyptus Plantation**). Since most farmers who embarked on the plantation had received free seedlings and fertilizers by REX's and other programs' distribution projects, actual profits are higher than indicated in the Table. If plough and land preparation activities were done mainly by the farmer's own family members, the actual income of the farmer would be higher. The profitability is, of course, lower than that of cassava, but eucalyptus is superior for disadvantaged and extremely low profitability land and regions.

The farm price of eucalyptus, however, has decreased since the late 1990s. Therefore more and more farmers in regions that have completed the initial cut down tended to cut corners on the maintenance of the plantation. The reality has been that farmers were able to make profits despite dump cropping. On the other hand, in land in which cassava cultivation was impossible, the forest area has just been abandoned. At that time, farmers had been facing economic crises with excess labor, and in recent years have tried to diversify their operations. They have tried to direct this excess labor to the production of cash production activities such as growing small livestock, raising fresh water fish and planting vegetables and fruit trees to increase incomes. In contrast, there were many farmers who considered the advantage of eucalyptus plantation derives from the fact that they do not have to engage in the management activities. Degradation of farmers' plantation land has continued and the land's resource value has decreased.

Dr. Aungsumalin and his group pointed out that land concentration has occurred, centering around the plantation areas. They said that small-scale farmers were selling their



Table 5-8. Pulp Companies and Annual Production by Raw Varieties

		(1,000 t)			
Name of Company	Types of Short Fiber	1996	1997	1998	1999
Advance Agro	Eucalyptus	175	175	427	427
Phenix Pule and Paper	Bamboo, Eucalyptus, Kenaf	210	210	210	220
Pangapol Pulp Industry	CTM P (Bagasse + Eucalyptus Chemical	110	110	110	78
Siam Pule and Paper	(Bagasse, Recycled paper )	68	68	122	44
Siam Cellulose	Eucalyptus, Bamboo	60	60	55	110
Bang Pa-in Pulp and Paper	Eucalyptus				67
	Straw	3	3	3	3
Total		626	626	928	950

eucalyptus forests to large-scale farmers and large-scale forestry operators. It was not possible, however, to confirm this point during the team's investigation.

#### (6) REX and Pulp Industry

##### Growth of Pulp Industry

There few materials that prove how REX contributed to the growth of Thailand's pulp industry. Nevertheless generally it can be considered as follows. In the late 1980s, Thailand's paper manufacturing industry was forced to switch to domestic pulp, given the sharp rise in the price of overseas' pulp. Thailand's BOI, therefore, appointed the pulp industry as a target industry to promote domestic and overseas investment. In 1992, there were only three pulp making companies in Thailand, but new companies were established one after the other, and in 1998, the number has increased to six. Pulp production rapidly increased and up until the economic crisis, it recorded a phenomenal annual growth rate of 10% (**See Table 5-8. Pulp Companies and Annual Production by Raw Varieties**). Eucalyptus plantations became a boom in the mid 1980s to early 1990s and land disputes occurred frequency and became a serious social problem during this period. One of the reasons behind the land disputes was the rapid growth in the domestic pulp industry.

##### Expanding the Supply-base of Raw Materials and Farmers' Reforestation

There are three different routes in which pulp companies secured their supply of eucalyptus materials. First was the supply from plantations that were owned by the company itself or by its subsidiaries; second was the supply from the "contract farmers" who cultivated specific seedlings defined and distributed by the company; and the last was the supply from general farmers and through the product collector. For instance, Advance Agro Co., established by the Soon Hua Seng ( SHS ) group, for instance, buys from subsidiary companies which own 3,100 ha of plantation and from contract farmers who own 4,600 ha.

The subsidiary companies provide the contract farmers crossbred clone seedlings and teach them the know-how for growing the seedlings. Five years after plantation, the farmers can chose to sell the products at the market price or a minimum guaranteed price of 850 Baht (per ton), whichever is higher. Trees qualifying to be sold have to be more than five years old,

2.5 inches in diameter and two meters in height. The “contract farmers” had no direct relationship to RFD or REX but have contributed to REX in a broader sense that they have set conditions of the social environment that would be easier for reforestation. REX, on the other hand, has contributed to the expansion of the supply base of raw materials for the pulp companies through extensively promoting farmers’ reforestation activities. Advance Agro buys eucalyptus from the general farmers in an amount that is almost the same acreage as that of the contract farmers. It is not clear how many of these general farmers actually utilized REX, but it can be estimated that many farmers have initially started the eucalyptus plantation through REX before 1994 when the Thai government, led by the Royal Forest Department, seriously embarked on the implementation of the seedlings distribution project.

Are there Advantages in Farmers’ Reforestation?

Considered from a point of view of international competitiveness, Thailand’s pulp industry has a serious weakness in its supply base of raw materials<sup>5</sup>. The movement towards operating a large-scale plantation to secure cheap raw materials with standard quality became obvious in the 1980s and 1990s. Activities such as attempts to borrow land from prioritized national forest areas and launching large-scale plantations became very active. As mentioned before, there were many conflicts among the local people during this process. Therefore, the operation of plantation-sized reforestation became difficult and the growth of pulp industry, as a catalyst industry, in Thailand was restricted. The means to secure cheap raw materials in large quantity from contract and general farmers became the main agenda for the firms to compete in the international market.

Farmers’ reforestation activities are accompanied by the problem of their small size, but for the pulp companies and plantation operators, there are some merits in that they do not have to bare the cost of acquiring land or managing the forest area. As long as the farmers continuously plant eucalyptus that will be supplied as raw materials, and the pulp companies have a distribution system in which the supply to the companies is carried out efficiently, supplies from small-scale farms do not lead to a rise in the costs of the pulp companies. In the Northeastern Region of Thailand, an efficient assembly system has already been established, just like other agricultural distribution networks. A system for contracting the cutting work has already been incorporated in the assembly channel and met the demands of farmers who wish to save labor in reforestation activities. Farmers can start growing and dealing with other tree varieties such as eucalyptus, just like other general agricultural crops. The very existence of these product cutters and collectors, in large part, is enabling the farmers to carry out dump cropping in waste land.

Pulp companies have procured cheap raw material through these cutting and collecting contractors. Assembly cost born by the pulp companies was easily shifted to the product collectors. The collectors reacted to this by re-shifting the burden to low-end producers by bulk buying the forestland and contracting the work of cutting down the trees. The low selling price of the small-scale farmers owed to the situation of the actors who procured the raw

materials and structural problems of the related markets' distribution system. This led to further enhance the negligence of labor in managing the eucalyptus forest by the farmers. Nevertheless, though the product supplies by the general farmers had problems in quality, as it enabled the companies to secure cheap materials in a large quantities, they played an important role as a dampener for the pulp companies.

### **5.2.3 Community Forest and Dissemination Activities**

#### **(1) Background of the Development of Community Forest**

##### **Proposals to Embark on the Community Forest**

REX objectives were to “promote reforestation activities by the people in the region through the utilization of various socio-forestry measures, and thus restore the environment of the Northeastern Region of Thailand, and contribute to the improvement of living standards of the local people”. The development of the community forest was one of the socio-forestry measures stated in REX’s objectives. Community forest is common forestland conserved by the local people, groups or organizations for the benefit of the local members. It includes common village forests, school forests and temple forests. According to the 1991 statistics, there were 1,731,447 rai of community forests in Thailand in which 1,079,826 rai was in the Northeastern Region of Thailand.<sup>6</sup> The 1992 “Implementation Council Inspection Commission Report” recommended further development and support for the activity by pointing out the importance of village and school forest, considering that the establishment of village forests was “one of the important objectives of the reforestation extension plan as well as one of the main features of the dissemination activities,” besides the research on seedling demand and distribution of seedlings. REX’s support to the development of community forest was considered to be appropriate regarding Thailand’s national policies and the tradition of the utilization of the forest in the Northeastern Region of Thailand.

##### **Region and the Community Forest**

Community forest has a long history in Thailand. Long before being developed as a “common forest” under the Greening Project, people have conserved the natural forestry as the villages’ common forest for purposes of common use. Especially in the Northeastern Region of Thailand, whenever villages were established, people had designated part of the nearby forest to be used as a public cemetery, places to carry out religious rituals to worship the ancestors who protect the people of the village or temple forests to practice Buddhist ceremonies and rituals. People in the Northeastern Region have had a long tradition in protecting these places as common forest. People also used common forests for acquiring timber, bringing up livestock or gathering forestry products such as mushrooms (**See Table 9. Types of Community Forests in the Northeastern Region of Thailand**). Besides these already existing traditional common forests in villages, government-led establishment of community forests started after the middle of last century. The government designated the Buddhist Lent Day (public holiday, beginning of the eight month of the lunar year) as a reforestation day and

**Table 5-9 Types of Community Forests in the Northeastern Region of Thailand**

Forests to Retain Water
Ancestral Land Lands in which ancestors who protect the villagers reside and lands where ancestral ceremonies take place.
Cemetery Village Cemetery.
Temple Forests • Reserved Area Places to pursue Buddhist practices and nature study.
School Forests Forests reserved or established inside school grounds.
Livestock-Breeding Forests Could be used for other purposes simultaneously.
Utility Forests Forests to be used for utilization purpose. Necessary to obtain license from the community group prior to cutting down trees.
Development Forestry Afforested areas through government's reforestation rehabilitation policy or to retain water and prevent wind.

Source : Monkon Daanthanin

promoted tree plantation activities to governmental organizations, schools and temples on this day.

#### Community Forest as a way of Promoting the Reforestation Policy

The policy of promoting community forest became fully recognized in the 1985 National Forestry Policy. The government decided on the promotion of community forest as well as the forestry development cooperation projects undertaken by cooperation between the government and private sectors. One of the reasons behind this decision was the rapid decrease in the forest area in the country. Rapid increase in the numbers of community forest reforestation projects can be seen from the late 1970s, especially after the mid 1980s (**See Table 10. Community Forests Reforestation Projects up to The 6<sup>th</sup> National Economic and Social Plan (1987-91)**). The objectives of the community forest reforestation project included the conservation of water resources, utilization of firewood, coal and building materials, and development of rural villages. Target areas include parts of the national conservation forest, community lands in villages, and land in schools and temples. When new plantations were to be done in temple forests, the villagers tended to select a local breed. This was because reforestation within the temple forest areas was usually done in places next to natural forests, and conserving the natural environment was the main objective of the temple forests. In a temple forest that the evaluation team visited, neighboring local people were cultivating vegetables within the forest and contributions seemed to be made to increase local income as well as to increase participation in the reforestation activities by incorporating this agro-forestry method.

Table 5-10 Community Forests Reforestation Projects up to The<sup>th</sup> National Economic and Social Plan (1987-91)

Department	Section	Number of Projects	Year Implemented	Collaborative Organizations
Forestry	Water Resource Conservation	7	1980-4, 82-86, 82-88 77-79, 83-88, 77-, 84-87	UNDP/FAO USAID
Forestry	Management bamrun National Forestry Management	3	77-81, 82-, 84-, 75-, 81-84, 82-	ESCAP
National Land		1		
Forestry & National Land			84-	

Source : kaanjatkaan paachumchon, faai sonsoem le phathanaapaachumchon koongjatkaanthidinpaasongwonheengchaat krompaamaai. "Operation Manual of Community Forest", RFD p11-14.

Note In the third columns where it is written like 77- indicates that the project started in 1977 was still going on at the time when the report was written. It is not clear when the report was written but it was possible to come up with the estimation of around the period close to the 6<sup>th</sup> National Economic and Social Plan.

On the other hand, the types of the tree chosen for the reforestation, which was aimed at firewood utilization and community development, were the early maturing types, such as eucalyptus. The time period from planting to selling is shorter and these types were easier to change into cash.

Community forest reforestation brought the following advantages to the socio-economic living of the community members:

- (1) utilization of timber for firewood and coal material;
- (2) implementation of agro-forestry by cultivating vegetables, bringing up livestock, and gathering forestry products (for both food and medical use) among the growing trees,
- (3) utilizing the profits earned from the sales of timber for village development and school management.

In regard to the utilization of the profits earned from the sales of timber, when profits were made from the village community forests, some villages bought and sold fertilizers to the village people and others used part of the profits to extended financial assistance to the village people in a form of loans. Moreover, at schools, the profits were used for covering the cost for students' lunch, purchasing textbooks, and buying school uniforms for the poorer households. The timber was used for the maintenance of school buildings and lodging houses for teachers. REX has actively supported the community forest program implemented by the Thai government to fully recognize its objectives. It can be evaluated that these supporting activities were quite valuable in terms of conserving nature, supplying timber for firewood and char coal which used to be lacking in quantity, and improving the economy of the communities.

Table 5-11 Total Numbers of Community Forests Established

Area	1993	1994	1997	2000
Nursery Center 1 (Mahasarakham )	5	6	N/A	31
Nursery Center 2 (Udonthani )	6	10	21	22
Nursery Center 4 (Nakhonratchasima )	N/A	N/A	N/A	20

Source :The Implementation Plan and Result of Forest Tree Nursery Center 2,p21

Table 5-12 Achievements Made by the Nursery Center No.2 (N.C.2) in Establishing Community Forests

Year	Number of sites	Area (rai/ha )	Types of Land		
			Common Land	School	Temple
1993	6	75.0/12.0	5	1	2
1994	4	70.7/11.3	1	1	2
1995	3	38.0/6.1	1	1	1
1996	5	63.0/10.1	3	2	0
1997	3	48.0/7.7	1	2	0
計	21	294.7/47.2	11	7	3

Source :The Implementation Plan and Result of Forest Tree Nursery Center 2,p.21

## (2) REX's Supporting Activities to the Community Forest Program

### Contents of the Supporting Package

REX's supporting package for community forest included: (1) Reforestation of the community forest; (2) Maintenance of the existing community forests; (3) Education related to reforestation and operational management; and (4) Reforestation of village forests as exhibition and model forests. REX was mainly involved in the dissemination activities of the community forests. REX also took part in the training and model forest reforestation activities especially in the dissemination and promotion area.

Support of the community forest reforestation started in 1993 and its target area included community lands of schools, temples and villages. In order to get the support, however, it was necessary to secure at least 12.5 rai of land. Financial assistance is 21,000 Baht per area. The locations for the community forests to be developed were selected by the nursery centers' staff through collecting village data, consulting people in charge of managing simplified nurseries, or requesting the district or province forest agencies to introduce villages and regions that would cooperate with the projects. Each nursery center has supported and completed the reforestation of community forests in 20 to 30 locations (See Table 5-11. Total Numbers of Community Forests Established, Table 5-12. Achievements Made by the Nursery Center No.2 (N.C.2) in Establishing Community Forests). REX also supports the maintenance and management of the existing community forests. At the nursery center in the Udonthani province, for instance, REX has supported the community forests in seven locations during the project period.

Table 5-13 Community Forest at Nong Bun Choo School

Forest Land	Species	Land Area (rai)	Year of Plantation	Year of Sales	Distances Between Trees (m)	Height (m)	Profit (Baht )
School Forest 1	Eucalyptus	12.5	1994	2000	2 × 2	-	
School Forest 1	Eucalyptus	26.5	1995	2000	2 × 2	-	
Total		39					100,000
School Forest 1	Eucalyptus	25	1996	To be sold soon	2 × 2	約10	70,000
School Forest 2	Eucalyptus	33	1996	Planned Approx. 3 years later	2 × 2	3 ~ 5	(on negotiation )

## Assistance to the School Forest at Nong Bun Choo School

Table 5-14 JICA Assistance to the Village Community Forest: Nong Bun Choo Village School

School Forest	21,000 B	5,000 Seedlings
Village Forest	No financial Assistance	Seedlings (from REX )

Note: JICA's financial assistant covers costs for fence, transportation, fertilizer, rod, food during labour, etc. Land readjustment and maintenance are done by students and villagers themselves.

At the Nong Bun Choo village elementary school in the Mahasarakham province, planting took place twice in 1994 and the following year, and the trees were cut down in 2000. (See Table 5-13. Community Forest at Nong Bun Choo School). REX assisted the planting in 1994. The land designated for plantation was 39 rai and it was located not so far from the school. The villagers had donated the land to the school where they used to cultivate corn and cassava. After the handover of the land, the school rented the land to the villagers at 100 Baht per rai, but decided to convert it into forest, seeking higher income.

Schoolteachers were introduced to the community forest program by a center staff member when the teacher went to the nursery center to receive seedlings. The center staff member in charge of the dissemination division undertook the basic survey and trained several teachers at the center. The center also conducted instruction courses at schools and villages on how to plant and maintain the trees. It seems that the types of trees to be planted were decided by the school in consultation with the center staff. The center staff who conducted the land survey recommended economically productive trees such as Praduu (*Petrocarpus*) and Sak (*Tectona grandis*), but since the land was too dry the school decided to plant eucalyptus. The plantation was done by about 200 people in total including schoolteachers, students, villagers and center staff. 5,000 seedlings which were distributed by the nursery center were planted in

1994. JICA provided 21,000 Baht to cover the plantation cost. This money was used for building signboards and fences, purchasing two bags of fertilizers and equipment such as harvesting tools and systems for feeding water. The maintenance and management activities have been undertaken by the teachers and students themselves. **(See Table 5-14. JICA Assistance to the Village Community Forest At the Nong Bun Choo Village School).**

#### Outcome of the Establishment of School Forest

Several achievements were made through the establishment of the school forest. Firstly it educated the students on forest issues. Teachers took the students to the school forest in addition to the related lectures given in classes, and taught them about how to maintain and manage the forest. Teachers trained at the nursery centers gave instructions to other teachers who were responsible for forest related subjects. Students are also applying the knowledge gained at school outside the school circle through activities such as planting trees on paths between rice fields. Secondly, when the trees have grown to certain height, the villagers could freely graze cattle and water buffalo in the school forest. The land has therefore provided a place for raising livestock. Thirdly, it has brought income through the sales of trees. The school has bought a refrigerator by selling two rai of trees. The school earned 100,000 Baht by selling the trees of the remaining area. This income was kept in the bank at the time the interview was conducted, but it is going to be used for covering the cost for students' school meal in the future. Finally, the school forest became an impetus for the Nong Bun Choo village to establish community forests in the village. In 1996, the village established a village forest in the community land referring to the school forest as an example **(See Table 5-13. Community Forest at Nong Bun Choo School).** It did not receive financial assistance from JICA, but obtained the seedlings from the nursery centers.

The establishment of the Nong Bun Choo village elementary school's school forest, supported by REX, has generated funds to financially support the students from the poorer households. Given that the government support for school meals is insufficient, the profits made through the eucalyptus sales have become an important source of funds for the school meal project. In addition to bringing income to the school, the activity had an educational effect for conserving nature and disseminative effect leading to the establishment of community village forests in other parts of the village.

### (3) Community Forest with Significant Achievement

#### Creating Plans Adjusted to the Real Situation of the Northeastern Region of Thailand

REX has advocated the necessity to develop promotion methodologies adjusted to the condition of each area of the Northeastern Region of Thailand. The method used in the promotion of the community forest was relatively easy for the people in the region to adapt to and has been very effective in this sense.

The ratio of community forests in the Northeastern Region of Thailand is higher than those of other regions in the country. The region also has a tradition of conserving community



forests in the villages for use for public cemeteries, and worshiping places for ancestors. Rice crops, cultivation of corn, cassava and sugar cane are popular in the Northeastern Region. Solidarity of the community is quite strong with the labor exchange practice that takes place during the planting and harvesting period. Individuals own a vast area of forest land in the Northeastern Region and it is said that the way in which collaborative activities and community solidarity are realized are quite different from those in the Southern region of Thailand, where rubber plantation and fruit cultivation are carried out by families. The cultural tradition and the solidarity of community in the Northeastern Region have supplied the base for the development of the community forest. It must have been easier for the local people in the region than others to understand the concept of common property and support the implementation of the project too.

In principle, surveys of seedling demands are firstly conducted followed by implementation of a local community-led reforestation program. The community forest program has learnt from the past when social forestry had been conducted by a 'government-led uniform project that neglected the local needs'. From the beginning, the program tried to respond to the local needs by distributing the varieties of seedlings requested by the local people. This attitude of respecting local initiatives can be highly evaluated.

#### Problems in Community Forests where Economic Incentives are Strong

The reason behind the choice of eucalyptus to be planted in the village and school forestry is understandable from its characteristics such as its growing condition, management cost, labor hours, and demand. Nevertheless there were some problems when considered from other perspectives: the conflicts between the government-led commercial forestry and the local people which became a serious issue as did, and the level and manner of cooperation between experts and the local people. For example, in the area of cooperation between experts and the local people, since the emphasis was put too much on the "local needs" it seems that the provision of information on which the local people could make decisions was not sufficient. It might have been better if the local people had an opportunity to exchange opinions on their experiences and needs with the experts who have academic knowledge on the kind of soils and weather, the types of trees suitable for particular conditions and future prospects of environmental conservation. It might have been much more productive if the seedling selection and forestry management were conducted by considering the possibility of mix-planting commercial and fruit trees.

This became more obvious when taking into account the fact that the fundamental objectives of establishing community forest were to conserve nature and educate the people in addition to bringing in economic benefits to the local people. Of course it is important to understand the needs of the local people and distribute the type of seedlings they desire. Nevertheless, the overall plantation plan could have been delineated by the community members and the experts with a blueprint on the ultimate goal of conserving the natural environment and promoting regional development with a much longer term view; not just

setting a short term goal to earn quick cash which should only be the case for plantation on a more individual base. Suggestions made by REX might have been more effective if its knowledge, advice, as well as assistance were diffused through a channel established by better coordination with 1) the leaders of each community and 2) higher juridical agencies.

#### Community Forest Requiring Long-term Perspectives and Support

Although the villagers undertook the management and operation of the community forests, such as selecting the varieties of trees to be planted and maintaining the forests, the degree of success largely depended on the qualification and capacity of the leaders of the community, such as the village heads. This is due to the fact that these people had strong connection with the local district's governmental agencies. In the case of the village forest in the Nong Bun Choo village, the village head firstly contacted the district government and was then introduced to the seedling centers. The village head even sought advice from the district government on how to use the profit gained from the community forest. There is a concern that it will become a government-led reforestation project. A way to carry out an effective coordination mechanism between these people and concerned governmental agencies needs to be considered.

In regard to the community forests in Tambols (wards), with a revision in a law related to the Tambol Councils in 1995, Tambols were allowed to manage their resources, including forests, by themselves and their autonomy highly increased. At that point, Phase I of REX was getting close to completion. We could not confirm whether REX has approached the Tambol to enhance their community forest projects in accordance with increase in autonomy.

#### (4) Community Forests' Activities and "Awareness Building" Functions Operational/Management Guidance and Training

The 1992 investigation team report stated, "The Dissemination Division should expand its activities to the management of villages' community forests beyond its seedling distribution activities (p.44)". However, as seen from the case study in Nong Bun Choo village, operational and management guidance on community forests had already been conducted. In regards to the technical know-how on tree growth and application of fertilizers, staff from the nursery centers gave instructions.

As mentioned in the case study, village teachers received technical training on the establishment and management of community forests before starting the reforestation, and then shared their knowledge with the teachers who were responsible for teaching other forest related subjects. The investigation team interviewed the Nong Bun Choo village head on the villagers' views towards community forests, especially the extent of diffusion of knowledge related to the reforestation. The village head said, "In the past there were no forest lands around this area. Now since we have forests, we have rain. The village people think it is really nice because it is refreshing." The objectives taught by the nursery centers became increasingly understood by the local community. The community forest activities have played

Table 5-15 REX 's Financial Assistance at the Udonthani Nursery Center  
(Million Baht )

Area	Amount of Financial Aid
Nursery	35
Training	2.4
Dissemination	1
Exhibition Forest	35

an important role in enhancing local people's awareness about maintaining and managing forest resources.

#### Overall Achievement

As obvious from the case of the school forest, clear achievements were made in the area of conserving the natural environment and utilizing forest resources by the local community. These have been the main objectives of the establishment of community forests. It has contributed to the increase in the forest area and has enhanced awareness among the local people in conserving the forest area. Positive results were also identified in regards to economic benefits. The Nong Bun Choo elementary school used to rent out its 39 rai of land for 100 Baht per rai. Compared to the six years of ground rent which is 23,400 Baht, the profit realized from selling the eucalyptus six year after plantation was 100,000 Baht; around four times more than the profit from the ground rent. The community forest in the village has also been rented out for 25 Baht per rai and its four-years profit was only 2,500 Baht. The village is expecting 70,000 Baht of eucalyptus sales and, even deducting the cost for land preparation, which is 3,600 Baht, the village's income has greatly improved. It can be concluded that REX's assistance to the establishment of community forests has contributed to the improvement of peoples' lives.

With the launch of REX's assistance to the establishment of community forest in the elementary school, the village people started to work on the reforestation of the village's common lands too. One success case has led to the spontaneous participation of the villagers in other reforestation activities. The extent of its social effects can be highly valued. However, when viewed as a whole, REX's fund allocated to the community forests' assistance and training areas were smaller than those allocated to the nurseries and model forests (**See Table 5-15. REX's Financial Assistance at the Udonthani Nursery Center**). This is pity considering the positive effects of the community forests in the reforestation dissemination plan.

#### 5.2.4 Activities and Strategies of REX

##### (1) Involvement in the RFD's Reforestation Policy

REX has set up its main objective as to transfer technologies related to seedling production and widely disseminate the outcome to farmers and local people. Rather than restricting its activities in transferring technologies to C/P concentrated around the large-scale

nursery centers, REX distributed the seedlings to target villages to actually enhance the reforestation of the Northeastern Region which was suffering from the decrease in forest resources. It was a ground-breaking project planned with gargantuan objectives and scale.

In operating the project, research on local demands for reforestation was conducted through C/P or by the experts who visited the target areas themselves. Reforestation guidance was carried out on site based on these demands, involving a participatory process by making use of the seedling production in the transfer of technologies. Project activities ranged from the establishment of the nursery centers and their effective management, technology transfer for seedling production and management, establishment of exhibition and model forests, and development of training and educational methodologies to promote community forests. It can be said that REX has carried out a remarkably comprehensive project.

REX did not, of course, undertake all these activities by itself. REX is not responsible for the whole reforestation plan conducted by the Thai government in the Northeastern Region of Thailand. Actually, REX was only involved in part of RFD's activities. Nonetheless, REX has played a greater role than had been expected in Japan in all aspects of the RFD's activities. It is impossible to illustrate the reforestation projects conducted in the 1990s in the Northeastern Region of Thailand without referring to REX. REX has been deeply involved in reforestation projects in the Northeastern Region. As a consequence, general perception towards RFD policies and projects have been frequently mixed up with the evaluation of REX activities.

## (2) The Timing of Starting REX

REX started in 1992, but was this appropriate? It is fully understandable that there was a necessity to promptly advance the "Greening of E-san Project". The explanation is quite convincing considering there was a social mission to establish the seedling production and management technology and prepare the conditions for distributing large amounts of seedlings to the local people as soon as possible. Nevertheless, at that time, issues of social disputes over eucalyptus plantation were not yet settled. Taking into account the fact that reforestation activities by the farmers have rapidly expanded since then, it might have been better if REX had launched its project a little later.

The Investigation Report on the Prearrangement Planning conducted in March 1993 pointed out that REX should appropriately deal with the problems accompanied by the proceeding of the project (Report on the Prearrangement Planning Investigation Team of the Reforestation and Extension Project in the Northeast of Thailand, April 1993). It warned the possibility of the REX program itself causing problems of land disputes, and requested to pay attention to this issue. It pointed out that the project should be carried out by constantly consulting with Thai stakeholders, monitoring the project whenever problems occur, and conducting research on land utility before launching a project related to community forests. It also suggested that REX should confirm that agreements had already been met among the local people and provide necessary forestry information to the owners of private land.

### (3)The Size of the Nursery Centers

Second is the question of the appropriateness of the numbers and sizes of the nursery centers established by the grant aid cooperation. A plan was made to establish four nursery centers targeting 19 provinces in the vast area of Northeastern Region to meet the demand of 29 million seedlings required to assist the “Greening of the E-san project (1991-95) plan”.<sup>7</sup> It turned out to be an extensive project with total production of seedling being 100 million, 2670 villages and communities being targeted for seedlings distribution, 12 exhibition forests covering a total area of 7360 ha ,and 112 training courses. The appropriate production capacity was determined as 5 million seedlings per center. During the Phase I period, each center roughly met the targeted number of production. However in 1998 when phase I was about to be completed, the total number of seedling produced by the four centers was only 4 million. At the Udonthani Center area, approximately 12,800,000 seedlings were produced in 1995, but in 2000, the production dropped to almost one-third, or 3,650,000. Seedling production sharply decreased. The main reason was the reduction in the governmental budget after the economic crisis and cut in funds allocated to seedling production. Decrease in the demand of raw materials for pulp and the decline in farmers’ motivation to participate in the reforestation activities, given the low timber price, can be pointed out as other factors. Among the farmers that received a supply of seedlings from the centers, dump cropping of early maturity varieties has developed and few have purchased new seedlings. RFD is also shifting its policy priorities from the reforestation activities centered around the production and distribution of seedlings to the stabilization of forestry management, marketing and quality management. Given these circumstances, it is hard to expect as high demand in seedlings as seen during the REX’s Phase I period.

### (4)Eucalyptus

#### Attitudes Towards Eucalyptus

The third point is the selection process of the plant variety; especially farmers’ attitudes towards eucalyptus. Since the Thai government promoted eucalyptus at that time, the variety had the highest share among the seedlings produced by REX. As a consequence some people immediately associated the eucalyptus with REX. Some environmental conservation groups have been criticizing REX because of this. Given these criticisms, some Japanese experts and relevant people have made efforts in explaining REX activities sometimes even presenting counterarguments.

The reason why REX produced, distributed and disseminated eucalyptus seedlings was because (1) local people themselves recognized the economic value of the eucalyptus, (2) the Thai government put emphasis on eucalyptus, (3) eucalyptus trees were planted as a substitute for cassava in fields or waste lands which have low productivity, therefore it was envisaged that they would give no negative impact on the productivity of regional agriculture and contribute to improving poor farmers’ income, (4) though it is a non-native variety, it has no

Table 5-16 Breakdown of the Numbers of Distributed Seedling

Name of Project	(1,000 Seedlings)					
	1991	1992	1993	1994	1995	Total
REX	3,863	11,072	10,985	13,121	12,816	51,857
Special Project Commemorating the 50 Years Reign of His Majesty the King	0	0	0	11,866	18,718	30,584
Agricultural Production System Improvement Project	0	0	0	44,248	97,823	142,071
Community Forest	3,420	2,280	2,280	2,280	2,280	12,540
Border Police Project	?	568	575	575	600	2,318
Thung Kula Ronghai	?	1,003	5,235	12,000	3,000	21,238
<b>Total</b>	<b>7,238</b>	<b>14,923</b>	<b>19,075</b>	<b>84,090</b>	<b>135,237</b>	<b>260,608</b>

Source: Yasuyuki Kono, "REX Socio-economic Sector Short-term Expert Report," Submitted on 1st February 1994. (5) harm on the eco-system, (5) social conflicts are not caused by the eucalyptus but by the reforestation activities themselves, and (6) Food and Agriculture Organization (FAO) has also recognized the effectiveness of eucalyptus. REX, however, does not support the mono-reforestation of eucalyptus.

It is difficult to judge the appropriateness of eucalyptus without having sufficient knowledge and information on reforestation and eco-systems of forests. Therefore in this paper only a few outstanding points will be mentioned.

#### Assessing "Dump-cropping" by Farmers

Though eucalyptus is a non-native variety, it has been widely disseminated according to farmers' economic needs. The economic benefits of eucalyptus are, however, not as big as the farmers expected and its market price keeps fluctuating. Currently no eucalyptus boom can be seen as happened in the past.

Farmers have used the eucalyptus as a substitute for cassava. Eucalyptus was considered as a much more long-term investment than cassava. Among the farmers who participated in the cassava conversion projects, there is a strong tendency that after the initial cutting of the trees planted with the seedlings provided by the centers, they do not purchase further fertilizers or invest labour to maintain the forest. When the eucalyptus prices started to fall, farmers have completely "dump-cropped" the eucalyptus. Evidence was seen that farmers, mainly small-scale farmers and aging farmers without sufficient labour force, have almost all abandoned the eucalyptus plantations. There were some hopes that there would be a shift to a local variety in the future, but in areas where population is rapidly decreasing, especially in the reforestation area managed by aging farmers, eucalyptus has become the last resort.

During the three years between 1992-1994, about half of REX seedling production was aimed at eucalyptus. Its five-year average shares during the Phase I period was 35%. Some centers had higher share than this. REX could have had recognized the possibility of eucalyptus becoming a "dump-cropping agricultural product" and put much more priority on varieties that have more potential to revitalize the agriculture in the region. Moreover, given

the possibility of the eucalyptus becoming the last resort, the appropriateness of the dissemination of non-native eucalyptus remains questionable.

#### Relevance to Other Projects

In the Northeastern Region, before the large-scale nursery facilities were established, small-scale and scattered activities of seedling distribution had been conducted. In 1991, the main activities concentrated around the project “Reforestation of National Forest and Establishment of Community Forests,” but their production scale was smaller than that of REX which distributed 4,260,000 seedlings. During the three years up until 1994 when the cassava conversion project started, REX played a major role in producing seedlings (**See Table 16. Breakdown of the Numbers of Distributed Seedling**). According to one statistic, it occupied 47.1 % of the total reforestation area of the Northeastern Region of Thailand.<sup>8</sup> In the early 1990s REX activities constituted almost all of the Royal Forest Department’s activities. After 1994, when the RFD seriously started to embark on various projects, REX’s significance rapidly decreased. REX continued to target the early maturing varieties. On the other hand, native varieties have been the main focus of the Reforestation Project in Commemoration of the 50 Years’ Reign of His Majesty the King. The 3,000 Baht project has promoted commercial varieties with relative high values. In other projects, eucalyptus is the main variety. Taking these points into account it seems that it was necessary for REX to maintain its heavy reliance on eucalyptus.

#### (5) Concentration on Target Activities Utilizing Innovative Characteristics of REX

With the problems related to eucalyptus mentioned above, REX’s program has not necessarily been carried out smoothly all the time. Nevertheless, REX policies and plans were highly innovative. It promoted reforestation activities through enhancing awareness among local communities through participation in the activities and selection of tree varieties as well as developing and disseminating reforestation methodologies based on the needs of the community. REX Phase I was a gargantuan technical cooperation project and its activities also covered a wide area. Obviously, the contents of the technical cooperation have all been very important. It is a different question, however, whether all these projects could transfer technologies to counterparts during a relatively shorttime period of five years and could disseminated the activities to the local people in the target villages. This time, the evaluation team could not investigate the details of the appropriateness of the extent and varieties of activities conducted during the Phase I period. The Evaluation Report upon the Completion of the Project has concluded that the overall plan was appropriate. Nevertheless it can be said that if the technology transfer were conducted in a more focused manner and the target area was also more concentrated, experts and their counterparts could have been further involved in farmers’ reforestation and villagers’ forestry activities such as the community forests.

## **5.3 Activities and Evaluation of “Agricultural Cooperative Promotion Project in Thailand”**

### **5.3.1 Structure and Characteristics of the Project**

#### (1) Initiating “Total System”

##### Materialization of the Project

In 1982, a study on an Agricultural Cooperative Promotion Project Plan (ACPP) was conducted and the overall problems related to agricultural cooperatives were made clear (Japan International Cooperation Agency, “Feasibility Study Report on Agricultural Cooperative Organizational Promotion Project Plan in Thailand”, 1982). As a result, a promotion project with the following four strategies was recommended:

- 1) Expand and strengthen the existing base of the agricultural cooperatives;
- 2) Realize the leadership role of the agricultural cooperatives for regional agricultural development;
- 3) Promote the agricultural cooperatives as fair dealers;
- 4) Prepare conditions to respond to farmers’ financial demands and promote active engagement of the agricultural cooperative in farmers’ financial and farm planning.

“Total System” is a multi-purpose approach for promoting agricultural cooperatives in which the above four strategies can be simultaneously implemented.

The “Total System” was initiated given the severe conditions agricultural cooperative organizations were facing, and the new movements happening at that time. In the early 1970s small-scale credit cooperatives in farmers’ villages were reorganized into mixed cooperatives. Their jurisdiction has expanded to a relatively large-scale district level (*Amphur*). The scale of the organizational cooperative was enlarged and a system to recognize the “economies of scale” through its organizational operation was established. The Cooperative Promotion Department (CPD) encouraged the promotion of cooperatives that could undertake various operations, such as credit, marketing, purchase (supply), utilization and guidance under one umbrella. The Cooperatives Act enacted in 1968 also aimed at taking a comprehensive approach to the operation of agricultural cooperatives in rural villages, but this was not an easy task.

With agriculture becoming increasingly commercialized, the trend towards multi-purpose cooperatives that have agricultural financial institutions and distribution facilities and are capable of forming a local production base increased. In the area of agricultural finance, BAAC has been active and is increasing its finance but the main customers are still restricted to upper-class farmers. Lower to middle class farmers, found it difficult to meet the criteria of land mortgage required by BAAC. For these farmers agricultural cooperative banks which have a mortgage system based on products or personal



insurance have been more suitable. It was recognized that if the agricultural cooperatives were to respond to the demands of the lower to middle class farmers, a comprehensive approach should be employed to undertake the entire operation of member farmers' agricultural activities such as product collecting, production and marketing.

#### Shifting to a Project-based System

Two individual experts were dispatched in 1982 and the following year, respectively, to instruct 20 agricultural cooperatives scattered around the country. Later a request was made by the Thai side to further enhance the individual instructions into a structured ACPP. Recommendations were made on implementing a pilot project concentrating on the Nakhonratchasima province in the Northeastern Region of Thailand. ("Report on the Preliminary Survey on the ACPP in Thailand"). Moreover, a request was made to establish cooperative training centers through grant aid cooperation.

ACPP in Thailand started in July 1984. The main objectives were to strengthen organizational activities of agriculture, enhance agricultural productivity, promote marketing of agricultural products and improve socio-economic conditions of the cooperative members. During the five-year project period that ended in July 1989, 11 long-term and 16 short-term JICA (Japan International Cooperation Agency) experts were dispatched and 44 locals were sent for training in Japan. In addition, a two-year follow-up program was implemented from 1989. Cooperation activities during the entire 7 years can be roughly categorized into the following two areas:

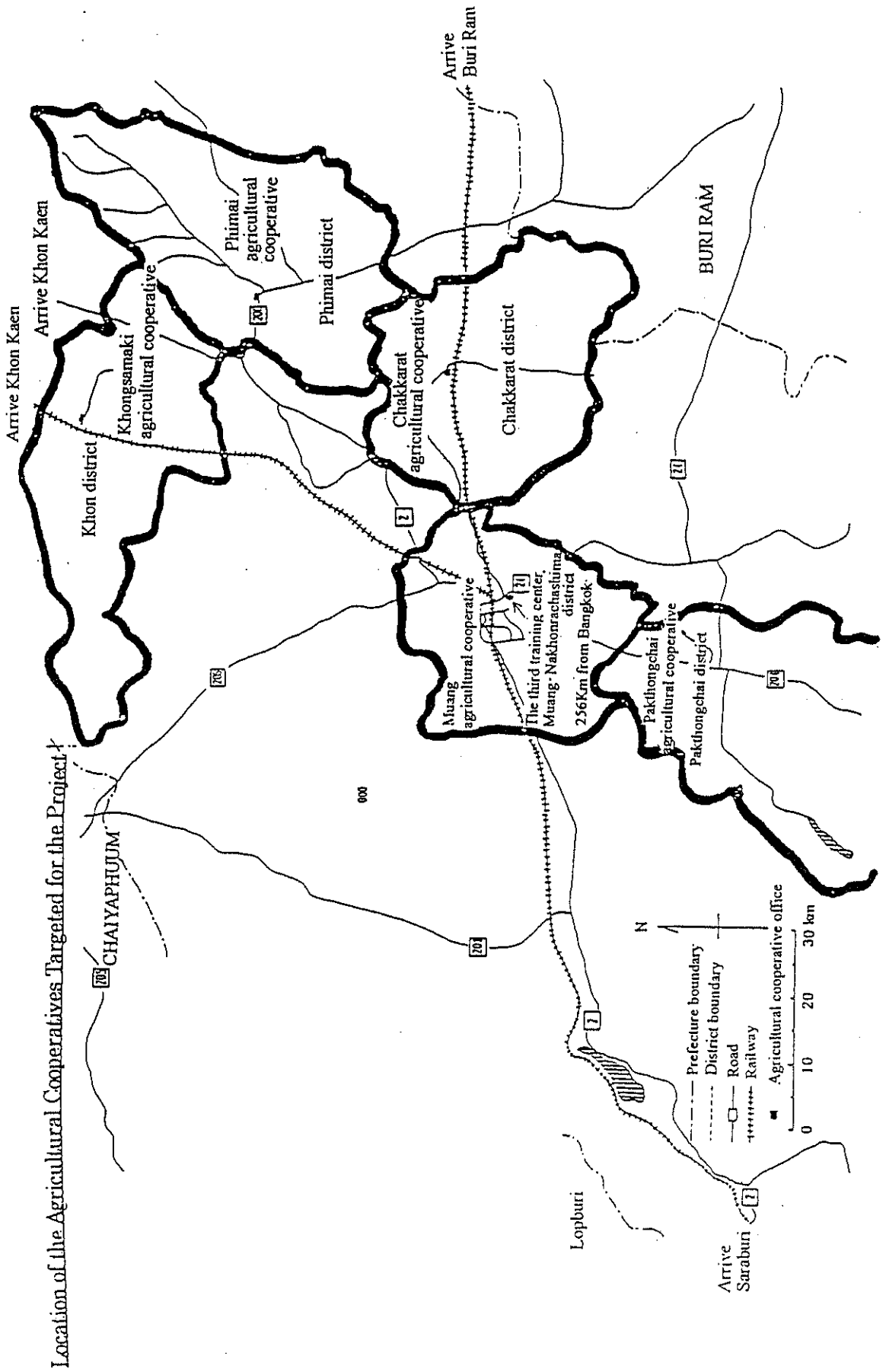
- 1) Providing guidance and advice to 5 model agricultural cooperatives selected from the Nakhonratchasima province;
- 2) Providing advice about planning and preparation of the training for disseminating the achievements made through establishment of model cooperatives.

#### Activities at the Model Agricultural Cooperatives

Agricultural cooperatives selected as model cooperatives from Nakhonratchasima province were Amphur Muang, Paktongchai, Chakkarat, Khongsamaki and Phimai cooperatives. Areas targeted for instruction and advice were farming guidance, agricultural cooperative management, sale and purchasing activities and training. JICA experts responsible for each project have cooperated in the planning and implementation of the promotion of model agricultural cooperatives through C/P. Contents of these activities can be found in many documents in addition to the operational reports. It is obvious from these documents and reports that the experts' activities have made a contribution to the "development of agricultural cooperatives and regional agriculture." As the post-project evaluation report concludes, it can be said that the agricultural community, in which the agricultural cooperatives were situated, was able to find a toehold for agricultural development and strengthen the operational and management structure of their agricultural cooperatives.

Experience and lessons learned through the activities of model cooperatives were

Figure 5-3 Location of the Agricultural Cooperatives Targeted for the Project



reflected in the Agricultural Cooperative Promotion Policy through CPD's CP activities as well as disseminated to neighboring agricultural cooperatives. Moreover, interested persons in the agricultural cooperatives came to visit the model cooperatives from all over the country and learned methods instructed by JICA experts to improve the operational and management system. At the CPD training center, established by a Japanese government's grant aid cooperation, activities to enlighten people on agricultural cooperatives and practical lectures were carried out. In this center, various textbooks and manuals were compiled through the instruction and advice from experts. The center covers the area of nine provinces located around the Nakhonratchasima province.

## (2) Characteristics of the Project

### Technical Cooperation in the "Soft" Area

The first characteristic of the ACPP is that it was technical cooperation in the 'soft' area aiming at the advancement of organizational and management bodies that the local communities take part in. In developing the project, deep understanding of the behavioral patterns and culture of the local people who live in the target area were required. In some regions in Thailand, the system and the organization of agricultural cooperatives has not been well understood by the local villagers, and many cooperative members have felt "alienated" from the agricultural cooperative as a formal organization, even though they were members of the cooperative. There were some difficulties in achieving the objectives of promoting agricultural cooperatives since the project had to be carried out by taking into account the behavioral patterns of the local people towards formal organizations. It is not clear whether this trend was strong in the five model cooperatives, but the experts were urged to make efforts in changing the conservative attitudes of the cooperative members into a more active one.

### Regional Agricultural Promotion through the Establishment of Organizations

Secondly, the ACPP not only aimed at strengthening the organizational and management bodies of the model cooperatives, but also aimed at providing appropriate advice and assistance to encourage production of agricultural and livestock products that the region has competitiveness in, and tried to establish these as major local products. These activities were undertaken as part of the agricultural cooperatives' promotion plan, but ultimately they became the base for assessing the overall project. The project aimed at gearing the energy of the local farmers towards establishing major local products, and tried to concentrate these energies on agricultural cooperatives. Model farming groups were organized within the model cooperatives to establish an operational system based on producers' group (so-called section units). This attempt was innovative in the sense that it provided a new way of forming an organization that is not based on groupings of related members. The project aimed at promoting the agricultural cooperative as an organizational body which is in charge of forming a local production base through the establishment of an operational and organizational system based on the producers' group.

It takes many years to establish a local production base and at the time when the “post-project evaluation” was conducted, results were not available. It can be said that this is the reason why the “post-project evaluation” did not give any clear indication or assessment regarding this issue.

From the field visits and interviews conducted by the evaluation team and the attitude survey conducted by staff from the Faculty of Economics, Kasetsart University, it was made clear, that more than expected, various activities have had been undertaken aimed at the formation of local production bases, mainly in the model cooperatives. It is not so important whether the products and livestock promoted by the project have taken root in the farm management or not. Given the fluctuation in market prices and supply-demand relationship, a switch in major products happens as a matter of course in the farming businesses. The real question is whether the region has been able to strengthen its planning and organizational capability; the base to bring up production capacity.

#### Converting the Practices of the Model Cooperatives into Policy

Thirdly, there were hopes that the ACPP and the experiences and policy activities could be made into manuals and disseminated not only to nearby agricultural cooperatives but to cooperatives all over the country. The project involved a process of converting the practices undertaken in the model cooperatives into the policies of CPD. It has been generally understood that this objective has not been fully accomplished. It is quite difficult to assess what kind of impact the project had at the cooperative policy level. Though it has never been systemized, the experiences from the promotion of model cooperatives have been utilized at CPD’s everyday internal operational work.

Finally, the ACPP was facing a danger of being buried by or merged with other policies and projects that were competing in the same field. Specifically these included the BAAC expansion in its agricultural finance and resource supply project, the Department of Agricultural Extension (DAE)’s activities in promoting farmers’ groups, and attempts to organize local community groups conducted by the Ministry of the Interior or other governmental as well as non-governmental organizations. Many similar projects were implemented by various organizations in rural villages at the same time. During the mid-1980s to the early 1990s, the Thai government was trying to organize farmers into some kind of united organization through trial and error. Three types of village community; agricultural cooperatives, client groups of BAAC, and village unit groups started to be formed in rural villages. The agricultural cooperative was situated somewhere in the middle of these three. BACC was starting to get many farmers’ participation to its client group through its country-wide network of branches and its abundant capital. Similar organizations in farmers’ villages directly competed or overlapped with the work of the agricultural cooperatives. Therefore, there was a possibility that the social dissemination effect of the model cooperatives would become restricted even they were successful.

Taking into account the above characteristics of the ACPP, this paper now moves the

Table 5-17. Contents of Activities by Area

Mater Plans	Specific Activities
(1) Credit Business	1.Preparing Manuals for Loan Business 2.Saving Promotion Policies 3.Improving Credit Operations Related to Loan
(2) Cooperative Management	1.Analasis and Preparatory Measures for the Five-Year Cooperative Development Plan 2.Preparation of Manuals for Monthly Account 3.Improving Regulations on the Authority of Work 4.Preparing Monthly Budgetary Plan 5.Publishing Cooperative News to Strengthen Communication among Members  < Research Analysis on Fundamental Conditions of Each village in the Cooperative Area > 1.Social Economic Condition 2.Agricultural Condition 3.Financial Environment 4.Rice Production and Distribution Channel 5.Collection Facilities for Agricultural Products 6.Supply Channel of Materials 7.Individual Group's Activities
(3) Marketing	1.Quality Control and Grading of Rice 2.Mechanism of Collection and Marketing of Agricultural Products other than Rice 3.Investigation on Subscription Marketing System involving Farmers' Housewives 4.Preparing Manuals for Purchasing Projects
(4) Trainings	1.Technical Advice on Training 2.Planning, Preparation and Implementation of Training Technical Advice on Training Implemented by CPD in the Northeastern Region of Thailand and Bangkok Various Models for Planning, Preparation and Implementation of the Training Provide Technical Advice Taking into Account the Experiences Gained from Activities
(5) Farm Guidance	1.Selecting Model Farm Groups 2.Preparing Farmers File 3.Preparing Plans for farm Guidance 4.Implementing Farm Guidance Record 5.Promoting Joint-use of Agricultural Machineries 6.Implementing Technical Farm Guidance

assessment of the socio-economic impact of the project. In regards to the impact on farm management and regional economy, Dr. Aungsmalin and Dr. Kornyuenyong have written a detail analysis in a separate volume.

### **5.3.2 Various Impacts on the Model Agricultural Cooperatives**

#### **(1) Outline of the Instruction and Advisory Activities at the Model Cooperatives Activities at the Model Cooperatives**

Model Agricultural Cooperatives were located in Amphur Muang (where the Provincial Administrative Office is) and the surrounding area (See Figure 5-3. Location of the Agricultural Cooperatives Targeted for the Project). Every model agricultural cooperative was a multi-purpose type of cooperative covering the entire district where it was located in. Technology transfer was aimed at a broad area of operation, management and overall organization (See Table 5-17. Contents of Activities by Area). Specific contents of the activities differed in each agricultural cooperative. Emphasis was put on enhancing the structure of operational management as well as considering how the members' views can be reflected to all project management.

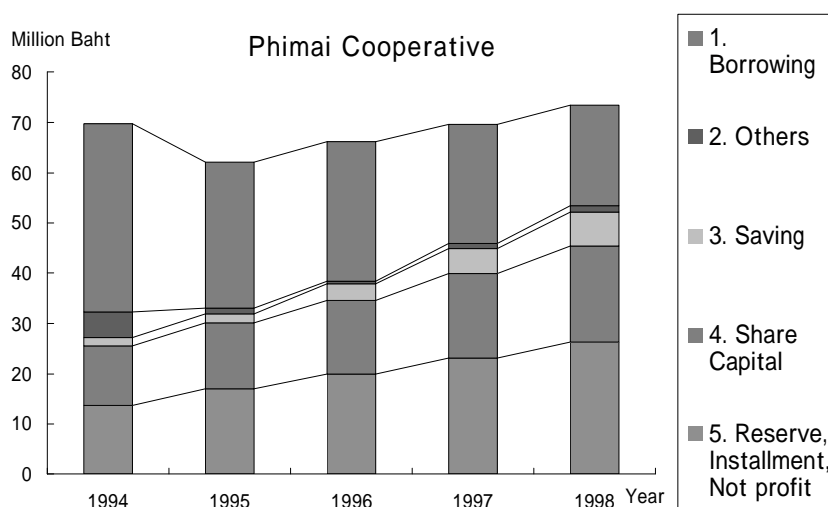
#### **Recovering Loans and Categorizing Members**

It is said that at that time, most of the agricultural cooperatives in Thailand were having difficulties in collecting loans from members. The instruction and advisory activities that were effective in this area were the compilation of farm management ledgers of members and the establishment of a ranking system in which the members were ranked according to the condition of repayment of loans or participation in cooperative activities. Phimai agricultural cooperative, for instance, set up four categories from A to D as funding criteria. Members categorized as A can receive up to 80-100% of the maximum loan limits, but B is set as 80% and C is 60%, and when judged as D, the person cannot receive a new loan unless he or she pays back all previous loans. In the past, the cooperative was financing anyone, without such categorization. As a result, the cooperative had problems in recovering loans from members which had led to the deterioration of the cooperative's financial position. Improvement in loan management can be clearly seen from the increase in the ratio of loan recovery from the members. The recovery rate in 1986 was about 30% in Pakthongchai, 48% in Phimai, and 52% in the Muang Cooperative. However in 1990, the figures improved to 60%, 78% and 83% respectively.

The credit assessment and ranking system introduced to the model cooperatives was disseminated to agricultural cooperatives all over the country through CPD. Currently many agricultural cooperatives in the country are still using the ranking system.

The other area that the project put emphasis on was the promotion of saving. According to the "Comparative Analysis on the Operational Condition of Model Agricultural Cooperatives" (data edition), it is clear that in the beginning the model cooperatives were financing their loan to the members by borrowing from BAAC or CPD. Saving-loan ratio and

Figure 5-4. Transition of Capital Procurement of the Model Cooperatives



external borrowing-loan ratio were both very high; the model agricultural cooperatives had a characteristic as a “debt cooperative”. Cooperative loans were heavily influenced by the condition of the BAAC funding. The project recommended the model cooperatives conduct budget planning and promote savings to their cooperative members. It has provided practical guidance such as the “One Baht a day” campaign. The model cooperatives gradually increased the ratio of capital raised through a non-borrowing channel and their financial status highly improved. (See **Figure 5-4. Transition in the Capital Procurement of the Model Cooperatives**).

#### Establishing Model Farm Group and Dissemination of Technology

One of the most distinctive areas of activity in the ACPP was the activities related to farm guidance. One model farm group was set up in each agricultural cooperative, and the types of products as well as livestock to be promoted were decided by this group. Crop varieties were selected by the members participating in the farm group and the cooperative staff. Related activities such as investment in facilities and establishment of agricultural bases were conducted as part of the project. To promote the common use of agricultural machinery, various machinery was also provided to model farm groups or cooperatives. Many of these facilities and the machinery donated by JICA a decade ago are still in use.

The cooperative members who participated in the model farm group are limited, but they started a new type of farm activity through the technical guidance of experts. In the case where a common piggery was established, members participating in the farm group ran a jointly managed breeding and meat business. Lectures on how to improve technologies of feeding management were conducted and direct instructions were also undertaken by experts. New varieties were promoted replacing old ones. The cooperative started to jointly purchase feed and run feed mixing facilities to supply cheap feed to the members. In places where the breeding operation started to smoothly function and was able to secure piglets for breeding,

pig-farming spread among general farmers too. In places like Phimai , Pakthongchai , and Khongsamaki, the pig-farming business that took root at this time is still prospering and has become one of the most successful pig-farming areas in the province. Besides pigs, local varieties of chicken ( Kai Baan )are kept, and farming and cultivation of chili has also started.

These experiences proved that when the farm groups' operations were promoted together with the establishment of the cooperative management system it became highly effective for the formation of local production base. To operate the farm groups' production and marketing activities, the agricultural cooperatives must diversify their activities and services. Moreover, the activities of "producers' groups," composed of cooperative members who cultivate the same variety of products and grow the same livestock, were promoted. In the model cooperatives, producers' groups are still active. In the agricultural cooperatives in Thailand, member groups with regional coherence form the bases of operational and organizational activities. It is worth noting that in the model cooperatives, there have also been producers' groups that deal with specific agricultural production, and these groups have been functioning more practically. Group activities are indeed essential to form a participatory type of agricultural cooperative but the main objective of the project was to directly connect these group activities to the operational activities of the cooperatives.

#### Successful Cases of Compound Farm Management

Many farmers in the Phimai agricultural cooperative used to engage in mono-culture farming of rice paddy cultivation. Farmers who joined the model farm groups started pig-farming business and were able to seize an opportunity to obtain a new source of income. In the beginning, the farmers considered compound farm management to be quite difficult, but eventually started to recognize that if they could get the operation system ready through the cooperative's guidance, the possibility of success would be much higher.

With the increase in the numbers of farmers engaged in the pig-farming business, and with instruction from experts, the use of compost rapidly increased in the region where the model farm groups were located. The numbers of farmers purchasing compost from the pig-farming farmers increased and the profitability per unit of the paddy fields in and around the area, where model farm groups are, steadily increased. Individual farmers could increase their income by combining different activities. With the launch of livestock farming, the agricultural productivity of the region gradually improved.

#### Strengthening the Operational Marketing Business

The project aimed at strengthening the operation of the marketing businesses. In order to establish a system for collecting the rice crop, which is the most important agricultural product, the project supported Phimai agricultural cooperative in establishing a rice mill. The rice mill business was not launched in Amphur Muang and Pakthongchai cooperatives but they also started to extensively deal with the paddy collecting operation. As will be explained in detail in the latter part of this paper, with the agricultural cooperatives entering the rice collecting and



rice mill operations, the distribution structure of paddy and milled rice in the region has drastically changed. The power of the collectors has relatively decreased and cooperative members were able to sell the paddy rice with better deals. The agricultural cooperatives undertook a corn collecting operation and sold them to feeding factories. In places where feed-mixing machines were provided by JICA, the cooperatives processed the corn by themselves to be used as feed and directly sold it to the members of the cooperatives.

In those days, there were not many agricultural cooperatives that genuinely engaged in marketing business and only a small number of cooperatives were undertaking rice collecting operation on a small scale. Even those were a very simple operation in which cooperatives collected paddy rice from small numbers of farmers and sold them to the provincial Agricultural Cooperative Federation that runs the milling operation. Moreover, this was only possible with the price of rice being guaranteed through the government purchase scheme (subsidies) and with low-interest loans provided by CPD for running the operation. It could not be called a marketing business in a real sense. Rice, which is the most important commercial agricultural product of a rural economy, sold by the agricultural cooperative only counted for several percentage of the overall rice supplied in the market nationwide.

The ACPP was innovative in the sense that it tried to establish the operational system to activate cooperatives' marketing businesses. It seems that there were many difficulties in operating marketing businesses, but the attempt is highly valued as it demonstrated how to include marketing business in cooperatives' operational structure and how effective it can be when implemented in conjunction with farm management guidance.

#### Service and Utilization Activity

Model cooperatives were also expanding their service and utilization activities with machinery and facilities provided by JICA. Pig-farming facilities, rice mill, mixed feed, and farming machines were donated and buildings and reservoirs established. The agricultural cooperatives took responsibility in being the major operational body for these facilities and complemented the low productivity level of the cooperative members and inefficiency of distribution activities. The main objective was to make the agricultural cooperatives deal with the entire process of members' agricultural activities from production to distribution. It tried to instruct the process of establishing the operational structure of an agricultural cooperative with a "total system" function. All facilities and machinery granted by JICA were essential to the expansion of the regional agricultural base but they were too costly for individual agricultural cooperatives to invest in by themselves. There has been a big impact on the regional agriculture when these facilities actually started to function. In the pig-farming business, breeding operations became possible and with the introduction of new pig breeds by expert, the region developed into one of the major local rearing bases of pigs in the province. The Phimai agricultural cooperative which established the rice mill has developed into one of the best local cooperatives in the Northeastern Region that produces high quality rice. Pakthongchai cooperative, which purchased farming and feed mixing machines, has become a

price leader among agricultural cooperatives in the production of corn. As the facilities for collecting paddy were established, the cooperative members started to forward their products to the cooperative. At Khongsamaki cooperative, facilities for breeding local breeds of chickens were established and purchased by private companies. The ACPP has offered a new business opportunity to the model farmers in the area of service and utilization activities, and a chance for the region to form a local production base by engaging in these activities.

#### Dealing with the Improvement of Management

In regards to the improvement in cooperative management, the experts firstly put emphasis on comprehending the actual condition of the cooperatives. They made efforts to transfer know-how about a monthly account settlement and financial planning system, but it was difficult to make the cooperative staff and the leaders understand the importance of long-term planning. Improvements were seen in the Phimai cooperative but little progress was made in other agricultural cooperatives.

The project came to the conclusion that in order to efficiently run the operational business, it was necessary to regulate the authority of each agency. C/P and cooperatives' higher-ranking staff visited agricultural cooperatives that demonstrated superior performance and the experts introduced the experiences of Japan. Since the capital and operational scale are small in the model cooperatives, they could not secure and allocate sufficient numbers of staff. Moreover, as the CPD retains the authority of the everyday operational activities of the cooperatives, it was difficult for the cooperatives to work autonomously on their management operation. The post-evaluation reports assessing the level of achievement in this area were quite low, but the truth was that the existing conditions made it difficult to train or make the directors, managers and staff consider the improvement of management as one of their concerns.

#### (2) Phimai Cooperative in the Post-project Period

##### Movements Right After the Completion of the Project

The Aftercare Mission dispatched in February 1997 has compiled a detail report on the organizational and operational trends of model cooperatives in the post-project period. Interviews and analysis on the operational report were also conducted by a group led by Dr.Aungsmalin and Dr.Kornyuenyong. Model cooperatives have continuously developed their operational and management bases (**See Table 5-18. Trends of Agricultural Cooperatives After the Completion of the Project**), but within Pakthongchai and Amphur Muang cooperative areas, the wave of urbanization influenced the decline in regional agriculture. Many farmers are leaving the agriculture sector in other regions too.

Chakkarat, Phimai and Khongsamaki cooperatives show relative success in its operational development. In particular, Phimai cooperative has developed its operational activities as a whole and has become known nationwide as one of the superior agricultural cooperatives in the country. In regards to Pakthongchai cooperative, since it has been merged

Table 5-18 Trends of Agricultural Cooperatives After the Completion of the Project

1989年		1997年
Phimai Cooperative	Launching on Mixed Farming Increase in Pig Farming	Development in comprehensiveness of projects Development in favorable condition for pig farming Expanding operation such as feed production utilizing chaff
Khongsamaki Cooperative	Organizing Chicken Farming Group Kaibaan Marketing Agent Establishing Guiding System by Farm Guidance Staff Purchasing Corn for Feed	Constant increase in membership Stagnation in numbers of projects
Pakthongchai Cooperative	Developing pig farming Poultry farming of Kaibaan not active due to failure in operating the poultry farming center Farm group activities of pig farming has been successful as model activities	Lack of capital for plant and equipment investment Decrease in number of farms due to industrialization of cities Decrease in memberships -stagnation in activities
Muang Cooperative	Agricultural incentives low due to its location that is close to the city Difficult to be develop as disseminative model due to favorable condition for farm businesses New marketing channel necessary due to high cost of existing species of cows	Steady development of project not recognized as a whole
Chakkarat Cooperative	Pig farming activities popular outside the model farm group Rapid transition such as: Kaibaan farming swine farming cattle farming pork farming Incentives for farm activities strong among members	Steady development recognized

Source Based on JICA's "Evaluation Team Report" and "Aftercare Investigation Team Report"

with on other cooperative, its operational and management standards cannot be highly valued. Nevertheless, it is quite active in marketing business and utilization operations, and has become a very distinct type of cooperative compared to general cooperatives that are based on credit businesses. The amount of activities in Khongsamaki cooperative is not increasing that much but cooperative memberships are increasing steadily.

The evaluation team visited and conducted interviews mainly at the Phimai and Pakthongchai cooperatives. A supplementary interview was conducted at Khongsamaki cooperative.

#### Continuous Development in the Operation and Management of Phimai Cooperative

The project was most effective at Phimai agricultural cooperative among all model cooperatives. There are many documents that provide information on Phimai cooperative and it is quite easy to follow its organizational and operational trend. Observing the point when the project ended and the activities that followed, it can be seen that not only the number of operations in paddy collecting, rice milling and pig-farming related businesses increased, but its financial condition also improved (See **Table 5-19. Development Trends and Characteristics of Phimai Cooperative** and **Table 20. Outline of the Activities of Phimai Cooperative**). The details of the impact of the project on the agricultural cooperative will be left for the report written by the group led by Dr. Aungsmalin. This paper will rather concentrate on the explanation of the most distinctive characteristics of the project.

#### Development of Rice Mill Operation and Distribution of Paddy

The rice mill operation at Phimai cooperative started with a milling machine being

**Table 5-19. Development Trends and Characteristics of Phimai Cooperative**

	1989	1997	2000
<b>Phimai Agricultural Cooperative</b>	<ul style="list-style-type: none"> <li>• Active in Model Pig Farming Activities</li> <li>• Original Account Settlement System</li> <li>• CAD's Model Cooperative</li> <li>• Excellent Councilors with BA Degrees</li> </ul> <p><b>Tauwan Village</b></p> <p>Pig Farming Group's Activities take root in '87 Aims at Establishing Mixed Farm Complex</p> <ul style="list-style-type: none"> <li>• Farm Group 90%</li> <li>• Launch of Rice Mill Business through granted Machineries</li> <li>• Join Purchase of Swine, Nampulaa (Fish Sauce) Business</li> <li>• Preparation of Manual for Phimai Rice Mill Project ('88)</li> <li>• Saving Promotion Plan (1 Baht a day)</li> </ul> <p><b>Pig Farming</b> Did not develop into pork production</p> <ul style="list-style-type: none"> <li>• Supply of Swine Center F 1=20 t /Year</li> <li>• Feed Mixing Facility Operation 10 t /Month</li> <li>• Feed : Change from cassava to corn</li> <li>• Expanding to other groups</li> </ul> <p><b>Aiming at Multi-purpose Type of Agriculture</b></p> <p>Infrastructure : Irrigation Facility, Pig Farming Facility</p> <p>Rice Productivity up 350Kg 400kg/rai</p> <p>Introduction of Mung Beans, Peanuts</p>	<p><b>Membership</b></p> <ul style="list-style-type: none"> <li>• Increased comparing '84 and '91-96 when project completed</li> <li>• Efforts made in increasing the numbers of memberships</li> </ul> <p><b>Projects</b></p> <p>Significant numbers of projects compared to other 4 cooperatives</p> <p>Farm guidance program mainly focused on establishment of farm groups strengthened; promotion of joint purchase and marketing take root and develop into favorable condition</p> <p><b>Increase in Work Capital</b></p> <p>Development in the 1 Baht a day saving plan</p> <p>Decrease in the ratio of self-raised capital to work capital</p> <p><b>Increase in Loan</b></p> <p>No improvement seen in loan rate</p> <p>Significant Numbers of Projects compared to others; One of the top level cooperative in the country</p> <p>Collaborate with administrative agents to bottom-up surrounding agricultural cooperatives (MCU Plan)</p> <ul style="list-style-type: none"> <li>• Comprehensiveness of projects develops</li> <li>• Securing water Mixed farming</li> <li>• Pig farming developing into favorable condition</li> <li>• Rice : Production expands, Introduction of Mills through subsidies, Collaboration with private companies, Software development for computerization</li> <li>• Heavy work load for managers</li> </ul>	<p>Capital : 100milB</p> <p><b>Rice Mill Business</b></p> <p>Selling to Amway and several other companies</p> <p><b>Mills</b> Over supply of milled rice</p> <p>Purchased a brand new mill five years ago and is not using granted by JICA anymore</p> <ul style="list-style-type: none"> <li>• Dryer Purchased last year, 3 years ago</li> </ul> <p><b>Farmers</b></p> <p>Sales to Agricultural cooperatives BAAC Jek</p> <p>5 years ago : mostly to cooperatives</p> <p>10 years ago : non to Jek</p> <ul style="list-style-type: none"> <li>• JICA Assistance support fertilizer, quality improves</li> <li>• Mill Marketable by putting into bags</li> </ul> <p><b>Pig Farming</b> : Common raising ground</p> <p>Number of participants differs depending on price</p> <p>30 B per kg last year-40-50 B</p>

Table 5-20. Outline of the Activities of Phimai Cooperative

	(Thousand Baht )			
	1993	1995	1997	1999
Phimai Cooperative				
Membership	4,439	5,890	7,485	8,125
Working Capital	127,550	203,532	286,812	381,260
Self-Raised Capital	64,714	76,252	92,291	117,717
Saving	20,428	35,734	48,904	63,164
Credit Business	85,719	94,174	16,034	31,679
Purchase Business	34,172	45,046	54,970	40,894
Marketing Business	33,395	39,636	47,013	67,855
Service Business	507	2,436	3,001	2,876
Business Profit	-	8,967	11,749	18,839
Net Profit	7,786	6,670	9,361	12,170

Source :Phimai Agricultural Cooperative Annual Report on Operation

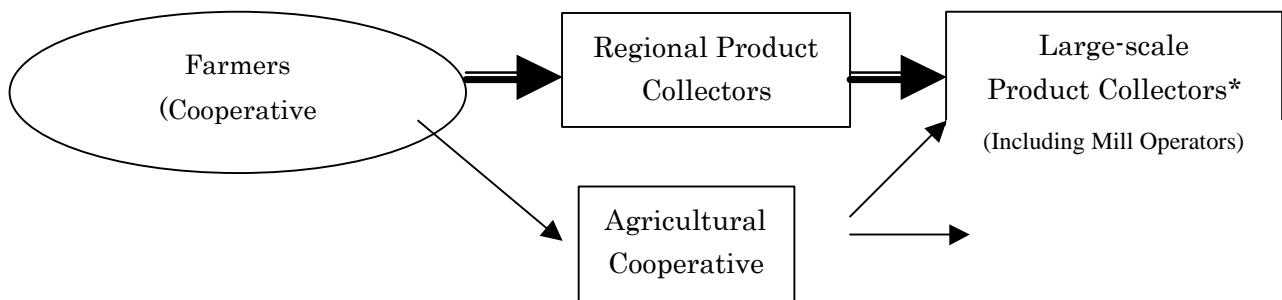
granted by JICA. The initial scale of the grant was relatively small with a milling capacity of 24 tons per day. The machine was a wooden mill manufactured locally. It could be categorized as small-scale as a rice mill factory in Thailand and even small as a rice mill owned by an agricultural cooperative. After the milling machine was donated, stores and paddy collecting facilities were also provided. Phimai cooperative steadily developed its operation. The 24 tons capacity became insufficient and it was replaced with a new milling machine with 40 tons capacity a day. Recently it has introduced the latest machine manufactured by a Japanese maker by borrowing funds from CPD and BAAC.

The yearly market supply of paddy in the Pima cooperative area is estimated as 40,000-50,000 tons. 14,000-15,000 tons are collected by the cooperative which has a relatively high share of around 35-37%. The share was, of course, not this high when the milling factory was initially established. The share increased after the cooperative succeeded in the collection of high quality native brand rice and was able to sell to large-scale retailers that had headquarters in Bangkok. Phimai cooperative's position in the paddy distribution operation became bigger than initially expected. In the 1990s, the structure of paddy distribution changed dramatically with the increase in the volume dealt with by Phimai cooperative. (See **Figure 5-5. Transition in the Structure of Paddy Distribution in Phimai Cooperative**).

Before the project started, Phimai agricultural cooperative was just a small-scale collector of paddy. The major channel was to buy up the paddy from farmers in accordance with various governmental subsidies and purchasing programs and sell to the Provincial Agricultural Cooperative Federation. Only the cooperative members who received loans from the agricultural cooperatives were engaged in the operation of marketing businesses. It was considered as part of the credit business rather than an operation of the marketing business. After the project was completed the ratio of sales to the cooperative to loan repayment rapidly

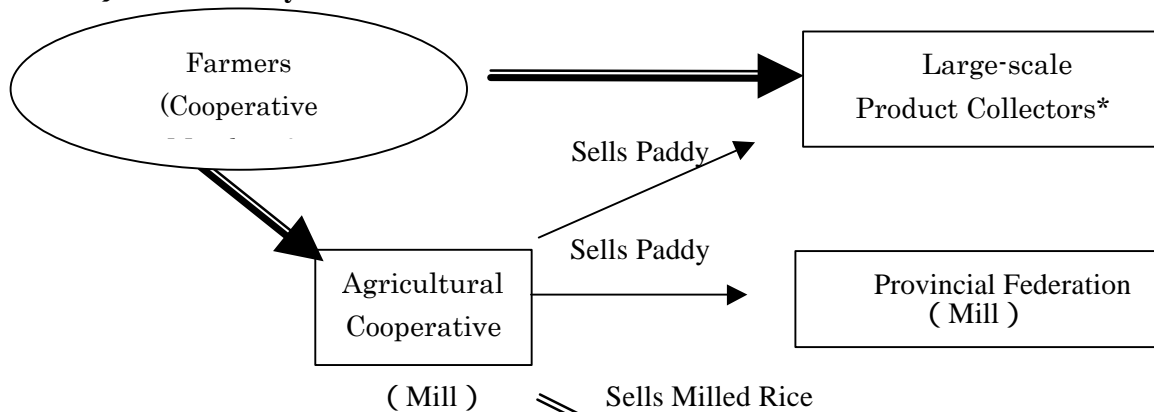
**Figure 5-5. Transition in the Structure of Paddy Distribution at Phimai Cooperative**

**Before the Project Started**

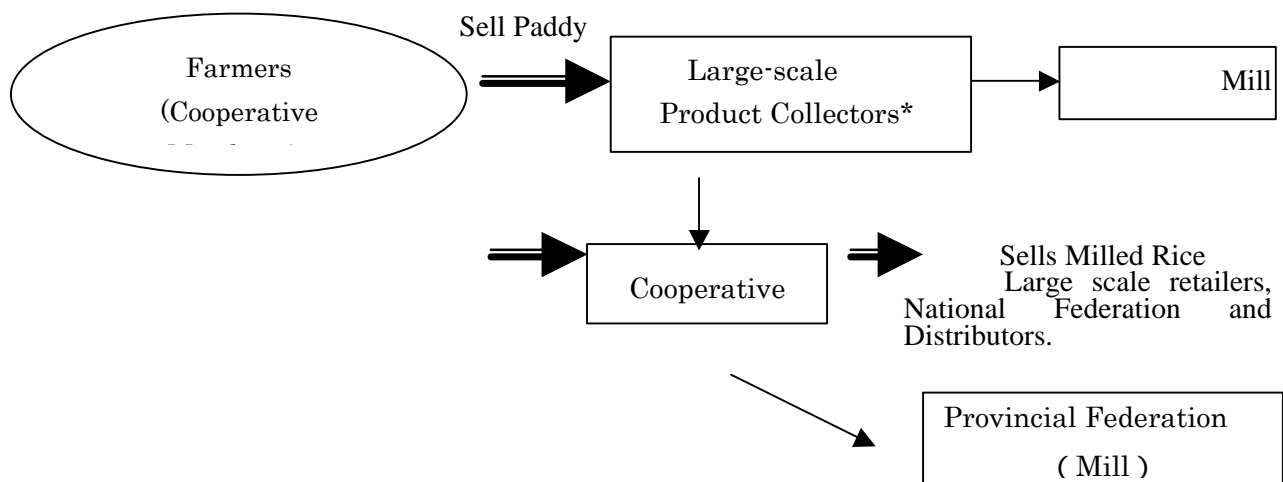


**II After the Launch of the Project**

**1 ) Immediately After**



**2) Present**



\*Chinese oriented merchants called 'jek'. Genealogically it refers to 'Pho Kha Yunchang' that has large-scale warehouse. Mill operators also collect and sell paddy.

Table 5-21. Change in the Mode of Paddy Transaction made at Phimai Cooperative after the Completion of the Project (Baht, %)

	Loan Repayment	Deposit	Cash Settlement	Total
1990	3,066,475 (42.6)	583,155 (8.1)	3,547,618 (49.3)	7,197,248 (100.0)
1991	7,804,438 (32.6)	889,808 (3.7)	15,243,314 (63.7)	23,937,560 (100.0)
1992	6,462,022 (19.4)	1,298,222 (3.9)	25,634,633 (76.7)	33,394,877 (100.0)

Note: Deposit system is a system in which the farms deposit rice to the cooperative and sell the rice when market price is high.  
Source: Phimai Agricultural Cooperative Annual Report on Operation

decreased. (See Table 5-21. Change in the Mode of Paddy Transaction made at Phimai Cooperative after the Completion of the Project). The operation of the marketing business became independent from the credit business and started to operate by itself.

In the past, most farmers (cooperative members) used to sell their products to the primary product collectors. Around the Phimai area were the second group of collectors who owned large warehouses. They had absolute power over the distribution of paddy. However, when the cooperative started the rice mill operation, a large structural change started to happen in the rural villages distribution channel. The role of the collectors within the region started to diminish, with the farmers directly selling the paddy to large-scale product collectors. During this transition period the agricultural cooperative entered the collecting business of paddy and gradually expanded its dealing volume.

Before the rice mill factory started to operate in full capacity, the paddy that could not be milled internally was sold to the Provincial Agricultural Cooperative Federation, but the cooperative gradually increased the ratio of rice milled by itself. One of the characteristics is that the cooperative aimed for an advantageous sale by increasing the ratio of quality rice such as Khao Hon Mari. Within the region, 70% of the rice produced is general rice, but the cooperative encouraged its members to plant Khao Hon Mari. The cooperative started to sell this high quality rice packed in 5kg or 10 kg of small plastic bags to large-scale retailers from a relatively early period. Since the cooperative's purchasing price of paddy is a bit higher than those of general product collectors, the collected volume steadily increased until 1997. The agricultural cooperative started to heavily influence the price structure of paddy in the Phimai region.

#### Increased Competitiveness in the Distribution of Paddy

In the Phimai region, there were large-scale rice millers and large-scale product collectors who actively undertook the collecting business. Many farmers point out that with the agricultural cooperative entering the rice business, the distributional operation of paddy became highly competitive. Transactions between the Phimai agricultural cooperative and the members are very fair and the farmers value the accuracy of the rice grading and the fairness of its volume scaling. In fact, the relationship between the cooperative and other rice millers is not completely competitive. When setting up the purchase price of the paddy rice, cooperative arrangements are made up to a certain level. In cases when the volume of the rice collected is not sufficient, they mutually lend the products to each other. The existence of the agricultural cooperatives that have a large-scale sales channels of Khao Hon Mari is also attractive to the

Table 5-22. Volume of Paddy Collected by Phimai Cooperative (1993)  
(ton , Baht )

	Purchase		Trust		Milled Rice (1)	
	Volume	Amount	Volume	Amount	Volume	Amount
General Rice	8,265.12	29,892,207	3,230.07		140.81	549,143
Kao Hon Mari	745.80	3,502,670	172.18		27.77	133,272
Total	9,010.93	3,394,877	3,402.25		168.57	682,415

Note Milled rice was brought in by farmers for consumption and not for marketing  
Source Phimai Agricultural Cooperative Annual Report on Operation

product collectors and rice millers (See Figure 5-5. Loc., cit).

Through the expansion of the cooperative's rice mill factory, the qualitative relationship between the farmers and the merchants has also changed. Farmers were able to freely sell their paddy based on their own decision. The custom of dealing in unharvested rice crops is no longer visible in the Phimai area. The cooperative completed the so-called deposit system. This is a system to avoid sales right after the harvesting when the market price for the paddy sharply drops. The members of the cooperative can deposit their crop up to a certain period in the cooperative's warehouse without charge. The farmers can ask the cooperative to sell the rice on their own decision when the market price improves. In some cases, the cooperative will make payment in advance to the members during the depositing period. In 1993, after the project was completed, the purchasing volume of the cooperative was 9,000 tons of which 3,400 tons were deposited rice (See Table 5-22. Volume of Paddy Collected by Phimai Cooperative (1993)). The cooperatives' marketing business has brought significant benefits to the cooperatives members. In 1999, however, the collecting volume was 10,618 tons or 4,380,000 Baht, and the ratio of transactions made in cash was 70%, the ratio of loan repayment was 24% and the deposit hold only 6%.

The paddy collecting and rice mill business have been successful up until recently, but the business has started to face difficulties. Competition with the merchants to secure Khao Hon Mari variety became highly tense. The large-scale retailers that the cooperative has been selling large volumes of polished rice to started to force the Phimai cooperative to accept difficult transaction deals because of the economic recession and the decrease in consumption. Phimai cooperative has therefore ceased transaction with some of these large-scale retailers and switched to other large-scale retailers or wholesale retailers. On the other hand, with the increase in the volume of collected paddy, it is becoming difficult to thoroughly implement inspection upon purchasing and controls on quality. Many members pointed out the decreased service of the cooperative. This was caused by the inappropriate arrangement of staff with the expansion of the operational scale. In particular, many members demanded promptness in the rice transaction. Adjustment should be made to appropriately meet the current collecting volume and milling capacity of the paddy.

#### Original Way of Dealing with Pig-farming Business

Market price of pork largely fluctuates, and the environment surrounding the



pig-farming business introduced by the ACPP was not necessarily a stable one. Nevertheless, the pig-farming business spread out through the Phimai cooperative area and is still in good shape, being one of the important agricultural activities of the region besides paddy field cultivation. At Tha-Luang village which was designated as one of the model farms, the pig-farming business is still in full action. Initially, the farmers who participated in the farm group jointly managed the business at the regional pig-farming facilities. However, they dissolved the joint management into private business and now they are only using the facilities together. The joint management of the project failed but the pig-farming business did expand through this model farm group. And it was the cooperative's pig-farming program that supported such activities.

The cooperative is engaged in the breeding business utilizing the facility granted by the project. They feed the pigs for 40-45 days after birth at the facility and then sell them to the cooperative members. They also sell breeding sows. The size of the pigs is smaller than those sold by general producers but the prices are much cheaper. Moreover, the cooperatives supply the members with the self-mixed feedings. This business was also introduced by the project but the amount of profit made has increased substantially. The cooperative has not engaged in the collecting and selling of the pigs. This is due to that fact that it is difficult to allocate staff with proper expertise and because of the higher risk, but product collectors can be introduced upon requests made by the members.

#### Strengthening the Management Base and Implementation Structure

The management base of Phimai agricultural cooperative has been strengthened. Due to the increase in activities, the number of members has steadily increased and its financial status has also improved. Current memberships are 8,627 households with total capital of 10 million Baht within which self-raised capital has reached 3,500,000 Baht. In the past, self-raised capital accounted for only a small portion of its capital and it depended heavily on borrowing. Now the cooperative has become known as one of the most superior agricultural cooperative in the country. It has received a certificate from the Cooperative League of Thailand (CLT) as a superior agricultural cooperative. One reason behind the success of the Phimai cooperative is that the management and the project implementation structure were reformed thoroughly in accordance to the project's instruction. Excellent staffs were trained through participating to the project. The manager has been recognized as one of the most excellent staff nation-wide and has received prizes several times. It can be considered that management guidance conducted by the experts and the training courses conducted in Japan has been a strong incentive for the staffs to make improvements.

#### Becoming a Major Actor Among the Agricultural Cooperatives

The Agricultural Cooperative Federation (Provincial Federation) in Nakhonratchasima province has long operated a rice mill factory. Agricultural cooperatives, being members of the Provincial Federation, have sold paddy collected from their respective cooperative members.

However, with the mill and facilities getting older and with some management problems, it started to suffer from a huge debt problem. The Federation can no longer purchase the paddy as requested by the member cooperatives. In the past, it was common that the paddy collected by the agricultural cooperatives was sold to the Provincial Federation. The role of the Federation, however, is becoming smaller. Phimai agricultural cooperative is collecting rice varieties such as Khao Hon Mari from the neighboring cooperatives such as Bua Yai and Khongsamaki on behalf of the Federation. The neighboring cooperatives, with support from the CPD, have opened up dealing centers for paddy and tried to increase the volume of rice to be collected, but with the deteriorating situation of the Provincial Federation, which has been the major sale route, it has chosen the Phimai cooperative as its sales channel. In the area centered around Phimai district, new kinds of cooperative relationships are starting to emerge among the cooperatives centered around the Phimai agricultural cooperative. The relationship has changed from a vertical one between the cooperatives and the Federation to a horizontal relationship between the cooperatives. The economic effect of Phimai cooperative's rice mill business on neighboring agricultural cooperatives is significant. This kind of cooperative relationship among agricultural cooperatives has also been seen at Pakthongchai cooperative.

### (3) Post-Project Development of Pakthongchai Agricultural Cooperative

#### Pakthongchai Cooperative on Completion of the Project

On completion of the project, Pakthongchai cooperative was assessed as not making much achievement as compared to Phimai cooperative (**See Table 5-23. Development Trends and Characteristics of Pakthongchai Agricultural Cooperative and Table 5-24. Overview of the Pakthongchai Agricultural Cooperative**). The organizational structure of the cooperative did not steadily develop, with many farmers starting up side-businesses or moving out of agriculture influenced by the wave of urbanization, and given that the area was burdened with many disadvantaged land for cultivation. Nevertheless, product collecting operations developed significantly.

#### Achievements Assessed by the Leaders

The current president of the agricultural cooperative gives three points as considered to have been beneficial in participating in the project as a model agricultural cooperative. First is the organization of the producers' group and the achievements made by linking the members' farm activities to the collecting and marketing business of the cooperative. Currently the cooperatives collect corn, peanuts, and mung beans besides paddy. Secondly, the promoted saving campaign has been disseminated among the members and the staff, and has been beneficial in stabilizing the management of the agricultural cooperative as well as farms. Finally, the project has demonstrated the importance of farm planning and book keeping for the members and these have contributed to improve the everyday cooperative activities.

Newly dispatched staff point out that the atmosphere at the Pakthongchai cooperative is quite different from other cooperatives. While other cooperatives' main activities are

**Table 5-23. Development Trends and Characteristics of Pakthongchai Agricultural Cooperative**

	1989	1997	2000
<b>Pakthongchai Agricultural Cooperative</b>	<p><b>Model Farm Activities</b>                      Development in Pkg Farming : Confined to model activities and not expanded to others                      Kaibaan : Poultry farming center closed down                      Breeding weak                      Chicks bred internally                      • Feed mixing facility                      Low operation rate</p> <p><b>Model Infrastructure Project</b>                      Pond, land maintenance, livestock facilities ( refer to Phimai ) aimed at Multi-purpose Type of Agriculture                      Nong Feb village                      • Difficulties mostly in developing spontaneous farm planning                      • Promotion Products are Pkg farming, Gai baan and Vegetables                      • Farm groups 55%                      • Quality control and grading of rice                      • Marketing research on corn and cassava</p>	<p><b>Membership</b>                      • Decreased comparing '84 and '91-96 when project completed ( only at old Pakthongchai cooperative )                      • Continuous decrease since 1993                      Projects : Increasing trend                      Farm guidance program mainly focused on establishment of farm groups strengthened; promotion of joint purchase and marketing take root and develop into a favorable condition                      Increase in Work Capital                      Development of the 1 Baht a day saving plan                      Decrease in the ratio of self-raised capital to work capital                      Increase in Loan                      No improvement seen in loan rate                      • Insufficient measures such as lack of warehouses                      Lack of capital                      • Decrease in number of farmers due to industrialization of cities, increase in number of farmers with side-businesses                      • Membership ratio of cooperative and BAAC about the same among farmers</p>	<p><b>Paddy Collecting Business</b>                      • Price decided on ratio of water content                      Price leader of the region                      • Sales to Bangkok, Ayutthaya etc..                      Corn                      • Price decided on ratio of water content                      • Sales to feed factories                      • Partly originally mixed                      Pkg Farming                      • Participating numbers depend on pork price                      No poultry raising ground or mills as in Phimai                      • JICA contributes to F 1 and introducing technology Significant outcome                      • Feed : Originally mixed                      Poultry Farming : Commercial base                      Vegetables : No particular activities                      Pumpkin cultivation did not expand                      • Loan Business Expanded ( though less than BAAC )                      Loan recovery rate low                      25% unrecoverable                      Borrowing                      From BAAC, CPD and Farmers' Market Organization                      Operational Capital 35million                      Key to Success                      • Launch on activities not implemented at other cooperative                      • Superior managers                      Nong Feb Village                      Facilities granted by JICA : waterway, pond and pen.                      Currently still utilized.                      Increase in rice productivity, Lean Pork                      Increase in income</p>

Table 5-24. Overview of the Pakthongchai Agricultural Cooperative

	(Thousand Baht )			
	1993	1995	1997	1999
Membership (person)	2,600	2,567	2,614	2,411
Working Capital	44,447	52,073	69,892	74,600
Self-raised Capital	18,612	21,398	30,812	33,381
Saving	3,218	5,924	7,637	7,056
Credit Business	16,614	42,142	51,630	50,587
Purchase Business	5,817	5,899	16,804	15,201
Marketing Business	5,688	5,764	37,594	28,461
Service Business	0	0	407,438	1,478
Business Profit	-	3,136	6,195	4,041
Net Profit	633	1,766	6,191	2,023

Source :Pakthongchai Agricultural Cooperative Annual Report on Operation

concentrated on credit business and supply of product materials, at the Pakthongchai cooperative, the most active operation are the product collecting and marketing businesses. The cooperative staff are highly active in business, almost like merchants. The cooperative does not own a rice mill factory like the Phimai cooperative, but the operation of collecting and marketing of paddy rice is in full operation. The cooperative functions as the dealing center of the agricultural products in the region.

#### Launching Pig-farming Business

Pig-farming, local chicken breeding and pumpkin cultivation were introduced to the cooperative. Pig-farming expanded to the whole region. Many farmers started up a pig-farming business after the project was completed. However, in 1995, with the fall in pork price, many farmers quit the business. The project conducted as a joint-farming operation but with difficulties in human relationships, joint management was dissolved. Up until recently, there were four groups engaged in pig-farming business but currently they have all been converted into individual farming. The cooperative does not operate a pig-farming center.

At the Nong Feb village in which a model farm group was organized, JICA established a piggery for breeding pigs and pig-farmers jointly used the facility. However, since the pig-house was built far from the farmers' residences, some people started to build small pig-houses inside their own gardens. Currently only five or six cooperative members are using the joint facility and raising 15 breeding pigs. The piglets raised in these facilities are sold 40-45 days after birth.

Farmers who participated in the farm group highly value the F1 pigs recommended by the experts and technologies to improve the way to raise pigs. Instead of using old rice, bran and leftovers, feedings mixed by the agricultural cooperative were used. The farmers say that they were not only able to shorten the time to grow pigs but also improve the quality of meat.

Table 5-25. Major Products Collected at Pakthongchai Agricultural Cooperative

		1996	1997	1998	1999	2000
Milled Rice	Collecting Price	8.6	21.8	31.2	39.7	21.2
(Million Baht )	Selling Price	9.1	22.5	32.5	41.2	18.7
Corn	Collecting Price	13.5	12.7	16.6	29.6	23.2
(Million Baht )	Selling Price	13.7	13.3	17.2	27.5	28.4
Mung Bean	Collecting Price	11.5	10.0	17.4	1.2	249.8
(10 Thousands Baht )	Selling Price	13.2	14.9	19.0	1.7	271.3
Peanuts	Collecting Price	0.0	0.0	16.7	13.9	8.9
(10 Thousands Baht )	Selling Price	0.0	0.0	17.1	14.7	9.2

Source :Pakthongchai Agricultural Cooperative Annual Report on Projects

The farmers who participated in the model farm groups stated that though there is fluctuation in market prices for pork, when combined with paddy field cultivation, the economic merit of the activities was quite significant. At Nong Feb village, a reservoir was established by the project and it became easier to secure water for the rice paddy field. Moreover, the farmers started to utilize rice leaves and made fertilizer out of pigs' feces and urine and applied it to the paddy field. As a result, the final rice crop has increased from four to five bags (one bag is 85kg) per rai to eight bags. The productivity of the village has largely increased.

#### Local Chicken that Did Not Become Established

The project encouraged local chicken breeding in this village as it did at the model farm group at Khongsamaki cooperative. By 1995, however, no farmers were engaged in chicken farming as it was not possible to solve the disease problems, the fall in chicken price and high production cost. Cultivation of pumpkins was also promoted but did not diffuse.

#### Restructuring the Joint-use of Machinery and Converting into a Maize Center

Agricultural machinery was donated through the project and the farmers were reorganized to jointly use this machinery. It seems that an organization was established to undertake the utilization of harvesting and milling machines of maize but they stopped functioning after the project was completed. The agricultural cooperative has claimed back this machinery, repaired it and is trying to use it again. The cooperative is subcontracting cultivation and/or harvesting activities and the machines granted by JICA are still fully utilized. The cooperative also puts emphasis on the utilization and processing business and has newly built a drying field and silo, and it is increasing the dealing volumes of maize. Maize cultivation was popular around this area for a long time, but since the agricultural cooperative

has expanded its investments in relevant facilities for collecting, drying and processing maize, and advanced it into a utilization center, the volume of maize production increased. The cooperative's dealing center started to collect maize from external areas. Currently, the ratio of product collected from the members is 60% and the non-members is 40%. The silo can accommodate 1,000 tons of maize and the drying capacity of the dryer is 20 tons per day. The feeding mixer has a capacity of 500kg per hour. Part of the milled maize is sold to Phimai agricultural cooperative.

When the project started in Pakthongchai, the direction of the model farm group was not clear and with the decrease in membership, some assess that the project was not very effective. However, when observed as an operational or management body, the agricultural cooperative has steadily strengthened its base. In the area of maize, beans and rice processing, the cooperative has already increased its capacity to lead regional agriculture (See Table 5-25. **Major Products Collected at Pakthongchai Agricultural Cooperative**)

#### Trial and Error at Khongsamaki Agricultural Cooperative

The agricultural condition of Khon district in which the Khongsamaki cooperative is located is quite severe and susceptible to drought. Compared to Phimai or Pakthongchai, the financial conditions of the member farmers are not very good. The project has established reservoirs at 11 locations as part of its infrastructure program, but it was not enough to secure sufficient water reserves. Therefore a solution was sought in local breed chicken farming that is less influenced by drought. A local breed chicken breeding center was established and the cooperative launched chick breeding. The chicken breeding business diffused even to non-members of the model farm groups and developed steadily for a certain time period. The cooperative's operational system was prepared and feed started to be supplied. However, around 1995, the price of chicken started to fluctuate and chicken farmers were no longer able to make profits. Many farmers started to leave chicken farming and the cooperative's center was also forced to terminate its operation.

The pig breeding business, on the other hand, is steadily developing. At the point when the project was completed, there were 50 farmers engaged in pig-farming but currently the number has reached more than 100. The utility ratio of the pig breeding center donated and established by the project is high and at the time of investigation, seven breeding boars and 120 sows were raised at the center. Besides this center, the cooperative is running another raising center. Pig-farming is an important source of income for the agricultural cooperative. In places with drought problems, paddy field cultivation is highly unstable. Due to the diversification of agricultural products, sugarcane cultivation has expanded, but when the project started, paddy field cultivation was the only source of the agricultural income in the region. Apparently local farmers' hope towards pig-farming has been high.

Sales of pigs after 40-45 days of birth bring many merits to the cooperative members. The pigs are sold on six months credit to the members.<sup>9</sup> Price per kilogram is set lower than general market price. The farmers sell the pigs to the collectors who visit the village from

places such as Amphur Muang or Bua Yai. In some cases the cooperative introduces farmers to the merchants. A direct sales center was set up in front of the agricultural cooperative office in 1998, and three to four pigs per day are sold here. This was started by advice given by an expert in the past.<sup>10</sup>

#### (4) Organization of Agricultural Cooperative and Impacts on its Operation

The ACPP's activities aimed at strengthening the operation, management and organizational structure of the cooperatives have basically been successful. By strengthening the operational base of the agricultural cooperative, positive effects were recognized in the agriculture business in the region. In regards to paddy rice maize, and pig-farming, the project has given an opportunity to the model agricultural cooperative to be developed as one of the major local production bases. Moreover the financial status of model cooperatives has improved and the project founded the base for the cooperative to become a superior cooperative with abundant self-raised capital. These points are highly valued.

The ACPP aimed at improving the members' economic condition through the strengthening of the operation and management of the cooperatives. Therefore, it was not a project that directly transferred technologies to, or granted income-increasing methodologies to farmers. Activities implemented at the model farm groups were very limited when considered from a regional perspective, and the number of people participating in those activities was also small. Nevertheless the agricultural cooperative recognized the necessity for establishing an operational and management system that corresponds to these model farm groups, and ultimately started to aim at the realization of an operational and management system that puts emphasis on the characteristics of local agriculture. Recognizing the attitudes of the cooperatives, general members and non-members started to take part in cooperatives' "utilization" (processing) operation. The exhibition effect of the implemented activities by the model farm group was clearly seen in the diffusion of pig-farming in the Phimai and Pakthongchai areas. The project has played a role in converting the "top-down" agricultural cooperative into a participatory organization.

### **5.3.3 Disputed Areas in the ACPP: Effect and Limits**

#### (1) Meaning and Limitations of Agricultural Cooperative Promotion

##### Pessimistic Views of Agricultural Cooperatives

The question of what kind of farmers' organization or village community should be promoted to carry out rural development has been debated for a long time. It is widely recognized that it is necessary to develop a participatory and cooperative type of organization. In fact, however, it is not easy to promote cooperatives. Therefore there were times in which pessimistic views towards the development of farmers' organizations prevailed. Nowadays, debates concerning developments are based on the premises that it is impossible to promote sustainable agriculture and rural development without a local participatory-type of organization (including cooperatives). Even so, there are some development planners and policy makers who

Table 5-26. Participation to Agricultural Cooperative, Farmers' Groups, and Client Groups

	Farmers' Household (thousand households)	Agricultural Cooperative				Farmers' Group				Client Group	
		Cooperatives	Memberships	Memberships per cooperative	Participation ratio <sup>1)</sup>	Groups	Memberships	Memberships per cooperative	Participation ratio <sup>1)</sup>	Client Farmers	Participation ratio <sup>1)</sup>
1975	4,120	575	363,115	632	8.8	2,511	258,191	103	6.3	516,314	12.5
1980	4,468	857	743,105	867	16.6	3,771	469,357	124	10.5	960,465	21.5
1985	4,878	1,059	837,434	791	17.2	3,832	484,297	126	9.9	1,381,851	28.3
1990	5,073	1,373	917,731	668	18.0	4,097	380,633	93	7.5	2,135,975	42.1

Note :<sup>1)</sup> Total number of farmers' households divided by memberships

Source :Cooperative Promotion Department, Cooperative Audit Department, BAAC

are doubtful of its effects.

The reason behind this pessimistic view is the fact that many farmers' organization promotion projects, including pilot projects, repeatedly failed in the past. In Thailand, there are at least three main reasons why these projects failed. First is the fact that the promotion plans set up and implemented by the government of aid organizations were not responding to the realities faced by rural villages or farmers. Secondly, the farmers were not capable of carrying out formal cooperative activities by themselves. Finally, adjustment and allocation of responsibilities between the promoters and the farmers was not made clear and contradictions and confusion within the policies and systems were neglected for many years. The farmers have criticized the projects for their bureaucratic management and lack of flexibility in responding to different operations. On the other hand, farmers tend to be indifferent to the operation and management of the organization, once their personal benefit was realized such as receiving loans by being members of the cooperatives.

### Three Organizations in Villages

When the ACPP was implemented, there was confusion in Thailand on issues related to policies and systems of farmers' organizations.<sup>11</sup> The government repeatedly altered the organizations as well as their systems without having a clear policy on how the farmers' organizations should be. In 1968, a New Cooperative Act was enacted and in the 1970s, a base for the current agricultural cooperative system was almost formed. Around the same time, agricultural banks were dissolved and merged into BAAC, which had branches all over the country. Besides funding agricultural cooperatives, BAAC expanded its direct loans to its client farmers.

During the political turmoil of the 1970s to the early 1980s, many formal and informal farmers' organizations emerged. In the 1970s, farmers' organizations were established all around the country under the jurisdiction of the Department of Agricultural Extension, in the Ministry of Agricultural Cooperatives. In the actual rural villages, various organizations having similar functions and organizational structure as the agricultural cooperatives and operated simultaneously, competing with each other (See Table 5-26. Participation to Agricultural Cooperative, Farmers' Groups, and Client Groups, and Figure 6. Cooperative System in Rural Villages Before 1990).



### Vagueness in the Policy of the ACPP

Primarily the agricultural cooperatives should have been placed as the main body of farmers' organizations. BAAC, however, was expanding its direct loans and gaining control over many farmers through its abundant capital and network of branches extended all over the country. When the ACPP started in 1984, the agricultural cooperatives were put into a disadvantaged position in regards to their membership and operational scale. Moreover, the number of farmers taking part in the farmers' group was catching up with the memberships of the cooperatives. In other words, the Thai government of those days was not fully backing up the promotion of the agricultural cooperatives. The ACPP, as a whole, had an ambiguous policy stance outside the CPD circle.

### Competition within the Region

Though the expansion of organizational and operational systems was the major goal of the ACPP, there have been certain limitations to it. Specifically, there has been no hope that their memberships would increase above a certain level. In the same region, there have been BAAC and farmers' groups, and in the past the farmers were basically not allowed to take part in more than one organization. Even inside the model agricultural cooperative area, BAAC branches were expanding their direct loans to the farmers. On the other hand, the farmers' groups were supplying fertilizer in collaboration with the Extension Department or Marketing Organization for Farmers (MOF). The promotion of model agricultural cooperatives was done amid these competitive conditions. For reference, within the current Pakthongchai cooperative area, 60% of the farmers are related to BAAC, 30% are agricultural cooperative members and the remaining 10% belong to the farmers' groups.

### BAAC Entering the Operational Area of the Agricultural Cooperative

There were limits in stabilizing the credit business too. The land-owning conditions of the members of the cooperatives are inferior to those client farmers of BAAC. Both BAAC and agricultural cooperatives basically employ the same financial methodology using land as collateral. The BAAC, however, sets much higher amounts for the maximum loan and is ready to respond to large-scale commercialized agricultural businesses. BAAC conducts agricultural finance based on economies of scale realized through its abundant capital and numbers of branches all over the country. The main source of its capital has been soft loans procured overseas (including Japan). The credit business of the agricultural cooperative has, on the other hand, depended heavily on borrowing from BAAC and CPD. Ability to procure self-raised capital is low and the capacity of funding is limited. The maximum amount to be lent out to a member is much lower than that of BAAC.

Basically, BAAC was supposed to support the credit businesses of agricultural cooperatives and farmers groups through its funding. At the cooperative level, BAAC's underlease loan exceeded the total amount of loan, but a small change is observed in the numbers of the cooperative members who can use the underlease funds. In the case of the

Table 5-27. Amount of Loan by Agricultural Cooperatives and BAAC 's Underlease Fund  
Million Baht

	1984	1985	1986	1987	1988	1989	1990
Total Loan	2,805	3,256	3,568	3,957	4,367	5,037	6,694
Underlease Fund	2,425	3,113	3,563	3,808	4,054	5,419	6,767
Ratio <sup>1)</sup>	1.16	1.05	1.00	1.04	1.08	0.93	0.99

Note :<sup>1)</sup> Ratio=Underlease fund/Total loan

Source :Cooperative Audit Department ,BAAC

Table 5-28. Number of Cooperative and Farmers ' Group that Received Underlease Loan from BAAC

	Client Farmers	Agricultural Cooperative		Farmers Group	
		Cooperatives Membership (person )	Membership (person )	Cooperatives Membership (person )	Membership (person )
1980	960,465	822	773,918	1,474	254,953
1985	1,381,851	825	788,665	794	132,208
1990	2,135,945	838	880,408	525	83,303

Note Not all members receive underlease loan

Source :BAAC

farmers' group, the number of members who receive underlease loans continued to decrease. (See Table 5-27. Amount of Loan by Agricultural Cooperatives and BAAC's Underlease Fund and Table 5-28. Number of Cooperative and Farmers' Group that Received Underlease Loan from BAAC). Agricultural cooperatives and farmers' groups had to operate their credit business without getting much support from BAAC. Therefore, many cooperatives had difficulties in procuring funds and could not respond to farmers' increasing demand for capital. As a consequence, the number of farmers leaving the agricultural cooperative and joining BAAC increased and in the 1990s, the number of BAAC's client farmers was overwhelming.

The other factor that limited the development of agricultural cooperatives was BAAC's system of loan in kind. (Table 5-29. Transition of BAAC's Loan in Kind). It was a system of combining a short-term loan and supply of product material ( Credit in Kind ) , and it aimed at supplying cheap products to client farmers all around the country by making contracts with producers who registered at BAAC headquarters. In the 1980s, the numbers of loans of this kind increased. As a result, the product supply operation undertaken by the agricultural cooperative was heavily influenced. Later this system was reformed and transferred into the "agricultural cooperative for client farmers" undertaken by BAAC. BACC was expanding its operational and organizational scale in the 1980s when the Project was implemented. Agricultural cooperatives were heavily influenced by this and the same was true of the model agricultural cooperatives.

Was the Project Aimed at the Agricultural Cooperatives Beneficial?

Was aiming at the existing cooperative as a target for the technology transfer appropriate when farmers were increasingly becoming organized under BAAC? This question is frequently raised by Japanese aid related people. Many agricultural cooperatives had small capital and

Table 5-29. Transition of BAAC 's Loan in Kind

	1981	1985	1986	1987	1988	1989	1990
Registered Company <sup>1)</sup>	16	106	142	174	176	182	127
Number of Supplied Products	n.a.	2,330	2,902	2,491	2,210	1,249	1,166
Number of Price (Million Baht)	0	55	60	60	71	115	115
Ratio (%) <sup>2)</sup>	7,967	14,143	15,817	17,100	20,063	25,675	30,963
	9.2	12	11.2	13.6	17.5	12.4	8.3

Note <sup>1)</sup> Companies that made certain contracts with BAAC and supply products for the loan in kind system Registration is made at Bangkok's Headquarter

<sup>2)</sup> Ratio = Amount of Loan in Kind / Total Loan (Direct Loan Only ) (%) )

Source: BAAC

operational scale and the organization was obviously weak. Moreover, while BAAC was expanding its operation by organizing many farmers, small village units such as Tambol and Mubaan were implementing activities that were much more appropriate to the local conditions than those of the agricultural cooperatives.

In the 1990s, a drastic restructuring program was conducted by BAAC and the agricultural cooperatives. BAAC established the "Agricultural Cooperatives for Client Farmers" in each district. It was a kind of agricultural cooperative that was recognized by the 1986 Agricultural Cooperative Act, but in fact it employed a different organizational system and management operation from the previous one. There were some "Agricultural Cooperatives for Client Farmers" that had more than 100,000 memberships. Since many client farmers of BAAC joined this new type of agricultural cooperative, the number of farmers participating in the cooperatives rapidly increased in the rural villages of Thailand (See **Figure 5-7. Organizational Change in Agricultural Cooperatives**). BAAC branches and regional offices operate the "Agricultural Cooperatives for Client Farmers". Since the members receive loans from BAAC, this type of agricultural cooperative mainly operates in the area of supplying product materials and collecting and selling agricultural products.

Nevertheless, farmers' production and distribution activities cannot complete only with this new type of agricultural cooperative. Quite a number of client farmers and their families also registered as cooperative members of the existing type of agricultural cooperatives. The number of farmers (farms) receiving loans from BAAC and utilizing the existing type of agricultural cooperation mainly for sales and purchasing purposes are increasing. At Phimai and Pakthongchai agricultural cooperatives, the cooperative members utilize various types of cooperative operations but the farmers are requesting operational activities that could respond to commercial activities in particular. It is indeed important that economies of scale are realized in the cooperative's operation, but it is equally important that the agricultural cooperative can meet the daily requests of farmers and flexibly responds to them. Restricting the operation of agricultural cooperatives in rural villages to a gigantic organization like BAAC will not be appropriate.

Figure 5-7. Organizational Change in Agricultural Cooperatives



On the other hand, in recent years, small-scale development activities based on village units are becoming increasingly popular. Since it is relatively easy to gain participation from villagers, small-scale cooperative organizations are becoming active. (Supporting plans such as those by the Ministry of Interior are also becoming complete). In many cases these organizations are left as informal organizations to maintain flexibility in their operation. The merits of this kind of cooperative organization are that they can be engaged in saving businesses aimed at village people, micro credit business and environmental resource management in a relatively small area. However, many of these small-scale cooperatives cannot respond to financial requests put forward by the farmers because of their capital problems and weakness in their operational structure. The existing type of agricultural cooperatives is challenged by the question of how to make use of their characteristics as being an intermediate organization between BAAC and small-scale cooperative organizations.

The ACPP seemed to have been lacking in its consideration of farmers' organization in rural villages that were becoming increasingly complex. It seems that the Project did not try to recognize the merits of BAAC or the small-scale organizations based in the villages, and concentrated too much on the promotion of agricultural cooperatives.

## (2) Impacts on CPD's Policy Change

### Policies of Making Use of the Characteristics of Agricultural Cooperatives

It was anticipated that the CPD staff who were the C/P of the experts would make use of their experiences in future training and policy making. Textbooks were published at training centers and the programs implemented at model agricultural cooperatives have been widely disseminated. However, according to the post-evaluation report, it is pointed out that it did not

reach the point of changing the system of CPD itself, such as its policy structure. Taking these points into account, CPD launched on its own improvement activity targeting 15 agricultural cooperatives nationwide starting from 1999, taking into consideration the experiences from the five model agricultural cooperatives.

The ACPP was quite successful in the area of technology transfer. It launched activities such as farm management and marketing businesses that were an underdeveloped area in the existing agricultural cooperatives, and ultimately brought about economic effects for members. However, regional (province and district) CPD offices retained a strong authority over the operational and organizational activities of the agricultural cooperatives. Its system of requesting everyday paperwork and approvals did not change. The members' autonomy increased and the farm management activities made certain progress, but they did not reach the point where they could influence the overall environment that surrounded agricultural cooperatives to improve the administrative system. The project included a policy-supporting type of technology transfer but it could not change the overall administrative structure of cooperatives.

#### Administrative Factionalism and the ACPP

The above mentioned problem was caused by the conditions surrounded by the CPD in those days rather than due to the limitation of the project. In the 1980s, there was a movement to enlarge BAAC. Meanwhile there was also a movement to expand the farmers groups throughout the whole nation to enhance technological innovation and supply of product materials. CPD was supposed to work in collaboration with these related organizations and promote the cooperatives, but the reality was quite different. It was due to departmental conflicts within the Ministry of Agriculture and Cooperatives and the influence of administrative factionalism.

### (3) Prospects for a Phase by Phase Development of Agricultural Cooperation

#### Development Patterns of Agricultural Cooperatives

The project set up an annual planning to promote model agricultural cooperatives. It was not easy to develop an agricultural cooperative with a "total system" function within a limited time period. Nevertheless it was realized at a relatively early stage at the Phimai agricultural cooperative. According to the "Comparative Study of the Overview of Model Agricultural Cooperatives' Management", compiled by the project team, it is obvious that the financial status in the credit business improved and the utilization and processing business got fully started. On the other hand, there were cooperatives that spent so much time on establishing and operating the model farm group, or cooperatives that they could not carry out the technology transfer in accordance with the annual plan. As pointed out in various reports such as the Post-project Evaluation Report, the differences in the speed of the technology transfer are due to the differences in the initial conditions of each cooperative and the level of understanding among the instructors and staff.

When developing an agricultural cooperative program, a “total system” cannot be realized overnight. As indicated in the Figure, it can be expected that it has to go through at least three phases to realize a multi-purpose type of cooperative management (See **Figure 5-8. Development Phases and Patterns of Agricultural Cooperatives**). It cannot be judged from the documents written at the beginning of the project but it can be envisaged that the five model agricultural cooperatives were at the stage of product credit. In general, however, this type has many variations: Cooperatives that carry out funding operation by heavily depending on external borrowings; cooperatives that increase their amount of loans to cooperative members by increasing the ratio of self-raised capital; cooperative that center their activities around the joint purchase of fertilizer and agricultural chemicals; and cooperatives that include credit function in their product supply operations in order to fund farmers’ management operations and meet the demands for necessary materials.

#### Agricultural Cooperative with Large Effects

The agricultural cooperatives that showed clear effects of the technology transfer were Phimai, Chakkarat, and Pakthongchai cooperatives all of which were functioning as product credit type. Phimai cooperative had almost reached the stage of sales responding type. With the establishment of the rice mill factory, Phimai cooperative developed into a diversified operational unit making use of its merits of operating distribution and processing facilities from a product and loan operation unit. Pakthongchai cooperative followed a similar path. The two cooperatives actively engaged in the investment activities of distribution and processing facilities and the investment activities were included as part of their operation. One of the biggest achievements of the project is that it formed a base for developing the cooperatives to move from the stage of product credit type up to distribution responding type. People engaged in both projects say that the established structure to operate the infrastructures formed the base of the following development.

Investments made facilities by the model agricultural cooperatives had big exhibition effects. Visits to model agricultural cooperatives, starting with Phimai cooperative, continued even after the project was completed, and the superiority of the cooperatives that had distribution and processing facilities were widely recognized by people who had stakes or interests in agricultural cooperatives. When CPD conducted a project of establishing small-scale agricultural production transaction centers at agricultural cooperatives nationwide from the mid to late 1990s, it referred to the activities conducted at the Phimai cooperative.

#### How was the Targeted Level of Technology Transfer Set?

Considered from the development stage shown in Table, it is not clear to what level the ACPP was initially aiming at as its project target. Though the project aimed at an establishment of a multi-purpose type of management system of agricultural cooperatives, considered from the limited time period of five years, it might have been much more realistic if it aimed at achieving the level of product credit type or sales responding type. Since the model cooperatives were also

at the stage of mainly engaging in loan and purchasing business, the above targets are not necessarily low. This is the reason why the knowledge and technology transfer in the area of credit business and purchasing product materials operations are highly valued among the people who are aware of the subject matter. To stabilize the management base of the cooperative, it was necessary to establish the basic system of program operations, such as thorough credit inspection of members, planned fund management, increase in self-absorbed capital such as savings, and ensuring recovery of loans. It is noteworthy that the methodology of carrying out thorough credit inspection of members that was introduced by the project, was not only accepted by the model cooperatives but was widely accepted by agricultural cooperatives nationwide. The project could have put more emphasis on the way to enhance product credit.

#### Marketing Business Operations: Too Idealistic?

Among the people who are involved in the cooperation aid, including the Japanese experts dispatched to the ACPP, there is a strong tendency to think that the ultimate goal of promoting farmers' agricultural cooperatives is to get the farmers themselves to participate in the marketing process and agricultural product market autonomously. The reason behind the negative views towards the achievements made by the ACPP is the fact that the operation of marketing business was not necessarily successful in the model agricultural cooperatives. It can be said, however, that the model agricultural cooperatives in those days were not yet prepared to respond to the technology transfer of farming and operation of marketing businesses. Moreover, if conditions were established in which the competitiveness of distribution of agricultural products was maintained, it is not necessary for the agricultural cooperatives to embark on the operation of marketing businesses. Phimai and Pakthongchai agricultural cooperatives have established a co-existing and supplementary relationship with the distributors of agricultural products and do not necessarily have exclusive and hostile relationships with them.

#### Consideration of the Base of Cooperative's Members

In addition, an operational body which has to achieve economic efficiency, like the agricultural cooperative, sometimes can not respond to all types of farmers. This is why small-scale groups can be more flexible in responding to the operational activities of small-scale farmers. The reason for promoting small-scale groups to be organized at village level is that there is a reality that agricultural cooperatives cannot target small-scale poor farmers. The ACPP had a strong feature of forming a local production base mainly aiming at the middle-class farmers within the model agricultural cooperative area. In order to establish an organization in the poorer area that small-scale farmers can participate in, different methods and operational management systems should be developed.

The experience in Thailand has shown that even within a relatively small area like the district, farmers' organizations need to be diversified. In areas where there was a wider gap among the villagers in terms of income as well as possession of land, the ratio of the farmers' cooperative organizations duplicating with others was higher. The agricultural cooperative

cannot respond to requests from all villagers by itself. A future direction of the promotion of agricultural cooperative can be examined from such organizational perspectives.

## **5.4 Conclusion**

### **5.4.1 Contribution to Regional Society**

#### **(1) Improvement in Farmers' Income through Reforestation and Conservation of Regional Common Resources**

REX has made the large-scale production and distribution of seedlings possible and formed the basis to rapidly enhance the “Greening of E-san Project”. It has provided economic merits that accompany reforestation activities while encouraging farmers' spontaneous participation in the activities. Although its areas are not so big, REX's seedling distribution had direct economic effects to the poor farmers who had a lot of unused land. Farmers who were suffering from the unstable production of cassava and seeking for products that could substitute for it, or farmers who were looking for jobs outside the agriculture sector, actively participated in the reforestation activities with the seedlings being distributed. They could easily work outside the agricultural sector and earn income from reforestation activities at the same time. When farmers' reforestation projects developed, it became easier for them to secure household fuel and in particular it is said that the natural environment surrounding the farms changed. The effects brought about by the reforestation activities are indeed diversified.

In areas where farmers hold unused lands or lands with low productivity, plantations of early maturity varieties and commercial varieties took root as an effective means to utilize land resources. Reforestation was very attractive for poor farmers who were suffering from severe environmental conditions and who were engaged in continuous cropping of specific agricultural products constrained by the restrictive use of land. Reforestation activities also became effective tools to control the overuse of agricultural resources in poor rural villages.

#### **Conservation and Utilization of Common Forestry: Expanding Community-based Approach**

REX's support to the community forest activities has improved the regional environment of villages and brought large economic profits to its members. The impact of the management of school forestry was particularly big. It could support students from poorer families by securing funds from the school operation. The meaning of having a common forest became understood by the villagers. Profits made through the community forest activities were used as funds to improve the living environment of the village. Support to conserve and utilize the regional common resources become much more effective when there was a mechanism to distribute the resources fairly among the members as mentioned above. REX's support for community forest was innovative from this point of view.

Joint activities' approach as seen in the community forest can be applied to the utilization of other common resources starting from forestry, farmlands, ponds and water. As



seen in the case of Nong Bun Choo village, management and utilization of common forests was one of the many joint activities carried out by the villagers. Economic merits that cannot be realized by using personal owned resources were realized by effectively using various common resources in the region. It has helped to improve the standard of living in the villages where there were poorer people. Common resources tend to be excessively used because of their nature of open access, but if assistance was made to recycle these common resources and technologies were transferred to establish a management system to use these resources in a sustainable way, the local people could continuously enjoy their merits. REX's activity is valued because of the fact that it has established a base for linking regional resource management and rural development activities and implementing them.

## (2) Agricultural Cooperative Promotion that Enabled Formation of Sustainable Regional Agriculture

### Diversification of Regional Agriculture

The Agricultural Cooperative Promotion Project implemented in Nakhonratchasima province has been successful in shifting agricultural production based on rice cultivation to a mixed agricultural operation through the promotion of agricultural cooperation. "Paddy field +  $\alpha$ " has almost completely taken root in the area and progress in forming a local production base has been seen within the " $\alpha$ " sectors. Some research concludes that these sectors did not have an effect in bringing in higher income than those from the non-agricultural sector, but their contribution to the increase in agricultural income is highly valued.

The introduction of new agricultural varieties can be promoted by directly providing technical guidance to farmers, but the Agricultural Cooperative Promotion Project put emphasis on the activities of assisting organizational bodies that could autonomously lead the regional agriculture. It was a project to form local production bases and establish a system to ensure the sustainable development of these bases. Although all model agricultural cooperatives' level of achievement was not the same, progress was made in areas such as improvement in credit business, establishment of instructive operation, and entering distribution and processing related operations. These activities were not seen in the past. Particularly, the project is highly valued from the point of view that it prepared a system for carrying out production credit and stable supply of agricultural materials, which are essential factors for the formation of local production bases. As seen in the case studies at Phi Mai and Pakthongchai agricultural cooperatives, technologies for breeding pigs and making feed have been transferred and the business took root. Farmers' business was stabilized and the "+  $\alpha$ " sector was established. It was made clear that if a stable agricultural cooperative could be established through the advancement of cooperatives, and could operate activities that are directly linked to the members' new farming activities, it would be possible to improve productivity of regional agriculture as well as increase farmers' income.

### Backing up Paddy Field Cultivation

The Agricultural Cooperative Promotion Project has made a big impact on rice production: the base of farmers' economy. In those days, the agricultural cooperatives in Thailand could not take part in distribution operations of non-hulled and milled rice, but the successful experiences at the Phi Mai agricultural cooperative, though supported by JICA, have proved that it is not impossible for an agricultural cooperative to enter the rice business. Moreover, the strategies of putting emphasis on collecting and milling high quality rice such as the Hong Mari variety succeeded with the increase in demand for high quality rice among city consumers, and they became the engine of growth for the development of agricultural cooperatives' activities. Superior cooperatives (such as Sanpatong agricultural cooperative in Changmai province) in the Northeastern and Northern Region have taken the same strategy as Phi Mai agricultural cooperative.

Pakthongchai agricultural cooperative has expanded its role as a transaction center while functioning as the primary product collector for non-hulled rice distribution. The distribution operation of non-hulled rice is expanding not only in the Northeastern Region, but all over Thailand and a system to collect and distribute non-hulled rice in a large-scale has become necessary in the region to respond to this expansion. Pakthongchai cooperative can be said to be one of the forerunners of establishing such systems. The number of agricultural cooperatives that are attempting to operate large-scale non-hulled rice transaction centers is steadily increasing, though they cannot invest in the rice milling plants. Two agricultural cooperative's rice operations that are considered as forerunning cases were seen in the model agricultural cooperatives. It can be said that this owes to JICA's cooperation project and hence is one of the achievements of the project.

It is natural that agricultural production and farmers' employment structure keep changing, but the agricultural cooperatives can seek new ways of regional agriculture by flexibly reforming their organizational and operational structure in accordance to the change. This is where the essential task of advancing agricultural cooperatives lies and where future hopes for sustainable dissemination effects are.

### (3) Future Project Operation

The two projects have basically made substantial achievements and are supporting improvements in farmers' agricultural activities as well as everyday lives. Nevertheless, there are some factors to be considered and improved. These particular issues are pointed out below.

#### 1) Judgment on the Background Analysis on the Demand for the Project and its

##### Appropriateness

##### Advice From Regional Experts

In order to understand the background of the request for the project and make a decision on whether they are appropriate, advice should be sort from researchers who have experience in conducting field research in the target country or region. Though

requests made by the recipient countries may seem rational to experts and involved in the project, it may not be true when looked at from a different point of view. When there is a possibility that the project could cause social disputes or criticism against the project or misunderstandings, opinions should be from experts outside the concerned area who could make comments from an objective point of view.

#### Selecting Targets for Technology Transfer

There is a possibility that the organization targeted for technology transfer may not necessarily represent the concerned sector. The problem faced by the Agricultural Cooperative Promotion Project was that the agricultural cooperative was indeed one of the major farmers' organizations but there were also many other similar organizations. Since the request was made by the CPD, the agricultural cooperatives under its jurisdiction were selected as the target organizations for technology transfer. In rural development projects, many similar programs seemed to be implemented concurrently as seen in the case of the cooperative promotion project and different administrative organizations are involved. There is a limit on technical cooperative activities that could respond to the compartmentalized public administration of the recipient country, and there are cases in which adjustments are needed among similar administrative sectors.

#### 2) Setting the Goal of the Project and Step-by-step Strategy

##### The "Japan Model" and Goal Setting

When transferring technologies to areas that are deeply related to social system or culture, such as farmers' financial organizations, the distribution channel of agricultural products, or management of forestry resources, models are frequently set up based on the experiences of Japan. In many cases these are quite effective. Nevertheless, there is a danger in reproducing the Japan model when setting up the goal as it may make it difficult for the project to adjust to the local society. There is a system that is suitable for each local society and the basic approach should be that the local people seek this system by themselves.

##### Setting Achievable Goals within the Project Period

It will take many years to achieve the ultimate goals in the areas that REX and the Agricultural Cooperative Promotion Project targeted. Nevertheless, with an increasing tendency both domestically as well as from overseas to request quick results from the technology transfer, it is becoming difficult to set a goal with a long-term perspective. Projects which require mid to long-term perspectives should make clear from the planning stage the level of the goals achievable within its limited time period.

### Setting up the Project Goals Step-by-Step

It is obvious that goal-setting and operation should be carried out in accordance with the progress of the project. In the rural development project, especially in the areas related to dissemination activities and social systems, constant monitoring should be carried out; objective judgment should be made on its progress and the next goals should be based on this progress. Goals that have been set step-by-step must be adjusted in accordance with the progress of the project and changes in social conditions.

The experiences of REX and the Agricultural Cooperative Promotion Project reveal the necessity of a “wholistic” approach in assisting rural villages. Instead of giving aid to a particular sector within the region, it is better to include all related sectors as it will expand the bases for local people’s participation in the project and thus make it easier to achieve the goals. Transfer of technologies on large-scale production management of seedlings carried out by REX was highly successful combined with the supporting activities of the community forest. The promotion of producers’ groups’ activities encouraged by the Agricultural Cooperative Promotion Project was combined with the transfer of agricultural technology and has realized sustainable agricultural development in the region.

Management of regional environmental resources and sustainable use of these resources would be the main areas of demand in technology transfer in rural villages in the future. REX-type methods would be required in the area of reutilization of natural resources. An Agricultural Cooperative Promotion Project-type method would be required to advance these economic activities so that the profit would be disseminated to the local people. It is worth noting that there is a possibility of combing the two projects into a single systemized project.

---

<sup>1</sup> Mr. Hiroshi Shirakawa recognizes REX as a social forestry approach. He has conducted a project assessment using the degree of sustainability and dissemination as indicators and pointed out that the results became more obvious when the dissemination indicator was applied. See Hiroshi Shirakawa, “Post-Project Evaluation of Technology Cooperation utilizing the Social Forestry Approach” (*Shakai-ringyo Apurochi niyoru Gijutsu-kyoryoku Purojekuto no Jigo-hyoka*), *Kokusaikaihatsu-gakkai*, Vol.8, No.1, 1999, pp.44.

<sup>2</sup> Not all seedlings are produced at the centers.

<sup>3</sup> Japan International Cooperation Agency (JICA), “Evaluation Report Upon the Completion of the Reforestation and Extension Project of the Kingdom of Thailand in the Northeast of Thailand” (*Tai-hokoku Tohoku-tai Zorinfukyu-keikaku Shuryoji Hyoka Hokokusho*), pp.14.

<sup>4</sup> There are many thesis and reports written on REX activities. Many regional surveys have been actively undertaken by various groups and individuals who have interests in the reforestation and eucalyptus plantation issues.

<sup>5</sup> Yasushi Yamashita, Shinya Takeda and Sonkhram Thamincha “The Growth of Pulp Industry in Thailand and its Supply Base” *Journal of Forest Economics*, Vol.15 No.1, 1999, pp.63-68.

<sup>6</sup> Apichai Puntasen 1996 `Tambol councils and community forest management` in Hirsch, Philip ed., *Seeing Forests for Trees: Environment and Environmentalism in Thailand*, Silkworm Books: Chiang Mai.

<sup>7</sup> Japan International Cooperation Agency (JICA), *Report on the Survey of the Basic Design of the Establishment Plan for Large-scale Nursery Centers in the Northeastern Region of Thailand of the Kingdom of Thailand*, July 1993. (*Thai-okoku Tohohoku-thai daikibo Naebatake Senta Setsuritsu Keikaku Kihon sekkei Chosa Hokokusho*).

---

<sup>8</sup> Yasuyuki Kono, “REX Report on Social-economic Area by Short-term Dispatched Experts” (REX Shakai Keizai-bunya Tanki-senmonka Hokoku-sho), submitted on 1<sup>st</sup> February 1997.

<sup>9</sup> Given that the farmers sell the pigs after bringing them up for three to four months, the time period set to settle the account seems to be too long.

<sup>10</sup> There are many members who want to sell at the direct sales center and therefore have to wait for their turn.

<sup>11</sup> For details, see Masahiro Yamao , *Development and Cooperatives, (Kaihatsu to Kyodo-kumiai)* Taga Shuppan,1999.

