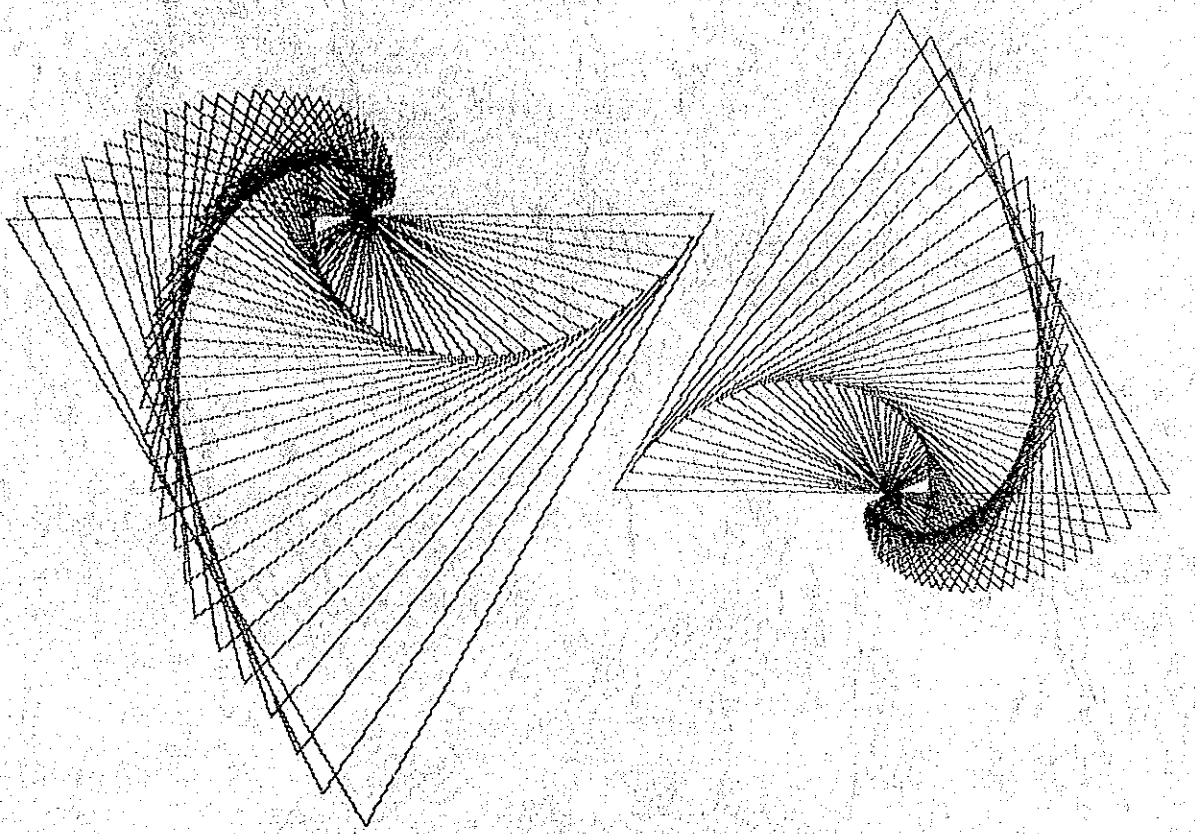
AGRICULTURAL EXTENSION AND AGRICULTURAL MECHANIZATION PROJECT IN THE KASETSART UNIVERSITY

(KINGDOM OF THAILAND)



March 1989

Institute for International Cooperation
Japan International Cooperation Agency (JICA)

AGRICULTURAL EXTENSION AND AGRICULTURAL MECHANIZATION PROJECT IN THE KASETSART UNIVERSITY

(Kingdom of Thailand)

March 1989

Institute for International Cooperation
Japan International Cooperation Agency (JICA)

PREFACE

The Project-type Technical Cooperation is an integrated form of cooperation whose aim is to realize technology transfer to relevant personnel of the project in the recipient country, by effectively combining such assistances as dispatch of experts, training of counterparts in Japan, and supply of equipment as required. It is intended to assure smooth and systematic implementation of technical cooperation program through planning, implementation and evaluation.

The duration of cooperation is usually about five years. When the project is actually commenced, a variety of survey teams and experts are dispatched to the recipient country, preparing work reports.

This case study of Project-type Technical Cooperation has been compiled originally in Japanese, then translated into English, based upon a number of these reports prepared at each stage of planning, implementation and evaluation of the project.

We would be pleased if it would be of some usefulness as reference material for those who are interested in our technical cooperation.

March 1989

Director
Institute for International Cooperation
Japan International Cooperation Agency (JICA)

CONTENTS

Outline of the Project

Extension Section

The Kasetsart University is the largest and highest-grade agricultural university in Thailand. It was established in 1943 under the Law for establishing the Kasetsart University and has exerted efforts to extend practical techniques in agriculture since then. In 1953, it established a variety of extension courses for the common people, and in 1970, the Office of Extension and Training (abbreviated as OET) was set up as an organization which was treated in the same manner as a faculty. Since then, the OET has played an important role in increasing production of mushrooms, maizes, sorgo, and kidney beans as well as broilers and orchids; all of these have come to be important commodities exported from Thailand.

In 1979, the Japanese Government constructed the National Extension and Training Center (abbreviated as NAETC) in the Kamphaengsaen campus under grant aid cooperation amounting to ¥1,660 million for the purpose of further strengthening the activities of OET. The Japan International Cooperation Agency (JICA) dispatched experts, granted machinery and equipment, and accepted counterparts for training in Japan in accordance with the NAETC management project.

The Project has proceeded and developed smoothly as shown below:

1) Dispatch of Japanese experts : 2 (long-term) and 7 (short-term)
2) Machinery and equipment granted: ¥77,470 thousand
3) No. of counterparts trained in Japan : 12

During the term of the Project, JICA implemented the following programs under its own budget:

1) Course for training middle-level technicians : 21 training courses, 178 days in total, and number of counterparts trained : 844.
2) Publishing agricultural handbooks : 8 types, 8,000 copies
3) Survey on farmers twice covering 703 farms in total.

The Thai side was positive about the Project:

1) The number of office workers and laborers was increased from 18 and 21 at the initial stage to 42 and 41 at the final stage, respectively.
2) The budget allocated by the Thai Government amounted to B39,150 thousand, including that for the OET.

Some of the results of the Project on completion of a five-year term are as follows:

1)	Production of audio tapes for broadcasting	640 sets
2)	Production of sound slides	28 sets
3)	Production of video tapes	74 sets
4)	Printed matter	¥1,120 thousand, or 24,840,000 pages
5)	Extension activities in fields	130 times
6)	Training courses	382 courses, training 29,869 persons
7)	No. of users of lodging facilities	28,183 persons

The reasons why the Project achieved such successful results are summarized in the following three points:

1) The project was not started as a new activity but as successor to past activities.
2) The University has staff with excellent capabilities.
3) Incomes from the printing business and from facilities offered for public use (including rooms and dormitories) amounted to a considerable sum.

The Project ended on June 30, 1986 with successful results.

Mechanization Section

In the course of the Agricultural Extension and Agricultural Mechanization Project, the Agricultural Mechanization Center effected technology transfer by giving priority to the below-mentioned items during the limited period of five years.

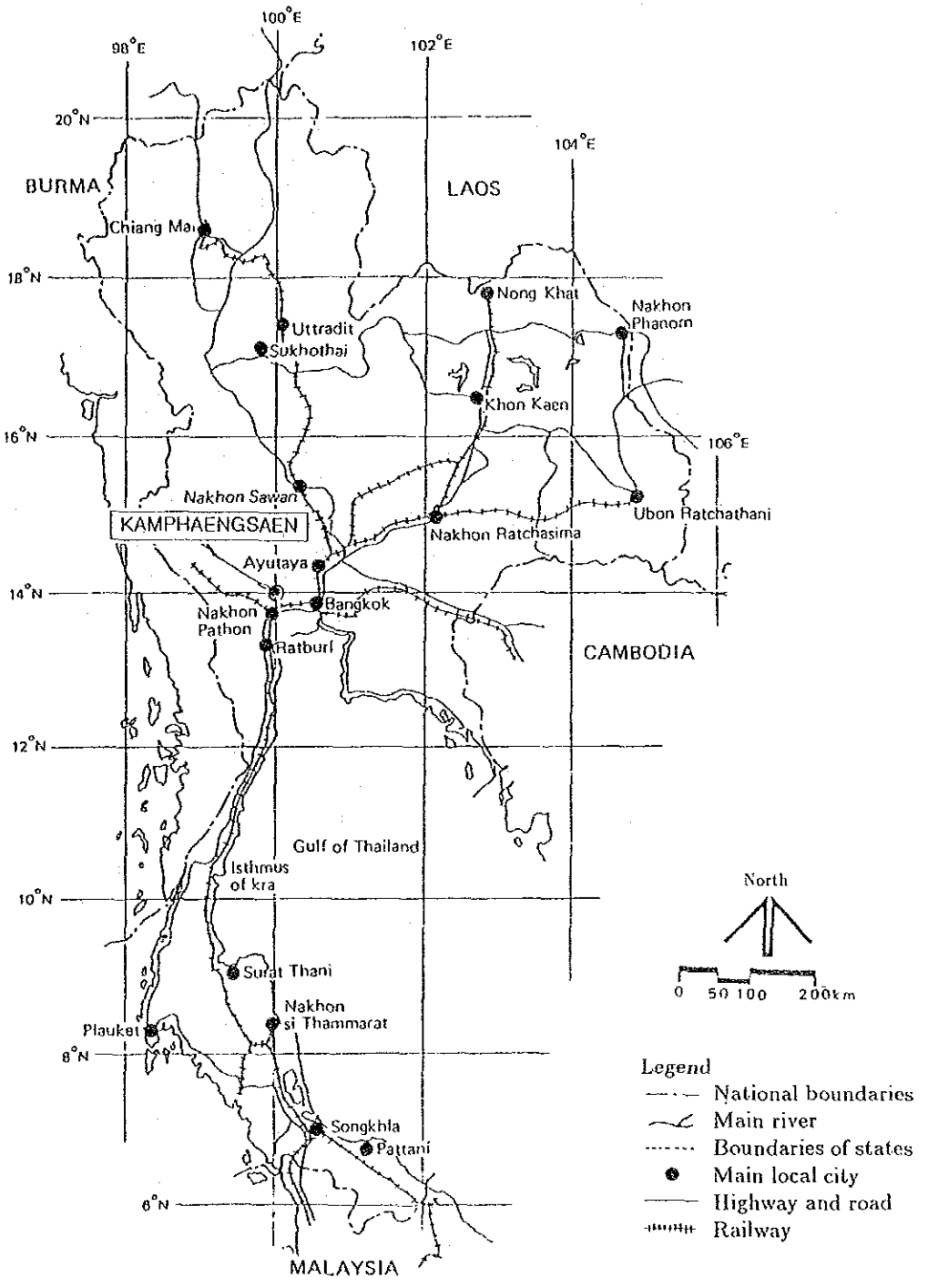
1) Establishment of research methods for the promotion of agricultural mechanization systems.
2) Establishment of measuring and testing methods for the improvement and selection of agricultural machinery and implements.
3) Advice and guidance on agricultural mechanization training.

The Agricultural Machinery Center was a newly founded organization. Delay in the assignment of personnel and the granting of machinery and implements hampered the smooth progress of the Project. In response to the suggestion of the Third Technical Guidance Team in March 1985, however, the Japanese side switched the expert-dispatching period from a short term of one or two months to a medium term of six to nine months so that the initial objectives could be met by reinforcing the activities of the experts. As a result, the Project made considerable progress and about 70 to 80% of the objectives were attained.

The cooperation made to date had aimed mainly at building up a foundation on which the Center could conduct research activities by itself, and it was expected that technology transfer would be further realized in the subsequent step in which concrete themes would be digested and solved.

The five-year cooperation period of the Project which, started in July 1981 in response to Thailand's request and ended in June 1986, is positioned as the first phase (Phase I), and now the second phase (Phase II) has been entered for continuing cooperation under a new program.

Map of the Project Site



Outlined Schedule of the Project

Agricultural Extension and Agricultural Mechanization Project in Kasetsart University, Thailand
Cooperation period (R/D): July 1, 1981 to June 30, 1986 (F/U): July 1, 1981 to March 31, 1987 Requested in : 1977
Signed in : 1981 Grant aid cooperation : ¥2,300 million (buildings) in FY 79 ¥500 million (research machinery) in FY 81

Items and years	Up to 1980	1981	1982	1983	1984	1985	1986
Dispatching of Survey Teams		Implementation Survey Team (April)		Technical Guidance Team (January) / Technical Guidance Team (July)		Technical Guidance Team (March)	Evaluation Team (March)
Dispatch of experts: [Long-term assignment] Agricultural extension leader		9					6
Agricultural mechanization leader		11			3		8
Coordinator			7				6
[Short-term assignment]		(long-term survey) 2		(Mechanization of paddy) 12 2 / (Improvement of fields) 7 9		(Tractor testing methods) 3 5 / (Agricultural machinery) 10 3	
		(long-term survey) 1 2		(Mechanization of maize) 12 2 / (Tractor testing methods) 11 12		(Drying and storing of maize) 2 3 / (Printing technique) 12 2	
		(Implementation control) 12 3		(Printing technique) 1 1 / (Drying and storing of maize) 11 12		(Cropping system) 3 4	(Agricultural extension) 2 3
		(Mechanization of paddy) 3 3		(Agricultural extension) 3 5 / Junichi Sato (Cropping test) 1 2		(Printing technique) 1 4	(Liaison) 7 3
		(Installation of soil tank) 3 3		(Installation of soil bogies) 6 6 / (Implementation control) 1 6		(Distortion instruments) 8 8	(Agricultural mechanization) 8 3
		(Installation of soil tank) 3 3		(Irrigation discharge) 7 9 / (Agricultural extension) 3 4		Seiji Utsumi (Video programming) 8 9	(Agricultural machinery) 11 3
	[Expenditure of dispatch] ¥2,737 thousand	(Mechanization of maize cropping) 9 10		(Implementation control) 12 2		(Agricultural mechanization) 9 5	(Installation of machinery) 12 12
Training of Thai personnel in Japan			(Extension and research) 3 4 / (Production of programs) 7 10 / (Agricultural extension) 9 10	(Bogie testing method) 3 7 / (Research) 11 11 / (Tractor testing methods) 3 8 / (Agricultural extension) 4 7 / (Production of programs) 1 3 / (Research for mechanization) 10 11	(Agricultural extension) 7 12 / (Printing technique) 3 / (Mechanization testing method) 10 3 / (Mechanization testing method) 3 7	(Research) 7 7 / (Research) 10 11 / (Maintenance of machines) 6 12 / (Research) 3 3 / (Agricultural extension) 8 12 / (Audio-visual materials) 3 5 / (Production educational programs) 8 2	(Mechanical designing) 3 9 / Mr. Akradet (Research) 6 7 / (Agricultural extension) 7 10

Brief History of the Project

November 1976	The Thai Government requested Japanese assistance.
July 1977	JICA dispatched a preliminary survey team for the project for improvement of facilities (composed of six members, including Mr. Arimatsu as Leader)
October 1977	The Japanese side surveyed the facility improvement program and basic designs of construction work for the General Research Institute and of greenhouses by ten members including Mr. Arimatsu as Leader.
July 1978	The Technical Cooperation Survey Team (composed of six members, including Mr. Suzuki as Leader) studied the feasibility of cooperation for the General Research Institute and the Agricultural Extension and Agricultural Machinery Center.
November 1978	Agricultural Extension and Agricultural Machinery Center Facilities Improvement and Basic Design Survey Team (composed of six members including Mr. Suzuki as Leader) was dispatched.
December 1980	Long-term researcher (Mr. Nagai) for the Agricultural Extension Center was dispatched.
January 1981	Long-term researcher (Mr. Imaizumi) for the Agricultural Machinery Center was dispatched.
April 1981	The Record of Discussions (R/D) was concluded by the Japanese Implementation Survey Team (composed of six members with Mr. Endo as Leader)
September 1981	Long-term expert for the Agricultural Extension Center was dispatched.
October 1981	Mr. Banchaw, Chief of the Agricultural Machinery Center visited Japan for the purpose of conducting research.
November 1981	Long-term expert for the Agricultural Machinery Center was dispatched.
December 1981	Inauguration Ceremony for both Agricultural Extension and Agricultural Machinery Centers was held. Mr. Mori, Taiyo Consultant Co. was dispatched as an expert for designing and controlling processes in soil tank experiment (and stayed till March 1982).
March 1982	Assistant Prof. Matsuzaki, Tokyo University was dispatched for surveying paddy crop and he surveyed it in diversified areas of Thailand (during his stay till the end of March). Messrs. Koga and Tanaka, Yanmar Diesel Co., were dispatched for installing soil tank rails.
September 1982	Mr. Matsuyama, technical official, National Grassland Research Institute, was dispatched for surveying the possibilities of mechanizing maize crops.

December 1982	Mr. Kanaya, technical official, Hokuriku National Agricultural Experiment Station, was dispatched for cooperating in tests for mechanizing rice crops. Mr. Yoshihara, technical official, National Grassland Research Institute, was dispatched for cooperating in tests for mechanizing maize crops.
January 1983	Mr. Fujioka, technical official, Hokkaido National Agricultural Experiment Station, and two other experts were dispatched for giving instructions while traveling throughout Thailand.
March 1983	Mr. Tanya visited Japan for studying soil tank testing methods (and stayed till July 2). Mr. Siri visited Japan for studying tractor testing methods (and stayed till August 16).
June 1983	Messrs. Suda and Matsumoto, experts from Yoshizawa Motors Co., were dispatched for installing soil tank bogies, (and stayed till June 22).
July 1983	Messrs. Yukawa and Matsukawa, experts from Nippon Giken Co., were dispatched for surveying improvement and design of test fields (and stayed till September 2).
July 1983	The second Technical Guidance Team (composed of Mr. Funabiki, technical official and two other experts) was dispatched.
November 1983	Mr. Yagi, Chief of the Agricultural Mechanization Research Institute, was dispatched for cooperating in tractor tests (and stayed till December 19). Mr. Okazaki, chief technical official, National Agricultural Research Center, was dispatched for cooperating in maize drying tests (and stayed till December 19). Dr. Kamphol visited Japan for researching agricultural experiment stations and institutes (and stayed till November 30).
December 1983	Mr. Yukawa and Nozoe, experts from Nippon Giken Co., were dispatched for controlling and managing test field (and stayed till June 1984).
January 1984	Mr. Sato, chief technical official, National Agricultural Research Center, was dispatched for cooperating in tests of tilling methods (and stayed till February 19).
March 1984	Mr. Vicha visited Japan for researching mechanization testing methods (and stayed till July 31). Mr. Ogawa was dispatched to serve as a long-term expert, and Mr. Imaizumi left his post as the long-term expert (on March 31).
October 1984	Mr. Prayuth visited Japan for studying mechanization testing methods (and stayed till the end of March 1985).

February 1985	Mr. Okazaki, chief technical official, National Agricultural Research Center, was dispatched for cooperating in maize drying tests (and stayed till March 14).
	The third Technical Guidance Team (composed of Mr. Asakawa as Leader and two other members) was dispatched (and stayed till March 23).
March 1985	Mr. Yagi, chief of Agricultural Mechanization Research Institute was dispatched for cooperating in tractor tests (and stayed till May 14).
	Mr. Boonsom visited Japan for researching the state of agricultural mechanization (and stayed till March 23).
June 1985	Mr. Anek visited Japan for studying maintenance of machines (and stayed till December 21).
August 1985	Mr. Yamamoto, expert from Kyowa Dengyo Co., was dispatched for cooperating in the handling of distortion meters (and stayed till August 31).
September 1985	Mr. Amano, chief technical official, Shikoku National Agricultural Experiment Station, was dispatched for cooperating in agricultural mechanization tests (and stayed till May 29, 1986).
October 1985	Mr. Suzuki, chief technical official, Agricultural Mechanization Research Institute, was dispatched for cooperating in agricultural mechanization tests (and stayed till March 31, 1986).
	Dr. Wanchai visited Japan for researching the state of agricultural mechanization (and stayed till November 16).
March 1986	The Evaluation Team (composed of Mr. Asakawa as Leader and two other experts) was dispatched (and stayed till March 30).
	Miss Jasadee visited Japan for studying agricultural machinery testing methods (and stayed till September 20).

1. REQUEST FOR COOPERATION

1-1 Aim of the Request

1-1-1 Expansion and Upgrading of Kasetsart University

The principal universities in the Kingdom of Thailand arose from affiliated organizations of respective Government ministries and have come to function as universities. The following principal universities were separated from the below-mentioned ministries before growing to their present status as universities:

Chulalongkorn University from the Ministry of Education; Thamasart University from the Ministry of Home Affairs; Mahidol University from the Ministry of Welfare; and Kasetsart University from the Ministry of Agriculture.

Therefore, they have their own characters. It seems that the activities and social influences of the universities in Thailand are closely related to their historical development.

The Thai term "Kasetsart" signifies "agricultural science." The Kasetsart University was once separated from a school of sericulture belonging to the Ministry of Agriculture, incorporated in itself educational and training sections of the Ministry, added some newly established educational sections to its organization, and then came to possess its present functions as a university. So, it is one of the oldest universities covering agricultural science in Thailand.

The University is 13 km north of the center of Bangkok, together with other affiliated organizations of the Ministry of Agriculture. It is surrounded by districts which have already been urbanized and has such a restricted campus space that the environment is rather undesirable for a field of agricultural education. Since the buildings and facilities had become obsolete and required prompt renewal, the University set up an improvement plan which included renewal and improvement of educational facilities and construction of new training facilities for agricultural research and extension. Then, the University acquired a vast area of 1,248 hectares as a second campus in Kamphaengsaen, about 80 km north west of Bangkok. It reconstructed the buildings in the campus and arranged for the Kamphaengsaen campus to construct facilities and buildings there by drawing credit (US$15.4 million) from the World Bank and by means of the governmental budget allocation, the improvement plan amounted to US$35.3 million in total. Thus, the University completed the first phase of the Kamphaengsaen campus plan for constructing buildings for agricultural faculties, management wards, library, hospital, central restaurant ward, gymnasium, primary school dormitory, and staff dwellings.

On the other hand, the University has had the three main roles of education, research, and extension, but the organizations and facilities for research and extension activities have been rather insufficient. Regarding extension and training, the University has established the Extension and Training Office, which is treated as a unit equivalent to other faculties. Regarding the research activities, however, only a research council composed of representatives of respective faculties, has been built up. The University does not possess any independent research facilities. Generally, the functions of a university are satisfied only when both the educational and research activities are combined into one body. The fragile constitution of this department

has long prevented Thai agriculture from developing in a proper manner. Therefore, the Kasetsart University studied the possibilities for improving these conditions, including changing the consciousness of the teaching staff, in order to change itself from "a university which does nothing more than education" into "a university which engages in research and provides education based on it." As a result, it requested Japan to cooperate in its project to help attain this goal.

1-1-2 Positioning of education, research, and extension in the Kasetsart University

The Kasetsart University occupies an important position among the Thai universities which have faculties of agricultural science. It has supplied the Thai governmental, academic, and agricultural fields, including the Ministry of Agriculture, Chiengmai University, and Khon Kaen University, both of which have agricultural faculties, with graduates who numbered 9,350 since its foundation (as of August 1977). Judging from the fact that the university keeps close contact with the Ministry of Agriculture, it has a substantial social influence upon the whole country.

The Kasetsart University possesses ten faculties: agriculture, fisheries, forestry, veterinary science, economics, education, engineering, science, humanities and sociology, as well as postgraduate courses. In addition, it has the Extension and Training Office, Research and Development Mechanism, Food Research Institute, and Maize and Sorgum Research Center.

1-2 Contents of the Request for Cooperation

1-2-1 First Improvement Plan (Loan from the World Bank)

The first improvement plan, from 1972 to 1978, had a total budget of US$35.3 million, which consisted of US$15.4 million as a loan from the World Bank and the balance from the governmental budget. In this plan, the University improved and renewed its facilities at the old campus, arranged roads, fields, and principal facilities, and moved the faculties of agriculture, veterinary science, and engineering (Dept. of Agricultural Engineering) to the Kamphaengsaen campus. At the same time, the University planned to construct research and extension facilities at the new campus, and then requested cooperation from the Japanese Government.

1-2-2 Request to the Japanese Government

The request to the Japanese Government was for grant aid cooperation for the principal research and extension facilities in the Kasetsart University and for guidance in planning the construction of facilities and equipment and technical cooperation for their activities. Specifically, the request was composed of the following factors:

1. Central Laboratory and Greenhouse Complex
2. National Agricultural Extension and Training Serving Center
3. Soil and Fertilizer Research Center
4. Agricultural Machinery and Equipment Center
5. Fresh-water Fisheries Research Center
6. Agro-industry Technology Research Center

The Thai side requested grant aid cooperation for the expansion and improvement of the above-mentioned six facilities, and then requested technical cooperation and dispatch of experts in relation thereto.

After it submitted the above-mentioned request to Japan, the University formed the Kasetsart University Japan Project Committee in the University, taking the importance of the Project for the future of agriculture in Thailand into consideration, and expressed its earnest expectations by appointing the Rector, Vice Rector, and other principal members of the University as committee members. It also promoted an organization which would mainly receive the Japanese assistance to the status of Research and Development Institute, which is equivalent to faculty of a university.

1-2-3 Outline of the facilities requesting cooperation

1) Central Laboratory and Greenhouse Complex

The Central Laboratory and Greenhouse Complex is a facility which should be constructed in the Kamphaengsaen campus (hereinafter abbreviated as "KC") and should act as the center of research activities in the KC. It is planned to be buildings arranged in a flat space, separated by functions, rather than a joint experiment ward.

a) Management ward : the ward has an area of 1,000 m^2 with the main facilities of office rooms, library, data bank rooms, and conference rooms.
b) Soil and fertilizer research ward : the ward has an area of 1,200 m^2 with the main facilities of office rooms, experiment and analysis rooms, sample preparation rooms, data-processing rooms, and so on, for effecting physical and chemical research on soil and fertilizers.
c) Processing and distribution research ward : the ward has an area of 1,200 m^2 with the main facilities of office rooms, quality inspection room, wrapping experiment room, oxygen experiment room, and low-temperature room.
d) Plant pathology research ward : the ward has an area of 500 m^2 with the main facilities of office rooms, display rooms, experiment rooms of plant pathology, nematode, and harmful inspects, quarantine room, and fumigation room.
e) Seed research ward : the ward has an area of 1,200 m^2 with the main facilities of office rooms, seed specimen gallery, clean room, experiment rooms for physiology, germination, and low-temperature treatment room, and seed storing rooms.
f) Microbe research ward : the ward has an area of 500 m^2 with the main facilities of office rooms, research rooms for mycoplasma, virus, and germs, incubation room, and culture room.
g) Environment research ward : the ward has an area of 1,000 m^2 with the main facilities of office rooms and research rooms for water pollution, soil pollution, chemical pollution, air pollution, and noises.
h) Biochemical research ward : the ward has an area of 1,000 m^2 and is connected with the management ward and possesses such main facilities as a photographing room (commonly employed), electron microscope room (commonly employed), and experiment and analysis rooms.

i) Radioisotope research ward : the ward has an area of 500 m^2 with the main facilities of office rooms, research rooms for mutation and cytogenetics, a series of safety assurance facilities, and x-ray rooms.

j) Specimen ward : the ward has an area of 1,500 m^2 with the main facilities of an animal museum, animal icotype rooms, soil museum, and plant icotype rooms.

k) Small animal research ward : the ward has an area of 300 m^2 with the main facilities of office rooms and research rooms for experimenting and breeding rabbits and mice.

l) Maintenance and control ward : the ward is a space required for maintaining and controlling the Central Laboratory and has an area of 200 m^2 to be located at a corner of the biochemical research ward.

m) Weather observation facilities : these facilities contain all the instruments which are required for general weather observation.

n) Lysimeter : A lysimeter is to be installed for measuring water and eluviating components.

o) Air-conditioning facilities : these facilities have an area of 1,200 m^2 and are required for setting conditions for research activities, maintaining research environment, and controlling the conditions of the two glass houses.

p) Greenhouse complex : this is a greenhouse complex required for promoting research activities, composed of two glass houses (in which air is conditioned so as not to exceed outdoor temperatures up to 25°C), 14 screen houses (which are covered with steel nets and have a roof installed, as required), two lath houses (with ceilings and sidings made of Venetian blinds so that weak light can enter the house and there is free ventilation), and three combinations of a screen house both sides of which are connected to the lath house (namely, nine houses in total), and the dimensions of each house are 30m x 10m.

2) National Agricultural Extension and Training Service Center

The Center was to be located in the KC and to have the main facilities as audio-visual education equipment, classrooms, demonstration halls, and a management ward and such attachments as a clinic, restaurant, dormitory, and athletic facilities. The Center will be a core facility for agricultural extension and training, with a building area of 8,391 m^2.

3) Soil and Fertilizer Research Center

This Center was to be installed in the old campus (hereinafter abbreviated as "BC"), with the first floor containing sample storing rooms for soil and crops, sample storing rooms for fertilizers, a drug warehouse, an instrument warehouse, drying room, sterilizing room, and gas/water supply room. The second floor was to contain chemical and mineral research rooms (I, II, and III), soil fertilization and crop nutrition research rooms, and office rooms; the third floor would have research rooms for soil microbiology and soil physics, a soil storage room, and a soil classification/observation room. The roof would have on it a glass house (120 m^2), a screen house (60 m^2), lath house (50 m^2), and a preparatory room, with the total building area of 3,100 m^2.

4) Agricultural Machinery and Equipment Center
This Center was to be constructed in the KC and to contain facilities for maintenance and testing and warehouses for stockpiles of spare parts, as well as office rooms, experiment rooms, and classrooms for the purpose of effecting research on agricultural machines and implements, maintaining field machines, and bringing up technicians for operating them. The total area, to be located in the KC and on some local farms, was to be 4,000 m^2.

5) Fresh-water Fisheries Research Center
This Center was to be constructed in the KC and to facilitate both research on and extension of techniques for producing fresh-water fish, covering the fields of water resources, environment, water quality, breeding, and cultivation. The Center was to have a research ward with an area of 400 m^2, containing breeding ponds and settling and filtrating facilities in addition to research rooms, chemical rooms, work shops, and breeding facilities.

6) Agro-industry Technology Research Center
This Center was to be installed in the BC with an area of 2,000 m^2, with its main facilities being office rooms, quality inspection rooms, separation/extrusion research rooms, physical property research rooms, analysis rooms, microbe research rooms, and low-temperature rooms.

1-2-4 Order of priority among the facilities requested and approximated amounts

The order of priority among the facilities which the Kasetsart University had requested from the Japanese Government through the Thai Government was supposed to have been determined and requested as a result of the general assessment of present and future progress in research at the University and the plan to improve research, extension, and instruction systems, including the distribution of personnel. Table 1 below displays the order of priority with the approximate amounts required.

Table 1 Order of priority and approximate amounts of facilities required

Order	Name of facilities	Initial plan		Revised plan		Location
		Area	Required amount	Area	Required amount	
1	Central Laboratory and Greenhouse Complex	14,060㎡	B 128,055,980	11,800㎡	B118,300,000	KC
2	National Agricultural Extension and Training Serving Center	10,490	60,329,930	8,391	45,000,000	KC
3	Soil and Fertilizer Research Center	3,300	20,410,000	3,100	17,825,000	BC
4	Agricultural Machinery and Equipment Center	5,840	44,182,800	4,000	33,000,000	KC
5	Fresh-water Fisheries Research Center	400	7,400,000	400	6,600,000	KC
6	Agro-industry Technology Research Center	1,821	17,000,000	2,000	12,000,000	BC
	Total		277,378,710		232,725,000	

Note : The approximate amounts required do not include expenses for temporary installation at job sites, consulting expenses, and preliminary expenses.

Regarding the approximate amounts required, the University initially calculated the total of the six facilities at B. 277,378 thousand. Then, officials of the Ministry of Foreign Affairs and the Japanese survey teams gave the University staff in charge of the Project a full explanation of the concepts of grant aid cooperation, of the Japanese system of compiling budgets, and of the economic standing of Japan, and then requested the University to review the Project amount. After discussions made at urgent meetings with the University staff and with authorities concerned, the University revised the scale of the plan and reduced the required amount to B. 232,725 thousand (approximately ¥3,500,000 thousand) as shown in Table 1 above.

2. IMPLEMENTATION DISCUSSION OF THE PROJECT

2-1 Objectives of the Cooperation

In 1976 the Thai Government requested the Japanese Government for grant aid cooperation and technical cooperation for facilities, equipment, machinery, and technicians as required for expanding and reinforcing agricultural research and extension activities at the Kasetsart University. In response, the Japanese Government dispatched a survey team to ascertain the significance and feasibility of the requested project. As a result of the survey, it was judged that cooperation from Japan would contribute substantially to development of agricultural education in Thailand and that the project was highly feasible. Hence the Japanese Government decided to extend cooperation for it.

2-2 Dispatching the Survey Teams

Until the R/D was concluded, the survey teams and survey experts, with their own objectives, were dispatched, as listed in Table 2 below, to expedite cooperation and to implement effective assistance.

Table 2 List of Surveys Effected for Improvement of Facilities and for Technical Cooperation for the Kasetsart University

Period	Survey Objectives	Members
Jul. 17 - 31, 1977	Preliminary Survey of the Kasetsart University facilities improvement plan	Mr. Arimatsu as leader and six other experts
Jul. 5 - 18, 1978	Kasetsart University Technical Cooperation Survey Team	Mr. Suzuki as leader and six other experts
Nov. 7 - 18, 1978	Basic Design Survey Team for National Agricultural Extension and Training Service Center and Agricultural Machinery and Equipment Center	Mr. Suzuki as leader and six other experts
Dec. 25, 1980 to Feb. 24, 1981	Long-term survey of cooperation to the National Agricultural Extension and Training Service Center	Tsuguo Osanai
Jan. 20 to Feb. 24, 1981	Long-term survey of cooperation for the Agricultural Machinery and Equipment Center	Hichiro Imaizumi

3. IMPLEMENTATION OF THE PROJECT

Although the agricultural extension and mechanization project had been treated in a single R/D, it was determined that both centers should be operated and managed separately, since this project is intrinsically composed of two different projects.

The Implementation Survey Team for the agricultural extension and mechanization project was dispatched in April 1981 and the R/D which provided for commencement of the technical cooperation on July 1, 1981 was signed by the Rector of the Kasetsart University and the leader of the Team. The Project began with dispatching of experts and acceptance of counterparts for training.

3-1 National Agricultural Extension and Training Service Center

(1) First Technical Guidance Team and its evaluation

The first Technical Guidance Team had five survey items, namely to survey 1) the state of personnel stationing, 2) budgets on the Thai side, 3) the state of utilization of machinery and implements granted, 4) requests for dispatch of experts, and 5) requests for acceptance of counterparts for training.

The number of personnel in the National Agricultural Extension and Training Service Center (NAETC) was gradually increased and the budget amounts were also increased. The machinery and implements which Japan had granted were effectively employed. It was requested that more experts and counterparts be dispatched and accepted, respectively, at an earlier time.

The following three points were indicated as problems to be solved, namely, 1) training courses under the leadership of NAETC should be increased, 2) the number of media independently produced should be increased, and 3) traveling guidance to farming areas and farmers should be reinforced.

(2) Second Technical Guidance Team and its evaluation

The principal objective of the second Technical Guidance Team was to confirm the progress in preparation made by the Thai side, including the contents and implementation systems of the training courses which had been planned to start in FY 1983 by applying the middle-class technician training budget. It was understood from the survey results that this program had been scrupulously scheduled and was fully supported by the Ministries concerned of the Thai Government. The types of training courses which had been scheduled were as follows:

1) General training of extension personnel
   1) Manager course, 2) Extension staff course, 3) Local research course, and 4) Evaluation course
2) Training of video tape production
3) Training of agricultural mechanization
   1) Basic course, 2) Advanced course, and 3) Expert course
4) Training of cultivation of paddy and other crops in irrigated areas
   1) Paddy cultivating technique course and
   2) Crop system course

It was confirmed that the two programs – a) to establish agricultural extension technique and b) to prepare agricultural extension aids and put them to practical use – had been expedited smoothly among the programs contemplated in the annual programs of the Project.

(3) Third Technical Guidance Team and its evaluation

The team surveyed the following five subjects : 1) progress in procedures to grant machinery and implements, 2) training programs and actual progress, 3) preparation and distribution of data produced by using audio-visual instruments, 4) budgets and other expenses, and 5) allocation of personnel.

The survey results were summarized in the four points mentioned below:

1) Generally speaking, the extension programs have made smooth progress thanks to the Thai efforts.
2) Since extension activities including a variety of training courses have been carried out, it was expected that their effects would gradually crystallize in the future. Some measures should be reviewed for reinforcing the operation bases.
3) Training criteria should be reviewed again.
4) When evaluating the degree of extension, attempts should be made to evaluate extension of techniques and changes in consciousness.

(4) Evaluation Team and its evaluation

Since the Kasetsart University Agricultural Extension Project, which started on July 1, 1981, was nearing completion as scheduled on June 30, 1986, the Evaluation Team was dispatched to survey and evaluate the extent of objectives fulfilled, actual progress of the Project, and actual results of activities (dispatching of experts, acceptance of counterparts as trainees, and granting of machinery and implements) and to recommend an ideal course for the Project in the future.

An evaluation was conducted as a joint effort by the Japanese and Thai sides covering the following items:

1) Activities based on the R/D, preliminary implementation plan, and technical cooperation plan
   (1) Activities based on themes described in the R/D
   (2) Actual results of activities
   (3) Operation and administration of the Project.
2) Recommendation for future course of the Project.

The evaluation was carried out, by following the procedures described below.

(1) For surveying and ascertaining actual progress, results, and problems related to the activities of the Project
   1) Various questionnaires were prepared, and data were collected by having them filled out.
   2) Field surveys were carried out to learn the degree of progress and problematic points directly from Japanese experts and counterparts.

(2) The results of the surveys of item 1) above were discussed and confirmed among the experts and the counterparts. Based on these results, the steering committee effected joint evaluation together with the parties concerned with the Project and then made up recommendations for assuring the future progress of the Project.

(3) Details of the evaluation results are described in Chapter 4 "Actual results and evaluation of the Project." In summing them up, the degree of fulfillment to that time was high, 80 to 100%, except for "preparation of improvement and extension programs" and "preparation of training criteria and courses" in the annual programs of the Project. The degree of fulfillment remained low for these two items because the agricultural extension programs in Thailand had not reached the stage at which these two items were really required.

Both actual results of activities and operation and administration of the Project are described in Chapter 4 "Actual results and evaluation of the Project."

3-2 Agricultural Machinery and Equipment Center

(1) First Technical Guidance Team (FY 1982)

During the week starting from January 30 and ending on February 5, 1983, the Team heard and discussed the present state, future prospects, and problematic points of the activities with the Thai staff of the Agricultural Machinery and Equipment Center and with the experts dispatched by Japan. The results of the hearings and discussions were summarized as follows:

1) Regarding delays in granting machines and equipment, more machines than had been expected were supplied as a result of the Japanese decision to provide small-lot grant aid cooperation, but the number of Thai staff was inadequate for utilizing and maintaining these machines. The Team strongly requested that the University provide at least one researcher as would be required for the four sections of the Center.
2) As the facilities, machines, and research environment were improved to activate the research and survey activities, more funds were required for research activities and for maintenance and inspection of the machinery. The Team requested that the budgets be increased to allow the Center to carry out full research activities.
3) Future orientation of the Center was discussed as to the items mentioned below:
    1) To reinforce research departments for designing and developing agricultural machinery which will meet Thai requirements.
    2) To establish a system for evaluating performance and for inspecting agricultural machinery produced in Thailand.

3) To systematize cooperation and division of labor with the National Agricultural Extension and Training Service Center, other projects, and other research departments of private enterprises, even though technical guidance and training had already been effected by the Center for realizing agricultural mechanization.

4) Many other significant items were discussed.

(2) Second Technical Guidance Team (FY 1983)

In succession to the first survey, the second one was carried out from July 11 to 22, 1983. The contents of the discussions made during the survey were summarized as follows:

1) Cooperation for development and improvement of rice planting machines and corn shellers

This subject was strongly requested by the Thai side, but the research theme related to the improvement and selection of machinery and implements for tillage and harrowing, which form a basic activity that should be positioned prior to transportation, fertilization, and seeding activities. Since it was probable that this theme would be treated after solving these other problems, the Thai request was withdrawn for the time being. It was agreed that counterpart trainees would adopt this theme during their training in Japan.

2) Establishment of techniques for mechanizing tilling and harrowing jobs

This theme was estimated to be important for agricultural mechanization and use of agricultural machinery, and since Mr. Tanya had returned from his training in Japan, it was probable that the theme might be handled in an ideal wasy. In this connection, efforts should be made to clarify relationship between a traction unit with attachments and the physical properties of soil, for example, to measure traction resistance of a tractor. It was expected that such data would form a basis for developing tractor attachments which would be most suitable for Thai agricultural conditions.

3) Dispatch of short-term experts and acceptance of counterpart trainees

Short-term experts to be dispatched during FY 1983 for tractor testing methods and maize drying methods should be dispatched as soon as possible. Efforts should be made by the Japanese side to contact the authorities concerned and to meet requests for acceptance of trainees.

4) Plan to improve test fields

It was confirmed that the operational expenses of test fields, which would be improved in accordance with the model infrastructure, would be covered by ordinary government budgets, that income from agricultural products in the test fields could be applied to expenditures, and that farm workers could be employed by the Chief of the Center.

5) Operation of the Center

It was found that some of the packages of granted facilities and materials were not unpacked even after they arrived at the Center.

More funds were allocated and the number of staff membrers was increased. However, it seemed that concrete expansion would not be effected unless the machines and implements be put to actual use.

It was possible that a shortage would be found in machines for tillage and harrowing, machines for trial production, measuring instruments and meters, and audio-visual aids when the Center enter into practical operation.

(3) Third Technical Guidance Team (FY 1984)

The third traveling instruction was carried out from March 17 to 23, 1985. The survey results are summarized as follows:

1) Present state and problems of the Project activities

a) Survey

The theme was "establishment of methods to survey requirements for promoting agricultural mechanization." The survey was completed for mechanization of paddy and maize crops, and reports were submitted. However, nothing was done regarding sugar cane which was also included in the survey program. The Leader strongly requested the Thai side to carry it out.

b) Preparation of survey manuals

This item was agreed upon in the R/D, but it had not been realized. The Leader expressed the opinion that further review should be made as to whether or not it would be necessary to prepare manuals and that this item might be withdrawn if required.

2) Establishment of experimenting and testing methods

(a) Tests for tilling and harrowing jobs

1) Tillage, harrowing, and leveling as well as physical properties of soil

Short-term experts were dispatched for this theme during two periods: 30 days from January 20 to February 19, 1984 and 40 days from March 15 to April 22, 1985, respectively. The experts collected soil samples and measured their water contents, porosity, three-phase distribution, and hardness with the cooperation of Thai staff. Since both of these periods were during the dry season in Thailand, however, the measurement results did not agree directly with the tilling methods, because no tilling was effected during this season. A more opportune timing of dispatch, therefore, must be selected.

2) Measuring methods for tilling machines and implements

Two experts were dispatched for tractor testing methods to cover a total period of 90 days. In addition, another short-term expert was dispatched for 60 days to test the performance of rice planting machines, though he was initially dispatched for effecting tillage tests. Although it might be difficult to master during a limited period all the operations of power meters, electronic instruments and other items for testing tractors and tilling instruments and attachments, the techniques for operating the basic items have been transferred as scheduled. It would be important, therefore, for the Thai staff to set up testing designs, to operate instruments, and to repeat testing by themselves in the future.

(b) Methods to drying, conditioning, and testing maize
This item aimed at technical development for improvement of quality (aflatoxin), by selecting maize as one of the main field crops in Thailand. The first guidance was given to clarify the mechanism of removing grains from maize and the reasons why some of them are damaged, but only the performance test of grain removers was completed. In the second and third guidance, drying method was adopted as the theme, and tests were effected on drying methods, especially, the use of solar heat in the tropical zone.
Since corn pickers, machines for harvesting corn, had not been granted, they were not yet been tested.

(c) Training for mechanization
Since the Center took charge of training for mechanization, which was implemented at the National Agricultural Extension and Training Service Center, in addition to training conducted by the Agricultural Machinery and Equipment Center, it gives recommendation to participants in both training courses.
Training courses covering agricultural machinery were held independently by respective authorities and organizations in Thailand; they were held by the Ministry of Agriculture, universities, and so on, independently of each other. They are not at optimum efficiency due to insufficient communications among these organizations.

3) Advice on the Project
The Technical Guidance Team summarized the survey findings as listed below. The results were proposed to and approved by the Steering Committee which was composed of the Team and the National Agricultural Extension and Training Service Center.

1) Universities in Thailand had a short history of research on agricultural machinery and had not trained enough personnel in time. It took time to start full-fledged research partly because a sufficient number of personnel was not allocated to the Center and partly because granting of machines from Japan was delayed. As a result, the progress of the whole program was delayed.
2) As the machines and implements were arranged in order and training of counterparts were completed, cooperation activities had now been just launched.
3) Since the Project term was five years, the remaining period was one year and three months. Although delays were still found in some parts of the Project, efforts should be exerted to fulfill the programs agreed upon in the R/D by making full use of the remaining period.
4) The Team requested the Agricultural Machinery and Equipment Center to make strenuous efforts to obtain the required staff and to promote the programs by emphasizing appealing the significance of the Center to the public through active public relations work promoting the results attained to date.

(4) Problems in implementation and operation of the Project

1) Concept of the basic program

The Project was conceived in accordance with the programs shown on the R/D, but there were some discrepancies in the concept of the Project when the R/D was concluded and also at the present time. In reviewing the programs, the subjects of cooperation seemed to be mixture of independent and separate themes. The programs lacked a policy for building up a mechanization system along a certain orientation. Though it was understood that tillage, tractor, and maize drying tests, which were all contained in the program, had their own significance, they seemed to be finished as they were.

Since no definite systems of mechanized cropping techniques had been shown in strict accordance with the actual cropping state of the paddy and maize, which were two main crops in Thailand, it was not clear how the results of the respective tests should be consolidated to establish a definite mechanization system. The respective subjects must be correctly positioned and related to each other by revising the contents of the basic plan.

2) Methods of dispatching experts

The present method of dispatching experts for a short term of one or two months for each subject does not always agree with the general practice of agriculture and sometimes makes it impossible to conduct relevant experiments locally in Thailand. If the cooperation term was five years as initially programmed, it was necessary to devise an expert-dispatching method that it could assure more effective cooperation within the remaining period of one year and three months.

If the term of dispatch is switched from a short term to a long one, it is recommended to combine an expert who takes charge of tests on diversified types of agricultural machinery in order to develop and improve these machines in terms of performance, safety, and durability, with another expert who takes charge mainly of utilization of the machines for research in mechanized cropping techniques, working techniques, and mechanized technical systems. Since sufficient effects could not be expected from a short-term dispatch of one or two months within the remaining period of cooperation, it was hoped that this request of the Leader could be realized.

3) Necessity of provisional measures

a) Repairing of field-irrigating facilities

The pumps for irrigation wells which had been installed in accordance with the model infrastructure in 1983 were then under repair, since they became inoperable at the end of 1984 due to abnormal corrosion of the pumps, pipe-connecting bolts and nuts. Since this corrosion was supposed to have been caused by the abnormally high salt content of the underground water, it was necessary to inspect the quality of this water and to take long-lasting measures to protect the pumps from further corrosion. The water supply channels were so shallow -20 to 30 cm - that their capacity was too small, and they had the shape of a reversed trapezoid, so that water often overflowed.

It would be necessary to take some countermeasures in advance, since river water would be supplied through these irrigation channels in a few years.

b) Installation of devices to protect experiment rooms from noise, discharged gas, and dust
Since the experiment ward had no partitions among rooms, noises and discharged gas from tractors and engines were diffused over the whole ward, while they were in use. They made it difficult to carry out more than one experiment at a time in the ward.

c) Installation of compartment for measuring instruments
The experiment ward was not thermally controlled and was exposed to dust and dirt, which caused problems in measuring instruments. So it is recommended that two compartments be installed in the ward to maintain the accuracy of the instruments and to effect measurements protecting machines and implements from noise and dust.

(5) Thai request for extending the cooperation term of the Project
The Agricultural Machinery and Equipment Center of the Kasetsart University requested an extension of the Agricultural Mechanization Project for another five years at the Steering Committee of the third traveling instruction survey.
The Thai side described the reason for requesting the extension by indicating that, although delay in arrangement of machines at the start of the Project and a shortage of the Center staff had caused delays in the fulfillment of the programs, it was then necessary to extend the term to attain the goal of the Project, namely, completion of tests and researches, promotion of effective utilization of the granted machines and implements, and development of agricultural machinery.
In reviewing the present progress of the Project, it was found that facilities and machines had been kept in good condition and that the Thai staff had been increased in quality and quantity, though the degree of fulfillment had still been low. It was then essential for both the Japanese and the Thai sides to do their utmost to realize the objectives of the programs within the remaining period of one year and three months. It was reasonable to consider extending the term at the time of completion of the initial term if it was found that some problems still remained unsolved at that time. The Joing Committee managed to agree upon this principle.
The Thai request was so strong in this respect that it would be necessary for Japan to deliberately review this matter.
It was supposed, in this connection, that the following four types of measures were possible in the future:

1) Simple completion : The Project would be completed in accordance with the initial term, irrespective of degree of progress.
2) Completion after making efforts to realize the objectives of the basic programs : Relatively long-term experts or many short-term experts should be dispatched to help fulfill the basic programs, and closer cooperation should be given within the remaining period of the term; then the Project could be completed on time.

3) Simple extension : The cooperation term should be extended based on the conventional method of dispatching short-term experts so as to recover delays in cooperation and fulfill the objectives of the basic programs.

4) Extension after improving the contents of cooperation : After reviewing the present contents of cooperation and any problems with the expert-dispatching method, necessary improvements should be effected, and then the term should be extended under a new method which ensures more efficient and effective implementation of the Project.

Among the measures suggested above, measure 4) was reviewed as below. The true purpose of extending the cooperation term as requested by Thailand was to proceed with research and cooperation aimed at the establishment of a general agricultural mechanization system based on the progress to date. Since the Thai side understood the present state of progress in agricultural mechanization research in Japan, it was supposed that they had understood the importance of this research and had established their attitudes toward the Project.

It seemed necessary, under these circumstances, for the Japanese Government to review and improve the themes adopted and the expert-dispatching method for the basic program as quickly as possible so that Japan could cooperate in the establishment of mechanizing techniques in accordance with the development of the agricultural conditions in Thailand. The Team reached the conclusion that the project term should be extended, since the remaining period was too short for attaining the beneftis expected from of the cooperation.

It was necessary, in this case, to try a new objective and a new expert-dispatching method, assuming that the term would be extended. It seemed that dispatch of two long-term experts would produce more benefits within a short period.

Since better allocation of Center personnel and improvement of the Thai system of technical transfer were indispensable for the above-mentioned changes in the system by Japan, the Team earnestly requested them from the Thai side.

(6) Changes of the implementation programs

Since the third Technical Guidance Team suggested that it would be difficult to complete the programs within the project term, a method was adopted to overcome the difficulties. The expert- dispatching method was switched from the short term of one or two months to a longer term, and two experts were dispatched for medium terms from September 1985 to the end of May, 1986 and from October 1985 to the end of March, 1986, respectively, so that they might give cooperation for incidental items in addition to their specific subjects.

This system provided a slightly different treatment of the Project from the conventional method. A leader was dispatched over a long term while several short-term experts were dispatched for respective themes, thereby concentrating full energy on fulfillment of the programs within the remaining period of the Project.

4. RESULTS AND EVALUATION OF THE PROJECT

4-1 Results and Evaluation

4-1-1 National Agricultural Extension and Training Service Center

The NAETC has the four operating departments listed below:

1) Audio-visual aid producing department
2) Printing plant
3) Extension and training department
4) Classroom and dormitory department.

The results of operation of these four departments in the past five years are listed in Table 3 below:

Table 3 Results of operation of the Project

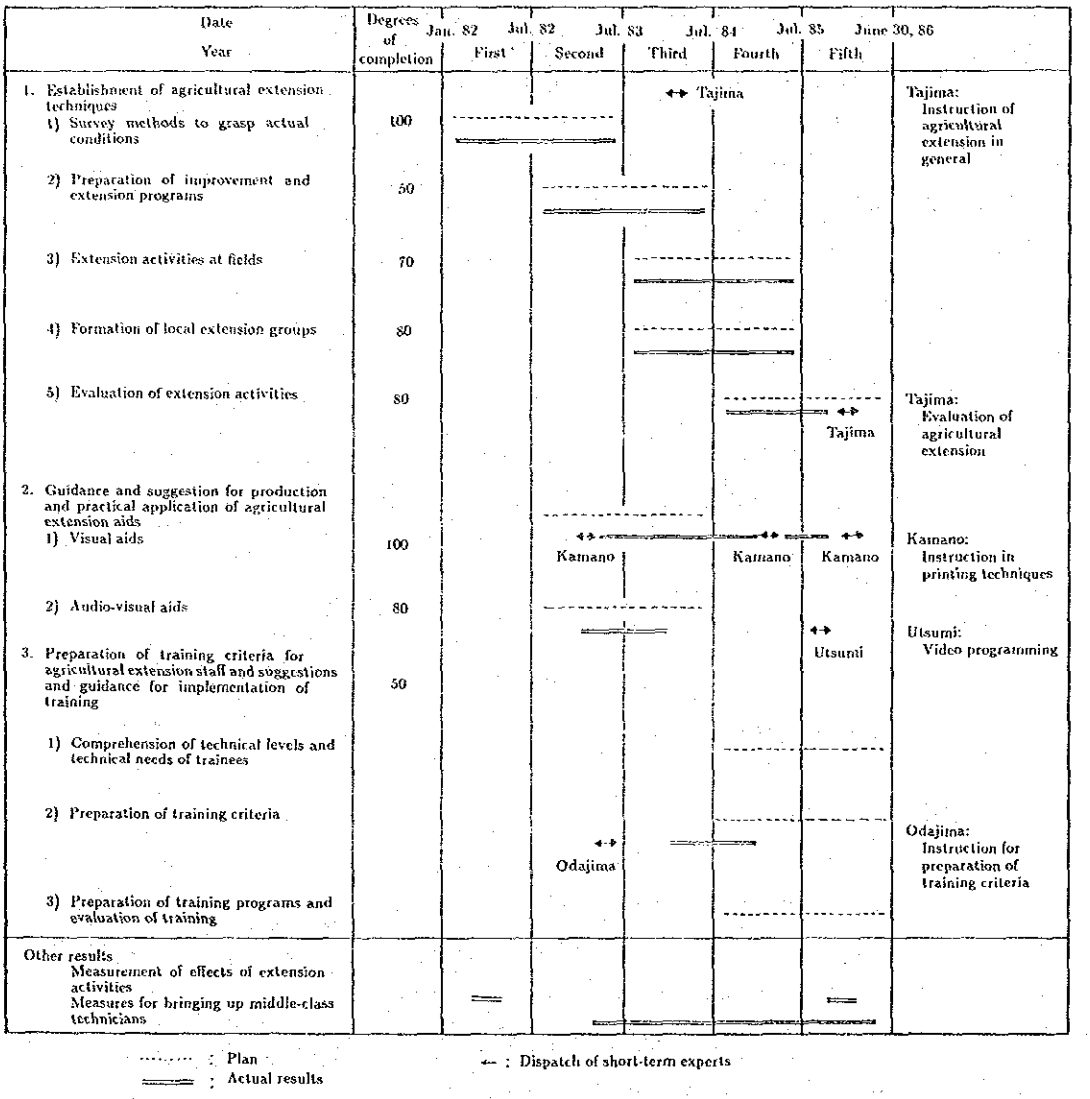
		1981	1982	1983	1984	1985	1986	Total
1)	Production of radio tapes	–	–	–	257	256	127	640
2)	Production of sound slides	4	8	8	4	3	1	28
3)	Production of video tapes	13	12	12	11	16	10	74
4)	Printing operations							
	Pages (unit: 1,000)	1992	3219	4162	6819	6453	2197	24842
	Volumes (unit: 1,000)	467	388	90	77	61	39	1122
5)	Extension activities outside the university	0	13	39	54	20	4	130
6)	Training operations							
	No. of training courses	27	71	75	75	90	44	382
	No. of trainees	1985	5461	5186	5563	8218	3456	29869
7)	Utilization of classrooms and dormitories							
	No. of days used	121	302	349	352	350	148	1622
	No. of boarders	1942	5039	5618	6320	6555	2709	28183
	Male	1025	3842	4224	4950	4907	1916	20864
	Female	917	1197	1394	1370	1684	793	7319

Note: A total number of six months from July to December and from January to June is applied for 1981 and 1986, respectively.

Among the activities of these four departments, those of the media production department and the department of extension activities outsides the university were rather insufficient, though the printing, research, and dormitory departments recorded satisfactory results.

(1) Degree of fulfillment of the project objectives
Figure 1 displays the year-based programs, the programs completed, and degrees of the completion.

Figure 1 Year-based programs and degrees of completion



The actual results and the degrees of completion for each item are described below:

(1) Establishment of agricultural extension techniques

1) Survey methods for grasping actual conditions

In having the agricultural extension staff give correct instructions on extension of farms, it was generally necessary that they should conduct a survey on actual conditions for grasping the needs for extension activities so that they could acquire techniques for collecting and analyzing data as required for really understanding the actual states of the farms. To attain this goal, surveys were conducted in March 1982 with the assistance of the Kamphaengsaen County Extension Office for the purpose of measuring the effects of the extension activities by surveying what benefits the extension of techniques would give farmers in the vicinity of the Kamphaengsaen Campus. At the same time, this survey aimed at educating counterparts, who would be engaged in the survey in the future, about planning and operation of the survey and about collection, analysis, and evaluation of data. As a result, the counterparts successfully mastered the techniques for setting up survey plans (objects and methods), for conducting surveys, and for processing survey results.

Since this survey consisted of surveying farm economic factors which was most difficult, the counterparts were then confident that they had acquired techniques for treating any type of survey in the future. The degree of completion was 100%.

2) Preparation of improvement and extension programs

The following instructions were given to the counterparts about the methods of treating extension themes by setting up handling programs. It was necessary to discover, diagnose, and analyze extension themes from among the needs for extension which had been grasped through the survey under item 1) above, and to prepare an improvement and extension program which clarified what measures should be taken for the extension themes.

Since NAETC had neither experience nor duties in preparing improvement and extension programs for farmers in Thailand, examples were taken of those programs which had been prepared in Japan. Then, the participants in the first middle-class technician training were advised that the extension staff in the respective fields should establish programs for their respective districts under unified objectives and methods.

However, the extension activities effected in the farm villages of Thailand had all been one-way from the Government to farmers. It had not been opportune to carry out an extension program based on farmers' needs, so no programs had succeeded in displaying sufficient results at that time. It was necessary, therefore, for the counterparts in the NAETC to play a leading role in coping with the extensions by holding training courses suitable to the present status of the Thai farm villages. The degree of completion was 50%.

3) Extension activities at fields
Japanese experts witnessed field extension activities in which counterparts participated for developing techniques of pig raising, beef cattle fattening, cultivation of vegetables, pest control, and education of youth groups, and they gave counterparts suggestions about methods of selecting extension objectives, of preparing extension programs for farmers, and of effecting extension activities by type of objective to be taught. In giving suggestions, the experts placed emphasis upon evaluation and follow-up of the results of instructions as well as upon provision of proper guidance based on specific conditions at fields. As a result, extension activities were gradually developed in quality and quantity. It was expected that they would be developed further by carrying them out in accordance with programs. The degree of completion was 70%.

4) Formation of local extension groups
Guidance was given about methods of grasping actual states of existing groups so that technical instructions and guidance for group operations could be correctly given to groups of youth, women, and mushroom cultivators. Although the group activities were steadily developed as a result of guidance, no groups reached the level at which they could conduct activities independently without receiving guidance from counterparts. Intensive guidance should be given to the group leaders. The degree of completion was 80%.

5) Evaluation of extension activities
Mr. Tajima, an expert, furnished counterparts and students belonging to the Department of Agriculture, the Kasetsart University two times (in 1984 and 86) with guidance based on accumulated experience and examples taken in Japan and other countries on methods of accurately measuring and evaluating the effects of extension activities. As a result, this theme was fully understood by the NAETC counterparts and the students belonging to the Department of Agriculture, the Kasetsart University, both of whom formed a nucleus of agricultural extension in Thailand. It was expected that the theme would be dispersed gradually through extension activities in the future, although immediate effects were not expected so much. The degree of completion was 80%.

(2) Guidance and suggestion for production and practical application of agricultural extension aids

1) Visual aids
Guidance was given on the preparation of extension materials including posters and pamphlets and photographing techniques as one effective means of extension. Among others, Mr. Kamano, an expert, gave three consecutive lectures on the techniques of operating, inspecting, and maintaining printing machines. As a result, counterparts had not only mastered printing techniques but also prepared 1,890,000 volumes of extension materials. These materials were utilized among university staff as well as by other persons concerned with extension activities. The degree of completion was 100%.

2) Audio-visual aids

Four counterparts were trained about media, including video techniques at NHK, SONY, and Okinawa International Center in Japan, so as to make full use of advanced educational media (sound slide, films, VTR, and so on). In 1985, Mr. Utsumi, an expert, gave guidance on the production of video tapes. Since then, steady development had been seen in the fields of video tape production, sound slide production, and radio tape production.

However, almost all the requests for guidance on such production techniques had been made by organizations other than the NAETC. It would be necessary, therefore, for a video production committee to be established so that requisite video products could be produced in accordance with an annual program. The degree of completion was 80%.

(3) Preparation of training criteria for agricultural extension staff and suggestions and guidance for implementation of training

Training criteria should be prepared as guidance for attaining the goal of enhancing the capabilities of the agricultural extension staff in a programmed and systematic manner. In 1983, Mr. Odajima, an expert, gave instructions on the methods of utilizing such criteria and of implementing training for agricultural extension staff. Then, the training criteria and curriculum were prepared in the Thai language, and the contents thereof were explained at training courses for the extension staff, together with methods of preparing criteria for respective districts. As a result, the necessity of the criteria was recognized. Judging from the present extension system in Thailand, however, it would be more important and effective to attempt to upgrade and reinforce training courses than to prepare common criterion curriculums. The degree of completion was 50%.

4-1-2 Agricultural Machinery and Equipment Center

The principal programs of the Project and the state of their completion are summarized in the following three points:

(1) Establishment of methods for surveying conditions necessary for promoting agricultural mechanization

1) Survey of actual states for realizing agricultural mechanization

The actual states of agriculture were surveyed with respect to paddy, maize, and sugar cane cultivation, and problems which would appear in mechanizing agriculture were clarified while an orientation for developing machines was established. The degree of completion was 100%.

2) Preparation of survey methods and manuals

Neither survey methods nor survey manuals were prepared. Since the counterparts had acquired survey methods for collecting data and for clarifying problems as necessary for carrying out agricultural mechanization by effecting the above-mentioned surveys, they could then conduct surveys at their own discretion. Since they still requested guidance on how survey results should be used for research objectives, the degree of completion was 70%.

(2) Establishment of measuring and testing methods required for improving and selecting agricultural machinery and implements

1) For tillage and harrowing

Tillage testing methods were taught by using disc plows, bottom plows, and rotary plows in wet and dry fields and soil tanks. The test results made it clear that, by selecting timing for tillage, rotary plowing would be possible, even in the soil of Thailand where only heavy-weight plows were then used. Testing methods were also taught for power tillers and tractors which were required for tillage. As a result of these instructions, it was then possible for Thai counterparts to effect similar tests independently of Japanese exerts. Although knowledge of the physical properties of soil was important for tillage testing, no methods of measuring such physical properties were conducted using the machinery granted. They must be conducted in the future. The degree of completion was 80%.

2) Harvesting at fields (maize)

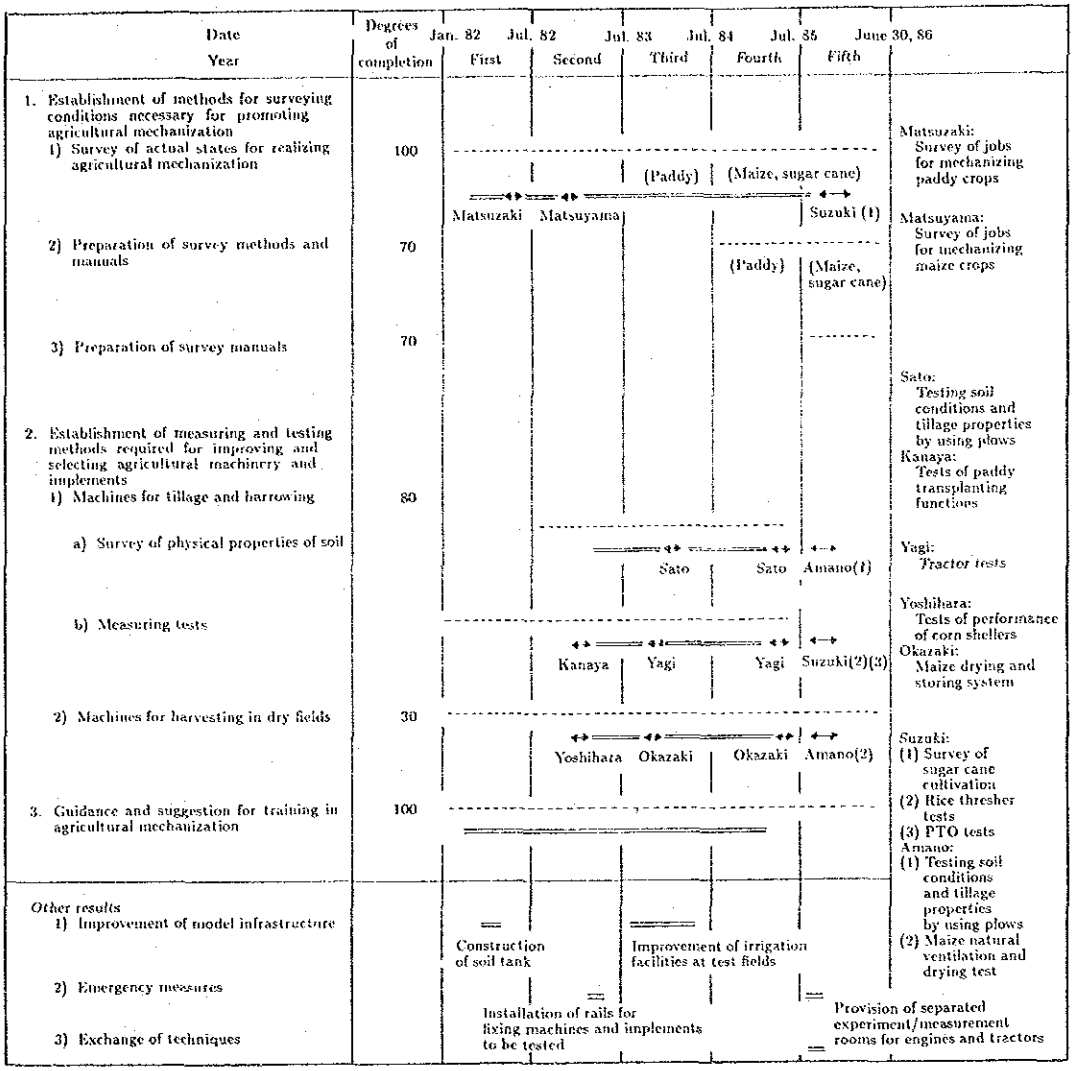
Corn sheller tests and drying and storing tests were taught by using maize. The test results demonstrated that maize could be dried in a simple facility. Since Thai counterparts learned these testing methods, they could then conduct similar tests without Japanese experts.

Since no corn pickers had been granted to date, however, the harvesting machines had not yet been tested. They must be tested as soon as possible when the pickers be granted so as to clarify problematic points in improving the harvesting machines, as well as a desirable way for developing them. Therefore, the degree of completion was 30% at that time.

(3) Guidance and suggestion for training in agricultural mechanization

The Agricultural Machinery and Equipment Center held training courses for middle-level technicians three times a year since 1983. The project leaders gave them appropriate suggestions. The degree of completion was 100%.

Figure 2 Year-based programs and degrees of completion in agricultural mechanization department



To sum up, the activities as a whole were producing substantial impacts upon the Thai agriculture, but neither methods to measure physical properties of soil and nor to test maize harvesting machines were not carried out at all. This was due to delayed arrival of machines and materials granted and the fact that the methods were not properly utilized at the present technical level in Thailand.

As a result of the technical guidance survey conducted in 1987, it was determined that the conventional policy of dispatching short-term experts for one or two months should be changed into one of dispatching experts for as long as possible within the remaining term of the Project so as to recover delays in cooperation activities and attain the goal of the R/D within the term initially agreed upon. Experts for agricultural machinery and agricultural mechanization were dispatched for the terms of six and eight months, respectively, in the fall of 1987. As a result, it was then possible to handle more themes than ever, and the cooperation activities produced more benefits in shorter periods. So, delays were greatly reduced. However, some of the themes were left untouched as stated above, and it was necessary to carry them out by means of follow-up activities. In the meanwhile, staff manpower in the Agricultural Machinery and Equipment Center was not reinforced to date, though the Japanese side had strongly requested it from the very beginning of the Project. We did hope that the Thai side would make more efforts in this regard.

(4) Conclusion

Implementation of the Project consolidated the base of administration and operation of the Agricultural Machinery and Equipment Center. The principal benefits of the cooperation are stated below:

1) All the surveys of actual states concerning agricultural mechanization were completed and the course in which the agricultural mechanization should be promoted in the future was clarified.
2) Techniques for basic testing and surveying methods with respect to agricultural mechanization were transferred to the Thai side.

It is hoped that these benefits will be utilized as a basis for research on agricultural mechanization.

Another important benefit is that the staff of the Agricultural Machinery and Equipment Center acquired a profound understanding of the concepts of agricultural mechanization systems, which formed the basis of research and was one of the final objectives of the Project.

3) At the initial stage of the Project, cooperation activities were delayed due to the fact that the history of agricultural mechanization was short in Thailand, that the Center had not acquired a sufficient number of personnel since it was a newly established organization, and that the arrival of some of the machines and implements from Japan was delayed.
Based on the report of the Technical Guidance Team in March, 1985, the Japanese Government dispatched two experts for the terms of six and eight months, respectively, to the Center in the same year for the purpose of reinforcing the Project activities and attaining the Project goal. As a result, technical transfer was promoted and the programs made rapid, steady progress.
The degrees of realization of principal objectives as a whole were roughly estimated to be 70%. However, development of the following two themes remaied insufficient. It was preferable, therefore, that they be promoted in the future by means of these follow-up activities:
   1) Instruction on methods of measuring physical properties of soils, as required for tillage, by using soil-testing equipment and the machines granted.
   2) Instruction on methods of testing maize harvesting machines.
4) Printing of the reports on completion of programs
The research and survey activities completed during the cooperation term are described below. The programs thus completed were summarized in reports by long- and short-term experts or university staff. Some of these reports were translated into and printed in the Thai language and were distributed among the parties concerned.
   1) Survey Report on Paddy Cropping in Thailand, Part I (In Japanese and Thai languages)
   2) Survey Report on Paddy Cropping in Thailand, Part II (In Japanese)
   3) Final Report of Agricultural Extension and Agricultural Mechanization Project, Part II Mechanization Project (In English).

4-2 Results of Activities (not including grant aid cooperation)

(1) Dispatch of experts

	Long-term	Short-term	Total
NAETC	2	7	9
AMC	2	25	27
Total	4	31	36

(2) Acceptance of counterparts as trainees

NAETC	11
AMC	10
Total	21

(3) Machines and implements granted
¥307,008 thousand

(4) Special programs
1) Improvement of model infrastructure: ¥37,311 thousand
2) Emergency measures: ¥7,258 thousand
3) Measures to bring up middle-class technicians: ¥46,600 thousand
4) Measurements of effects of extension: ¥2,511 thousand
5) Technical exchange: ¥927 thousand

4-2-1 Results of Project activities

A) Results of activities by the Japanese side

(1) Dispatch of experts

Only one expert, Mr. Nagai, Leader was dispatched for the whole term of the Project, but other experts in respective specialities were dispatched, as necessary, for short terms. As to the printing department, Mr. Kamano, expert, was dispatched three times. He gave counterparts instructions on general printing techniques and as a result, they mastered advanced printing techniques.

In the department of educational media, Mr. Utsumi, expert, was dispatched for one month in 1985. Since he taught counterparts video production techniques, they made steady progress in mastering these skills.

In the department of training, Mr. Odajima, expert, instructed counterparts on the production of a training criterion curriculum. Since the curriculum system did not fully agree with the present extension system in Thailand, the counterparts had to revise it so that it would meet actual requirements in Thailand and would benefit farmers over a long period.

Since Leader Nagai requested dispatch of short-term experts in an effective manner, the Project had a more favorable impact upon Thai agriculture than had initially been expected.

(2) Acceptance of counterparts as trainees

Mr. Poom Khumgliang (in the study tour of agricultural extension) and ten other counterparts were accepted as trainees. Among others, many of those counterparts who received training in the extension group course expressed the opinions that "Direct study of the extension activities in Japan was very instructive. We do hope that the course will be continued in the future." Counterparts who completed the course were then playing key roles in their respective fields.

(3) Granting of machinery and implements

Machinery and implements for transportation, film production, technical guidance, TV production, and photographing were granted in accordance with the initial program. They were fully utilized and were functioning correctly thanks to the dispatch of, and instructions by, short-term experts and to the acceptance and training of counterparts in Japan.

(4) Bearing local costs
Since 1983, local costs, which consisted mainly of expenses for bringing up and training middle-class technicians, were usually borne by the Ministry of Agricultural Cooperatives (agricultural extension staff) and the Ministry of Home Affairs (farm village developing staff).

B) *Results of activities by the Thai side*

(1) Stationing of counterparts
The number of counterparts steadily increased from 18 at the start of the Project to 44 in 1986. Moreover, able persons with master degrees werebeen employed in the extension field; they were a vital factor in the smooth implementation of the Project.

(2) Budgets, facilities, machinery, and implements
Funds for the Project were steadily increased in spite of the reduced budget policy of the Thai Government resulting from financial deficit. Training utilizing modern information equipment was carried out at the training facilities, reaching a total of 351 courses and 27 thousand trainees. The facilities have been utilized very effectively; about 26 thousand people used the guest house (dormitory) and the restaurant.

1) The budget for NAETC was B6,798,909 in fiscal year of 1984/85 (including expenditure of B1,760,300 covered by NAETC's income).
2) The budget for improving NAETC facilities and equipment was B4,375,134 from 1981 to February 1985.

4-3 Project administration

Since the NAETC was an expansion of the functions of the Kasetsart University's extension department, which had a long history of outstanding experience, it had a dependable organization and the staff were well qualified. Hence, we felt confident about entrusting extension activities to it. Many of the counterparts were highly qualified, and the staff members in charge of the extension were selected from among excellent persons possessing a master's degree from the Kasetsart University.

Audio-visual instruments and printing machines backed by advanced technology were administered by graduates of the University of Arts and the Printing College, and those persons responsible for them completed the training courses in Japan. There was no need for concern about maintenance and administration of machines and facilities in the future.

Since the machines and facilities generated an annual income of B2,500 to 3,000 thousand, they would be maintained and administered in NAETC to assure its own future development.

4-4 Extension of the cooperation term

Delay in the granting of facilities and machinery and in the stationing of personnel at the start of the Project caused delays in completing the Project programs. the Kasetsart University submitted a request for extending the cooperation term when the Technical Guidance Team visited the Center. In addition, a request for technical cooperation was submitted for a second plan at the end of the first plan of the Project.

In response to movements by the Thai side, Japan sent a preliminary survey team in October 1986 and confirmed the contents of the request and discussed frameworks for cooperation. It was confirmed that technical cooperation would be effected in a similar style of project cooperation as the first cooperation project, together with a research cooperation project for the Kasetsart University.

APPENDICES

1. The Record of Discussions (R/D)

The Record of Discussions between
The Japanese Implementation Survey Team and
The Authorities Concerned of the Government of Thailand
on the Japanese Technical Cooperation
for the Agricultural Extension and
Agricultural Mechanization Project
in Kasetsart University

The Japanese Implementation Survey Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Kanji Endo, Senior Technical Adviser, JICA, visited Thailand from April 21 to May 2, 1981 for the purpose of working out the details of the technical cooperation program concerning the Agricultural Extension and Agricultural Mechanization Project in Kasetsart University, Thailand.

During its stay in Thailand, the Team exchanged views and had a series of discussions with the Thai authorities concerned in respect of the desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Project.

As a result of the discussions, the Team and the Thai authorities concerned agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Bangkok, April 30, 1981

Mr. Kanji Endo
Leader, Japanese Implementation
Survey Team, Japan International
Cooperation Agency

Prof. Dr. Phaitoon Ingkasuwan
Rector, Kasetsart University

In the presence of

Mr. Apilas Osatananda
Director-General
Department of Technical and Economic Cooperation

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN THE TWO GOVERNMENTS

1. The Government of Japan and the Government of Thailand will cooperate with each other in implementing the Agricultural Extension and Agricultural Mechanization Project in Kasetsart University (hereinafter referred to as "the Project") for the purpose of improving agricultural extension techniques and developing agricultural mechanization system, thus contributing to the promotion of agricultural technology in Thailand. The project will be carried out in the facilities of Kasetsart University, namely, the National Agricultural Extension and Training Center (hereinafter referred to as "NAETC") and the Agricultural Machinery Center (hereinafter referred to as "AMC") which were constructed by the Japanese Grant Assistance under the Exchange of Notes dated July 23, 1979.
2. The Project will be implemented in accordance with the Master Plan which is given in Annex I.
3. The Project will be carried out in close contact with the Technical Cooperation for the Research and Development Project in Kasetsart University which is being implemented by both sides on the basis of the R/D signed on April 10, 1980.

II. DISPATCH OF JAPANESE EXPERTS

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense services of the Japanese experts as listed in Annex II through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
2. The Japanese experts referred to in 1 above and their families will be granted in Thailand the privileges, exemptions and benefits no less favorable than those accorded to experts of third countries working in Thailand under the Colombo Plan Technical Cooperation Scheme.

III. PROVISION OF MACHINERY AND EQUIPMENT

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to provide at its own expense such machinery, equipment and other materials necessary for the implementation of the project as listed in Annex III, through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

2. The articles referred to in 1 above will become the property of the Government of Thailand upon being delivered c.i.f. to the Thai authorities concerned at the ports and/or airports of disembarkation, and will be utilized exclusively for the implementation of the Project in consultation with the Japanese experts referred to in Annex II.

IV. PROVISION OF SPECIAL MEASURES

For fostering the smooth promotion of the Project, in accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA as follows:

1. to provide at its own expense travel allowance of training tour, materials to be procured for teaching, training and a part of additional expense within Thailand;
2. to supplement a portion of the local cost expenditures for the execution of the physical infrastructure such as construction work of model farm and so on when necessity arises.

V. TRAINING OF THAI PERSONNEL IN JAPAN

1. In accordance with the laws and regulations in force in Japan, the Government of Japan will take necessary measures through JICA to receive at its own expense the Thai personnel connected with the Project for technical training in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme.
2. The Government of Thailand will take necessary measures to ensure that the knowledge and experience acquired by the Thai personnel from technical training in Japan will be utilized effectively for the implementation of the Project.

VI. SERVICES OF THAI COUNTERPART PERSONNEL AND ADMINISTRATIVE PERSONNEL

1. In accordance with the laws and regulations in force in Thailand, the Government of Thailand will take necessary measures to secure at its own expense necessary services of Thai counterpart personnel and administrative personnel as listed in Annex IV.
2. As to the Thai counterpart personnel, the Government of Thailand will endeavor to allocate the necessary number of suitably qualified personnel corresponding to each Japanese expert to be dispatched by the Government of Japan as specified in Annex II, to fulfill the effective and successful transfer of technology under the Project.

VII. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THAILAND

1. In accordance with the laws and regulations in force in Thailand, the Government of Thailand will take necessary measures to provide at its own expense:
   (1) Land, buildings and facilities as listed in Annex V;
   (2) Supply or replacement of machinery, equipment, instrument, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than those provided through JICA under III above;
   (3) Transportation facilities and travel allowance for the Japanese experts for the official travel within Thailand;
   (4) Suitably furnished accommodations for the Japanese experts and their families.
2. In accordance with the laws and regulations in force in Thailand, the Government of Thailand will take necessary measures:
   (1) To meet expenses necessary for the transportation within Thailand of the articles referred to in III above as well as for the installation, operation and maintenance thereof;
   (2) To meet expenses necessary for the operation and maintenance of the articles provided by the Japanese Grant Assistance under the Exchange of Notes as referred to in I. 1. above;
   (3) To exempt customs duties, internal taxes and any other charges, imposed in Thailand on the articles referred to in III above.
   (4) To meet all running expenses necessary for the implementation of the Project.

VIII. ADMINISTRATION OF THE PROJECT

1. The Rector of Kasetsart University will bear overall responsibility for the implementation of the Project.
2. Heads of NAETC and AMC will be jointly responsible for operational and administrative matters of the Project.
3. The Japanese Team Leaders will advise the Heads of NAETC and AMC on the technical matters concerning the operation of the Project.
4. The Japanese experts will provide technical guidance and advice to that counterpart personnel in the concerned fields under the Project.
5. There will be close consultation on any matters concerning the implementation of the Project between both sides. For this purpose, the Joint Committee will be established with the functions and composition as specified in Annex VI.

IX. CLAIMS AGAINST JAPANESE EXPERTS

The Government of Thailand undertakes to bear claims, if any arises, against the Japanese experts engaged in the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in Thailand except for those arising from the willful misconduct or gross negligence of the Japanese experts.

X. MUTUAL CONSULTATION

There will be mutual consultation between the two Governments on any major issues arising from, or in connection with this Attached Document.

XI. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be 5 years from July 1, 1981. However, there will be a general review by the Joint Committee on the progress of the implementation of the Project after three (3) years from the commencement of the cooperation taking into account the measures to be taken by the two Governments in order to decide if the cooperation should be adjusted for two (2) more years.

ANNEX I. MASTER PLAN

The Project consists of the following activities, which will be carried out at NAETC and AMC in Kasetsart University.

A. NAETC
(1) Establishment of the following agricultural extension techniques
1) Surveying method on actual agricultural conditions
2) Planning on agricultural extension program
3) Practicing of agricultural extension activities in the field
4) Grouping for agricultural extension activities
5) Evaluation for agricultural extension activities
(2) Advice and guidance for the development and utilization of the extension materials
(3) Advise and guidance for agricultural extension trainers in developing training curriculum as well as performing actual training.

B. AMC
(1) Establishment of research methods for the promotion of agricultural mechanization system.
(2) Establishment of measuring and testing methods for the improvement and selection of the following agricultural machinery and implements for:
1) Tillage and harrowing
2) Upland crop harvesting (for maize)
(3) Advice and guidance on agricultural mechanization training.

ANNEX II. JAPANESE EXPERTS

1. Long-term Assignment
A. NAETC
Team Leader
B. AMC
Team Leader
C. Liaison officer for the Project
2. Short-term Assignment
A. NAETC
Experts in the field of Agricultural Extension
B. AMC
Experts in the field of Agricultural Mechanization

Notes:
1. Short-term experts in related fields may be dispatched when necessity arises.
2. Liaison office mentioned in 1. C. above will coordinate the activities of Japanese Teams for the implementation of the Project and for the Central Laboratory and Greenhouse Complex of Kasetsart University.

ANNEX III. LIST OF THE ARTICLES

1. Equipment, machinery, instruments, tools, spare parts and other materials for agricultural extension activities, and measuring and testing of agricultural machinery and equipment
2. Fertilizers, pesticides and chemicals
3. Vehicles
4. Books and other necessary printed matters
5. Other necessary equipment and materials

ANNEX IV. LIST OF THAI COUNTERPART PERSONNEL AND ADMINISTRATIVE PERSONNEL

1. Counterpart personnel
   A. NAETC
      1) Head of NAETC
      2) Researchers in the field of agricultural extension
      3) Technical assistants and/or aids
   B. AMC
      1) Head of AMC
      2) Researchers in the field of agricultural mechanization
      3) Technical assistants and/or aids
   C. Project coordinator of Kasetsart University
2. Administrative personnel
   - Both NAETC and AMC
      1) Clerical personnel
      2) Service employees, operators, laborers
      3) Others

ANNEX V. LIST OF LAND, BUILDINGS AND FACILITIES

A. NAETC
   (1) Administrative building
   (2) Audio-visual media center
   (3) Printing shop
   (4) Classroom building
   (5) Dormitory
   (6) Testing field and other necessary facilities
B. AMC
   (1) Administrative building
   (2) Workshop for agricultural machinery and equipment
   (3) Testing field and other necessary facilities
C. Others
   Other necessary land and buildings for the two Centers

ANNEX VI. JOINT COMMITTEE

1. Functions

The Joint Committee composed of those members as listed under 2. below will meet at least once a year or whenever necessity arises, and work:

(1) To review the overall progress of Tentative Implementation Schedule in line with the Master Plan of the Project;

(2) To review those measures taken by the Government of Japan, i.e.:

1) Dispatch of Japanese experts;
2) Acceptance of Thai counterpart personnel in Japan for training:
3) Provision of machinery, equipment and Special Measures;

(3) To review those measures taken by the Government of Thailand, i.e.:

1) Allocation of necessary budget (including local cost expenditures);
2) Allocation of necessary counterpart personnel;
3) Utilization of machinery and equipment provided by the Government of Japan;

(4) To formulate the Annual Operation Plan of the Project;

(5) To recommend to the two Governments particularly on:

1) Budgetary matters;
2) Recruitment and appointment of Thai counterpart personnel;
3) Selection and effective utilization of machinery and equipment;
4) Appropriate dispatch of Japanese experts;
5) Acceptance of Thai counterpart personnel in Japan for training;
6) Others.

2. Composition

(1) Chairman: Rector of Kasetsart University

(2) Thai side

1) Officials of the Ministry of Agriculture and Cooperatives
2) Dean of the Faculty of Agriculture, Kasetsart University
3) Dean of the Faculty of Engineering, Kasetsart University
4) Director of Kasetsart University Research and Development Institute (KURDI)
5) Director of Extension and Training Office
6) Head of NAETC
7) Head of AMC
8) Coordinator of the Project
9) Others

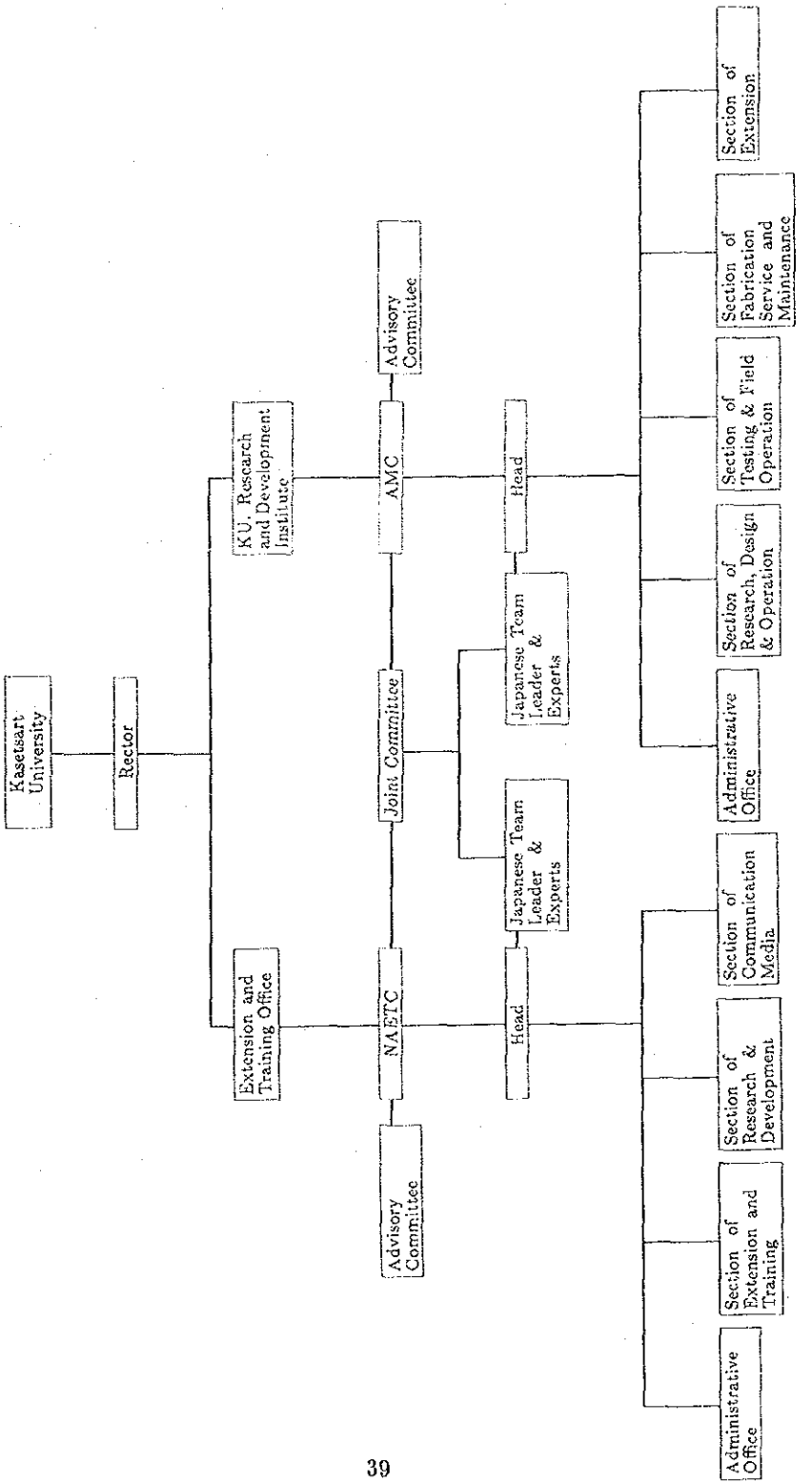
(3) Japanese side

1) Team Leaders
2) Experts designated by the Team Leader
3) Liaison officer
4) Representative of JICA

Note:

Officials of the Embassy of Japan may attend the meeting of the Joint Committee as observers.

ANNEX VII. ORGANIZATION FOR THE IMPLEMENTATION OF THE PROJECT



2. Tentative Schedule of Implementation and Technical Cooperationprogram of the Agricultural Extension and Agricultural Mechanization Project in Kasetsart University

The Japanese Implementation Survey Team and the Thai authorities concerned of Kasetsart University have jointly formulated the Tentative Schedule of Implementation and the Technical Cooperation Program of the Project as annexed hereto. These have been formulated in connection with I-2 of the Attached Document of the Record of Discussions signed between the Japanese Implementation Survey Team and the Thai authorities concerned of Kasetsart University for the Agricultural Extension and Agricultural Mechanization Project on the conditions that necessary budget will be allocated for the implementation of the Project by both sides, and that the above-mentioned Schedule and Program are subject to change within the framework of Record of Discussions when necessity arises in the course of implementation of the Project.

Bangkok, April 30, 1981

Prof. Dr. Phaitoon Ingkasuwan
Rector, Kasetsart University

Mr. Kanji Endo
Leader, Japanese Implementation Survey Team,
Japan International Cooperation Agency

Item \ Year	1st	2nd	3rd	4th	5th	Total
I. JAPANESE ASSISTANCE						
1. Dispatch of Expert (Long-term Assignment)						180
(1) Agricultural Extension	←	—	—	—	→	man-month
(2) Agricultural Mechanization	←	—	—	—	→	
(3) *Liaison Officer*	←	—	—	—	→	
2. Dispatch of Expert (Short-term assignment)						
(1) Agricultural Extension	Several man-month	Several man-month	Several man-month	Several man-month	Several man-month	
(2) Agricultural Mechanization	(Number and duration of these experts will be agreed upon during the operation of the Project)					
3. Training of Thai Personnel in Japan						
(1) Agricultural Extension	Several man-month	Several man-month	Several man-month	Several man-month	Several man-month	
(2) Agricultural Mechanization	(Number and duration of Thai Personnel to be trained in Japan will be agreed upon during the operation of the Project)					
4. Provision of Equipment and Machinery	←	—	—	—	→	Approximately 280 million yen
II. THAI RESPONSIBILITIES						
1. Counterpart Personnel						
(1) NAETC						
1) Head						
2) Researchers in the field of Agricultural Extension	} At least one counterpart to each Japanese Expert					
3) Technical Assistants and/or Aids						

Item \ Year	1st	2nd	3rd	4th	5th	Total
(2) AMC 1) Head 2) Researchers in the field of Agricultural Mechanization 3) Technical Assistants and/or Aids (3) Project Coordinator of Kasetsart University	Necessary number of personnel					
2. Administrative personnel (1) Clerical Personnel of NAETC and AMC (2) Service employees, Operators, Laborers of NAETC and AMC (3) Others	Necessary number of personnel					
III. OFFICE FACILITIES (table, desk, shelf, etc.)	←		Sufficient			→
IV. RUNNING COST (wages, expenses for telephone, electricity, fuel and installation of equipment, etc.)	←		Sufficient			→
V. OTHERS	←		Sufficient			→

Note:
1. This schedule is subject to conditions that necessary budget will be acquired for the implementation of the Project.
2. This scope of Technical Cooperation is subject to change within the score of the provisions given in the Record of Discussions.

Item \ Year	1st	2nd	3rd	4th	5th
A. NAETC (1) Establishment of agricultural extension techniques 1) Surveying methods on actual agricultural conditions	1. Collection and analysis of data 2. *Plan of surveying* (Subjects and Methods) 3. Techniques for investigation 4. Data consolidation and analysis				
2) Planning on agricultural extension program		1. Finding, analysis and judgement of extension problems 2. Solution and counter measures for problems 3. Completion of the extension and training program			
3) Practicing of agricultural extension activities in the field			1. Selection of the extension subjects 2. Setting of training plans 3. Case-study on extension activities		
4) Grouping for agricultural extension activities			1. *Guidance methods to the* different types of groups 2. Training methods of group leaders 3. Group activities by project-method		
5) Evaluation for agricultural extension activities				1. Recording of extension activities 2. Evaluation programming 3. Estimation method of extension effect 4. Evaluation methods	

Item \ Year	1st	2nd	3rd	4th	5th
(2) Advice and Guidance for the development and utilization of the extension materials 1) Visual aids		1. Printing 2. Posters, charts, and leaflets, etc. 3. Photography and demonstration farms			
2) Audio-visual aids		1. Slide films 2. Motion pictures 3. Video tape recording			
(3) Advice and Guidance for Agricultural extension trainers in developing training curriculum as well as performing actual training				1. Identification of the technical level and training needs of extension workers 2. Making of model training curriculum (Basic course and staple products courses) 3. Making of training curriculum 4. Evaluation of training results	
B. AMC (1) Establishment of research methods for the promotion of agricultural mechanization system 1) Research and investigation on actual conditions of agricultural mechanization	1. Preparatory research (Rice, Maize, Sugarcane) 2. Setting of method and items for preparatory research and investigation	1. Analysis and evaluation of results 2. Planning of main research and investigation	1. Main research and investigation (Rice) 2. Analysis of results (Rice)	1. Main research and investigation (Maize, Sugarcane) 2. Analysis of results (Maize, Sugarcane)	1. Finalization and evaluation of research and investigation

Item \ Year	1st	2nd	3rd	4th	5th
	3. Planning of preparatory research 4. Collection of necessary materials				
2) Selection of appropriate methods for research and investigation				1. Selection of appropriate methods for research and investigation (Rice)	(Maize, Sugarcane)
3) Compiling of research and investigation manual					1. Compiling of research and investigation manual
(2) Establishment of measuring and testing methods for the improvement and selection of agricultural machinery and implements 1) Tillage and harrowing a) *Testing on physical properties* of soils under plowing and harrowing		1. Testing on physical properties of soils (moisture, hardness, soil layer, consistency, etc.)	1. Experiments on working efficiency and soil movement under plowing and harrowing by plow, harrow and rotor	1. Analysis and evaluation of results 2. Establishment of testing methods	

Item \ Year	1st	2nd	3rd	4th	5th
b) Measuring and testing on machinery and implements for plowing and harrowing	1. Investigation on prevailing methods of plowing and harrowing	1. Performance test (paddy field) 2. Traction test by tractor (paddy field)	1. Performance test (upland field) 2. Traction test by tractor (upland field)	1. Analysis and evaluation of results 2. Establishment of measuring and testing methods	
2) Upland Crop Harvesting (for Maize)	1. Investigation on prevailing methods of harvesting	1. Performance test 2. Finding of improvement	1. Performance test 2. Improvement of maize harvester	1. Performance test of improved maize harvester	1. Analysis and evaluation of results 2. Establishment of testing methods
(3) Advice and guidance on agricultural mechanization training	1. Identification of the technical level and training needs of agricultural mechanization 2. Making of training programming 3. Evaluation of training results				

3. Minutes of Meeting on the Record of Discussions

The Minutes of Meeting on the Record of Discussions on
the Technical Cooperation for the Agricultural Extension and
Agricultural Mechanization Project in Kasetsart University

The Japanese Implementation Survey Team and the authorities concerned of the Government of Thailand have jointly agreed upon and signed the Record of Discussions (hereinafter referred to as "the R/D") to establish a basis for the technical cooperation for the Agricultural Extension and Agricultural Mechanization Project to be carried out in Kasetsart University (hereinafter referred to as "the Project") on the conditions that the necessary budget will be allocated for the implementation of the Project by both sides, and the schedule is subject to change within the framework of the R/D when necessity arises in the course of implementation of the Project. Agreement made by both sides is recorded as the following Minutes of Meeting in order to clarify and specify the issues as described in the R/D.

I. ORGANIZATION

Organizationwise, the National Agricultural Extension and Training Center (hereinafter referred to as "NAETC") and the Agricultural Machinery Center (hereinafter referred to as "AMC") in Kasetsart University are recognized as units of academic department rank, i.e., the former is under the Office of Extension and Training (faculty level), the latter is under the Kasetsart University Research and Development Institute (faculty level).

II. COVERAGE OF THE TECHNICAL COOPERATION

1. NAETC
   (1) The technical cooperation to be extended by Japanese experts at the NAETC as specified in the R/D, Annex I.A. will be mainly focused upon the Head and counterpart personnel of the Center, The cooperation will not be extended directly to such people as agricultural extension workers, farmers, etc.
   (2) The term "Surveying", which is specified in the R/D, Annex I, A (1), 1), will be performed in adjacent area of Kamphaengsaen Campus of Kasetsart University.
   (3) The term "Grouping", which is specified in the R/D, Annex I, A, (1), 4), means how to arrange the rural people through the activities of the 4H club and Women's club and so on.
   (4) Advice and guidance concerning the training activities to be done by the Japanese experts referred to in the R/D, Annex I, A, (3) will be mainly focused upon the development of training curriculum and planning of actual training.

2. AMC

(1) Research and investigation on actual conditions of agricultural mechanization referred to in the Tentative Schedule of Implementation and Technical Cooperation Program, Annex II, B, (1), 1), covers sugarcane in addition to rice and maize; however, sugarcane will not be included for upland crop-harvesting.

(2) Advice and guidance concerning the training activities to be given by the Japanese experts referred to in the R/D, Annex I, B, (3) will be mainly focused upon the development of training curriculum and planning of actual training.

III. FACILITIES FOR JAPANESE EXPERTS

(1) In accordance with the R/D, the Attached Document VII, 1, (3), the Thai side will provide transportation facilities for both long-term experts and short-term experts to be dispatched from Japan.

(2) The Thai side will provide offices at NAETC and AMC for the Japanese Team Leader and other experts and at Bangkhen Campus for the Japanese Team Leaders and Liaison Officer.

(3) The Thai side will provide suitably furnished accommodation for the Japanese Team Leaders, Liaison Officer and other experts at Kamphaengsaen Campus.

IV. ASSIGNMENT OF COUNTERPART PERSONNEL

(1) Substantial number of counterpart personnel and administrative personnel should be assigned prior to the arrival of the Japanese experts in Thailand.

(2) One (1) liaison officer mentioned in the R/D, Annex II, 1., C., should be dispatched from Japan in order to coordinate the two Projects, namely, the Research and Development Project and the Agricultural Extension and Agricultural Mechanization Project.

V. PROVISION OF MACHINERY AND EQUIPMENT

The provision of machinery and equipment for the two Centers will be based upon the priority, the conditions of the existing machinery and equipment and the progress of the technical cooperation program, through mutual consultation between the Japanese experts and the Thai counterparts, and the recommendation of the Joint Committee.

VI. FACILITIES

(1) For the Provision of Special Measures to be taken by the Government of Japan in the fiscal year 1981, described in the R/D, the Attached Document, VI, 2, the Thai side requested the Team to allocate the budget for the construction of the soil bin (except measuring and testing equipment) and Nebraska surface facility. Among these facilities, the Team indicated that it would report to the Government of Japan that the strong request for Special Measures concerning the construction of the soil bin merits prompt and appropriate consideration.

(2) The Thai side expressed its intention to construct the experimental field with paddy field of one (1) hectare and upland field of four (4) hectares at the area adjacent to the AMC.

(3) Construction of the water source facilities to the above field and the soil bin will be completed by the Thai side by September, 1981.

Bangkok, April 30, 1981

Prof. Dr. Phaitoon Ingkasuwan
Rector, Kasetsart University

Mr. Kanji Endo
Leader, Japanese Implementation Survey Team,
Japan International Cooperation Agency