

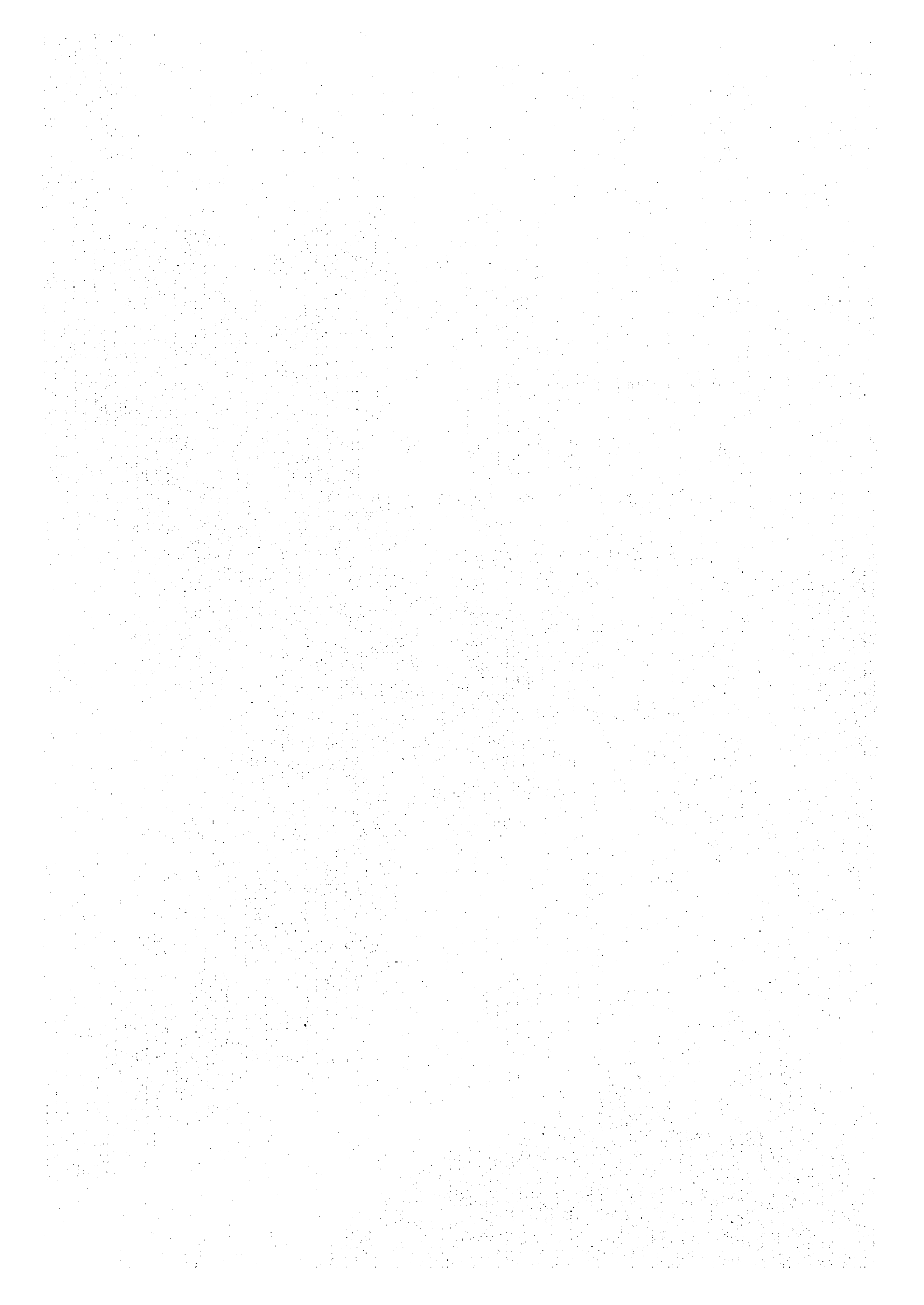
付 属 資 料

資料1 ミニッツ

資料2 当初プロジェクト (ADAET) の概要

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MINUTES OF DISCUSSIONS
ON
THE AFTERCARE PROGRAM
OF
ACADEMIC DEVELOPMENT OF THE GRADUATE PROGRAM
AT THE FACULTY OF AGRICULTURAL ENGINEERING AND TECHNOLOGY,
INSTITUT PERTANIAN BOGOR (IPB)

The Japanese Aftercare Survey Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Yasuhisa SEO, visited the Republic of Indonesia from September 14, 1997 for the purpose of working out the details of the Aftercare Technical Cooperation for Academic Development of The Graduate Program at The Faculty of Agricultural Engineering and Technology, Institut Pertanian Bogor Project (hereinafter referred to as "the Aftercare Program") in the Republic of Indonesia.

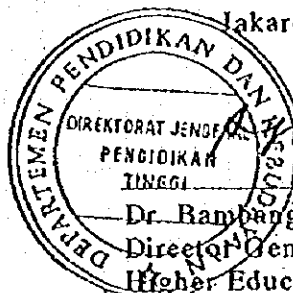
During its stay in the Republic of Indonesia, the Team carried out a field survey, exchanged views and held a series of discussions with the Indonesian authorities concerned in respect of the desirable measures to be taken by both Governments for the successful implementation of the above-mentioned Program.

As a result of the discussions, in accordance with provisions of the Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Indonesia, the Team and the Indonesian authorities concerned agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Jakarta, September 23, 1997



Dr. Yasuhisa SEO
Leader,
Aftercare Survey Team
Japan International
Cooperation Agency, JICA



Dr. Bambang Suhendro
Director General of
Higher Education,
Ministry of Education and Culture
The Government of the Republic of
Indonesia

THE ATTACHED DOCUMENT

I. OBJECTIVES OF THE AFTERCARE PROGRAM

The Government of Japan and the Government of the Republic of Indonesia will cooperate with each other in implementing the Aftercare Program for the purpose of supporting and developing the achievements of the "Academic Development of The Graduate Program at The Faculty of Agricultural Engineering and Technology, Institut Pertanian Bogor Project" which terminated on March 31, 1993.

II. COOPERATION ACTIVITIES OF THE AFTERCARE PROGRAM

In order to attain the above-mentioned objectives, the following activities of the Aftercare program will be carried out at the Faculty of Agricultural Engineering and Technology, Institut Pertanian Bogor.

- (1) Technical guidance for repair and maintenance of equipment and instruments.
- (2) Technical guidance for training of graduate students in the field of agricultural engineering technology.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF JAPAN

In accordance with the laws and regulations in force in Japan, the Government of Japan will take, at its own expense, the following measures through JICA according to the normal procedures under the technical cooperation schemes of Japan.

1. DISPATCH OF JAPANESE EXPERTS

The Government of Japan will dispatch a few Japanese short-term experts for smooth implementation of the Aftercare Program.

2. PROVISION OF EQUIPMENT

The Government of Japan will provide machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Aftercare Program. This will include the replacement and renewal of already available machinery and instruments which were donated by the Government of Japan at the

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Faculty of Agricultural Engineering Technology, Institut Pertanian Bogor and will be used to further enhancement of the related graduate program under the ADAET Project. The Equipment will become the property of the Government of the Republic of Indonesia upon being delivered C.I.F. to the Indonesian authorities concerned at the ports and/or airports of disembarkation.

3. TRAINING OF INDONESIAN COUNTERPART PERSONNEL IN JAPAN

The Government of Japan will train the Indonesian personnel connected with the Aftercare Program for technical training in Japan.

IV. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF INDONESIA

In accordance with the laws and regulations in force in the Republic of Indonesia, the Government of the Republic of Indonesia will take the following measures to provide at its own expense:

1. INDONESIAN COUNTERPART AND ADMINISTRATIVE PERSONNEL

The Government of the Republic of Indonesia will secure the services of qualified Indonesian counterparts, administrative personnel and supporting staff.

2. PROVISION OF FACILITIES

The Government of the Republic of Indonesia will provide the facilities necessary for implementation of the Aftercare Program.

3. SUPPLY AND REPLACEMENT OF EQUIPMENT, INSTRUMENT AND MACHINERY

The Government of the Republic of Indonesia will supply and/or replace machinery, equipment, tools, spare parts and other materials necessary for implementation of the Aftercare Program except for the Equipment referred to in III.2 above.

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4. ALL RUNNING EXPENSES

The Government of the Republic of Indonesia will cover the running costs of the facilities (e.g. electricity, water, fuel) for implementation of the Aftercare Program.

V. ORGANIZATION OF THE AFTERCARE PROGRAM

1. RESPONSIBLE SUPERVISION AND IMPLEMENTATION ORGANIZATION

(1) Responsible Supervision

Directorate General of Higher Education, Ministry of Education and Culture, The Government of the Republic of Indonesia

(2) Implementation Organization

The Graduate Program, Institut Pertanian Bogor

2. PROJECT SITE

The Graduate Program, Institut Pertanian Bogor.

VI. MUTUAL CONSULTATION

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

VII. TERM OF COOPERATION

The duration of technical cooperation for the Aftercare Program will be two (2) years from April 1, 1998.

VIII. OTHERS

1. The Government of The Republic of Indonesia should make necessary arrangements for requesting the dispatch of Japanese experts, the provision of equipment and training of Indonesian counterpart personnel in Japan by submitting the application forms (A1, A4 and A2-3 Form) as quickly as possible.
2. The Aftercare Program under this Minutes will be implemented according to the articles in the Record of Discussions signed on December 24, 1987, except for the matters stipulated above.
3. The Team and the Indonesian authorities expected that Aftercare Project could play an increasingly important role not only to accelerate the enhancement both in terms of educational and research activities in the fields of agricultural engineering and technology at the IPB graduate program but also to contribute for the sustainable agriculture in Indonesia and other developing countries.

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資料2 当初プロジェクト (ADAET) の概要

《内 容》

(1) プロジェクト目標

- 1) 共同研究を通じた IPB 教職員のレベルアップ
 - ・ 学術レベルの向上
- 2) 大学院生に対する学位取得に必要な指導・助言
 - ・ 修士号と博士号の取得
- 3) セミナーやワークショップなど研究機関との学術交流に対する指導、助言
 - ・ 他の研究機関との学術交換

(2) 活動内容

- 1) 共同研究を通じての技術移転
- 2) 農業工学分野での専門家の派遣
- 3) 機材供与、既供与機材の維持管理
- 4) 学位修得研修

(3) 共同研究課題

- 1) 作物生産圃場への農業機械利用の最適化
- 2) 農業生産のシステム解析手法
- 3) 労働科学と農作業体系学
- 4) エネルギーと農村電化
- 5) 農業施設と材料強度学
- 6) 農業への水文モデル最適化
- 7) インドネシアにおける灌漑と排水の有効利用
- 8) 作物生産への圃場最適物理条件の評価
- 9) ポストハーベストテクノロジー
- 10) 食品工学

(4) プロジェクト期間

1988年4月1日～1993年3月31日 (5年間)

(5) 実施機関

合同委員会 (別添1参照)

《活動実績》

(1) 専門家

12名の長期専門家と多数の短期専門家、JOCV 1名の派遣

(2) 研修

1) 海外

学位なし：日本等で研修

学位あり：アジア工科大学院 (AIT)、タイで研修

2) インドネシア国内

学位なし：1年以内の農業工学分野に関するトレーニング (427名)

学位あり：157名中79名が修士、博士課程卒業、2名が博士号取得 (別添3)

(3) セミナーとワークショップ

国内：国内レベルで多数、国外レベルで1度開催

海外：海外で開催されたセミナーとワークショップに数名参加 (別添2)

(4) 著作

IPBのC/Pにより27冊の本と21冊のマニュアルを発行

(5) 供与機材の獲得、維持管理

日本側から1億1,796万380円、IPB側から9,273万ルピア

(6) 他の研究所での共同研究の実施

20の研究所で実施

(7) モデルインフラの確立

(8) 他大学との連携 (別添4)

《終了時評価調査》

本プロジェクトは研究者の育成や学術交流等に着実な成果をあげたが、更なるレベルアップを図るため、協力期間終了後のとるべき対応策として、以下に記してある提言がなされた。

(1) 1名ないし2名の長期専門家の派遣

(2) 既供与機材のスベアパーツの供与

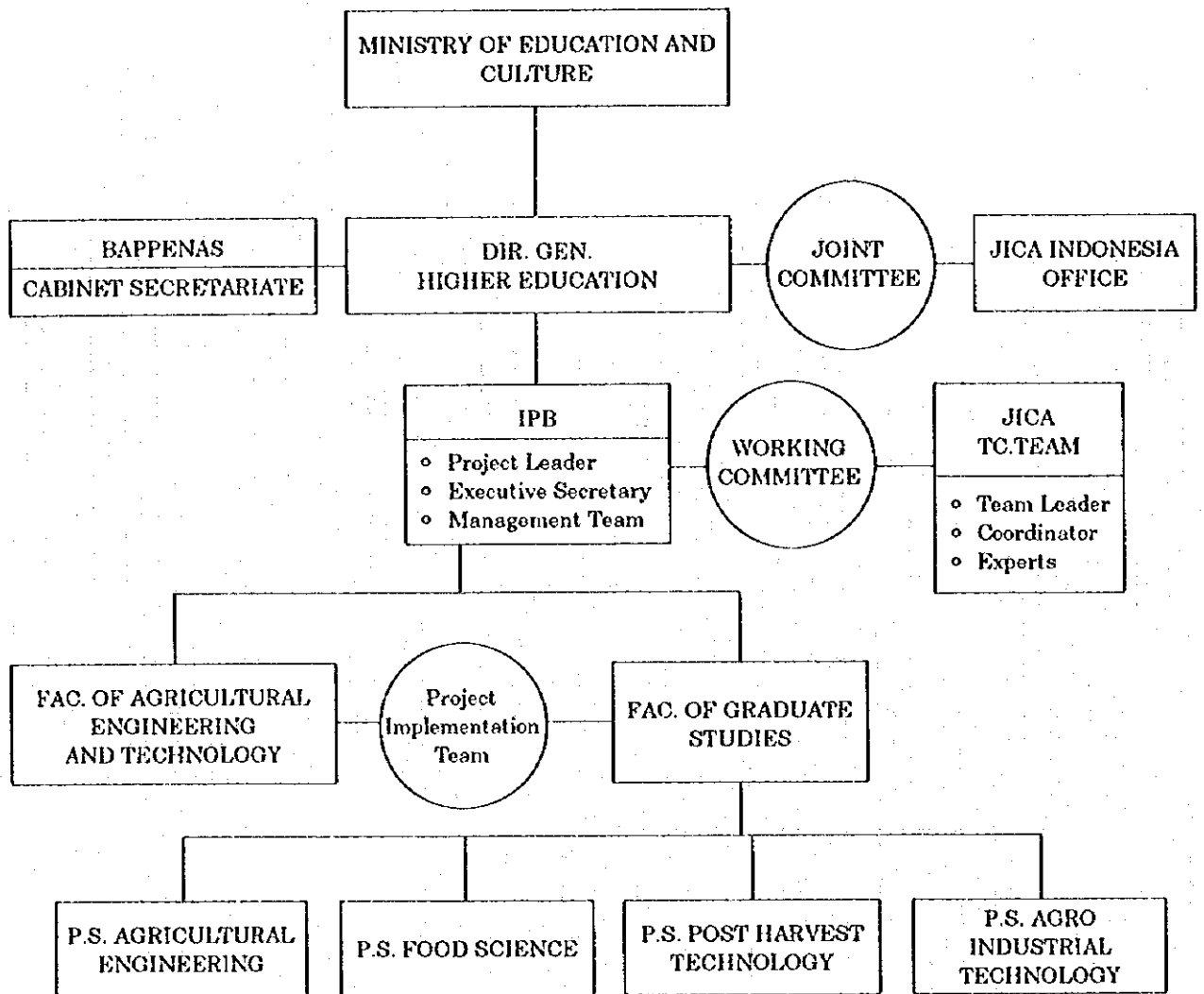
また、インドネシア側から次の項目について指摘があった。

- (1) 供与機材の一部不着、いくつかの基本機材の不足
- (2) JICA 専門家の指導による修士、博士プログラムの未終了
- (3) プロジェクトで得られた本、雑誌の不足
- (4) 他の機関との連携の強化
- (5) プロジェクトの完全な成功に必要な専門家の指導

さらに、終了時評価調査団の提言を踏まえてプロジェクト終了後、次の専門家の要請に基づき指導が継続されている。

個別（長期）専門家：各分野1名（農業機械、農業土木）

別添1 実施機関組織図



PROPOSAL

AFTER-CARE PROJECT

FOR

ACADEMIC DEVELOPMENT OF GRADUATE PROGRAM AT THE
FACULTY OF AGRICULTURAL ENGINEERING AND TECHNOLOGY
(ADAET) : JTA-9a (132)

INSTITUT PERTANIAN BOGOR
DIRECTORATE GENERAL OF HIGHER EDUCATION
MINISTRY OF EDUCATION AND CULTURE
THE REPUBLIC OF INDONESIA



JICA-DEGHE/IPB PROJECT/ADAET : jta - 9A (132)
Academic Development of the Graduate Program
The Faculty of Agricultural Engineering and Technology
Bogor Agricultural University
(Institut Pertanian Bogor)

PROPOSAL

AFTER-CARE PROJECT FOR ACADEMIC DEVELOPMENT OF GRADUATE PROGRAM AT THE FACULTY OF AGRICULTURAL ENGINEERING AND TECHNOLOGY (ADAET) : JTA-9a (132)

INSTITUT PERTANIAN BOGOR
DIRECTORATE GENERAL OF HIGHER EDUCATION
MINISTRY OF EDUCATION AND CULTURE
THE REPUBLIC OF INDONESIA

I. BACKGROUND

A. THE PROJECT

Project ADAET JTA-9a (132) was initiated in April 1988. According to its R/D signed on December 24, 1987, the project has been terminated in March 1993. During the four years of the project implementation, the Project was properly carried out as stated in the tentative schedule of Implementation and the R/D.

1. Project Objectives

- 1) To provide technical guidance and advice to Indonesian counterpart personnel through joint research with the following purposes:
 - a. Upgrading the academic level
 - b. Obtaining masters and doctoral degrees
 - c. Increasing academic exchanges between IPB and other institutions in Indonesia
- 2) To conduct the following activities in relation to joint research:
 - a. Seminar/Workshop
 - b. Training
 - c. Instructional Material Development
- 3) To provide equipment and instruments for graduate research and education

2. Project description

Accomplishment of ADAET Project Activities covering aspects in:

- 1) Transfer of technology through research cooperation
- 2) Provision on experts in the field of Agricultural Engineering and Technology
- 3) Procurement of equipment and instrumentation
- 4) Degree and non-degree training
- 5) Multiplying effects of technical cooperation

3. Scope of cooperation

- 1) Manpower development
- 2) Institution buildings in graduate program

B. ACHIEVEMENTS

After four years of project implementation, the following activities were achieved:

1. Experts

A total of 12 long-term experts (28 man-years) and short-term experts (25 man-years) from JICA including one from JOVC.

2. Training

1) Overseas

- Non-degree: 20 trainees to Japan, one to the Philippines, and 4 short visits to Thailand
- Degree : One to AIT, Thailand (MS degree)

2) In-country

- Non-degree: Annual mid-level training comprising of the Advanced Agricultural Engineering, short courses, technician training and curriculum development.

A total of 427 participants were trained from 20 universities and research institutes throughout Indonesia.

- Degree : JICA experts involved in the lectures in the graduate course and refreshing course, etc., as a member of advisory committees in the university.

The total number of 157 students (138 students in the MS degree-course, 19 students in the Dr. degree-course) enrolled, and the total number of 79 students (70 MS students, 9 Dr. students) graduated successfully from the following two graduate-study-programs related to the IPB-JICA-Project: (refer to Table II)

the field of Agricultural Engineering Science

44 MS-degree holders, and 9 Dr.-degree holders

the field of Post-Harvest Technology

26 MS-degree holders.

3. Seminar and workshop

- In-country: Holding 4 annual Joint IPB-JICA seminars on Agricultural Engineering and Technology and one international seminar scheduled for October 1992. The Project also provided seminars and workshops both of the national and international levels.

- Overseas: The IPB-JICA-Project contributed and participated in 16 kinds of International Seminars and Conferences. (Refer to Table I)
The JICA-Project provided the limited supports to the participants who attended to the following international society meetings:

- 3 participants to International Seminar on International Drying Symposium (IDS' 90) in Chekoslovakia
- 4 participants to Agricultural Engineering Seminars on Agricultural Mechanization in Beijing, China
- 2 participants to the 1st AFCEDA meeting in Malaysia
- 2 participants to the International Irrigation Seminar in Thailand.

4. Book Writing

About 27 books and 21 laboratory manuals had been printed and published. The books were written by IPB staff counterparts together with JICA experts and by the graduate students with JICA experts.

5. Procurement of Research Equipment and Instrumentation

About 117, 960, 380 Yen (1988-1991) had been spent for the equipment and instrumentation from Japan and Rp. 92 730 000 (1988-1991) from the Government of Indonesia, including basic instrumentation and equipment for education and collaborative research activities.

6. Collaborative researches

A total of 20 researches had been completed.

7. Establishment of Model Infrastructure

8. Establishment of Linkages and Extension Services to Other Universities, Institutions, Agencies

A total of 39 extension activities as the out-reaches were achieved to the Indonesian society. (Refer to Table III)

C. PROBLEMS FACED (as of end, 1992)

Despite of the above achievements and success, several programs remain to be accomplished when the project terminated in April 1993.

- 1) Provision of FY 1991 and 1992 equipment which may not arrived within FY 1992, or some basic equipment were not possible to be procured during the implementation of the Project.
- 2) Completing MS and Dr. program of those under the guidance of JICA experts.

- 3) Provision of Books and Journals. So far very limited number of books and journals had been procured by the projects. Since updated references are imperative to conduct graduate education, adequate books and journals need to be provided in the future.
- 4) Establishing linkages. Some of linkages with related institutions had been lied down. However, such activities should be continued in the future to support the graduate program both in terms of source of students as well as funding.
- 5) Expert assignment is still needed to complete the project successfully such as graduate student guidance, installation of procured equipment, completion of collaborative research and administration activities.

D. ASSIGNMENT OF INDIVIDUAL EXPERTS

The remaining activities stated in problems faced above (Item C) had been solved orderly during the completion of the Project. Besides the success of the over all Project, the GOJ dispatched a total of 8 man-years individual experts. The individual experts are comprised of:

1. Long-term experts

- 1) 4 man-years individual experts for agricultural machinery (June 1993 to October 1997)
- 2) 4 man-years individual experts for soil and water engineering (June 1994 - October 1998)

2. Short-term experts

A total number of 3 short-term experts served from 1993 to 1997 in the project. (2~3 weeks / one expert)

II. NECESSITY OF AFTER-CARE PROJECT

A. PRESENT CONDITION OF THE PROJECT

1) Organization

The ever increasing needs of agricultural engineering and mechanization to develop a sustainable agriculture system in Indonesia, force IPB through its Department of Agricultural Engineering, Faculty of Agricultural Technology & Engineering to increase their involvement and activities.

Since February 1996, mainly based on the success of ADAET Project implementation, the activities under the Center for Research on Engineering Applications in Tropical Agriculture (CREATA) have received a grant for three years' implementation.

2) Utilization of Facilities and Equipment

So far all equipment and laboratory instrumentation provided through the ADAET (Academic Development of Graduate Program at the Faculty of Agricultural Engineering Technology) from 1986 to 1993 had been utilized effectively in conducting high quality graduate education (teaching and research), as shown in Table II which indicates the considerable number of MS and Dr. degree-holders were produced during the course of project implementation.

Besides graduate education, the equipment and instruments were also used to support research activities of individual staff as well as team-research activities in the Faculty of Agricultural Technology including collaborative-research activities with other universities and several related departments such as the Ministry of Agriculture, Ministry of Transmigration, Ministry of Public Works, Ministry of Cooperatives and Small Entrepreneurs Development, BULOG, BPP Technology and others including the private sectors.

In order to assist other universities and also to establish effective linkages with the governmental institutions and private sectors, project facilities were also utilized during annual training of highly demanded expertise of Agricultural Engineering, such as the Application of the GIS, Solar Energy Conversion Technology, Thermal System Design in the Processing of Agricultural Products, Industrial Drying Technology, System Management and Analysis, Farm machinery. (Refer to Table III)

Some of these training activities have been conducted and supported by the DGHE on regular basis for the purpose to assist universities in the Eastern Region of Indonesia to enhance their research.

Recently, some staff have been returning back from overseas, particularly from Japan (8 Doctors), and they have started to conduct their advanced graduate studies, more research activities as well as graduate teaching activities in the undergraduate and graduate courses in the university.

As a result in the currently, available equipment and instrumentation are no more adequate to support their contribution in further development of the graduate program in the field of Agricultural Engineering Technology. Since most equipment and instrumentation were purchased more than 10

years ago, some of them require replacement of their old parts to new ones, and some of them need not small reparation but a complete replacement with the new one. (Refer to Table IV)

B. NECESSITY AND PURPOSES OF THE AFTER-CARE PROJECT

Therefore, due to the above reasons and in order to sustain further development of the Graduate Program at the Faculty of Agricultural Engineering Technology of IPB which in currently has been expanded to include the training of graduate students from the "ASEAN" region and may include even those from other developing countries such as the "African continent", reparation and replacement of equipment and facilities whenever felt necessary through JICA's "after care" program is indeed will play a very decisive role.

The current investment through the ADAET Project may be used to conduct the "3rd Country Training Course" in the near future on subjects belong to "Agricultural Engineering Technologies" which are unique under the "Tropical Condition".

Furthermore, since good and high quality graduate-education may take longer time to really recognize their tangible impact to the development of a country, a continuous support of JICA in the future will ensure that the ultimate aim of the Japanese government assistance for the economic well being and self reliance of the developing countries will finally be achieved and hence a peaceful condition based upon mutual understanding among nations in the world can be nurtured and created.

Table IV shows the list of all equipment and instrumentation provided by the Japanese government through the JICA sponsored ADAET Project, and provides the present condition of these equipment and instruments which can be used to determine the magnitude of assistance through the "After-Care Project" as described below.

This after-care project may have a possibility to promote the scientific level of the IPB staff so as to contribute their academic papers, the results of collaborative research activities in the project, to the Peer Reviewed Journals published by international academic societies.

C. PROPOSED PROGRAM OF THE AFTER-CARE PROJECT

Proposed program of the after-care project:

- 1) Reparations and replacements of equipment and laboratory instrumentation provided by JICA through the ADAET Projects and through the Grant in Aid in the past.
- 2) Provision of experts: 1 (one) long-term and 2 or 3 short-term experts every year in the field of Agricultural Engineering.
- 3) Proposed period of the after-care Project: 2 (two) years.

D. PROPOSED BUDGET

The amount of proposed budget will depend on the degree of replacement and reparation of equipment and instrumentation listed in Table IV and a required number of experts necessary to fulfill the task. Indonesian Government will provide counter budget in terms of Japanese contribution (office, counterparts, after-care committee).

Table 1. List of Participation in International Seminars

No.	Name	Seminar	Title of paper	Date
1.	Dr. Kamaruddin A. Dr. Moeljamo D. Dr. Y. Sagara	International Drying Symposium		2-10 Sept., 1988
2.	Ir. Asep Sapei; MS	Seminar of Japan Society of Agricultural Civil Engineering which was held in Tokyo		July, 1989
3.	Dr. Kamaruddin A. Ir. A. Kohar, Msc	The Seminar on Energy Planning for 2010 for ASEAN		19-23 Feb., 1990
4.	Dr. Kamaruddin A.	International Seminar on Scientific Policy Issues Facing All Government International	Estimation of Forest Area Change in Indonesia	9-13 April, 1990, Chicago, USA
5.	Dr. Atjeng M. Syarief Dr. Soedodo H.	Asia Pasific Regional Conference on Engineering for the Development of Agricultural II (AFOED)	The Status of Agricultural Mechanization in Indonesia and High Agricultural Engineering Education in Indonesia	5-7 June, 1990, Malaysia
6.	Dr. Kamaruddin A. Dr. Y. Sagara	World Renewable Energy Congress	Development of Cooling system Using Renewable Energy Souce	22-25 Sept., 1990, Univ. of Reading, UK
7.	Prof. T. Nakamura Prof. I. Nisimura Dr. Moeljamo D. Dr. Tineke Mandang	International Conference and Exhibition on Agric. Engineering		3-6 Dec., 1990, Bangkok Thailand
8.	Ir. Frans Weaur Dr. Kamarudin A. Dr. Y. Sagara	The IDS' 90	Freeze Drying Characteristic and Transport of Shrimp Pastes	Aug., 1990 Prague, Chekoslovalia
9.	Dr. Tineke Mandang Ir. Inan Hidayat	International Agricultural Mechanization Conference	The Effect of Dynamic Load and Intersity of Tractor Traffic on Soil Compaction	16-20 Oct., 1991, Beijing, China
10.	Ir. E.N. Sembiring, MS Dr. Tineke Mandang	International Agricultural Mechanization Conference	Soil Compation as Influenced by Mechanical Tillage in Sugar Care Plantation	16-20 Oct., 1991, Beijing, China
11.	Dr. Soedodo H.	International Workshop on Soil and Water Engineering for Paddy Field Management	The Effect of Depth of Floding and Method of Water Application on Water Requirements and Yeld of Wetland Paddy	28-30 Jan., 1992, Bangkok, Thailand

12.	Ir Asep sapei, MS Dr. M. Azron Dhalhar Prof. T. Nakamura	International Workshop on Soil and Water Engineering for Paddy Field Management	Study on The Physical Properties of Two Soil Types of wet Paddy in west Java, Indonesia	28-30 Jan., 1992, Bangkok
13.	Prof. Kamaruddin A.	Eur Eng' 94	Performance of Renor MP II Flat Type Solar Dyrer for Cloves and Black Paper	Aug., 29-Sept. 4, 1994, Milan, Italy
14.	Prof. Kamaruddin A.	IDS' 94	Drying of Black Pepper Using Solar Energy	1-4 Aug., 1994 Gold Cost, Australia
15.	Prof. Kamaruddin A.	FTEC' 94	Heat and Mass Transfer Within a Fibreglass house Solar Dryer	12-14 Dec. 1994, Denpasar-Bali
16.	Dr. Tineke Mandang (and Team)	Eur Eng' 94	The Effect of Organic Matter on Tillage Draft and The Physical Properties of Soil	20 Aug.- 4 Sept. 1994 Milano, Italy

Table II. Numbers of degree course students who enrolled and graduated

. Study/year	1988	1989	1990	1991	1992	1993	1994	1995/ 1996	Total
Agricultural Engineering									
Teaching staff degree									
MS									
Dr.									
Enrollment									
MS	11	10	7	4	5	5	4	9	55
Dr.	1	2	1	2	0	1	1	11	19
Graduates									
MS	6	6	5	3	2	10	5	7	44
Dr.	0	2	2	1	1	0	0	8	14
Post-harvest Technology									
Enrollment									
MS	15	10	8	15	6	6	7	16	83
Graduates									
MS	-	-	-	-	-	2	6	18	26
GRAND TOTAL									
ENROLLMENTS									
MS	26	20	15	19	11	11	11	25	138
Dr.	1	2	1	2	0	1	1	11	19
GRADUATES									
MS	6	6	5	3	2	12	11	25	70
Dr.	0	2	2	1	1	0	0	3	9

Note : Program of Study in Post-harvest Technology started in 1986

Table III : List of linkages developed since 1989 - 1995

No.	Collaborative Agency	Contract Amount	Title	Category
1.	Ministry of Transmigration		Training for main staff and private contractor (10 phases) in land preparation and land farming	Training
2.	Citas Engineering	Rp. 25.000.000,-	Solar Tea drying	Applied research
3.	IDRC and Universite Moncton	Rp. 296.000.000,-	Passive crop dryer	Training
4.	AGPP and Bulog	Rp. 280.000.000,-	Development of soybean post-harvest system	Applied research
5.	Bina Pertiwi Co. Ltd.	Rp. 84.000.000,-	Modification and development of moldboard plow hand tractor	Applies research
6.	Yamaha Motor Co. Ltd	Rp. 40.000.000,-	Development of an agro-carrier	Applied research
7.	APBN		Irrigation efficiency at tertiary blocks	Applied research
8.	APBN		Evaluation of optimum physical condition for crop growth	Applied research
9.	BAPEDAL		Damage criteria development of sand mining for river environment deterioration mitigation	Applied research
10.	Ministry of Transmigration	Rp. 100.054.000,-	Development of macro KUD in TSSDPI, Pasir pangaraian and Belilas	Applied research
11.	Ministry of Transmigration	Rp. 199.960.000,-	Center for the development of intergrated transmigration area	Training
12.	Dit. Bina Usaha Ekonomi Ditjen Pengarahan dan Pembinaan Deptran		Preparation for the development of workshop to support rural industry	Training
13.	PT. INDECO DUTA UTAMA		Consultancy agricultural research management, ground water utilization specialist	Consultancy
14.	Biro Pusat Statistik	Rp. 114.000.000,-	Consultancy, planning for sampling method and facilities	Consultancy
15.	Ministry of Cooperative	Rp. 504.000.000,-	Training on the development of entrepreneurship skill of KUD manager	Training
16.	Ministry of Cooperative	Rp. 50.000.000,-	Development pattern of cooperation among KUD provinces	Applied research
17.	PT. INDECO DUTA UTAMA MOA-Estate Crops Directorate General	Rp. 40.000.000,-	Environment information assessment environment management planning for crumb rubber factory	Applied research
18.	Deptran	Rp. 199.529.000,-	Survey on water resource potential and determination of	Applied research

			pump location in 26 provinces	
19.	Ministry of cooperative	Rp. 314.966.000,-	Training for consultant and KUD	
20.	Ministry of Cooperative	Rp. 199.957.000,-	Development of integrated transmigration area	Applied research
21.	Ministry of Cooperative	Rp. 21.600.000,-	Training for public nucleus estate	Training
22.	Agency for Technology Assessment and Application	US\$ 1,500	Training on system analysis and agricultural information system	Training
23.	PT. Total Persada, PT. Pembangunan Perumahan, PT. PTT-HIT-JO, PT. Exotica, PT. Jatiwaringin, PT. Tunggal Kaung, PT. Rancamaya, PT. Octamix	US\$ 10,000	Highly tension on concrete cube sample	Material Testing
24.			Development of seeds drying system for urban small scale industry.	Research
25.			Training on agroindustrial processing for KUD staff	Training
26.	Ministry of Cooperative	US\$ 250,000	Training on Agrobusiness for KUD (Village Unit Cooperatives)	Training
27.	Ministry of Cooperatives and Small Enterprises Development	US\$ 150,000	Training for Consultant of Extension Workers on Agrobusiness for KUD (Villages Unit Cooperatives)	Training
28.	Ministry of Cooperatives and Small Scale Enterprises	US\$ 55,000	Training on Small-Scale Agroindustrial Process for KUD	Training
29.	ARM/World Bank - Ministry of Agriculture CDAE - Serpong	US\$ 16,000	Training on Agricultural Machinery Design	Training
30.	Ministry of Cooperative	US\$ 25,000	Development Pattern for Networking of KUD (Village Unit Cooperatives)	Development
31.	Ministry of Cooperatives and Small Enterprises Development	US\$ 22,500	Pilot Project for Cooperative Networking	Development
32.	Ministry of Industry	US\$ 8,000	Candle Nut Processing and Marketing	Study
33.	BAPPENAS (Agency for National Development Planning)	US\$ 5,000	Assessment and Prospect of Small Credit Scheme for Agricultural Machinery	Study
34.	FAO-Ministry of Agriculture		National Policy and Strategy on Agricultural Mechanization	Consultancy
35.	ADP-USAID		Commercialization of Fruit Production Center	Consultancy
36.	Yamaha Motor Co., Mfg., Japan	US\$ 25,000	The Design and modification of an agro-carrier	Study
37.	PT. Bina Pertiwi	US\$ 12,500	The Utilization of power tillage in an upland farming	Study

			system	
38.	Ministry of Transmigration	US\$ 70,000	Training on maintenance and utilization SKR VII	Field training
39.	Ministry of Transmigration	US\$ 185,000	Training on application and management production of SKR VII	Field training

Table IV PRESENT CONDITION OF MACHINERY AND EQUIPMENT

No.	Items/Specification	Qty	Condition	Related Courses	No. of Students	Problem	Solution
1.	Kyowa strain amp. • DPM, 603 A, 6 Ch • 613B, 4 Ch	1 1	Fair Good	Special problem	5-10	2 Ch are faulty Not enough	1. Repair 2. Need 1 more repair
2.	Data recorder 14 Ch, Kyowa RTP 550A	2	Poor	Utilities	3-5	One is broken, another one 5 ch are faulty	Replace
3.	Panetro-meter SR-2	2	Poor	Soil and machinery relationship Land clearing and land preparation Special problem	20-30 15-25	One is out of order and another is incomplete	Replace
4.	100 Kg spring balance	1	Poor	Soil and machinery relationship Land clearing and land preparation Special problem	20-30 15-25	Out of order	Replacement
5.	50 cc Ring sample (10 pcs)	1	Good	Soil and machinery relationship Special problem	3-5 20-30	Not enough	Need 2 more
6.	Hydraulic pressure gauge	1	Poor	Internal combustion engine and farm power Farm tractor	3-5	Out of order	Repair
7.	Engine research test bed, Tokyo Meter Co. (1985)	1	Poor	Internal combustion engine and farm power		Panel instrument, water brake are infunction	Repair
8.	Flowmeter	1	Not work	Drainage Eng	20-30	Not work properly and low accuracy	Need additional sensor types of high accuracy and recording
9.	Channel Hydraulic	1 Unit	need renovation and parts replacement	e. Soil-water Conservation Engineering f. Field Experiment	20-30	Not work properly for student practices	Renovation and replacement of pump + discharge measurement device
10.	Air flow Demonstr. Appr	1 Unit	need RPM regulator and manometer replacement		20-30	air flow measurement can not be practiced by the students	Replacement of RPM regulator and manometer
11.	Head losses in pipe flow Appr	1 Unit	need replacement of venturimeter and pitot tube		10-15	fail of head losses measurement by venturi and pitot tube	Replacement of venturimeter and pitot tube

12.	Reynold Number Appr.	1 Unit	need color liquid injection replacement			difficulties in demonstrating laminar and turbulent flow	provide full liquid
13.	Groundwater Modeling Appr.	1 Unit	not work properly	Hydrology and related courses	110-120	broken screen/filter	replacement of the broken part
14.	Weather Station	1 Unit	not work properly	Soil-Plant-Water Relationship	20-30	Meteorological and soil temp. and moisture data at the experiment field not available for student experiments	need replacement by a computerized meteorological and soil moisture data monitoring at experiment field
15.	Pressure membrane appr	1	good condition, difficult providing membrane			difficulties in providing the membrane	
16.	Moisture Equivalent Centrifuge	1	not with equipped with suitable transformer, does not work since			not in function	
17.	Hybrid Recorder Model HR2500E Hybrid Recorder Model RD3500-21 Cable for GP-IB Interface GP-IB Interface Board For PC9801 PC9801FAU5 Monitor NEC-PC-KD834N Hygrometer Heatflow-meter Air velocity meter Photon meter	1 1 1 1 1 1 1 1 1 1 1	Ok Ok Ok Too Old Too Old Too Old Old Old Ok	TEP 371 Farm Structure and Environ. TEP 473 Farm Structure Design	50	The number of each item is not fulfill to the number of students. Needs a sensor to realize what student want to measure. Connected PC is too slow Still not enough to practice work in environmental phenomena such as greenhouse system and gross chamber system	Add the number of each item. Upgrade and add the memory of PC. Add sensor and need more equipment for laboratory work regarding to environmental studies.
18.	HP Gas Chromatography U-Rod beam meter Lux meter	1 1 1	Ok Ok Ok	TEP 473 Farm Structure Design TEP373 Greenhouse Technology TEP 472 Storage Env. Engineering	50	Not enough for displaying how the construction function is working such as ventilation system, CA cooling system, CA system in the storage and other farm building. The number is not enough to totals students	Add the accessories for storage system in order to displaying all parameters. Add the number of equipment. Need new equipment for construction work in laboratory scale.

19.	Bomb calorimeter	2	Fair	Agric. Energy and Electrification, Alternative Energy	150	A pair of Beckman thermometer is out of work	Has to be changed
20.	Eko-Epily	2	Poor	Agric. Energy and Electrification, Alternative Energy	150	The glass cube is broken	Has to be changed and calibrated
21.	Heat exchanger Model HEP-1200 220 V, 3P, 15 KVA	2	Poor	Cooling and Refrig. Engineering	50	Thermostats and liquid pumps are out of use	Those equipments have to be repaired
22.	Vacuum dryer	1	Poor	Alternative Energy, Cooling and Refrig. Engineering	50	Electric heater does not work	Has to be repaired
23.	Freeze Dryer	1	Fair	Alternative Energy, Cooling and Refrig. Engineering	90	Electronic balance is out of work	Has to be changed
24.	Refrigeration test bench Model RNP-3000E 220V, 50Hz, 3P, 15 KVA	1	Fair	Cooling and Refrig. Engineering	50		Needs minor repair
25.	Inverter for TV	1	Poor	Agric. Energy and Electrification, Alternative Energy	150		Needs minor repair.
26.	Anemometer Kanomax 6141	1	Poor	Agric. Energy and Electrification, Alternative Energy	50		Needs minor repair Additional quantity to 3 wait
27.	Consumables for Recording Ink, recorder chart, sparcparts, etc.			Agric. Energy and Electrification, Alternative Energy	50		need additional supply
28.	Temperature recorder CHINO	1	Poor	Agric. Energy and Electrification, Alternative Energy	50		needs repair and calibration
29.	Solorimeter Recorder	3	Poor	Agric. Energy and Electrification, Alternative Energy	50		needs repair and calibration
30.	8-bit Computer machine VEC, PC-880	12	Poor	Computer related courses	100	out of order	should be replaced
31.	16-bit Computer machine MS-8	1	Very poor	Computer related courses	100	out of order	should be replaced
32.	STILL System Tanifuji	1	Very poor	Farm power and Machinery		out of order	repair
33.	Three phase meter DKK-1120 (serial No1430)	1	Poor	Farm power and Machinery		out of order	repair
34.	Data recorder Kyowa RTP 650A	1	Poor	Farm power and Machinery		out of order	repair
35.	Handy Stain Meter UCAM-1A	1	very poor	Farm power and Machinery		out of order	replace

ADAETアフターケア（仮訳）

I. 背景

A. プロジェクト

ADAETプロジェクトは1987年12月にR/Dを結び、1988年4月から1993年3月まで暫定実施計画及びR/Dに基づき、適切に実施された。

1. プロジェクト目標

(1) 次あげる目的のため、インドネシア側のC/Pとの共同研究を通じた技術指導及び助言を行う。

- a. 学術レベルの向上
- b. 修士号と博士号の取得
- c. インドネシアにおける他の研究機関との研究交流

(2) 共同研究に関する次の活動支援

- a. セミナー／ワークショップ
- b. 研修
- c. 教材の開発

(3) 大学院研究及び教育のための機材供与

2. 活動内容

- (1) 共同研究を通じた技術移転
- (2) 農業工学分野における専門家派遣
- (3) 機材、機器の維持管理
- (4) 学位修得トレーニング
- (5) 技術協力の多面的な努力

3. 協力範囲

- (1) 人的能力開発
- (2) 大学院の研究棟

B. 活動

1. 専門家

全部で 12 名の長期専門家と多数の短期専門家、JOCV の派遣

2. 研修

(1) 海外

学位なし：20 名（日本）、1 名（フィリピン）、4 名（短期：タイ）が研修に参加

学位あり：修士 1 名（AIT、タイ）が研修に参加

(2) インドネシア国内

学位なし：1 年以内の農業工学分野に関する研修（427 名、20 大学）

学位あり：157 名中 79 名が修士、博士課程卒業、2 名が博士号取得

(3) セミナーとワークショップ

国内：国内レベルで多数、国外レベルで 1 度開催された。

海外：海外で開催されたセミナーとワークショップに数名参加した。

(4) 教材の執筆

27 冊の教科書と 21 冊の実験指導書が、IPB の C/P 及び大学院生と JICA 専門家との共同作業により発行された。

(5) 研究機材の調達

日本側から 1 億 1,796 万 380 円、IPB 側から 9,273 万ルピアが供与された。

(6) 共同研究

全部で 20 の研究が完成された。

(7) モデルインフラの整備

(8) 他大学、研究機関等との連携、普及サービスの確立

全部で 39 の普及活動が実施された（表Ⅲを参照）。

C. 終了時評価で指摘された問題点

- (1) いくつかの供与機材が獲得できなかった。
- (2) JICA 専門家の指導の下で、修士、博士プログラムを完遂する必要がある。
- (3) 書籍と雑誌の供与。プロジェクトで供与された書籍は数が限られており、最新の参考書が必要である。
- (4) 他の機関との連携の強化。
- (5) 大学院生の指導、供与機材の取付け及び共同研究の完成と運営管理活動など、プロジェクトの完全な成功にはまだまだ専門家の指導が必要である。

D. 個別専門家の派遣

先にあげた問題の指導

1. 長期専門家

- (1) 農業機械
- (2) 農業土木

2. 短期専門家

全部で3名の短期専門家が派遣された。

II. アフターケアプロジェクトの必要性

A. プロジェクトの現在の状況

(1) 組織

インドネシアの持続的な農業システムの発展のため、農業工学、農業機械工学の必要性が高まっており、そのためには IPB の農業工学部を強化する必要がある。

1996 年 2 月から、ADAET プロジェクトの成果に基づいて開始された CREATA の活動に 3 年間の援助が与えられている。

(2) 施設、機材の活用

1986 年から 1993 年にかけて、すべての機材、研究施設が ADAET プロジェクトに供与され、高い教育が行われた。プロジェクトの研修コースの実施を通じて、表 II で示すように修士号と博士号を取得するものが多数現れた。

大学院教育に加えて、施設や機材は、他大学や他研究機関（農水省、海外移住省、法務省、協力広報省、BULOG、BPP、他民間機関）の研究を含めた農業技術科の研究活動

のみならず、研究スタッフの個々の研究活動の支援にも用いられている。

他大学の支援と政府研究機関、民間機関との連携確立のため、プロジェクト施設は要求度の高い特定の農業工学の分野（GIS、太陽エネルギー交換技術、農業生産過程における熱利用システム、システム管理と分析、農場機械技術、表Ⅲ参照）の研修に用いられた。

これらのトレーニング活動はインドネシア東部地域の大学の研究支援と強化のため、DGHEに指導、支援されている。

最近、数名のスタッフが日本から帰国し、大学の学部生、大学院生の指導活動と同時に大学院研究、他の研究活動の指導を始めている。

以上のことから、農業工学技術分野における大学院教育を更に発展させるには、今まで利用されていた機材や機器類ではもはや十分とはいえない。というのは、たいていの機材や機器類は10年以上も前に購入されたものであり、その幾つかは新しい部品と交換する必要があること、また、幾つかは微調整ではなく完全に新しいものと交換する必要があるからである。

B. アフターケアプロジェクトの必要性

それゆえ、上記の理由と最近では ASEAN 地域の大学院生の研修やアフリカ地域の発展途上国の大学院生を受け入れるまでになっている IPB の農業工学分野の大学院教育の更なる発展を維持するため、アフターケアプログラムをとおした機材、機器の修理と取替えが是非とも必要であり、とても重要な役割を果たすと考えられる。

ADAET プロジェクトにおける最近の投資活動により、当プロジェクトは将来熱帯気候下における農業工学に関する各分野の第三国研修の指導的な立場になると考えられる。

加えて質の高い卒業教育により発展途上国に対する明確な成果を得るには長い時間がかかるので、将来における JICA の継続的なサポートが必要である。このサポートにより発展途上国の経済の健全化と自立という日本政府の究極目標が達成され、世界各国の相互理解に基づく平和が芽生え、つくり出されるだろう。

表Ⅳは ADAET のスポンサーである JICA をとおして、日本政府から供与された機材すべてを表しており、これら機材の現在の状況を示している。このリストにしたがってそれぞれの機器類を、後述するアフターケアプロジェクトで維持するかどうか決定する。

C. アフターケアプロジェクトで要請されたプログラム

下記のことを要請された。

(1) ADAET プロジェクトと過去の無償援助に JICA によって供与された機材と研究室の機

器類の修理と取替え

(2) 専門家派遣（農業工学分野）：長期専門家1名、短期専門家2、3名

(3) 協力期間：2年

D. 要請された機材予算

要請された予算は、表IVでリストされた修理、取替機材と、専門家が仕事を行うのに必要な予算である。インドネシア政府は事務所、C/P 及びアフターケア委員会に必要な経費について日本の貢献に見合う予算を準備することになっている。

資料4 その他収集資料

(1) Table A4-1 Origin of Graduate Students

No.	Origin	1991	1992	1993	1994	1995	1996	Total
1.	IPB							
	S2	29	21	47	30	26	22	175
	S3	8	6	18	13	22	21	88
							+
								263 (11%)
2.	National University							
	S2	132	105	134	137	136	154	798
	S3	15	19	26	28	36	36	160
							+
								958 (42%)
3.	Private University							333
	S2	72	30	48	49	52	82	44
	S3	2	7	5	8	11	11+
								377 (16%)
4.	Private University other than MOE							20
	S2	1	3	0	1	4	11	7
	S3	1	0	0	0	0	6+
								27 (1%)
5.	Department							324
	S2	62	54	57	33	36	82	80
	S3	13	8	7	9	17	26+
								404 (18%)
6.	Others							242
	S2	25	10	23	43	77	64	17
	S3	1	0	3	4	7	2+
								259 (11%)
TOTAL								2,288

(2) Table A4-2 List of University with Faculty of Agriculture/Department of Agricultural Engineering/P.S. Agricultural Engineering

No.	Institution	Office Address
1.	Syiah Kuala University*)	Rector : Kantor Pusat Administrasi UNSYIAH Telp. 52721, 51977 Pes.210 Faks. 52721
*	Faculty of Agriculture, Syiah Kuala University Banda Aceh	Dean : Fakultas Pertanian UNSYIAH Banda Aceh Telp. 52097, 52977 Pes. 152
2.	Sumatera Utara University*)	Rector : Jalan Dr. Mansur No.9 Kampus USU, Medan Telp. 061-811633, 814033, 814210
*	Faculty of Agriculture, Sumatera Utara University	Dean : Jalan Prof. A. Sofyan No.3 Kampus USU, Medan Telp. 813236
3.	Riau University	Rector : Jln. Pattimura No.9 Pekanbaru Telp. 0761-21341 Faks. 0761-31810
*	Faculty of Agriculture, Riau University	Dean : Kampus Binawidya UNRI Simpang Baru, Pekanbaru
4.	Andalas University, Padang*)	Rector : Rektorat Unand, Limau Manis, Padang 25163 Telp. 0751-71389 Faks. 0751-71085
*	Faculty of Agriculture, Andalas University	Dean : Fakultas Pertanian Limau Manis Padang Telp. 0751-72702
5.	Jambi University*)	Rector : -Jln. Prof. Dr. Sri Soedewi Masjchun Sofyan, SH, Jambi Telp./Fax. 62774 -Kampus Unja Mendalo Darat. Jambi Telp. 25122
*	Faculty of Agriculture, Jambi University	Dean : Jalan Prof. Dr. Sri Soedewi Masjchun Sofyan, SH, Jambi Telp. 63118

No.	Institution	Office Address
6.	Sriwijaya University*)	Rector : Kampus UNSRI Palembang 30662 Telp. 580073 Faks. 0711-580644
*	Faculty of Agriculture, Sriwijaya University	Dean : Kampus UNSRI Indralaya Palembang. Telp. 580059
7.	Lampung University*)	Rector : Jln. Prof. Dr. Sumantri Brojonegoro No.1 Bandar Lampung Telp. 72673, 74954 Faks. 72767
*	Faculty of Agriculture, Lampung University	Dean : Jln. Prof. Dr. Sumantri Brodjonegoro No.1 Bandar Lampung Telp. 74946
8.	Bengkulu University*)	Rector : Jalan Raya Kandang Limun, Bengkulu Telp. 22105, 41873 Faks. 0736-22105
*	Faculty of Agriculture, Bengkulu University	Dean : Jln. Raya Kandang Limun, Bengkulu Telp. 21170, 21884 Pesawat 23
9.	University of Indonesia	Rector : 1.Kampus UI Depok Telp. 7270020, 7270017 Faks. 7270017 2.Kampus UI Jalan Salemba Raya No.4 Jakarta Pusat Telp. 330355, 330343 Faks. 330343
*	Faculty of Engineering, University of Indonesia	Dean : Fakultas Teknik UI Kampus UI, Depok Telp. 7270011, 7270050, 7863405, 7863404 Faks. 7270050
10.	Bogor Agricultural University*)	Dean : Gedung Rektorat IPB Kampus IPB Darmaga Bogor Telp. 0251-622642, 622643, 622708
*	Faculty of Agriculture, Bogor Agricultural University	Dean : Jln. Raya Padjadjaran Bogor Telp. 0251-326429

No.	Institution	Office Address
*	Faculty of Agricultural Engineering and Technology, Bogor, Agricultural University	Dean : Fateta IPB Kampus IPB Darmaga, Bogor Telp. 0251-621219, 621210
11.	Padjadjaran University*)	Rector : Jalan Dipati Ukur No.35 Bandung Telp. 022-2501977 Faks. 022-2503277
*	Faculty of Agriculture, Padjadjaran University	Dean : Kampus UNPAD Jatinangor, Sumedang Bandung Telp. 022-4203998
12.	Institut Teknologi Bandung	Rector : Jalan Tamansari 64 Bandung Telp. 022-2503147, 2504048 Faks. 022-434413
*	Faculty of Industrial Technology	Dean : Jalan Ganesha 10 Bandung Telp. 022-432189, 432266, 440245 Pesawat 720 Faks. 022-2503659
13.	Jenderal Sudirman University*)	Rector : Kantor Pusat Administrasi UNSOED Grendeng Purwokerto Telp. 0281-33078, 35292, 35293, 32594, Pos 113 Faks. 0281-31802, 31737
*	Faculty of Agriculture, Jenderal Sudirman University	Dean : Kampus UNSOED Karangwakal Kotak Pos 15 Purwokerto Telp. 38791
14.	Dipenogoro University	Rector : Jalan Imam Bardjo, SH No.1 Semarang Telp. 024-311520 Faks. 024-318381
*	Faculty of Engineering, Dipenogoro University	Dean : Jalan Hayam Wuruk Semarang Telp. 318350
15.	Gadjah Mada University*)	Rector : Bulaksumur, Yogyakarta Telp. 0274-562011, 901900 Faks. 0274-565223
*	Faculty of Agriculture, Gadjah Mada University	Dean : Sekip Utara Yogyakarta Telp. 0274-902160 Faks. 0274-563062
*	Faculty of Agricultural Engineering and Technology, Gadjah Mada University	Dean : Bulaksumur, Yogyakarta Telp. 901324, 901320 Faks. 0274-563542, 901325
16.	Sebelas Maret Surakarta University*)	Rector : Kampus UNS Jalan Ir. Sutami 36 A Ketingan, Surakarta Telp. 42283 Faks. 46655

No.	Institution	Office Address
*	Faculty of Agriculture, Sebelas Maret Surakarta University	Dean : Kampus UNS Jalan Sutami No.36 A Ketingan, Surakarta Telp. 37457
17.	Airlangga University	Rector : Jalan Airlangga 4-6 Surabaya Telp. 031-41348, 521983 Faks. 031-42557
18.	Institut Teknologi 10 November	Rector : Kampus ITS Keputih Sukolilo, Surabaya Telp. 5947264, 5943358 Faks. 031-5947845
*	Faculty of Industrial Technology, Institut Teknologi 10 November	Dean : Kampus ITS Keputih Sukolilo, Surabaya Telp. 5947843
19.	Brawijaya University*)	Rector : Jalan Mayjen Haryono No.169, Malang Telp. 0341-51611, 51097 Faks. 0341-65420
*	Faculty of Agriculture, Brawijaya University	Dean : Jalan Mayjen Haryono No.169, Malang Telp. 51611, 51665 Faks. 51665
20.	Jember University*)	Rector : Jln. Kalimantan Jember Telp. 0331-87422 Faks. 0331-87422
*	Faculty of Agriculture, Jember University	Dean : Jalan Kalimantan 111/23 Jember Telp. 84054
21.	Tanjung Pura University	Rector : Jalan A. Yani Pontianak Telp. 0581-39630 Faks. 0381-39630, 39636
*	Faculty of Agriculture, Tanjung Pura University	Dean : Jalan A. Yani Pontianak Telp. 40191
22.	Lambung Mangkurat University	Rector : Jalan Brigjen H. Hasan Basry, Kotak Pos 219 Banjarmasin Telp. 0511-54195 Faks. 0511-54195
*	Faculty of Agriculture, Lambung Mangkurat University	Dean : Jalan Jend. A. Yani KM. 35, Banjarbaru Telp. 92254
23.	Mulawarman University*)	Rector : Gedung Rektorat Kampus Unmul Gunung Kelua Samarinda Kotak Pos. 1068 Telp. 41797 Faks. 32870

No.	Institution	Office Address
*	Faculty of Agriculture, Mulawarman University	Dean : Fak. Pertanian Kampus Unmul Gunung Kelua Jalan Pasir Belengkong Samarinda 75123 Telp. 41118 Pes. 603
24.	Palangkaraya University*)	Rector : Kampus Unpar Tunjung Nyaho, Jalan Yos Sudarso. Kotak Pos 2/PLKUP Palangkaraya 73111A Telp. 21722 Faks. 0514-21722
*	Faculty of Agriculture, Palangkaraya University	Dean : Kampus Unpar Tunjung Nyaho, Jalan Yos Sudarso. Kotak Pos 2/PLKUP Palangkaraya 73111A Telp. 22664
25.	Udayana University*)	Rector : Kampus Bukit Jimbaran Telp. 771854 Pes.201 Faks. 771607
*	Faculty of Agriculture, Udayana University	Dean : Kampus Bukit Jimbaran Telp. 771854 Pes.201 Faks. 771607
26.	Mataram University	Rector : Jalan Majapahit Mataram NTB Telp. 33004 Faks. 0364-36041
*	Faculty of Agriculture, Mataram University	Dean : Jalan Pendidikan Mataram Telp. 21435
27.	Nusa Cendana University	Rector : Kampus UNDANA Penfui Jalan Adi Sucipto Kupang Nusa Tenggara Timur Telp. 0361-21680 Faks. 0361-21674
*	Faculty of Agriculture, Nusa Cendana University	Dean : Kampus UNDANA Penfui Jalan Adi Sucipto Kupang Nusa Tenggara Timur Telp. 21680
28.	Hassanuddin University*)	Rector : Jalan Perintis Kemerdekaan Km. 10, Kampus UNHAS Tamalanrea Ujung Pandang Telp. 510102 Faks. 510088, 510059
*	Faculty of Agriculture, Hassanuddin University	Dean : Jalan Perintis Kemerdekaan Km. 10, Kampus UNHAS Tamalanrea Ujung Pandang Telp. 512014
29.	Tadulako University	Rector : Kampus Bumi Tadulako, Tondo, Palu Telp. 22355 Faks. 0451-22844

No.	Institution	Office Address
*	Faculty of Agriculture, Tadulako University	Dean : Kampus Bumi Tadulako, Tondo Palu Telp. 22611, 22966
30.	Haluoleo University	Rector : Rektorat UNHALU Kampus Bumi Tridharma Anduonohu, Kendari Telp. 25104, 25105, 24487 Faks. 0401-22006
*	Faculty of Agriculture, Haluoleo University	Dean : Rektorat UNHALU Kampus Bumi Tridharma Anduonohu, Kendari Telp. 0401-25104, 25105
31.	Sam Ratulangi University*)	Rector : Kampus UNSRAT Bahu, Manado Telp. 63786
*	Faculty of Agriculture, Sam Ratulangi University	Dean : Kampus UNSRAT Bahu, Manado Telp. 62786
32.	Pattimura University	Rector : Jalan Ir. M. Putuhena Puka, Ambon Telp. 69520, 69415 Faks. 69560
*	Faculty of Agriculture, Pattimura University	Dean : Jalan Ir. M. Putuhena Poka Ambon Telp 69707
33.	Cendrawasih University	Rector : Jalan Sentani, Abepura PO BOX 422, Jayapura Telp. 81674 Faks. 0967-81674
*	Faculty of Agriculture, Cendrawasih University	Dean : Jalan Gunung Salju Amban, Manokwari Telp. 21974 Faks. 21455
	Private University	
34.	Faculty of ITI*)	Jln. Raya Muncul Sorpng
35.	Faculty of Agriculture, Juanda University*)	Jln. Tol Ciawi 1 Bogor
36.	Faculty of Agriculture, Mercubuana University *)	Dean : Fak. Pertanian Mercubuana Jl. Meruya Selatan Kebun Jeruk Jakarta Selatan
37.	Faculty of Engineering Sahid University*)	Dean : Jl. Prof. Dr. Supomo, SH. No.84 Jakarta-12870

*) Agricultural Engineering Departement/Program of Study available

(3) Table A4-3 Curriculum of Program of Study of Agricultural Engineering, IPB

Magister Program Level

Code	Title	Credits
TEP-501	Instrumentation	3(2-3)
TEP-502	Computer Programming Technique	3(2-3)
TEP-503	Applied Mathematics	3(3-0)
TEP-504	Advanced Thermodynamics	3(3-0)
TEP-505	Advanced Heat Transfer	3(3-0)
TEP-506	Agricultural Mechanization Strategy	3(3-0)
TEP-507	Momentum Transfer	3(3-0)
TEP-520	Kinematics and Dynamics of Machine Mechanism	3(3-0)
TEP-521	Farm Machinery	3(2-3)
TEP-522	Postharvest Machinery	3(3-0)
TEP-523	Soil Machine Relationship	3(2-3)
TEP-531	Advanced Food Processing Engineering	3(2-3)
TEP-532	Agro-Industrial Engineering	3(3-0)
TEP-533	Agricultural Product Storage Engineering	3(2-3)
TEP-534	Energy Auditing and Energy Planning	3(3-0)
TEP-535	Thermal Systems Design	3(2-3)
TEP-540	Water Flow Measurement	3(3-0)
TEP-541	Erosion and Erosion Control Structures	3(3-0)
TEP-542	Hydraulic Engineering	3(2-3)
TEP-544	Soil Biophysics	3(2-3)
TEP-545	Water Flow Hydraulics	3(2-3)
TEP-590	Research Methodology in Agricultural Engineering	3(3-0)
TEP-602	Systems Analysis	3(3-0)
TEP-603	Basic Data Analysis	3(3-0)
TEP-604	Digital Data Analysis	3(2-3)
TEP-605	Cost Engineering and Optimization	3(3-0)
TEP-606	Decision Support Systems and Analysis	3(3-0)
TEP-607	Applied Engineering	3(3-0)
TEP-608	Ergonomics in Agricultural Engineering	3(2-3)
TEP-609	Energy and Mass Transfer	3(3-0)
TEP-620	Farm Power and Energy Alternative	3(3-0)
TEP-621	Tractors Design and Testing	3(2-3)
TEP-631	Advanced Agricultural Product's Processing Engineering	3(3-0)
TEP-632	Biological Process Engineering	3(2-3)
TEP-633	Environmental and Energy Aspects in Biological Systems	3(3-0)
TEP-634	Agric. Product's Electro-Optical and Magnetics Properties Measurement.	3(2-3)
TEP-640	Open Channel Hydraulic Flow	3(3-0)
TEP-641	Soil Mechanics	3(2-3)

Code	Title	Credits
TEP-642	Irrigation Engineering	3(2-3)
TEP-643	Drainage Engineering	3(2-3)
TEP-645	Soil and Water Conservation Engineering	3(2-3)

Doctoral Program Level

Code	Title	Credits
TEP-701	Collogium	3(3-0)
TEP-703	Numerical Analysis	3(3-0)
TEP-704	Computation Technique	
TEP-720	Shear and Stress Analysis	
TEP-721	Terramechanics	
TEP-723	Primary Cultivation Machinery Design and Concept	
TEP-724	Secondary Cultivation Machinery Design and Concept	
TEP-725	Traction and Soil Compaction	
TEP-726	Multipower Soil Tillage	
TEP-727	Harvesting Machine Design and Concept	
TEP-731	Biotechnological Process Engineering	3(2-3)
TEP-732	Solar Energy Conversion Technology	3(3-0)
TEP-733	Unit Thermal Operation	3(2-3)
TEP-734	Agricultural Product's Thermo Physical Properties Measurement	3(2-3)
TEP-735	Material Transfer in Fluid System	
TEP-736	Unit Operation of Material Sparation	
TEP-737	Greenhouse Engineering	
TEP-741	Ground Water Hydraulics	3(3-0)
TEP-742	Hydrologic Modelling	3(3-0)
TEP-743	Water Flow Analysis in SPAC System	3(3-0)
TEP-744	Water Resource Systems Planning	3(3-0)
TEP-751	Networking System	
TEP-752	Agrosystem Analysis	
TEP-753	Management on Information Technology	

(4) Table A4-4 Contents of Lectures in Graduate Program of Agricultural Engineering, Postharvest Technology and Food Engineering
Program study : Agricultural Engineering

Objectives:

1. To develop the analysis capability and problem solving in the agricultural area based on the engineering point of view
2. To increase the designing ability on agricultural engineering area as well as by new design and simulation
3. To strengthen the capability on technology application to support the development of agricultural engineering area

Postgraduate program in AE consist of:

1. Agricultural Machinery
2. Food and biological engineering
3. Soil and water engineering

Curriculum

TEP 501 Instrumentation

Measurement of physical *dimension* such as temperature, light, thermal, vibration, force, sound automatically by using computer. Basic knowledge about conversion from physical *dimension* to electricity which can be processed by computer. Discussion : basic knowledge in electricity, sensor/transducer working principle, amplifier system, data acquisition system by computer, control system.

TEP 502 Computer program technique

Computer operation, word processing, worksheet, programming language (BASIC, PASCAL), computer application on agricultural engineering area.

TEP 503 Applied mathematics

Mathematical modeling on agricultural engineering area : differential, partial differential, specific shape of differential, hidden differential equation, Bessel, Legendre, exact solution technique, Laplace transformation, imaginary function, hyperbolic, elliptic and parabolic partial differential equation, numeric analysis (Euler, Runge-Kutta), analytical and empirical mathematical modeling, simulation technique, optimization (Linear programming, Lagrange multiplier, transverse method)

TEP 504 Advanced on thermodynamic

Review on thermodynamic, application of 1st thermodynamic law and 2nd thermodynamic law, development of theoretic analysis from kinetic of gas to thermodynamically statistic. Application of thermodynamic on agricultural engineering.

TEP 505 Advanced on heat transfer

Discussion of heat transfer principle. Lecture contents : (1) conduction (one and two dimensions, steady state, transient), (2) convection (boundary layer, parallel flow in flat plate, flow in pipe, force convection, free convection

TEP 506 Strategy of agricultural mechanization

Role of agricultural mechanization on production, revenue, increasing of job opportunities regionally and nationally. Energy calculation, resources and utilization for agricultural activities, selection method, test and machinery evaluation. System analysis in agricultural mechanization. Planning and strategy for developing of agricultural mechanization.

TEP 520 Kinematics and dynamic mechanism of machine

Introduction of mechanism of component in agricultural machinery. Analysis of movement , velocity, acceleration, inert, force and moment in machine.

TEP 521 Agricultural machinery

Principle and operation of agricultural machinery (land preparation, cultivation, seed spreader, harvesting etc.) to achieve the maximum production. Evaluation and analysis on machine, power, performance, operator, and operation quality.

TEP 222 Post harvest machinery

Application of machine component designing on post harvest machinery for food plantation, horticulture and plantation. Functional and structural design. Testing and standardization. Testing and certification of agricultural machinery according to ISO 9000-9003.

TEP 523 Land and agricultural machinery

Dynamic properties of soil and measurement method. Mechanic properties of land processing machinery's. Designing and performance of land processing machinery. Mechanic properties of traction and transport, land compacting, dynamic properties of

land-agricultural machinery.

TEP 531 Advanced on food processing engineering

Application of engineering principle on food processing. Lecture contents : kinetic reaction on food, food rheology, mechanical separation, heating, cooling, thermodynamic phenomena on food freezing, evaporation, extraction.

TEP 532 Agro-industrial engineering

Basic knowlvdge on system analysis, quality control method, economic analysis in agriculture industry. Planning approach and development of agriculture industry project.

TEP 533 Warehousing of agricultural product

Engineering application on agricultural product processing mainly during storage process.

TEP 534 Energy auditing and energy planning

Evaluation on efficiency of energy utilization in production activity, calculation of energy demand, supply system, energy selection.

TEP 540 Water flow measurement

Basic knowledge of water flow, fluid mechanic and hydraulic, differentiation equation method and theory, measurement of water flow according to its characteristic, pressure, depth, velocity, surface area and discharge in laboratory and in the field.

TEP 541 Erosion and water erosion control building

The relation among soil, water and plant. Erosion classification, type of water and wind erosion. Assessment and measurement of soil losses by water erosion. Water and wind erosion control (method and building).

TEP 542 Hydrology engineering

Hydrology cycle, precipitation, evaporation/evapo-transpiration, infiltration process and measurement, up-flow, sub-flow, hydrograf analysis, flood analysis, probability analysis on hydrology and its application.

TEP 544 Soil bio-physic

Analysis of water movement in soil based on Darcy and Richard formula by considering to soil physic properties, soil hydraulic and microorganism.

TEP 545 Hydraulic of water flow

Dynamic theory of water flow in open canal, and pipe (theory and application). Basic knowledge on construction for irrigation building, river flow analysis, physical model for water building

TEP 590 Research methodology for agricultural engineering

Concept and methodology research on agricultural engineering area (method and challenge). The use of logical thinking for developing the science and technology. Project proposal and scientific writing.

TEP 602 System analysis

Concept of system for analyzing and controlling in agricultural area. Mathematical representative from dynamic and stochastic parameter. Model simulation from stochastic and dynamic system. Decision making on stochastic system.

TEP 603 Database system

Concept and theory of database system for supporting the information system such as MIS (Management information system), CAD/CAM (Computer-Aided Design/ Manufacturing), GIS (Geographical Information System) and AMIS (Agricultural Mechanization Information System). Study and analyze some database models such as relational model, data network model, hierarchical data model and object- data oriented model. Engineering approach and design method of database system.

TEP 604 Digital data analysis

Introduction of digital data processing. Discussion of time-signal discreet, filter digital, Discreet Fourier Transformation (DFT), Fast Fourier Transformation (FFT), spectral complex analysis, Kalman filter.

TEP 605 Budget technique and optimization

Formulation and concept of optimization design, interactive and practical optimization design. Budget comparison, product optimization, budget assessment and monitoring, design of production system.

TEP 606 Analysis and decision supporting system

Decision making problem in agricultural area. Theory and application of decision making method. Basic concept of decision supporting system with computer and its development technique.

TEP 607 Advanced on engineering science

Application of engineering science on agricultural area based on the strength material and design engineering.

TEP 608 Ergonomic engineering in agricultural area

Application of anthropometry and biomechanic on agricultural machinery design. Theory and method of human power measurement and efficiency, noise level, brightness intensity, vibration, and dust contain in air. Ergonomic principle in human-machine-environment system related to efficiency, freshness, healthy and safety.

TEP 620 Agricultural power machinery and energy alternative

Energy conversion from new energy resources and renewable energy (sun, wind, water and biomass) as driving force in agricultural area

TEP 621 Testing method and tractor design

Discussion of tractor as power resource in agricultural area (are seen as a power, traction system, scheme design, connecting design and hydraulic system design)

TEP 631 Advanced on post harvest technology

Application and engineering principle on agricultural product processing. Fluid mechanic, fluid flow measurement, pump and fan, scale reduction, cleaning, sorting and grading, handling, air-water mixing, drying, cool storage, process observation, recording and controlling, cost analysis

TEP 632 Biological process engineering

Basic design and biological process engineering. Application of engineering properties (physical, thermo-physical, optical, vibration and magnetic) on product increasing, harvesting and processing (plant and cattle). Discussion of nutrient absorption in hydroponics plantation and conventional plantation. Application of transport phenomena (momentum-mass-energy) on biological process, storage, transportation, sorting, and picking (vegetables, fruits, seed and fish). Automation on quality

separation. ISO9000-9003 on biological process.

TEP 633 Energy and environment aspects on biological system

Energy aspect on biological system such as water movement in plant, photosynthesis, bio-energetic, energy flow in biosphere, energy budget, plant-environment relationship.

TEP 634 Measurement of electro-optical and magnetical properties of agricultural products

Knowledge, characteristic behavior, measurement method of electro-optical and magnetical properties of agricultural products by non-destructive method and its application on agricultural products handling.

TEP 640 Open canal water flow hydraulic

Theory of water flow dynamic, water flows in open canal, theory, calculation and formulation for open canal included water flow on river

TEP 641 Soil mechanic

Soil mechanic for reclamation process and land condition improvement. Soil as solid and its characteristic and mechanical properties. Non resistance of building and its criteria. Calculation of stability of land building. Engineering aspect of soil-water system and its physical properties.

TEP 642 Irrigation engineering

Meaning and objective of irrigation, water requirement in plant, assessment method and its relation with production. Irrigation system (advantages and disadvantages). Planning, operation and system management of gravitation irrigation sprinkler and drip irrigation.

TEP 643 Drainage engineering

Relationship between production and drainage condition. Principle on agricultural drainage. Hydraulic on sub-flow. Design of open canal. Drainage on up-flow and sub-flow. Lay out and design of drainage system.

TEP 645 Soil and water conservation technique

Relationship among soil-water-plantation. Classification and type of water and wind erosion. Measurement and prediction of soil losses caused by water erosion. Controlling method, water and wind erosion controlling building

TEP 702 Transport phenomena

Equilibrium momentum principle on steady and unsteady flow problem. Viscosity and momentum transfer mechanism, basic concept and theory of boundary layer, turbulent flow, stream function, and another problem in fluid flow.

TEP 703 Numerical analysis

Numerical analysis application in agricultural area. Mathematical model formulation and differential equation solution which explain physical problem in agricultural area included the solution by using computer.

TEP 731 Technique for biotechnology process

Design and process operation on industrial scale. Continual growth, aeration and agitation for fermentation process and recovery of fermentation product. Explanation of scaling up of apparatus design, asepsis, instrumentation for controlling environment included computer application for industrial scale fermentation process.

TEP 732 Conversion technology of sun energy

Thermal principle analysis on sun energy conversion. Measurement technique and sun energy characteristics. Heat transfer characteristic on plate type and concentrator. Thermal analysis system based on the economical aspect.

TEP 733 Thermal unit operation

Basic concept of heat transfer. Mass transfer principle. Kinetic theory of molecule. Heat transfer in non-continued solid material. Heat and mass transfer by using computer. Heat conduction instrument. Cooling principle and air conditioning. Cooling and heating, drying. Thermophysical properties of agricultural products.

TEP 734 Measurement of thermophysical properties of agricultural products

Advanced theory of heat transfer, conduction, elasticity, friction, aerodynamic properties and its application and measurement of thermophysical properties of agricultural products (biological point of view)

TEP 741 Hydraulic of groundwater

Theory and knowledge application of groundwater flow in soil for saturated and unsaturated condition, confined aquifer and non-confined aquifer in homogen soil and

heterogen soil. Complex parameter and function for groundwater flow problem solution.

TEP 742 Hydrology modeling

Utilization of mathematical modeling and simulation to predict hydrology phenomena based on the physical characteristic of watershed and to apply those model for predicting the hydrology phenomena in other watersheds.

TEP 743 Water flow analysis in soil system, plantation and atmosphere

Water flow analysis in soil, plantation and atmosphere to explain the effect of water potential difference on evapotranspiration rate and to predict water potential distribution in plant.

TEP 744 Water resources system planning

Variety of water resources. Analysis of water resources characteristic. Exploitation and processing of water resources based on the conservation technique and economical aspects.

Program Study : Post Harvest Technology

Head : Hadi K. Purwadaria

Objectives:

To increase the ability on problem solving in post harvest technology area. The students who graduated from this study program are expected to understand the advanced on post harvest technology to decrease losses and to protect the quality during handling, storage, primary processing, transportation and distribution of agricultural products.

TPP 501 Insect and disease in post harvest technology

Discussion about insects and diseases in agricultural products. Identification, biological and ecological of post harvest diseases. Technology and pathology of post harvest diseases. Diseases incubation in agricultural products after harvesting. Diseases controlling by biological, chemical and physical treatment and its apparatus.

TPP 590 Post harvest research methodology

Systematic and logical development in problem identification, analytical approach, experiment method formulation included schedule and research budgeting on post harvest technology.

TPP 611 Post harvest technique

Discussion of engineering application on fresh agricultural product handling (technology application and post harvest problem in Indonesia)

TPP 612 Processing technology of agricultural waste

Characteristic of agricultural waste and its processing technique. The processing are explained detail based on the chemical, physical and biological point of view. Adoption of waste processing technology to develop the agro-industrial.

TPP 613 Fishery product processing technology

Discussion of method and technology to maintain and to preserve fishery product starting from harvesting to industry as a raw material or to consumer as fresh product.

TPP 614 Fungus in post harvest handling

Isolation method, identification, biological and fungus controlling during post harvest handling included storage. Effect of fungus on the food and feed product quality and toxin.

Program Study : Food Science

Head : Deddy Muchtadi

Objectives:

The objectives of this study program are to educate the food scientists who have knowledge deeply in food science to solve the quality and security food problems. The students who graduated from this program : (1) are expected to be able do the duty as well as in academic field or as a professional food scientist (2) have creativity to do the experiment and to develop food technology included to create a new food products

Subjects:

IPN 511 Change of food chemical properties during processing

Discussion about the change of chemical properties in foods (vegetable, livestock and fish) during processing. Discussion consist of: (1) change of chemical properties mainly carbohydrate, fat, protein, vitamin, mineral, aroma and reaction among of those components during processing, (2) effect of oxidation, enzyme reaction, drying, cooling, freezing, fermentation, chemical addition, irradiation and storage on browning.

IPN 531 Food engineering

Discussion about many aspects of food engineering in industry by physical and mathematical approach. Some food engineering aspects such as fluid technique application, phenomena transfer, heat process in microwave, sedimentation and centrifugation technique, filtration and membrane technique, extraction and supercritical extraction, storage kinetic and storage life.

IPN 522 Food preservation

The contents of this subject are food preservation, food deterioration aspect, harvesting and looses during preservation, concept of preservation, *barikade* theory, natural protection of agricultural products, mechanical, physical, chemical and micro-biological preservation theory. Laboratory works included: field observation and laboratory analysis in harvesting, deterioration, preservation and preservative analysis.

IPN 534 Physical food properties

Discussion about: (1) mechanical properties as a basic data in determining of rheology quality and food texture, (2) food properties such as density, thermal difussivity, thermal conductivity, porosity, heat capacity, (3) application of mechanical and physical measurement method such as optical microscope, electron microscope, hardness test

instrument, thermocouple, thermal analysis instrument.

IPN 602 Drying theory

Model analysis in drying process of agricultural materials such as water bonding, heat and mass transfer. Lecture: (1) thermodynamic of water and water bonding, water and heat transfer, (2) drying process according to material properties, (3) drying model, (4) computer application in drying process

IPN 631 Advanced on Food engineering

Study on the fluid mechanic properties of liquid foods mainly liquid food flow in pipe, *calendering* process, extraction and mixing, packaging/packing, mass and heat transfer during storage, freeze drying and aseptic process

IPN 632 Post harvest handling and transportation

Handling and transportation system of foods mainly to minimize losses and to increase the quality. Physical and chemical handling procedure in harvesting, packaging, storage, distribution of fresh products, selection of transportation system, building design and instrument, quality, inspection and products standardization.

IPN 635 Advanced technology on food packaging

Interaction between food and packing, quality during storage, food security. Mechanism and mathematical modeling in *monetary* migration, scraping of metal component and additive residue. Selection of simulation model for determining lifetime (Arrhenius, Q10, life decay). Migration analysis of packaging, law aspect (nutrition content, labeling, code number, ISO, Codex). Packing in international trade and trend of packing.

IPN 636 Advanced technology on food storage

Storage with MAS, CAS, HS for high rate respiration products and non-respiration products. Hydration parameter (A_w , RH, Water content), sorption isothermal for storage life prediction. Dry matter losses calculation, storage losses deterioration index. Insect ecosystem and micro-toxin aspect. Current research on storage and standardization of storage according to ISO/GATT-WTO

IPN 641 Post harvest physiology

Understanding of *life* in agricultural products and animal products. Physiological,

physical, hormonal change in both of ripening and storage. Deterioration controlling of agricultural products.

IPN 731 Extraction technique by supercritical for agricultural products

Extraction technology with supercritical fluid extraction for agricultural products, discussion about application and modification of separation process on supercritical phase region by controlling the parameter such as sensitivity, selectivity and solubility. Topics: high pressure thermodynamic and rheology of phase diagram (fluid, solid and mixing), experiment technique with high pressure: thermodynamic model and the relationship of phase characters (solid-fluid, fluid-vapor, solid- SF), phase equilibrium and separation technique.

IPN 733 Thermal process

Discussion about heat resistance of microba, and heat calculation in pasteurization and sterilization process. Calculation: general method, mathematical method, analytical method, integration method, and the method of Stumbo, Ball, Hicks, Pflug. Calculation is stressed on optimization process

(5) Table A4-5 List of Staff in Program of Study of Agricultural Engineering, IPB

Name Program	Staff
A. Agricultural Engineering	1. Moeljarno Djojmartono
	2. Kamaruddin Abdullah
	3. Sri Endah Agustina
	4. I. Wayan Budiastira
	5. Enmy Darmawati
	6. Frans J. Daywin
	7. Desrial
	8. M. Azron Dhalhar
	9. Gardjito
	10. S. Hardjoamidjojo
	11. Nora Harris
	12. Sam Herodian
	13. John Kumendong
	14. Dedi Kusnadi K.
	15. Putiati Mahdar
	16. Tineke Mandang
	17. Kusen Morgan
	18. Sri Mudiastuti
	19. Setyo Pertiwi
	20. Bambang Pramudya
	21. Prastowo
	22. Moedjijarto Pratomo
	23. H. Aris Priyanto
	24. Lilik Pujantoro
	25. Hadi Karya Purwadaria
	26. Asep Sapel
	27. Kudang B. Seminar
	28. Budi I. Setiawan
	29. Herry Suhardiyanto
	30. Yuli Suharnoto
	31. Sukandi S.
	32. Sutrisno
	33. Atjeng. M. Syarief
	34. Radite P.A.S
	35. Armansyah H. Tambunan
B. Food Science	1. Deddy Muchtadi
	2. A.B. Ahza
	3. N. Andjaja
	4. A. Apriyantono
	5. M. Astawan
	6. S. Budiyanto
	7. D. Fardiaz

	8. S. Fardiaz
	9. Y. Haryadi
	10. M. Hubels
	11. B.S.L. Jenie
	12. D. Kadarisman
	13. M. Manullang
	14. D. Muchtadi
	15. T.R. Muchtadi
	16. L. Nuraida
	17. B. Nurtama
	18. M.A. Nur
	19. N.L. Puspitasari - Neinaber
	20. A. Rachman
	21. S. Santausa
	22. B. Satiawihardja
	23. S.T. Soekarto
	24. Suliantari
	25. M. T. Suhartono
	26. R. Syarif
	27. C.H. Wijaya
	28. F.G. Winarno
	29. M.A. Wirakartakusumah
	30. S. Yasni
	31. F.R. Zakaria
C. Post Harvest Technology	1. Hadi K. Purwadaria
	2. A.N. Assik
	3. O.S. Dharmaputra
	4. Putiati Mahdar
	5. R. Nitibaskara
	6. H. K. Purwadaria
	7. Lilik Pujantoro
	8. S. Pertiwi
	9. Sutrisno
	10. Atjeng M. Syarif
	11. Kudang B. Seminar
	12. M.S. Sinaga
	13. S.T. Soekarto
	14. R. Syarif
	15. A. Turngadi
	16. Armansyah H. Tambunan
	17. F.G. Winarno
	18. F. Zakaria

D. Agro Industrial Technology	1. Irawadi Jamaran
	2. T. K. Bunasor
	3. A. A. Darwis
	4. Eriyatno
	5. P.D. Fewidarto
	6. A. Herindayanto
	7. S. Hardjo
	8. L. Hartato
	9. L. Herlina
	10. H. Hardjomidjojo
	11. T.T. Irawadi
	12. I. Jamaran
	13. K. Kadir
	14. S. Ketaren
	15. D. Mangunwidjaja
	16. M.S. Ma'arif
	17. Z.A. Mas'ud
	18. M. Z. Nasution
	19. E. Noor
	20. C. Pandji
	21. M. Romli
	22. M. Rahayuningsih
	23. Risnayeti
	24. M.S. Saeni
	25. E.G. Said
	26. I. Sailah
	27. A. Suryani
	28. K. Syamsu
	29. Suharto
	30. T.C. Sunarti
	31. A. Syahreza
	32. F. Udin
	33. S. Wijandi
	34. S. Wiraatmadja
	35. H. Yusuf

(6) Table A4-6 Research Topics in the Field of Agricultural Engineering at UGM and UNPAD

Research Topics (UGM)

1. Study on the plow pan spoilt (damaged) of sugar cane field based on the used life of field
2. Sediment control in Kalibawang irrigation area
3. Calibration of sediment discharge ratio based on the erosion rate estimation model
4. Estimation of water accumulation monthly by using runoff model
5. Isothermal adsorption and desorption of coffee bean (Robusta)
6. Identification of the change of mechanical properties of hard pans rice field at some levels of saturation intensity
7. Land and water management technology in dry land
8. Technology evaluation on utilization of soil-water for irrigation in Ngawi
9. Optimization process production of oxidation cholesterol for measuring cholesterol in blood
10. Engineering design of groundwater drainage to minimize the growing period of secondary crop and horticulture in wet land
11. Information system of horticulture product based on the consumer
12. Design of transpiration meter for individual plantation
13. Humid-soil conservation in sandy land
14. Design of rotation speed control system at viscometer (friction rotation cylindrical model)
15. Torque measurement of sugarcane stalk for designing sugarcane harvester
16. Prediction of specific heat and viscosity of agricultural products by using heat balance and fluid dynamics method
17. Technical aspect of the processing of crispy baked (*emping*) by wet processing
18. Thermodynamic properties of mass diffusivity and thin layer drying characteristic of *mlinjo* bean and its application on storage
19. Rotation speed control system design in DC- motor by using PC
20. Studies on the sampling of sediment-water
21. Studies on the farmer capability to pay water irrigation fee in
22. Design of stopping-control system in drying treatment
23.
24. Modification of weeder (konnweder S8-W2 type)
25. Continued heating process of high carbohydrate content liquid foods
26. Force convection cooling process for spherical horticultural products in container
27. Design improvement of crispy baked (*emping mlinjo*) machine at production center Mekar

28. Utilization of PV plastic for covering the vegetables plantation during rainy and dry season
29. see no. 10
30. Friction coefficient of agricultural products on some structural materials
31. Productivity improvement in marginal land by deep tillage plowing
32. Model analysis of tractor management in sugar cane plantation mechanically
33. Effect of sediment deposit on the performance of water level control in Cipoletti
34. Characteristics of concrete from pumice-stone as a material in agricultural construction
35. Correlation between rainfall energy and compactness of soil layer
36. Optimization of the utilization of resources in agricultural sector
37. Prototype design of *chisel* plow for primary plowing in dry-rice field
38. Mechanical properties of concrete from pumice-stone as a material in agricultural construction
39. Empirical studies on the water flow characteristic of irrigation canal for freshwater fish
40. Analysis of rainfall reservoir density in Yogyakarta
41. Design of mechanically apparatus system to accelerate the in-penetrable process of subsoil layer in irrigation wet land
42. Flood detection based on the river flow model and watershed model
43. Model of fruit quality estimation during re-modification atmosphere storage
44. Analysis of fruit cooling process by water evaporation with vacuum pressure
45. Stuffing and sliperying technology of swamp soil layer to increase the quality of land clearing in swamp forest area in middle Kalimantan

Research Topics (Padjajaran University)

1. Water vapor sorption isothermal of cut cassava
2. Determination of physical properties and components analysis qualitatively/quantitatively in honey in East Java
3. Study on the honey desiccation by using of some drying materials
4. Effect of vacuum dehydration temperature in rotavapor on the characteristic of honey
5. Fresh fish preservation by low temperature
6. Effect of utilization of various absorbent on the quality of *Manihot esculenta* during storage

7. Relationship between soil and water conservation area and total rainfall to erosion (Case study in Padjajaran University campus area)
8. Studies on the relationship of percolation rate to rice growing
9. Effect of covering on erosion rate at some cultivation patterns in dry land
10. Designing and testing of pressure losses measurement in fluid-flow
11. Design of water content measurement
12. Thermodynamic properties analysis of air in post harvest handling
13. Data-base system management of agricultural machinery's
14. Effect of cultivation pattern in dry land on both of the physical appearance of soil and corn production
15. Design of coconut fiber peeling
16. Studies on the correlation of actual evapotranspiration rate to wet land area
17. Design of decision supported system on farming planning by using PC
18. Effect of carbon dioxide on the fish freshness (*nila*) during low temperature storage
19. Effect of storage period of wheat-flour on the characteristic of bread
20. Effect of kind and concentration of coagulated materials on the physical and chemical properties of *psidium guajava* paste during storage

(7) Table A4-7 Research Topics, Reseachers and Graduate Student

Research Topics	Reseachers	Graduate Student
<i>A. Farm Power and Machinery</i>		
1. Optimum Utilization of Agricultural Machinery of Farm for Crop Production	Frans J. Daywin Tineke Mandang I.N.Suastawa Desrial Imam Hidayat R.G.Sitompul	E.N.Sembiring Izunuddin Noor Panji Surawidjaja Mastur Gatot Pramuhadi
2. Development of Field Machinery Suitable to Indonesian Low-land Farming	E.N.Sembiring Frans J. Daywin Tineke Mandang Radite PAS I.N.Suastawa Imam Hidayat R.G.Sitompul	Gatot Pramuhadi
<i>B. System Analysis and Management for Agricultural Product</i>		
1. Agricultural Product Handling	Moeljarno D. Setyo Pertiwi	Santosa Fitri
2. Development of Management and Information for Agriculture Products	Moeljarno D. Setyo Pertiwi	Enmy Darmawati Edy Yuniarto
3. Management of Sugarcane Mechanisation	Bambang P. Nesia Dewi	Sigit
<i>C. Labour Science and Farm Work Science</i>		
1. Measurement of Human Work Efficiency	Sam Herodian Kusen Morgan	Rony Kastaman
<i>D. Energy and Rural Electrification</i>		
1. Solar energy assisted radiative cooling system for storage of agricultural products	Kamaruddin A. Armansyah H.T. Sutrisno	Wilujeng T. Yudistira
2. Biomass gasifier for auxiliary heating in solar drying system of estate crops	Kamaruddin A. Sri Endah A. Edi Hartulistiyoso	Lamhot P.Manalu Dyah W. Leopoid Nelwan

<i>E. Farm Structure And Strenght Of Material</i>		
1. Development of container for storage and transportation of fresh horticulture products using controlled atmosphere method	Lilik Pujantoro Gardjito Arief Sabdo Y. Rokhani H.	Budi Satriyo
2. The Use of Agricultural by products for agricultural building materials.	Ir.Sri Mudiastuti	Abdul Rozak Ending Purwito Ir.Murdiati Munir Siti Sukihah
3. Development of Ethylene Scrubber Method Using Ozone Gas in PostHarvest Handling of Fresh Horticultural Products	Lilik Pujantoro Gardjito Sutristo	Dedic Tooy
4. Environmental Control for Garlic (<i>Allium sativuw L.</i>) Production Under Structure	Arief Sabdo Y. Herry S. Gardjito K. B. Seminar	M.Thamrin
<i>F. Optimum Development Model of Warershed for Agricultural Use in Indonesia</i>		
1. Study of Watershed Model Appropriate for Agricultural Use in Indonesia	H.Aris Priyanto Yuli Suharnoto	Kunthy M.Solahuddin
2. Early Warning of Forest Fire Monitoring Systems	Yuli Suharnoto H.Aris Priyanto	M.Solahuddi Yus Rustandi
3. Automatic sprinkler design with CAD	Yuli Suharnoto H.Aris Priyanto	Oktavri
<i>G. Efficient Use of Irrigation in Indonesia</i>		
1. Determing crop Susceptibility Factor for Corn and Soybean.	Soedodo H. M.Yanuar P.	Jr.Putri Astuti
2. Mathematical modeling for Performance Assessment of Furrow irrigation	Soedodo H. Aris Priyanto	Jr.Mohammad I.
<i>I. Postharvest Technology</i>		
1. Development of Controlled Atmosphere Storage for Tropical Fruits	Hadi K.P. Sutrisno	Sumardi Brawi Ayk umiv.
2. Development of Non Destructive Quality Detection System for Tropical Fruits Using Ultrasonic Waves	Hadi K.P. I Wayan B.	Bambang Haryanto

J. Food Engineering		
1. Study of Transport Phenomena on Frying Process	M. Aman W. Adil Basuki A. Budi Nurtama	Subarna
2. Freeze drying of "Jamu"	Kamaruddin A. Armansyah H.T.	Araki Tetsuya

(8) Table A5-1 List of Participation In International Seminars

No.	Name	Seminar	Title of paper	Date
1.	Dr. Kamaruddin A. Dr. Moeljamo D. Dr. Y. Sagara	International Drying Symposium		2-10 Sept., 1988
2.	Ir. Asep Sapei, MS	Seminar of Japan Society of Agricultural Civil Engineering which was held in Tokyo		July, 1989
3.	Dr. Kamaruddin A. Ir. A. Kohar, Msc	The Seminar on Energy Planning for 2010 for ASEAN		19-23 Feb., 1990
4.	Dr. Kamaruddin A.	International Seminar on Scientific Policy Issues Facing All Government International	Estimation of Forest Area Change in Indonesia	9-13 April, 1990, Chicago, USA
5.	Dr. Atjeng M. Syarif Dr. Soedodo H.	Asia Pasific Regional Conference on Engineering for the Development of Agricultural II (AFOED)	The Status of Agricultural Mechanization in Indonesia and High Agricultural Engineering Education in Indonesia	5-7 June, 1990, Malaysia
6.	Dr. Kamaruddin A. Dr. Y. Sagara	World Renewable Energy Congress	Development of Cooling system Using Renewable Energy Souce	22-25 Sept., 1990, Univ. of Reading, UK
7.	Prof. T. Nakamura Prof. I. Nisimura Dr. Moeljamo D. Dr. Tineke Mandang	International Conference and Exhibition on Agric. Engineering		3-6 Dec., 1990, Bangkok Thailand
8.	Ir. Frans Wenur Dr. Kamarudin A. Dr. Y. Sagara	The IDS' 90	Freeze Drying Characteristic and Transport of Shrimp Pastes	Aug., 1990 Prague, Chekoslovalia
9.	Dr. Tineke Mandang Ir. Iman Hidayat	International Agricultural Mechanization Conference	The Effect of Dynamic Load and Intersity of Tractor Traffic on Soil Compaction	16-20 Oct., 1991, Beijing, China
10.	Ir. E.N. Sembiring, MS Dr. Tineke Mandang	International Agricultural Mechanization Conference	Soil Compaction as Influenced by Mechanical Tillage in Sugar Care Plantation	16-20 Oct., 1991, Beijing, China
11.	Dr. Soedodo H.	International Workshop on Soil and Water Engineering for Paddy Field Management	The Effect of Depth of Floding and Method of Water Application on Water Requirements and Yeld of Wetland Paddy	28-30 Jan., 1992, Bangkok, Thailand

12.	Ir Asep sapei, MS Dr. M. Azron Dhalhar Prof. T. Nakamura	International Workshop on Soil and Water Engineering for Paddy Field Management	Study on The Physical Properties of Two Soil Types of wet Paddy in west Java, Indonesia	28-30 Jan., 1992, Bangkok
13.	Prof. Kamaruddin A.	Eur Eng' 94	Performance of Renor MP II Flat Type Solar Dyrer for Cloves and Black Paper	Aug., 29-Sept. 4, 1994, Milan, Italy
14.	Prof. Kamaruddin A.	IDS' 94	Drying of Black Pepper Using Solar Energy	1-4 Aug., 1994 Gold Cost, Australia
15.	Prof. Kamaruddin A.	FTEC' 94	Heat and Mass Transfer Within a Fibreglass house Solar Dryer	12-14 Dec. 1994, Denpasar-Bali
16.	Dr. Tineke Mandang (and Team)	Eur Eng' 94	The Effect of Organic Matter on Tillage Draft and The Physical Properties of Soil	20 Aug.- 4 Sept. 1994 Milano, Italy

(9) Table A5-2 Establishment of Linkage with Other Institutions (at least 3 years)

No.	Collaborative Agency	Contract Amount	Title	Category
1.	Ministry of Transmigration		Training for main staff and private contractor (10 phases) in land preparation and land farming	Training
2.	Citas Engineering, Company	Rp. 25.000.000,-	Solar Tea drying	Applied research
3.	IDRC and Universite Moncton	Rp. 296.000.000,-	Passive crop dryer	Training
4.	AGPP and Bulog	Rp. 280.000.000,-	Development of soybean post-harvest system	Applied research
5.	Bina Pertiwi Co. Ltd.	Rp. 84.000.000,-	Modification and development of moldboard plow hand tractor	Applies research
6.	Yamaha Motor Co. Ltd	Rp. 40.000.000,-	Development of an agro-carrier	Applied research
7.	APBN		Irrigation efficiency at tertiary blocks	Applied research
8.	APBN		Evaluation of optimum physical condition for crop growth	Applied research
9.	BAPEDAL		Damage criteria development of sand mining for river environment deterioration mitigation	Applied research
10.	Ministry of Transmigration	Rp. 100.054.000,-	Development of macro KUD in TSSDPI, Pasir pangaraian and Belilas	Applied research
11.	Ministry of Transmigration	Rp. 199.960.000,-	Center for the development of intergrated transmigration area	Training
12.	Dirt. Bina Usaha Ekonomi Ditjen Pengarahan dan Pembinaan Depran (Ministry of Transmigration)		Preparation for the development of workshop to support rural industry	Training
13.	Co. INDECO DUJA UTAMA		Consultancy agricultural research management, ground water utilization specialist	Consultancy
14.	Biro Pusat Statistik (control Burean of Statistics)	Rp. 114.000.000,-	Consultancy, planning for sampling method and facilities	Consultancy
15.	Ministry of Cooperative	Rp. 504.000.000,-	Training on the development of enterpreneurship skill of KUD manager	Training
16.	Ministry of Cooperative	Rp. 50.000.000,-	Development pattern of cooperation among KUD provinces	Applied research

33.	BAPPENAS (Agency for National Development Planning)	US\$ 5,000	Assessment and Prospect of Small Credit Scheme for Agricultural Machinery	Study
34.	FAO-Ministry of Agriculture		National Policy and Strategy on Agricultural Mechanization	Consultancy
35.	ADP-USAID		Commercialization of Fruit Production Center	Consultancy
36.	Yamaha Motor Co., Mfg., Japan	US\$ 25,000	The Design and modification of an agro-carrier	Study
37.	Co. Bina Peritiwi	US\$ 12,500	The Utilization of power tillage in an upland farming system	Study
38.	Ministry of Transmigration	US\$ 70,000	Training on maintenance and utilization SKR VII*)	Field training in Lombok, Sumbawa, Sulawesi, Ambon, Irian Jaya, and other places.
39.	Ministry of Transmigration	US\$ 185,000	Training on application and management production of SKR VIII *)	Field training in Lombok, Sumbawa, Sulawesi, Ambon, Irian Jaya, and other places.
40.	Ministry of Transmigration	US\$ 152,174	Training on application and management production of SKR IX *)	Field Training
41.	Ministry of Transmigration	US\$ 69,500	Training on application and management production of SKR X *)	Field Training
42.	Agency of the Assesment and application of technology		Agricultural Development Model in Memberamo Catchment, West Irian *)	Applied Research
43.	Ministry of Transmigration	US\$ 267,000	Study on the utilization of two-Wheeled Tractor in Palingkau, Peatland Area of Centre Kalimantan	Applied Research (Under Negotiation)

*) Project Include Eastern Part of Indonesia

Glossary

APBN	Development and Rutine Budget
AGPP	ASEAN Grains Post Harvest Technology Programme
BAPEDAL	Bureau of Environmental Impact Analysis
IDRC	International Developmnet and Research Cooperation, Canada

17.	Co. INDECO DUTA UTAMA MOA-Estate Crops Directorate General (Ministry of Agricultural)	Rp. 40.000.000,-	Environment information assessment environment management planning for crumb rubber factory	Applied research
18.	Deptan (Ministry of Agricultural)	Rp. 199.529.000,-	Survey on water resource potential and determination of pump location in 26 provinces	Applied research
19.	Ministry of cooperative	Rp. 314.966.000,-	Training for consultant and KUD	
20.	Ministry of Cooperative	Rp. 199.957.000,-	Development of integrated transmigration area	Applied research
21.	Ministry of Cooperative	Rp. 21.600.000,-	Training for public nucleus estate	Training
22.	Agency for Technology Assessment and Application	US\$ 1,500	Training on system analysis and agricultural information system	Training
23.	Co. Total Persada, Co. Pembangunan Perumahan, Co. PTT-HJT-JO, Co. Exotica, Co. Jatiwaringin, Co. Tunggal Kaung, Co. Rancamaya, Co. Octamix	US\$ 10,000	Highly tension on concrete cube sample	Material Testing
24.			Development of seeds drying system for urban small scale industry.	Research
25.			Training on agroindustrial processing for KUD staff	Training
26.	Ministry of Cooperative	US\$ 250,000	Training on Agrobusiness for KUD (Village Unit Cooperatives)	Training
27.	Ministry of Cooperatives and Small Enterprises Development	US\$ 150,000	Training for Consultant of Extension Workers on Agrobusiness for KUD (Villages Unit Cooperatives)	Training
28.	Ministry of Cooperatives and Small Scale Enterprises	US\$ 55,000	Training on Small-Scale Agroindustrial Process for KUD	Training
29.	ARM/World Bank - Ministry of Agriculture CDAE - Serpong	US\$ 16,000	Training on Agricultural Machinery Design	Training
30.	Ministry of Cooperative	US\$ 25,000	Development Pattern for Networking of KUD (Village Unit Cooperatives)	Development
31.	Ministry of Cooperatives and Small Enterprises Development	US\$ 22,500	Pilot Project for Cooperative Networking	Development
32.	Ministry of Industry	US\$ 8,000	Candle Nut Processing and Marketing	Study

(10) Table A5-3 Condition of ADAET Facilities

No.	Items/Specification	Qty	Condition	Related Courses	No. of Students	Problem	Solution
1.	Kyowa strain amp. -DPM 603 A, 6 Ch -613D, 4 Ch	1 1	Fair Good	Special problem	5-10	2 Ch are faulty Not enough	1. Repair 2. Need 1 more repair
2.	Data recorder 14 Ch, Kyowa RT17 650A	2	Poor	Utilities	3-5	One is broken, another one 5 ch are faulty	Replace
3.	Penetro-meter SK-2	2	Poor	Soil and machinery relationship Land clearing and land preparation Special problem	20-30 15-25	One is out of order and another is incomplete	Replace
4.	100 Kg spring balance	1	Poor	Soil and machinery relationship Land clearing and land preparation Special problem	3-5 20-30 15-25	Out of order	Replacement
5.	50 cc (Kung sample (10 pcs)	1	Good	Soil and machinery relationship Special problem	3-5 20-30	Not enough	Need 2 more
6.	Hydraulic pressure gauge	1	Poor	Internal combustion engine and farm power Farm tractor	3-5	Out of order	Repair
7.	Engine research test bed, Tokyo Meter Co. (1982)	1	Poor	Internal combustion engine and farm power		Panel instrument, water brake are in function	Repair
8.	Velometer	1	Not work	Drainage Eng	20-30	Not work properly and low accuracy	Need additional sensor types of high accuracy and recording
8.	Channel Hydraulic	1 Unit	need renovation and parts replacement	c. Soil-water Conservation Engineering f. Field Experiment	20-30	Not work properly for student practices	Renovation and replacement of pump + discharge measurement device
10.	Air flow Demonstr. Appr	1 Unit	need RPM regulator and manometer replacement		20-30 10-15	air flow measurement can not be practiced by the students	Replacement of RPM regulator and manometer
11.	Head losses in pipe flow Appr	1 Unit	need replacement of venturimeter			fall of head losses measurement by venturi and pitot tube	Replacement of venturimeter and pitot tube

12.	Reynold Number Appr.	1 Unit	and pitot tube need color liquid injection replacement			difficulties in demonstrating laminar and turbulent flow	provide fill liquid
13.	Groundwater Modelling Appr.	1 Unit	not work properly			broken screen/filter	replacement of the broken part
14.	Weather Station	1 Unit	not work properly	Hydrology and related courses	110-120	Meteorological and soil temp. and moisture data at the experiment field not available for student experiments	need replacement by a computerized meteorological and soil moisture data monitoring at experiment field
15.	Pressure membrane appr	1	good condition, difficult providing membrane	Soil-Plant-Water Relationship	20-30	difficulties in providing the membrane	
16.	Pressure plate appr.	1	good condition			not in function	
17.	Hybrid Recorder Model HRG-500E Hybrid Recorder Model RD1500-21 Cable for GP-13 Interface GP-13 Interface Board For PC9801 PC9801FA/US Monitor NEC-PC-KD854N Hygrometer Heatflow-meter Air velocity meter Photon meter	1 1 1 1 1 1 1 1 1 1 1	Ok Ok Ok Too Old Too Old Too Old Too Old Old Old Ok	TEP 371 Farm Structure and Environ. TEP 473 Farm Structure Design	50	The number of each item is not fulfill to the number of students. Needs a sensor to realize what student want to measure. Connected PC is too slow Still not enough to practice work in environmental phenomenas such as greenhouse system and gross calorimeter system	Add the number of each item. Upgrade and add the memory of PC. Add sensor and need more equipment for laboratory work regarding to environmental studies.
18.	HP Gas Chromatography U-Red beam Lux meter	1 1 1	Ok Ok Ok	TEP 473 Farm Structure Design TEP 373 Greenhouse Technology TEP 472 Storage Env. Engineering	50	Not enough for displaying how the construction function is working such as ventilation system, cooling system, CA system in the storage and other farm building. The number is not enough to total students	Addthe accessories for storage system in order to displaying all parameter. Add the number of equipment Need new equipment for construction work in laboratory scale.
19.	Bomb calorimeter	2	Fair	Agric. Energy and Electrification, Alternative Energy	150	A pair of Bockman thermometer is out of work.	Has to be changed

20.	Pyranometer	2	Poor	Agric. Energy and Electrification, Alternative Energy	150	The glass cube is broken	Has to be changed and calibrated			
21.	Heat exchanger Model HEP-1200 220 V, 3P, 15 kVA	2	Poor	Cooling and Refrig. Engineering	30	Thermoregulators and liquid pumps are out of use	Those equipments have to be repaired			
22.	Vacuum dryer	1	Poor	Alternative Energy, Cooling and Refrig. Engineering	50	Electric heater does not work	Has to be repaired			
23.	Freeze Dryer	1	Fair	Alternative Energy, Cooling and Refrig. Engineering	90	Electronic balance is out of work	Has to be changed			
24.	Refrigeration test bench Model RNP-3000E 220V, 50Hz, 3P, 15 kVA	1	Fair	Cooling and Refrig. Engineering	50		Needs minor repair			
25.	Inverter for TV	1	Poor	Agric. Energy and Electrification, Alternative Energy	150		Needs minor repair			
26.	Anemometer Kananmax 6141	1	Poor	Agric. Energy and Electrification, Alternative Energy	50		Needs minor repair Additional quantity to 3 unit			
27.	Consumables for Recording ink, recorder chart, sparepart, etc.	1		Agric. Energy and Electrification, alternative Energy	50		Needs additional supply			
28.	Temperatur recorder CHINO	1	Poor	Agric. Energy and Electrification, alternative Energy	50		Needs repair and calibration			
29.	Solonometer Recorder	3	Poor	Agric. Energy and Electrification, alternative Energy	50		Needs repair and calibration			
30.	8-bit Computer machine VEC, PC-880	12	Poor	Computer related courses	100	out of order	Should be replaced			
31.	16-bit Computer machine MS-8	1	Very poor	Computer related course	100	out of order	Should be replaced			
32.	STILT Sverzem Tarifull	1	Very poor	Farm power and Machinery		out of order	Repair			
33.	Three phase meter DIX-1120 (serial no 1430)	1	Poor	Farm power and Machinery		out of order	repair			
34.	Data recorder Kyowa KTY 650A	1	Poor	Farm power and Machinery		out of order	repair			
35.	Handy Stain Meter UCAM-1A	1	Very Poor	Farm power and Machinery		out of order	Replace			

(11) Table A5-4 Utilization of ADAET Output in IPB (Degree : MS, Dr, Seminar, Publication, etc.)

Numbers of degree course students who enrolled and graduated

Study/year	1988	1989	1990	1991	1992	1993	1994	1995/ 1996	Total
Agricultural Engineering									
Teaching staff degree									
MS			8	8	8	8	8	15	55
Dr.			9	9	9	9	9	20	65
Enrollment									
MS	11	10	7	4	5	5	4	9	55
Dr.	1	2	1	2	0	1	1	11	19
Graduates									
MS	6	6	5	3	2	10	5	7	44
Dr.	0	2	2	1	1	0	0	8	14
Post-harvest Technology									
Enrollment									
MS	15	10	8	15	6	6	7	16	83
Graduates									
MS	2	6	18	26
GRAND TOTAL									
ENROLLMENTS									
MS	26	20	15	19	11	11	11	25	138
Dr.	1	2	1	2	0	1	1	11	19
GRADUATES									
MS	6	6	5	3	2	12	11	25	70
Dr.	0	2	2	1	1	0	0	3	9

Note : Program of Study in Post-harvest Technology started in 1986

S2 : MS programme, S3 : Dr Programme

Data for 1997 for teaching staff 23 Dr, 17 MS

(12) Table A5-5 List of S-2 Student at Program of Study Agricultural Engineering

Year	Enrollment	Description
1997	1. Yose Sabastian 2. Satyanto Krido Saptano 3. Edi Joniarta 4. Krisdiyani 5. M. Solahuddin	
1996	1. Lamhot P. Manalu 2. Arjuna Neni Triana 3. Yudistira	
1995	1. Gatot Pramuhadi 2. Anang Lastriyanto 3. Edi Susanto 4. Sigit Prabawa 5. Muh. Idrus 6. Astanto	
1994	1. Dyah Wulandani 2. Tantrin 3. Dedie Tooy 4. Leopold Oscar Nelwan	
1993	1. Agus Sutejo 2. Sāndi Asmara 3. Rokhani Hasbullah 4. K.H. Iskandar	Grad. 1995 Grad. 1997
1992	1. Nesia Dewi 2. Roland Asnim Rantung 3. I. Wayan Astika 4. Panji Sutawijaya	Grad. 1995 Grad. 1997 Grad. 1994 Grad. 1995
1991	1. Oktafri 2. Mohanmad Amin 3. Ayendra Asnuti	Grad. 1994 Grad. 1994 Grad. 1995
1990	1. Usman Effendi 2. Puteri Astuti 3. M. Syaiful 4. Izzaddin Noor 5. Yoserizal Geneng	Grad. 1993 Grad. 1995 Grad. 1993 Grad. 1994 Drop Out
1989	1. Emmy Darmawati 2. Iskandar Zulkarnain 3. Totok Prawitosari 4. Iyus Hendrawan 5. Kimar Turnip 6. Victor M. Napitupulu 7. Marsudi 8. Retno Sri Endah 9. Ridwan	Grad. 1994 Grad. 1993 Grad. 1995 Grad. 1992 Grad. 1993 Grad. 1992 Grad. 1992 Grad. 1993 Grad. 1992
1988	1. Spto Kuncoro 2. Jasmid Edy	Grad. 1992 Grad. 1991

LIST OF S-3 STUDENT AT PROGRAM OF STUDY AGRICULTURAL ENGINEERING

Year	Enrollment	Description
1997	1. Amin Rejo	
1996	1. Enmy Darmawati 2. Putri Astuti 3. Santosa 4. Momon Rusmono 5. Bambang Haryanto	
1995	1. Oktafri 2. Wilujeng Trisasiwi 3. Ade Kramadikarta 4. Roni Kastaman 5. Sri Wuryani Lubis 6. Sinto Ruhan	Moved
1994	1. Edward	
1993	1. Sumardi	
1992	-	
1991	1. Tino Orciny Chandra 2. Thamrin	Grad.1997
1990	1. Frans Wenur	Grad 1997
1989	1. Namaken Sembiring 2. A. Kohar Irwanto	Grad 1997 Grad 1997
1988	1. Daryono	Drop Out

(13) Table A5-6a Budget Allocation from GOI to ADAET Project(the last 5 years)

Fiscal Year	Total	
	Rupiah	USD
1993/1994	110 000 000,-	47,826,-
1994/1995	49 500 000,-	21,521,-
1995/1996	16 975 000,-	7,380,-
1996/1997	16 000 000,-	6,956,-
1997/1998	28 140 000,-	12,234,-
Grant Total	220 615 000,-	95,917,-

(14) Table A5-6b Budget Allocation from GOI to Faculty of Agricultural Technology, FATETA(the last 3 years)

Fiscal Year	Total	
	Rupiah	USD
1994/1995	2 543 188 000,-	1,105,733,-
1995/1996	3 835 573 000,-	1,667,640,-
1996/1997	5 155 836 000,-	2,241,667,-
Grant Total	11 534 597 000,-	5,015,040,-

(15) Table A5-6c Budget Allocation from Graduate Student Program-IPB(the last 3 years)

Fiscal Year	Total	
	Rupiah	USD
1995/1996	6 210 318 200,-	2,700,138,-
1996/1997	7 528 339 634,-	3,273,191,-
1997/1998	7 291 460 000,-	3,170,200,-
Grant Total	21 030 117 834,-	9,143,529,-

JICA