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NOTE OF UNDERSTANDING OF THE JOINT EVALUATION

ON THE JAPANESE TECHNICAL COOPERATION FOR

THE PROJECT OF THE CENTER FOR DEVELOPMENT OF

APPROPRIATE AGRICULTURAL ENGINEERING TECHNOLOGY

IN THE REPUBLIC OF INDONESIA

With about four months left till the termination of cooperation period of the Project of the Center for Development of Appropriate Agricultural Engineering Technology on March 31, 1992 as stated in the Record of Discussions, the Japanese Evaluation Team organized by the Japan International Cooperation Agency and headed by Mr. Hideo Funabiki, visited the Republic of Indonesia from November 25 to December 7, 1991 in order to conduct an overall review and evaluation of the Project together with the Indonesian Evaluation Team headed by Mr. Thamrin Bastari.

As a result of discussions, both evaluation teams agreed to convey to their respective authorities the result of the evaluation referred to in the summary report of the joint evaluation on the technical cooperation for the Project of the Center for Development of Appropriate Agricultural Engineering Technology attached herewith.

Jakarta, December 5, 1991

舩曳英夫

Mr. Hideo Funabiki
Leader
Japanese Evaluation Team
Japan International
Cooperation Agency

Mr. Thamrin Bastari
Leader
Indonesian Evaluation Team
Director of Paddy and
Secondary Crops Production

SUMMARY REPORT OF THE JOINT EVALUATION ON THE PROJECT OF THE CENTER FOR DEVELOPMENT OF APPROPRIATE AGRICULTURAL ENGINEERING TECHNOLOGY IN INDONESIA

1. Introduction

Based upon the Record of Discussions (hereinafter referred to as the R/D) signed on February 7, 1987, the Government of Japan and the Government of the Republic of Indonesia have been implementing the technical cooperation program for the Project of the Center for Development of Appropriate Agricultural Engineering Technology (hereinafter referred to as the Project) for 5 years since April 1, 1987.

The purpose of the Project is to develop appropriate agricultural machinery thus contributing to agricultural development in the Republic of Indonesia. The Project has been carried out at the Center for Development of Appropriate Agricultural Engineering Technology (hereinafter referred to as the Center) in Legok, Tangerang, West Java where the buildings and facilities were constructed with the Grant Aid Program from the Government of Japan in March 1987. Main activities of the Project are as follows:

(1) System analysis for agricultural engineering,
(2) Design, development and improvement of agricultural machinery,
(3) Test and evaluation of agricultural machinery, and
(4) Training.

With the cooperation period about to reach its termination (on March 31, 1992), the Government of Japan and the Government of the Republic of Indonesia conducted a joint evaluation on the accomplishment of the Project.

2. Members of Joint Evaluation Team

2.1. Japanese Evaluation Team

(1) Mr. Hideo Funabiki (Leader)
Executive Managing Director,
Japan Agricultural Mechanization Association

(2) Mr. Tasaburo Masuda
Deputy Director, Fertilizer and Machinery Division,
Agricultural Production Bureau,
Ministry of Agriculture, Forestry and Fisheries (MAFF)

(3) Mr. Mikio Kanamitsu
Liaison Researcher for International Collaboration,
Planning Department, Institute of Agricultural Machinery,
Bio-Oriented Technology Research Advancement Institution

(4) Mr. Ryoichi Nakazato
Overseas Technical Cooperation Officer,
International Cooperation Division,
Economic Affairs Bureau, MAFF

(5) Mr. Motonori Tomitaka
Agricultural Development Specialist,
Institute for International Cooperation,
Japan International Cooperation Agency (JICA)

2.2. Indonesian Evaluation Team

(1) Mr. Thamrin Bastari (Leader)
Director, Paddy and Secondary Crops Production (PSCP),
Directorate General of Food Crops Agriculture (DGFCA),
Ministry of Agriculture (MOA)

(2) Mr. Gardjita Budi
Staff, Bureau of International Cooperation,
Secretariat General (SG), MOA

(3) Mrs. Ariyani
Staff, Bureau of Planning, SG, MOA

(4) Mr. Supriyadi
Staff, Directorate of Food Crops Programming (DFCP),
DGFCA, MOA

(5) Mr. Sidik Rosyadi
Staff, DFCP, DGFCA, MOA

(6) Mr. Muhlizar M.
Staff, PSCP, DGFCA, MOA

3. Purposes of the Evaluation

(1) To conduct a comprehensive evaluation on the performance of the Project as compared with the Tentative Schedule of Implementation (TSI) attached to the R/D and the cooperation schedule before March 31, 1992.

(2) To submit recommendations to the concerned authorities of the two Governments on the measures to be taken after the expiration of the cooperation period on the Project.

(3) To feedback the results of the evaluation for the improvement of formulation and implementation of technical cooperation project in the future.

4. Survey Items

The evaluation survey was conducted by the Joint Evaluation Team (hereinafter referred to as the Team) consisting of the Japanese team and Indonesian team. The Team surveyed such items as follows:

(1) Input Support Activities

1) Cooperation from the Government of Japan
a. Dispatch of experts
b. Provision of machinery and equipment
c. Training of Indonesian personnel in Japan
d. Others

2) Measures taken by the Government of Indonesia
a. Provision of land, buildings and facilities
b. Appointment of counterparts and other personnel
c. Allocation of budget
d. Others

(2) Activities of the Project

1) System analysis for agricultural engineering
2) Design, development and improvement of agricultural machinery
3) Test and evaluation of agricultural machinery
4) Training
5) Others

(3) Effects of the Project

(4) Management of the Project

5. Input for the Project

5.1. Cooperation from the Government of Japan

5.1.1. Dispatch of experts

Eleven (11) long-term experts and 23 short-term experts have been dispatched in total; the long-term experts are assigned to the Project in accordance with the fields mentioned in the R/D. Out of 23 short-term experts, 4 experts have worked for the system analysis (one expert was assigned twice), 14 experts for the design, development and improvement, and 5 experts for the test and evaluation. These experts have contributed to the attainment of the objectives of the Project. There is one another short-term expert planned to be dispatched within the cooperation period. Details of the dispatch of experts are in Table 1.

5.1.2. Provision of machinery and equipment

The total amount of machinery and equipment to be granted from the beginning of the Project until its termination has a value of about 200 million yen (including that of allocated for

the fiscal year 1991). The budget for the provision of machinery and equipment is in Table 2. Most of them have been utilized effectively in accordance with the objectives of the Project and they are kept in good condition in general. Main machinery and equipment provided by JICA are in Table 3.

5.1.3. Training of Indonesian personnel in Japan

Eighteen (18) Indonesian personnel working at the Project visited Japan for training and observation related to agricultural machinery development. The training was effective for the improvement of technical and administrative skill of counterparts assigned to the Project. However, some of the ex-trainees left from the Project. There are 2 more counterparts expected to visit Japan for attending training courses within the cooperation period. Details of the training are in Table 4.

5.1.4. Others

Under the Model Infrastructure Construction Program, a test field for agricultural machinery was constructed in 1990. It covered the construction of 0.5 ha of paddy field and 0.8 ha of upland field and improvement of 1.6 ha of upland field. About 23 million yen was spent for the construction.

Under the Middle Level Engineer Training Program, about 26 million yen has been spent for conducting the training courses since 1988 (including that of allocated for the fiscal year 1991).

Under the Emergency Countermeasure Program, about 4.6 million yen was spent for the improvement of the access road to the Center in 1990.

Under the Appropriate Technology Development Program, about 3.8 million yen was spent for multiplication of the prototypes of power tiller and reaper developed at the Project. Further, about 1.6 million yen is expected for the same purposes of the disk plow and thresher in the fiscal year 1991.

Under the Technology Exchange Program, 2 experts and 2 counterparts visited the Regional Network of Agricultural Machinery (RNAM) in Thailand in 1988.

Several Japanese Missions have been dispatched for the Project as mentioned in Table 5.

5.2. Measures Taken by the Government of Indonesia

5.2.1. Provision of land, buildings and facilities

The Government of Indonesia has provided necessary land, buildings, and facilities for the Project. The Center was constructed with the Grant Aid Program of Japanese Government. The construction was completed in March 1987.

5.2.2. Appointment of counterparts and other personnel

About 15 counterparts (5 administrative staff and 10 technical engineers) and about 35 mechanics and technicians are assigned to the Project by the Government of Indonesia. Besides, about 20 supporting staff have been assigned to the Project. The number of staff have been assigned to the Project are in Table 6.

5.2.3. Allocation of budget

The Indonesian Government has spent about 446 million Rp. for running the Project in the last 5 years. Details of the budget are in Table 7.

6. Achievements of the Project

6.1. System Analysis for Agricultural Engineering

For obtaining information about agriculture in Indonesia, statistical data and literatures regarding social and economic aspects of agriculture were collected in addition to field survey of villages. A data base on agricultural mechanization was made and some of the results of investigation have been inputted.

Besides, based on the results of survey, analyses were conducted on (1) optimum farm operation in intensive farming areas, (2) regional classification for introduction of agricultural machinery, and (3) influence of agricultural mechanization on labor employment in rural society. At the moment, the survey on contract land preparation, which is widely practiced in some areas, is being conducted.

Kind, using condition and specifications of agricultural machinery to be developed at the Project were proposed based on the results of the survey. Further, a simple method of price prediction in the market was developed for the agricultural machinery being developed at the Project. Using this method, it is also possible to predict the specifications of a machine under certain price condition.

The studies mentioned above were conducted jointly by Japanese experts and the Indonesian counterparts. Then the counterparts have acquired the knowledge of how to prepare the questionnaire, and how to use computer program, simulation and statistical method for processing and analyzing the data.

For farming practices survey, it is necessary to collect and arrange basic data continuously and to increase the number of areas for field survey which was done only in limited scale due to financial and manpower constraints. Through this practice, preciseness and reliability of the results of system analysis for agricultural engineering will be increased.

One of the study items in this division is the evaluation of

agricultural machinery developed in Indonesia. Although a survey on the farm machinery introduced by 2KR (Second Kennedy Round) program and those developed and distributed from other organizations such as RNAM is on-going using questionnaires, it will take a considerable time for the collection of data. Based on the results of the survey to be obtained, it is necessary to find out the effects of these agricultural machinery on the farming practices and farm economy and to make guidelines for further improvement of the machinery.

6.2. Design, Development and Improvement of Agricultural Machinery

The Project has worked out 9 kinds and 13 types of agricultural machinery (see Table 10). Some of them are as follows:

(1) Reaper with reduction of harvesting loss and high performance (IJR-I, IJR-II).
(2) Thresher with low power and reduced weight for better quality of rice and soybean (IJT-II,IJT-III).
(3) Rice husk furnace dryer of low fuel cost and simple design (IJDF-II, IJDF-III).
(4) Soybean planter for power tiller (IJS-II) and soybean planter for multi-purpose small hand tractor (IJST-I).

Some of the drawings and prototypes were distributed to provinces.

During the process of developing the above mentioned agricultural machinery, technical guidances on design, prototyping, functional test and improvement were carried out from the Japanese experts to Indonesian counterparts. The counterparts have improved their technical level in the fields of design drawing, understanding the drawing, and prototyping methods. For the functional test, the counterparts can decide the test method according to the purpose, conduct the test, and analyzed the data. As an over all cooperation effect in this division, the counterparts learned the know how of developing agricultural machinery.

However, functional test and improvement of reaper, thresher, dryer and peanut sheller are not completed yet. Since these machines have different function and mechanism, it is necessary to continue the assistance for transfer of technology to the counterparts on these machines.

6.3. Test and Evaluation of Agricultural Machinery

Among the existing test codes for 22 agricultural machines in Indonesia, making the draft for revising test code has been carried out for 8 machines. They are those machines tested at the Project (i.e. power tiller, irrigation pump, thresher, rice milling unit, sprayer) and those being developed at the Project (dryer, reaper, peanut sheller)

Out of the tests conducted in response to the requests from manufactures and trading companies, it was decided to conduct the test for power tiller and irrigation pump using the newly installed testing equipments which have high accuracy. At the moment, not only the test for rate of work, which had been conventionally conducted, but also the test for accuracy or durability can be done. Especially, the performance tests of power tillers and irrigation pumps have been improved to the higher levels.

But, it is necessary to add test items, to examine and revise the test method and equipment for other agricultural machines.

For standardization of the parts of agricultural machinery, specification of hitch and axle of power tiller have been investigated under the present industry standard. A proposal for the improvement of standardization of the hitch is to be submitted to the Ministry of Industry through MOA. If this proposal is approved and implemented, the users will have advantages of exchanging the implements produced by different manufacturers, and it is also expected that artisans can make and sell the implements.

It is necessary to investigate whether a standardization of axle for power tiller is possible.

6.4. Training

Training courses have been organized by the Project since 1988. They are (1) farm machinery utilization course (only in 1988), (2) farm machinery maintenance and repairing course, (3) farm machinery design and fabrication course, and (4) farm machinery testing and evaluation course. Participants of the training courses are those from Provincial Agricultural Services, Agency for Education and Training, Seed Centers, Manufacturers and others. Total number of participants for the training courses are 189 by the time of the evaluation (the training courses for fiscal year 1991 will be held early next year). Details of the training are in Table 8.

Thirty-four (34) teaching materials (mostly in Indonesian language) have been compiled for the training. A list of the teaching materials is presented Table 9.

With the mutual cooperation between the Japanese experts and Indonesian counterparts working at the Project, a lot of reports, drawing and software have been written. A list of them is shown in Table 10.

7. EFFECTS OF THE PROJECT

Since the Project has paid attention on fundamental studies for agricultural mechanization in Indonesia, the process of verification and extension is necessary before the output of the

Project diffuses to rural areas or farmers. In other words, the Project was formulated with an expectation of creating the impact from a long-term point of view; it is rather difficult to obtain the fruits within a short period under this kind of Project. However, owing to the collaborative efforts of concerned Japanese and Indonesian personnel, considerable effect and extension are realized.

(1) Highlights of individual cooperation items

1) System analysis for agricultural engineering
Statistical data of agriculture and farmers throughout Indonesia were collected and regional classification was made in a point of view of agricultural mechanization.

2) Design, Development and improvement of agricultural machinery
The reaper developed for paddy harvesting has a prospect of practical use. The thresher developed for paddy and soybean shows better performance than the ones commonly used.

3) Test and evaluation of agricultural machinery
The method of measuring the power of tractor PTO and axle, and the method of collecting and processing data by utilizing several new instruments were acquired. Pump testing apparatus was made, by which precise measurement can be achieved.

4) Training
Teaching materials for utilization, maintenance, design, fabrication and testing of agricultural machinery were prepared.

(2) Improvement of the technical level of counterparts

1) Understanding the importance of fundamental studies for development of agricultural mechanization.
2) Improvement of the ability on problem finding, problem solving, and arranging and utilizing the results.

(3) Presentation of research papers

There were 4 research papers presented by the counterparts; they contributed to the improvement of technology level of agricultural machinery in Indonesia.

(4) Extension of the output

1) Findings of the Project are utilized as materials for policy making in public administration.

2) Samples and drawings of the prototypes designed and developed at the Project were distributed to provinces following the request.

3) Some of the results of farm machinery testing conducted at the Project are utilized as references for the selection of machinery to be introduced by 2KR program.

As mentioned above, several positive effects of the Project implementation are being realized. With further efforts of verification and extension, it is expected that the output of the Project will contribute to the agricultural development in Indonesia.

8. MANAGEMENT OF THE PROJECT

(1) The Director General of Food Crops Agriculture has overall responsibility for the implementation of the Project. The Director of Paddy and Secondary Crops Production is directly responsible for the Project. The counterpart of Japanese Team Leader is the Head of Sub-Directorate Agricultural Machinery (SDAM) as Project Director and the counterparts of Japanese experts are staff of SDAM. Although enough number of the counterparts were assigned to the Project, not full-time assignment of the counterparts and transfer of some of the counterparts have affected the progress of the Project.

(2) Indonesian Government has allocated the budget for the implementation of the Project as mentioned earlier. However, the limitation of the budgets for research and development, facility maintenance, and telephone installation has affected the implementation of the Project.

(3) The Joint Committee Meeting was held 3 times so far; it has functioned important roles in the planning and implementing of the Project activities and understanding of concerned organizations and personnel each other. Besides, the meeting among Japanese experts and Indonesian counterparts has been held bimonthly for discussing the progress of the Project activities and exchange ideas on future activities.

9. CONCLUSION AND RECOMMENDATIONS

The Project started on April 1, 1987 at the Center in Legok, Tangerang, West Java for the purpose of developing appropriate agricultural machinery thus contributing to agricultural development in the Republic of Indonesia. Main activities of the Project have been (1) system analysis for agricultural engineering, (2) design, development and improvement of agricultural machinery, (3) test and evaluation of agricultural machinery, and (4) training.

The activities of the Project have conducted in accordance with the items mentioned in the R/D and the TSI with the efforts and mutual understanding of concerned Japanese and Indonesian personnel. The Project has accomplished most of the objectives and the personnel assigned to the Project have acquired the knowledge and skills along the fields mentioned above.

There are some extension of the output of the Project already being realized; research findings of the Project are used for policy making, and samples and drawings of the prototypes designed and developed at the Project are distributed to provinces.

Although the Project has accomplished most of the initial objectives, there are few items which can not be completed within the initial cooperation period due to lack of the full-time counterparts and lack of the budget. After a comprehensive evaluation survey on the performance of the Project, The Team found that the items mentioned below require further cooperation.

(1) System analysis for agricultural engineering

Conducting investigation on the impact of agricultural machinery developed in Indonesia and making guidelines for their improvement.

(2) Design, development and improvement of agricultural machinery

Functional test and improvement of the thresher, rice husk furnace dryer, peanut sheller under being developed.

(3) Test and evaluation

Transfer of technology on the production of equipment for sprayer nozzle test and its testing method, testing method of riding tractor, and testing method of irrigation pump.

Based on the above mentioned circumstances, it is necessary to carry out a follow up cooperation for 2 years on the following fields.

(1) System analysis for agricultural engineering,
(2) Design, development and improvement of agricultural machinery, and
(3) Test and evaluation of agricultural machinery.

For the smooth implementation of the follow up cooperation, it is necessary for the Indonesian side to take the following measures.

(1) The components of project implementation, such as organizational structure (commanding body), budget, staff and others are to be ready by March 31, 1992.

(2) With continuous allocation of the counterparts currently assigned to the Project, the qualified counterparts of full-time assignment are to be secured during the cooperation period.

Table 1 Japanese experts dispatched to the Project.

No.	Assignment	Name	Period
	I. Long-term Experts		
1	Project Leader	Mr. Michio IRIE	8. 5.'87-31. 3.'92
	System Analysis for Agricultural Engineering		
2		Mr. Mitsuo SUZUKI	1.10.'87-30. 9.'90
3		Mr. Youichi SHIBATA	14. 1.'91-31. 3.'92
	Design, Development and Improvement of Agricultural Machinery		
4		Mr. Tadashi WATAHIKI	8. 5.'87- 7. 5.'90
5		Mr. Hideki TAKESHIMA	21. 5.'87-20. 5.'90
6		Mr. Masaaki SAIGUSA	20. 5.'90-31. 3.'92
7		Mr. Norio TODA	15. 6.'90-31. 3.'92
	Test and Evaluation of Agricultural Machinery		
8		Mr. Motomu MASUZAWA	21. 5.'87-20. 6.'90
9		Mr. Yukito FUJII	20. 5.'90-31. 3.'92
10	Coordinator	Mr. Yasuhiro KIMURA	8. 5.'87- 7. 5.'91
11		Mr. Mikio YAMASHITA	28. 5.'91-27. 5.'92
	II. Short-term Experts		
	System Analysis for Agricultural Engineering		
1		Mr. Manabu SAKAI	12. 1.'88-11. 3.'88
2		Mr. Noriaki ISHIZUKA	10. 8.'88- 5.10.'88
		-ditto-	10. 3.'90- 8. 4.'90
3		Mr. Atsushi SAWAMURA	1. 3.'91-30. 4.'91
4		Mr. Masuo ANDOU	11.11.'91-10.12.'91
	Design, Development and Improvement of Agricultural Machinery		
5		Mr. Haruo OGAWA	4. 9.'87- 3.10.'87
6		Mr. Iwahiro ASADA	4. 9.'87- 3.10.'87
7		Mr. Fujio IGARASHI	1. 7.'88-30. 9.'88
8		Mr. Nobuyuki ABE	1. 7.'88-30. 9.'88
9		Mr. Takao SAKATSUJI	1. 7.'88-27.12.'88
10		Mr. Takao SUGIYAMA	2. 7.'88-30. 8.'88
11		Mr. Yoshiyuki KANESADA	31. 8.'89-28. 2.'90
12		Mr. Toshikatu TAKAHASHI	31. 8.'89-28. 2.'90
13		Mr. Hiroyuki TAKAHASHI	26. 2.'90-28. 4.'90
14		Mr. Youichi FURUTA	1.12.'90-15. 5.'91
15		Mr. Sumihiko MIYAHARA	1. 3.'91-30. 4.'91
16		Mr. Hideto MATSUFUJI	13. 3.'91-24. 8.'91
17		Mr. Isao TAKAHASHI	21. 9.'91-20. 2.'92
18		Mr. Masaru NAKAMARUO	21. 9.'91-20. 2.'92
	(plan)	Mr. Mitsuru HACHIYA	20. 1.'92-20. 3.'92
	Test and Evaluation of Agricultural Machinery		
19		Mr. Yasurou SUGIURA	20.10.'87-19.12.'87
20		Mr. Makoto NAKANO	2. 7.'87-30. 8.'87
21		Mr. Yousuke MATSUO	9. 8.'89- 7.10.'89
22		Mr. Masamitsu TAKAHASHI	1. 3.'91-13. 4.'91
23		Mr. Yoshiji OCHIAI	1. 8.'91-31. 8.'91
	III. Others (Model Infrastructure Construction Program)		
1		Mr. Kenjirou YATABE	24. 8.'88-15.10.'88
2		Mr. Nobuo NAGAWARA	24. 8.'88-15.10.'88
		-ditto-	1.11.'89-14. 4.'90

Table 2 Japanese budget for the provision of machinery and equipment.

Fiscal year	Amount (1,000 yen)
1987	44,324
1988	67,643
1989	34,465
1990	23,453
1991	(31,322)
Total	(201,207)

N.B. Figures in parentheses are those of planned.

Table 3 Condition and frequency of utilization of main machinery and equipments donated from Japan (those of more than 1 million yen).

No.	Item (specification)	Year of arrival or purchase	Condition	Frequency of utilization
1	Mini bus (Mitsubishi Colt)	September 1987	A	A
2	Wagon car (Toyota Kijang)	November 1987	A	A
3	Wagon car (Toyota Kijang)	December 1987	A	A
4	Micro bus (Toyota, 25 seats)	March 1988	A	A
5	Personal computer (NEC, 2 units)	May 1988	A	A
6	Personal computer (ICM, 2 units)	"	A	A
7	Storage scope	"	A	B
8	Solar battery system (Checking by manufacture is required)	July 1988	B	B
9	Meteorological observation kit (Checking by manufacture is required)	July 1988	B	A
10	Truck (3.5 t)	October 1988	A	A
11	Mini bus (Mitsubishi Colt)	November 1988	A	A
12	Wagon car (Daihatsu 6 seats)	January 1989	A	A
13	Vibro shear	March 1989	A	A
14	Universal milling machine	"	A	A
15	Data recorder	"	A	A
16	Fuel flow meter	"	A	A
17	Bulldozer	"	A	B
18	Tractor (60 HP)	April 1989	A	B
19	Lathe (1,800 mm)	June 1989	A	A
20	Spot welder	September 1989	A	A
21	Copy machine (Xerox 2510)	November 1989	A	A
22	Copy machine (Xerox 5026)	January 1990	A	A
23	Mini bus (Isuzu, 15 seats)	February 1990	A	A
24	AC generator (75 KVA)	"	A	A
25	Truck (0.7 t)	March 1990	A	A
26	Tractor (26 PS)	April 1990	A	A

Table 3 .....continued.

No.	Item (specification)	Year of arrival or purchase	Condition	Frequency of utilization
27	Slotter	May 1990	A	B
28	Precision lathe (1,200 mm)	"	A	A
29	Universal tool grainder	"	A	A
30	Bending machine	September 1990	A	A
31	Plasma cutter	January 1991	A	A

N.B. Condition: A, B, and C stands for good condition, need spare parts, and need replacement, respectively.
Frequency of utilization: A, B, and C stands for use often, use sometimes, and out of use, respectively.

Table 4 Indonesian personnel trained in Japan.

No.	Name	Training course	Period
1	Mr. Zaidir S.	AM in general	29. 3.-15. 4.'87
2	Mr. Dadang T.	AM in general	29.11.-29.12.'87
3	Mr. B. Gultom	AM in general	-ditto-
4	Miss. A. Promosiana	Design & development of AM	4.11.-20.12'87
5	Mr. S. Lesmonodjati	Design of AM	10. 3.-29.10.'88
6	Mr. Kusuno H.	Data base with personal computer	5. 5.-21. 7.'88
7	Mr. Thamrin B.	AM in general	23. 5.- 4. 6.'88
8	Mr. Hari W.	Testing & Evaluation of AM	4.10.- 5.12.'88
9	Miss. Trie L. D.	Data base system design	16.10.-23.12.'88
10	Mr. Ari E.	Design of AM	28. 2.-30.11.'89
11	Mr. Eddy T.	Agricultural mechanization	6. 3.-25.11.'89
12	Mr. Wahyu S.	Design of AM	22.11.'89-17. 1.'90
13	Mr. Budi S.	Design of AM	6. 2.-26.10.'90
14	Mr. Agung H.	Testing & Evaluation of AM	5. 3.- 8. 5.'90
15	Mr. M. Hidayat	Agricultural mechanization	6. 3.- 5.11.'90
16	Mr. Rachman M.	Design of AM	26. 3.- 3. 7.'90
17	Mr. Made D.	AM management	15. 5.-26.11.'90
18	Mr. Muhammad	Machine tooling	28.11.'90-30. 3.'90
	Mr. Deddy S.	Machine tooling	9.12.'91-29. 2.'92
	Mr. Rusdiatno	Testing & evaluation of AM	2. 3.-29. 5.'92

N.B. AM stands for agricultural machinery.
Out of 18 ex-trainees two transferred to other government organizations, one transferred to a private company, and two are pursuing further study (M.S. degree).
Names without number are those planned to visit Japan.

Table 5 Japanese teams sent for the formulation and technical guidance of the Project.

Kind of team	Number of members	Period
Agricultural cooperation project contact	5	22.10- 4.11.'84
Long term surveyors	3	15. 5-30. 6.'85
Preliminary survey	5	17. 6-30. 6.'85
Implementation survey	5	28. 1-11. 2.'87
Consultation survey	4	15.10-27.10.'87
Technical guidance	3	8.12-17.12.'88
Technical guidance	5	27. 8- 8. 9.'90

Table 6 Number of counterparts and other supporting staff assigned to the Project (as of October).

Counterpart/supporting staff	1987	1988	1989	1990	1991
Administrative counterparts (Director & Head of Division)	5	5	5	4	5
Technical counterparts (Engineers)	15	10	10	12	10
Mechanics & technicians	34	38	36	36	35
Other supporting staff	28	27	24	23	21
Total	82	80	75	75	71

Table 7 Budget allocated by the Government of Indonesia (1,000 Rp.).

Items	Fiscal year				
	1987	1988	1989	1990	1991
Recurrent budget	20,000	20,000	20,000	24,000	24,000
Development budget	63,950	27,910	30,110	67,500	36,575
Training	0	0	22,440	40,000	50,000
Others	0	0	0	0	0
Total	83,950	47,910	72,510	131,510	110,575

Table 8 Number of participants attended the different courses of agricultural machinery training conducted by the Project.

Name of training course	Fiscal year			
	1988	1989	1990	1991
Utilization (U)	15(18)			
Maintenance and repairing (M+R)	15(19)			
U + M + R		29(30)	20(30)	20(30)
Design and fabrication	16(19)	16(19)	20(30)	20(30)
Testing and evaluation	22(19)	16(20)	20(30)	20(15)
Total	68	61	60	60

N.B. Figures for 1991 are those in plan.
Figures in parentheses are training periods (number of days).

Table 9 Textbooks/handouts compiled at the Project.

Training course	Name of textbook/handout	Pages
I.	Farm Machinery Utilization and Maintenance Course	
	1. Agricultural machinery management	19
	2. Farm machinery safety	25
	3. Farm use of gasoline and diesel engine	15
	4. Maintenance of gasoline engine	12
	5. Maintenance of diesel engine	22
	6. Maintenance of hand and power sprayer, mist blower	30
	7. Maintenance of power tiller and equipment	18
	8. Maintenance of mini tractor and equipment	42
	9. Maintenance of thresher machine	20
	10. Plant protection farm machinery	14
	11. Soil tillage by tractor	11
	12. Quality aspects of milled rice	28
	13. Post harvest technology for paddy	38
	14. Workshop management	10
	15. Water pump irrigation	10
	16. Peanut sheller	38
	17. Farm water management	14
II.	Farm Machinery Design and Fabrication Course	
	1. Milling machine (Mesin Frais)	30
	2. Lathe machine and tools	48
	3. Technical drawing Vol.1, Vol.2, Vol.3	159
	4. Alternative energy for agriculture	15
	5. Basic farm machines design	18
	6. Design of thresher and machine	20
	7. Harvesting machine design	5
	8. Drying machine	26
III.	Farm Machinery Testing Course	
	1. Test code and procedure for corn sheller	16
	2. Test code and procedure for double axle tractor	37
	3. Test code and procedure for thresher	15
	4. Test code and procedure for dryer	17
	5. Test code and procedure for peanut sheller	20
	6. Penetrometer and sound level meter	21
	7. Compilation of handout for testing and evaluation course	26
	8. Electronic instrumentation	21
	9. Test code and procedure for reaper	19
	10. Heat treatment	6

Table 10 Kinds of report, computer software and drawing produced at the Project.

I. System Analysis for Agricultural Engineering

Reports

1. Report on guidance on system analysis of farm mechanization, M. Sakai, March 1988
2. Report on system analysis tools, N. Ishizuka, October 1988
3. Economical and durability evaluation of ATA-220 developing agricultural machinery, M. Suzuki and Trie L. D., August 1989
4. Simulation of farm operation system in Lampong Province, Trie L. D., N. Ishizuka and M. Suzuki, August 1989
5. Regional classification for appropriate agricultural mechanization, M. Suzuki, January 1990
6. System analysis on the influence of agricultural mechanization to labor situation in rural, N. Ishizuka, April 1990
7. Recommendation for development and improvement of appropriate agricultural machinery in Indonesia, M. Suzuki, Wiyant, Eva Z. Y., Viva S. June 1990
8. Report on practice of farm mechanization data base, A. Sawamura, April 1991

Soft wares

1. Farm operating system simulator, N. Ishizuka, August 1988
2. Economic analysis on agricultural machinery, N. Suzuki, June 1989
3. Tiny DYNAMO, N. Ishizuka, March 1990

II. Design, Development and Improvement of Agricultural Machinery

Reports

1. Working report on the cupola operation and maintenance, H. Ogawa, October 1987
2. Working report of machine tools, I. Asada, November 1987
3. Report on development of thresher, T. Sugiyama, August 1988
4. Report on guidance for design and development of the appropriate dryer, N. Abe, September 1988
5. Report on guidance of manufacturing techniques, S. Sakatsuji, December 1988
6. Development of power tiller and reaper in ATA-220 Project, H. Takeshima, T. Watahiki and M. Irie, August 1989
7. The design process, H. Takeshima and T. Watahiki, August 1989
8. Report on agricultural machinery development: Development of soybean planter, T. Takahashi, February 1990
9. Report on agricultural machinery development: Design, development and improvement, Y. Kanesada, February 1990
10. Development of the thresher: Design of the Thresher IJT-II, H. Takahashi, April 1990
11. Report on agricultural machinery design, development and improvement, T. Watahiki, April 1990
12. Report on the operation of cupola, R. Dadang T, September 1987, (in Indonesian)

Table 10 .....continued.

13. Rice husk furnace dryer IJDF-II, A. Abe and M. Irie, 1989, (in Indonesian)
14. Power tiller IJPT-II, T. Watahiki, (in Indonesian)
15. Soybean planter IJS-II, T. Takahashi and M. Irie, (in Indonesian)
16. Report on the practice of technological guidance for design and development of peanut sheller, S. Miyahara, April 1991
17. Report on the practice of design, development and improvement, Y. Furuta, May 1991
18. Report on the practice of design, development and improvement, H. Matsufuji, August 1991

Drawings

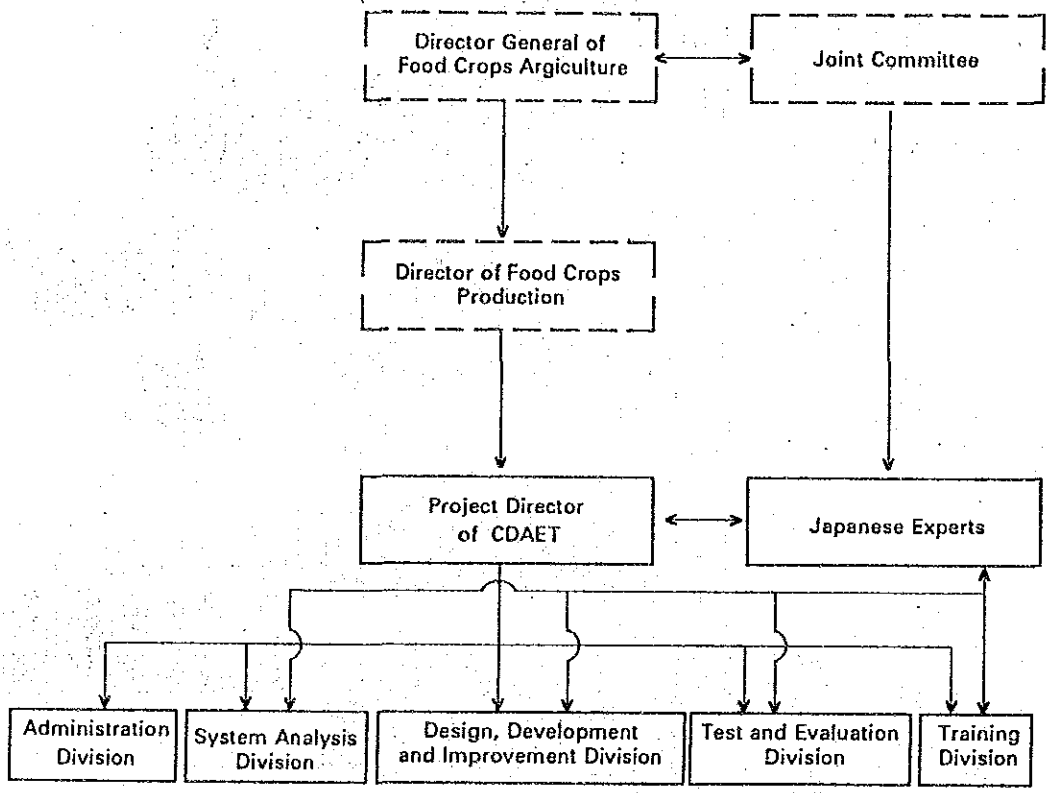
1. Reaper (IJR-II), 142 sheets
2. Power tiller II (IJP-II), 115 sheets
3. Soybean planter (IJS-II), 57 sheets
4. Soybean planter (IJS-III), 36 sheets
5. Thresher-2 (IJT-2), 49 sheets
6. Furnace for dryer (IJDF-II), 18 sheets
7. Disk plow (IJDP-I), 48 sheets
8. Disk plow (IJDP-II), 76 sheets
9. Multi purpose small power tiller (IJST-I), 250 sheets
10. Soybean planter for IJST-I (modification from IJS-II), 80 sheets
11. Two rows cultivator for IJST-I, 60 sheets
12. Two rows ridger for IJST-I, 20 sheets
13. Steel wheel of IJST-I for cultivating and ridging, 2 sheets
14. Paddy reaper head for IJST-I (modification from IJR-II), 20 sheets
15. Soybean reaper head for IJST-I, 150 sheets
16. Thresher (IJT-III), 200 sheets
17. Parts code for IJT-III, 1 unit
18. Illustration for assembling of IJT-III, 1 unit
19. Dryer (IJDF-III), 100 sheets
20. Peanut sheller (IJPS-I), 40 sheets

III. Test and Evaluation of Agricultural Machinery

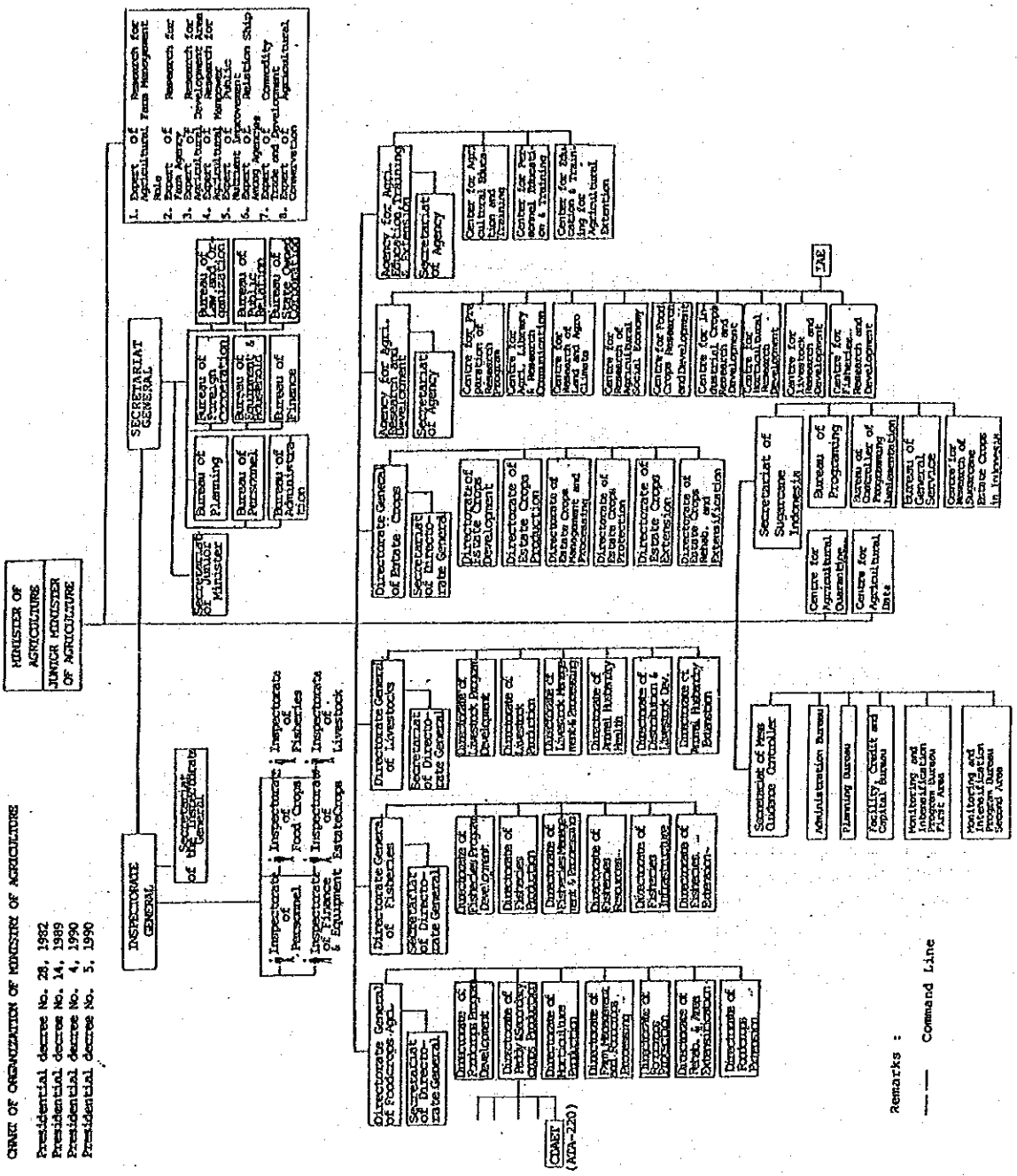
Reports

1. Report on the testing and testing method of tractor performance, Y. Sugiura, December 1987
2. Report on revising test code and procedure on agricultural machinery, M. Nakano, August 1988
3. Report on the practice of data collecting and processing for the test of agricultural machine, Y. Matsuo, October 1989
4. Report on activities in three years, M. Masuzawa, June 1990
5. Report on testing and measuring procedure on centrifugal pump performance test, M. Takahashi, April 1991
6. Report on the recommendation for standardization of hand tractor and for test methods of sprayer, Y. Ochiai, August 1991

適正農業機械技術開発センター計画組織図

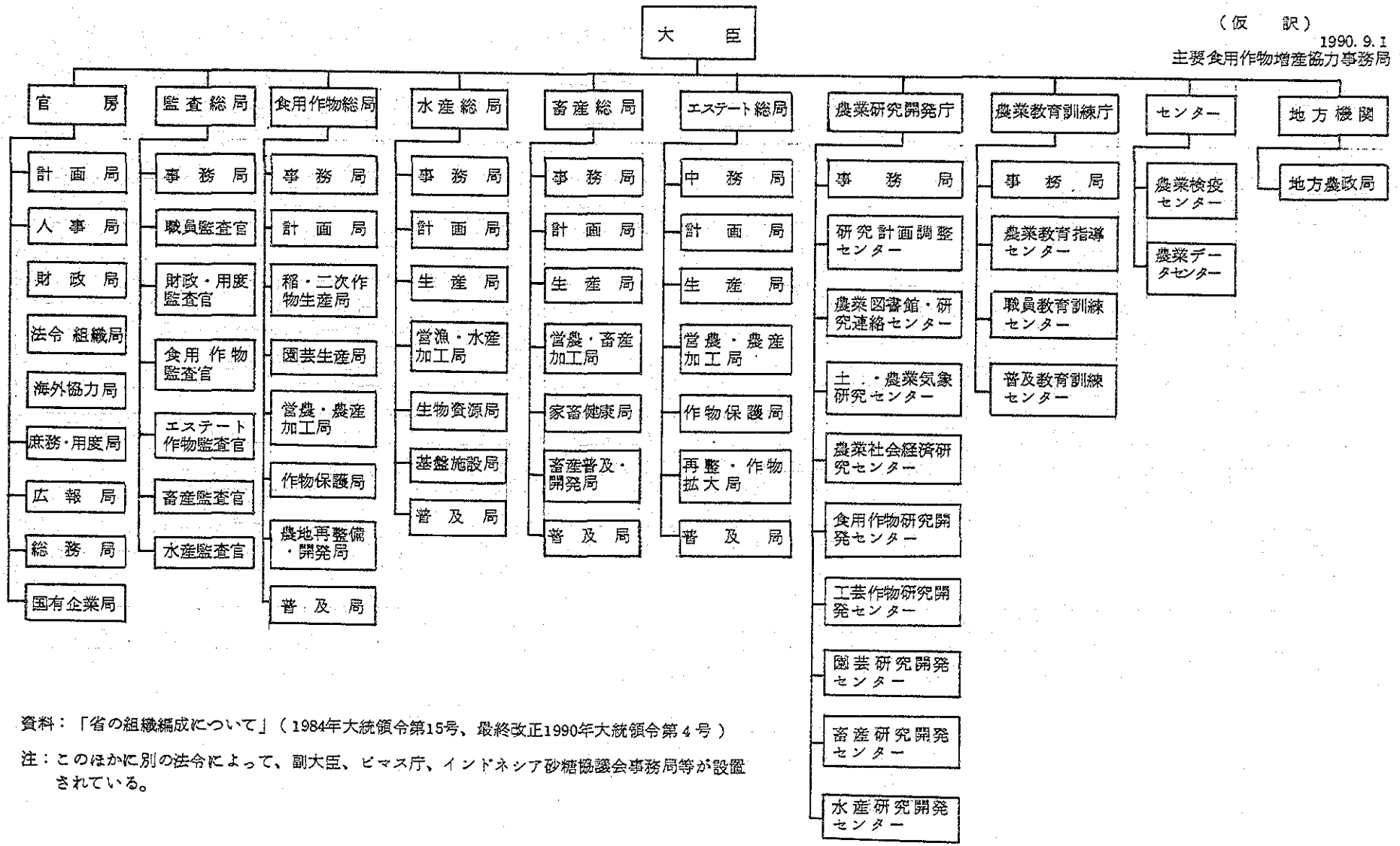


農業省における適正農業機械技術開発センター（ＣＤＡＥＴ）と農業機械研究所（ＩＡＥ）位置図



農業省組織機構図

（仮　訳）
1990. 9. 1
主要食用作物増産協力事務局

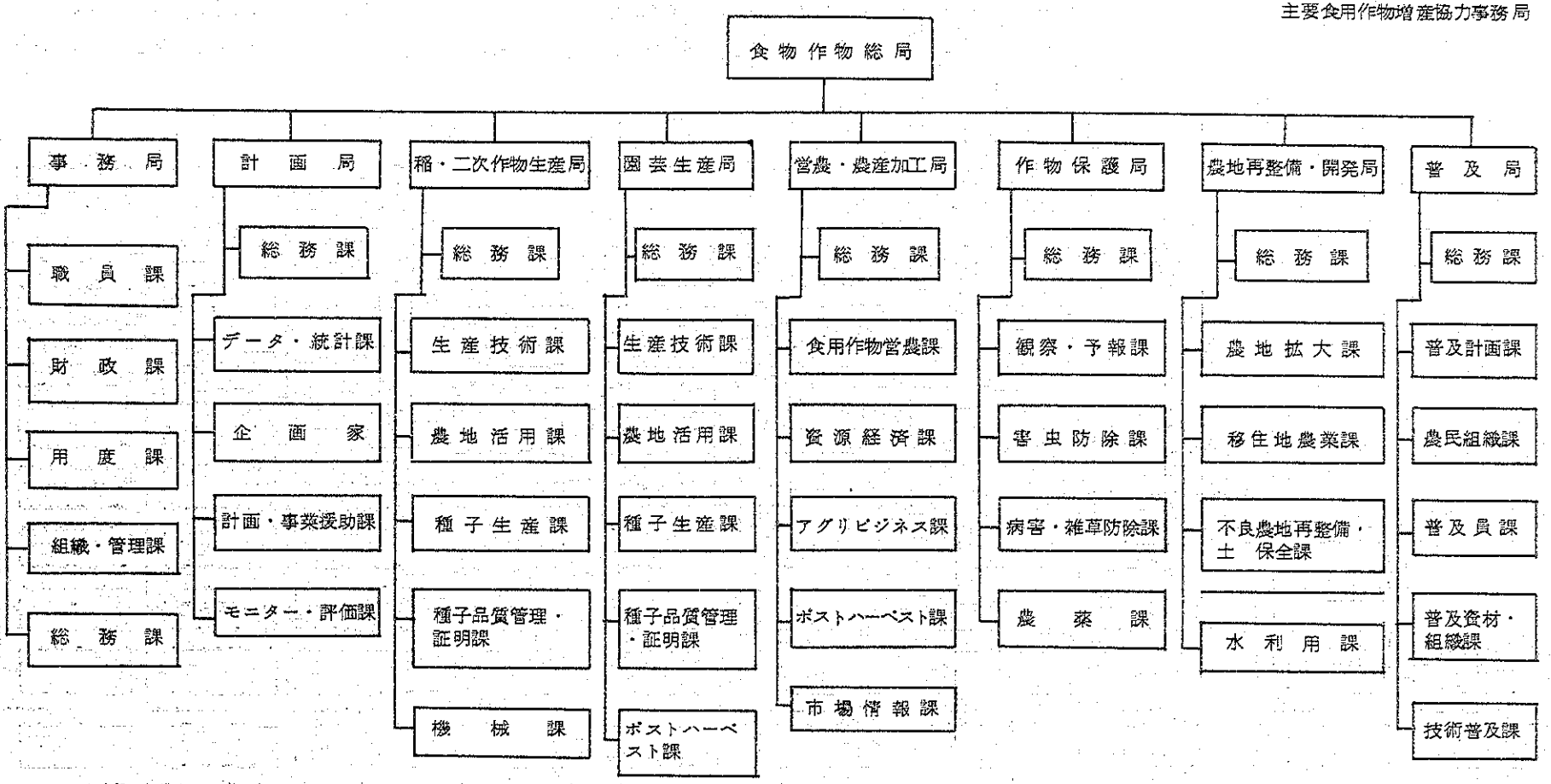


資料：「省の組織編成について」（1984年大統領令第15号、最終改正1990年大統領令第４号）

注：このほかに別の法令によって、副大臣、ビマス庁、インドネシア砂糖協議会事務局等が設置されている。

食用作物総局組織機構図

（仮　訳）
1990.9.1
主要食用作物増産協力事務局



資料：「農業省の組織編成及び所掌事務について」（1990年8月6日付け農業大臣令）

インドネシアで販売されている耕運機の主な諸元（技術分析部門調査結果）

List of the hard tractors in Indonesia 1991

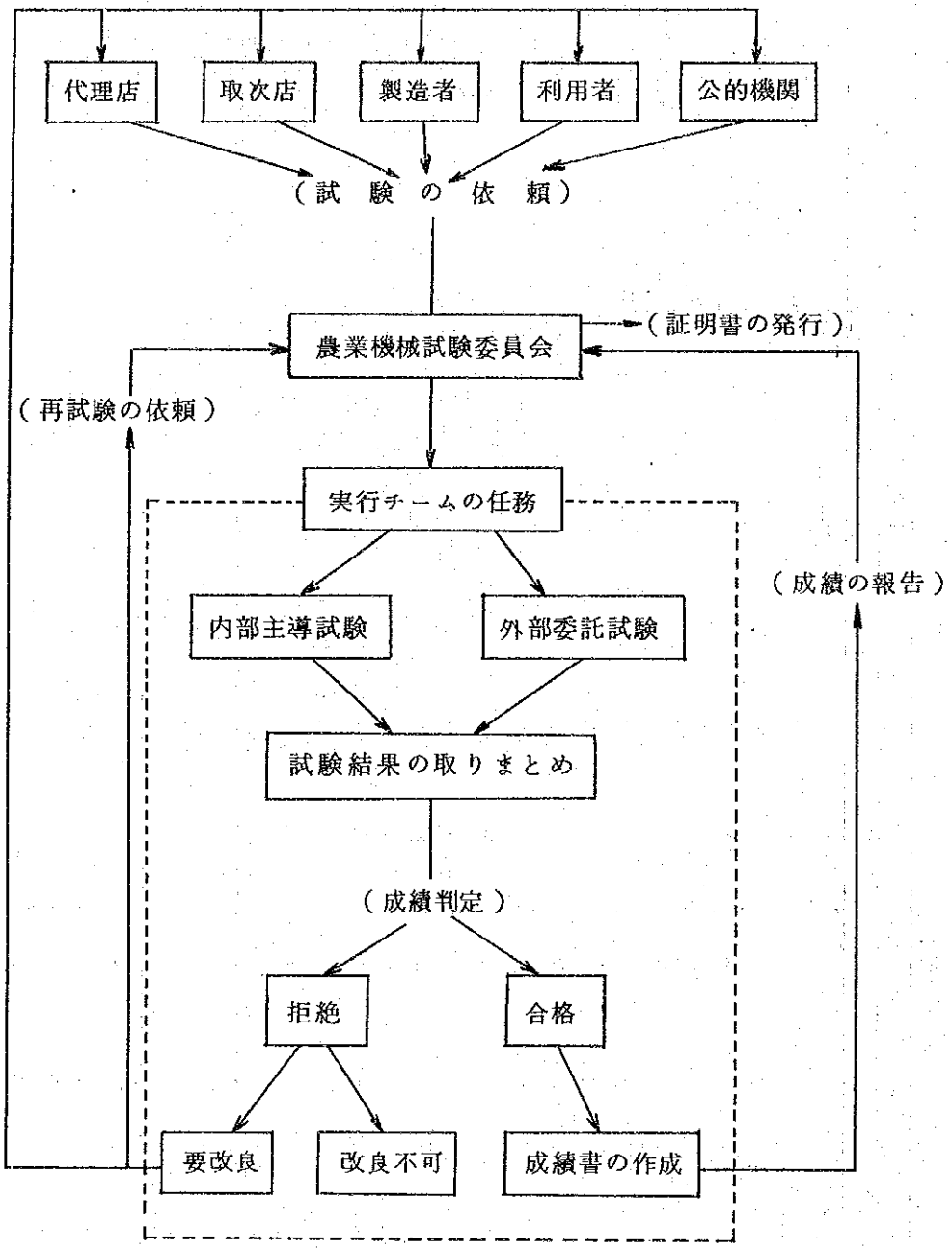
Maker	model	Hp	Chenge of velocity		St,Clutch	P,T,O	Weight(Kgf)			Price	Note
			Forward	Backward			Body	Engine	Total	mil,Rp	
KUBOTA,IND	DN712	D 8.5	1	0	yes	no	139.0	80.0	219.0	3.350	
K,H,S	TL800-RD	D 8.0	1	0	no	no			300.0	2.801	engine : KUBOTA
	G900B	D 8.5	1	0	yes	no	202.0	80.0	282.0	3.200	engine : KUBOTA
	G900D	D 8.5	2	0	yes	no					ongine : KUBOTA
YAMINDO	YST-85LY	D 8.5	1	0	yes	no	125.0	93.5	218.5	4.741	W. diameter : 900
	YST-85L	D 8.5	1	0	yes	no	125.0	93.5	218.5	4.620	W. diameter : 750mm
	YST-EX	D 8.5	2	1	yes	no	126.5	93.5	220.0	4.912	
	YZC	D 10.5	3	1	yes	yes	213.0	102.0	315.0	7.832	
	YZC-N	D 10.5	6	2	yes	yes	217.0	102.0	319.0	8.132	
	YZD	D 8.5	2	1	yes	no	207.5	93.5	301.0	7.632	
	YCF-65L	D 6.5	1	0	no	no	121.0	79.0	200.0	2.970	
AGRIND	TAR-75L	D 7.5	1	0	yes	no	162.0	74.0	236.0	3.135	engine : MITSUBISHI
	TAR-90L	D 9.0	1	0	yes	no	162.0	90.0	252.0	3.575	engine : MITSUBISHI
	TRA-75LSC	D 7.5	1	0	yes	no	174.0	74.0	248.0	3.245	engine : MITSUBISHI
	TRA-90LSC	D 9.0	1	0	yes	no	174.0	90.0	264.0	3.740	engine : MITSUBISHI
	TRB-90L	D 9.0	1	0	yes	no	165.0	99.0	264.0		engine : RATNA china
	KEK 100	D 9.0	3	1	yes	yes	215.0	90.0	305.0	7.550	
	KEK 100	D 11.0	3	1	yes	yes			309	7.725	body, engine : ISEKI

List of the hand tractors from China

江 西 牌	TY-61	D 6.0	6	2	yes	yes	210.0				
	TY-81	D 8.5	6	2	yes	yes	245.0	90.0	335.0	1.700	with the rotally
	東 風	D 12.0	6	2	yes	yes			340.0		copy of KUBOTA KMB200
南 岳 牌	湖南12	D 12.0	6	2	yes	yes	295.0	125.0	420.0		with a seat
	万里NH4	D 4.0	2	1	yes	no	107.0				air-cooling
GAMC	中山4型	D 5.5	3	1	yes	yes			212.0		air-cooling
四 方	GN-12	D 12.0	6	2	yes	yes		140.0		with ro, 3.5	with a seat

Gear box is made of molding.

インドネシアにおける農業機械検査手順

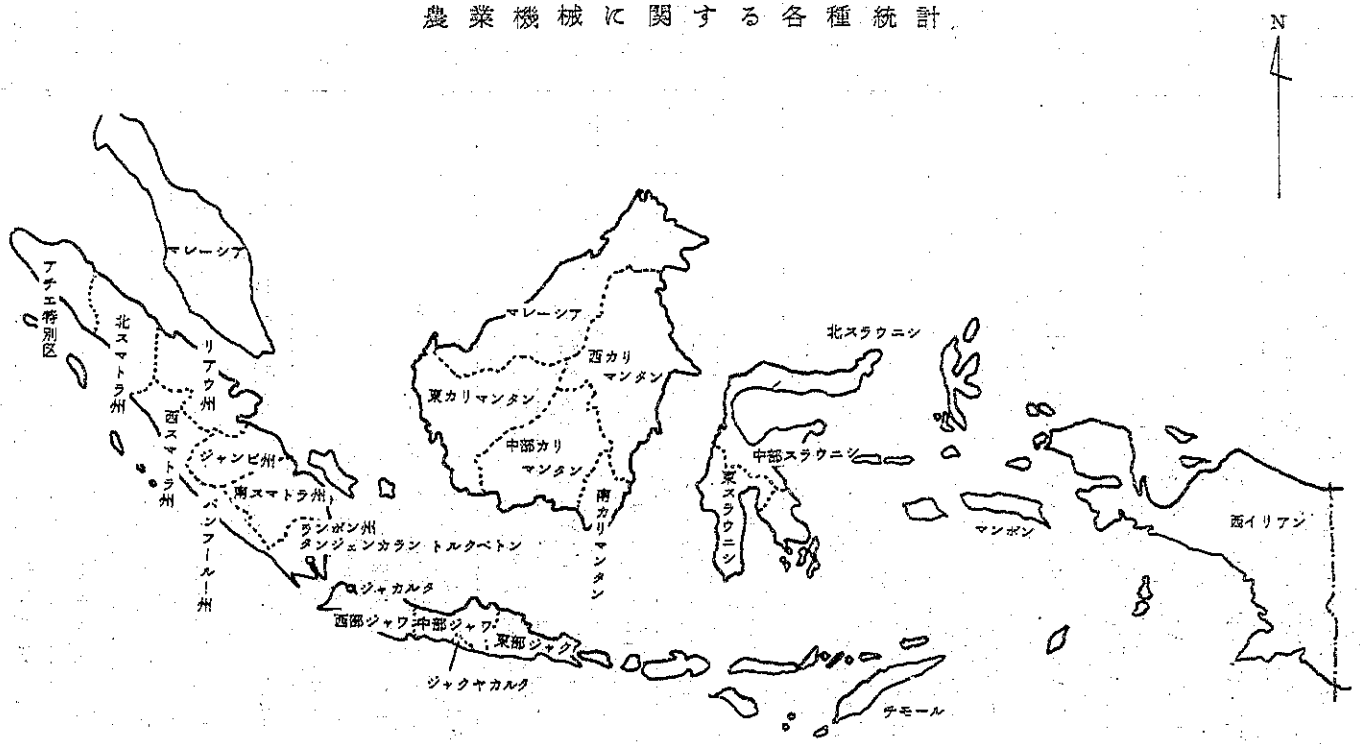


インドネシアにおける農業機械テストコード一覧

	テ ス ト コ ー ド 名	制 定
1	TRAKTOR DENGAN PERLENGKAPANNYA（歩行型トラクター） （SERI PENGOLAHAN TANAH DAN TRANSPORTASI）	jan. 1982
2	A. POMPA AIR CENTRIFUGAL（遠心ポンプ）	Jan. 1982
3	A. PENYEMPROT TANGAN（人力噴霧機）	Jan. 1982
4	A. PERONTOG BIJI（脱穀機）	Jan. 1982
5	TRAKTOR POROS GANDA DENGAN PERLENGKAPANNYA （乗用型トラクター）	Nov. 1983
6	POMPA AIR AKSTAL（軸流ポンプ）	Nov. 1983
7	ELEVATOR EMBER（バケットエレベーター）	Nov. 1983
8	PENYEMPROT BERMOTOR TEKANAN TINGGI （移動式動力噴霧機）	Nov. 1983
9	PENGERING BIJI（穀物乾燥機）	Nov. 1983
10	MESIN PENGUPAS GABAH（籾摺機）	Nov. 1983
11	MESIN PEMUTIH BERAS（精米機）	Nov. 1983
12	ALAT PENGUPAS KACANG TANAH（落花生割莢機）	Dec. 1984
13	ALAT PENGOLAH TANAH ROTARI（ロータリ）	Nov. 1985
14	PENGABUT VOLUME ULTRA RENDAH JENIS PENGABUT BERMOTOR TYPE GENDONG （微量散布機（背負式動力噴霧機，ミスト機））	Nov. 1985
15	ALAT PENANDUR PADI（田植機）	Nov. 1985
16	ALAT/MESIN PANEN（ALAT PANEN）（穀類収穫機（収穫機））	Aug. 1986
17	KULTIVATOR ANTAR JALUR TANAMAN（中耕除草機）	Aug. 1986
18	BAJAK PIRINGAN（ディスクプラウ）	Aug. 1986
19	GARU PIRINGAN（ディスクハロー）	Aug. 1986
20	ALAT PENGABUT TANGAN TYPE EERPUTAR （手回し式人力散粉機）	Aug. 1987
21	ALAT PEMBERANTAS GULMA UNTUK HERBISIDA CAIR （除草剤散布機）	Aug. 1987
22	ALAT PENANAM DENGAN/TANPA PERLENGKAPAN ALAT PEMAKAIAN PUPUK（施肥機付／無播種機）	Aug. 1987

資　料

農業機械に関する各種統計



インドネシア適正農業機械技術開発センター

技術的分析部門　　Nov. 1991

Growth and Structure of Merchandise Trade

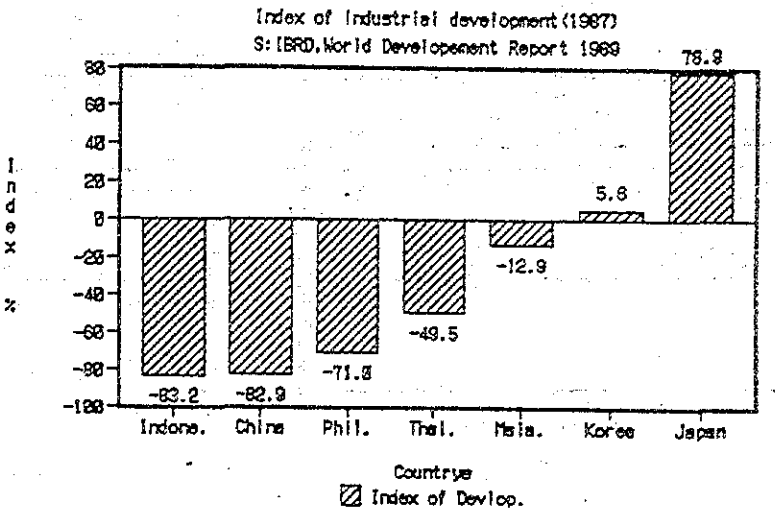
	Merchandise Trade (million $)						Structure of Merchandise Trade (%)									
	T.Amount of Import		Food		M.and T.Equ.(Mi)		Food		Fuels		Oth.Prim.		Com.		M.and T.Equ.		Oth.Man.	
	'83	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87
Indonesia	16,346	14,453	1,144	434	6,211	5,639	7	3	21	16	5	3	38	39	29	39		
China	21,390	43,392	4,278	1,301	3,636	16,923	20	3	1	2	18	11	17	39	41	46		
Philippines	7,980	7,144	798	572	1,756	2,000	10	8	26	17	4	7	22	28	38	40		
Thailand	10,279	12,955	514	647	2,467	4,145	5	5	31	13	7	9	24	32	33	40		
Malaysia	13,234	12,506	1,588	1,250	5,294	6,253	12	10	15	6	5	4	40	50	29	30		
Korea	26,192	40,934	3,143	2,456	6,024	13,917	12	6	30	15	15	17	23	34	20	28		
Japan	125,017	146,048	16,252	24,828	7,501	17,525	13	17	50	27	16	18	6	12	15	27		
	T.Amount of Export		Food		M.and T.Equ.(Ei)		Fu.,Mi.,Me.		Tex.,Clo.		Oth.Prim.		Com.		M.and T.Equ.		Oth.Man.	
	'83	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87	'82	'87
Indonesia	21,145	17,206			211	516	85	54	1	5	11	18	1	3	2	19		
China	22,226	39,542			1,334	1,582	26	14	15		20	16	6	4	34	66		
Philippines	4,932	5,649			148	339	12	14	7	6	38	24	3	6	39	50		
Thailand	6,368	11,659			382	1,399	7	2	10	18	64	45	6	12	13	23		
Malaysia	14,130	17,865			2,120	4,824	35	25	3	3	42	36	15	27	5	10		
Korea	24,445	47,172			6,845	15,567	1	2	21	25	7	5	28	33	43	34		
Japan	146,804	229,055			32,210	148886	1	1	4	3	2	1	56	65	36	29		

Note: M.and T.Equ.(Mi):Machinery and Transport Equipment, Oth.Prim.Com:Other Primary Commodities, Oth.Man.:Other Manufactures,
Fu.,Mi.,Me.:Fuels Minerals,and Metals, Tex.,Clo.:Textiles and Clothing
Sourse:IBRD,World Development Report 1989,New York,1989

Average Annual Growth Rate

	GDP(%)		Agriculture(%)		Industry(%)		Service.I(%)	
	'65~80	'80~87	'65~80	'80~87	'65~80	'80~87	'65~80	'80~87
Indonesia	8.0	3.6	4.3	3.0	11.9	2.1	7.3	5.6
Thailand	7.2	5.6	4.6	3.7	9.5	5.9	7.6	6.4
Philippines	5.9	-0.5	4.6	1.8	8.0	-2.8	5.2	0.0
Malaysia	7.4	4.5		3.4		5.8		3.8
China	6.4	10.4	3.0	7.4	10.0	13.2	7.0	7.6
Korea	9.5	8.6	3.0	4.4	16.5	10.8	9.3	7.7
Japan	6.3	3.8	0.8	0.8	8.5	4.9	5.2	3.1

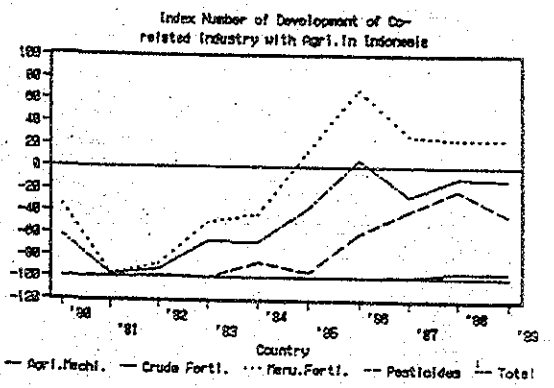
Note : GDP and its components are at purchaser values.
Sourse:IBRD,World Development Report 1989,New York,1989

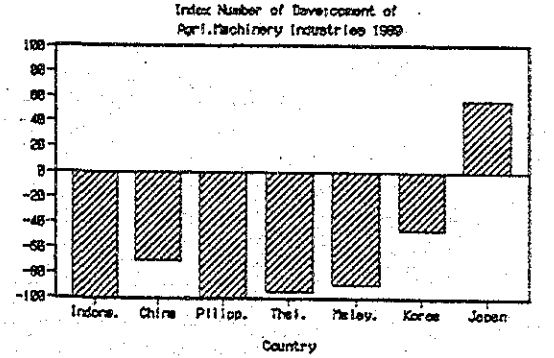


Index Number of Development of Corelated Industry with Agriculture (%)

		'80	'81	'82	'83	'84	'85	'86	'87	'88	'89
Indonesia	Agri.Machi.	-94.4	-99.9	-98.5	-100.0	-100.0	-100.0	-99.8	-100.0	-99.7	-99.5
	C.Fertiliz.	-100.0	-99.9	-99.8	-99.5	-99.9	-99.7	-100.0	-99.1	-95.1	-94.9
	M.Fertiliz.	-34.7	-96.8	-87.8	-49.8	-42.1	14.0	69.2	27.4	24.3	24.4
	Pesticides	-99.8	-99.0	-98.4	-99.8	-85.9	-94.6	-59.3	-38.9	-19.8	-42.9
	TOTAL	-61.7	-97.5	-92.3	-66.7	-67.0	-36.8	6.5	-26.1	-9.9	-10.8
China	Agri.Machi.					-26.9	-26.0	-27.2	-63.8	-43.5	-70.8
	C.Fertiliz.		-99.7	-99.7	-99.9	-100.0	-99.9	-98.4	-77.5	-74.1	-76.5
	M.Fertiliz.		-99.7	-99.3	-99.7	-99.1	-99.6	-99.6	-97.1	-97.4	-97.5
	Pesticides		-100.0	-100.0	-100.0	-67.7	-49.2	-54.1	-35.7	-52.3	-49.0
	TOTAL		-99.7	-99.4	-99.7	-89.3	-87.3	-86.4	-87.7	-90.8	-91.4
Philippin.	Agri.Machi.	-87.5	-97.7	-99.5	-98.6	-93.7	-75.9	-82.5	-93.7	-94.2	-99.6
	C.Fertiliz.	-89.3	-78.9	-66.3	-100.0	-95.1	-97.5	-99.5	-98.9	-83.2	-98.6
	M.Fertiliz.	-99.5	-99.9	-99.9	-97.6	-44.9	-100.0	15.3	-1.7	-29.5	-19.9
	Pesticides	-79.1	-80.9	-89.0	-77.8	-96.0	-97.1	-97.2	-98.1	-97.8	-96.9
	TOTAL	-96.1	-96.8	-98.0	-95.5	-83.8	-99.0	-15.0	-29.4	-45.2	-42.3
Thailand	Agri.Machi.	-94.5	-96.7	-95.3	-96.3	-93.5	-96.6	-98.0	-92.7	-93.3	-94.6
	C.Fertiliz.	-42.9	20.0	-55.6	33.3	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0
	M.Fertiliz.	-99.5	-99.9	-99.5	-99.8	-99.8	-100.0	-99.8	-99.7	-100.0	-100.0
	Pesticides	-96.6	-97.5	-95.2	-90.7	-93.0	-91.1	-90.4	-94.8	-87.3	-91.5
	TOTAL	-97.2	-98.3	-97.5	-97.6	-96.9	-97.5	-98.0	-96.9	-95.9	-97.2
Malaysia	Agri.Machi.	-94.5	-92.9	-87.5	-92.2	-89.7	-82.9	-87.2	-87.4	-85.8	-89.9
	C.Fertiliz.	-98.6	-97.8	-96.5	-94.0	-96.6	-97.4	-97.0	-95.1	-90.9	-90.0
	M.Fertiliz.	-98.5	-96.5	-94.2	-98.2	-98.2	-97.4	-64.1	-54.2	-59.6	-45.9
	Pesticides	-74.0	-71.3	-68.7	-67.2	-60.2	-51.5	-45.7	-39.9	-35.9	-20.5
	TOTAL	-94.0	-91.4	-87.8	-91.1	-90.6	-87.7	-64.0	-57.8	-59.0	-47.7
Korea Rep.	Agri.Machi.	-76.3	-87.8	-70.7	-80.9	-68.6	-76.1	-61.2	-30.3	-54.2	-46.1
	C.Fertiliz.	-100.0	-100.0	-100.0	-100.0	-98.3	-100.0	-99.7	-99.3	-99.5	-99.3
	M.Fertiliz.	80.6	83.9	54.0	71.6	86.3	58.7	83.4	48.1	56.1	56.5
	Pesticides	-75.1	-75.0	-60.2	-65.4	-38.3	-32.1	-13.8	10.3	-6.5	-10.3
	TOTAL	35.5	2.6	1.9	17.0	18.9	15.0	12.1	0.1	2.8	4.8
Japan	Agri.Machi.	70.5	85.2	85.2	89.4	88.7	87.7	83.2	77.8	64.0	56.4
	C.Fertiliz.	-100.0	-100.0	-100.0	-100.0	-100.0	-100.0	-99.8	-100.0	-99.9	-99.4
	M.Fertiliz.	8.9	9.7	-17.7	-43.1	-26.6	-37.1	-38.9	-42.2	-52.8	-52.1
	Pesticides	21.0	32.0	50.8	55.8	47.4	36.0	0.2	19.5	21.9	18.8
	TOTAL	32.0	44.7	41.3	46.7	45.5	40.4	41.7	36.4	20.0	13.4
World	Agri.Machi.					0.8	2.2	-0.1	4.3	4.8	3.0
	C.Fertiliz.		-6.2	-7.5	-6.7	-1.8	-3.3	-2.7	-16.7	-11.8	-11.8
	M.Fertiliz.		-6.9	-8.5	-8.6	-7.5	-8.3	-5.2	-0.3	-0.9	-3.6
	Pesticides		-6.5	-5.8	-5.2	-7.5	-9.0	-8.4	-7.7	-7.8	-7.3
	TOTAL		-6.7	-7.7	-7.4	-5.0	-5.7	-4.5	-2.2	-2.0	-3.5

*:((Ei-Ii)/(Ei+Ii))*100





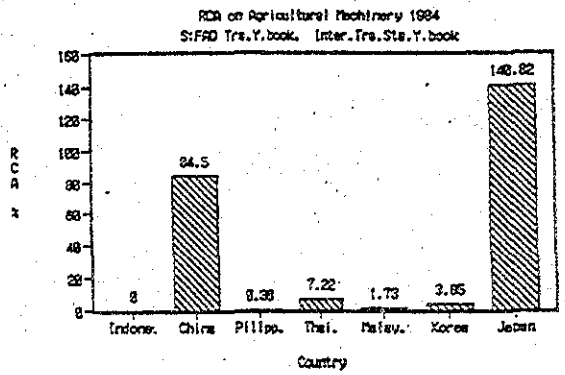
RCA on Agricultual Machinery (%).

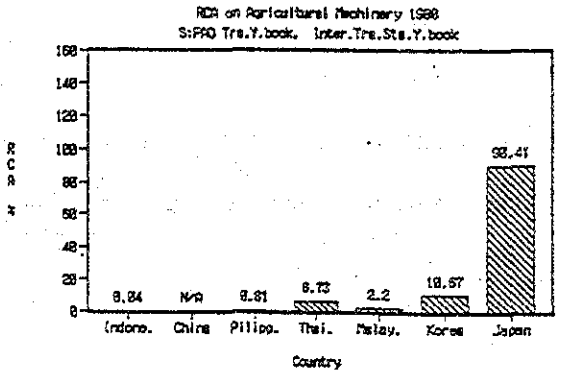
		'80	'81	'82	'83	'84	'85	'86	'87	'88	'89
Indonesia	A	103.7	2.0	36.5	0.4	0.0	0.5	3.3	0.1	2.9	6.0
	B	2,395,040	2,516,449	2,232,849	2,114,585	2,188,780	1,858,670	1,480,500	1,713,560	1,921,849	2,220,000
	C	0	0.000001	0.000016	0.000000	0.000000	0.000000	0.000002	0.000000	0.000002	0.000003
	RCA		0.81	0.30	0.00	0.00	0.01		0.00	0.04	
China	A					5,025	5,442	5,900	308	754	752
	B	599300	808742	911526	964326	1277232	1720378				
	C					0.003934	0.003163				
	RCA					84.50	70.33				
Philippin.	A	187	33	4	8	9	29	20	9	24	2
	B	772,691	794,600	768,692	748,663	539,065	462,895	484,178	572,024	703,200	776,600
	C	0.000242	0.000042	0.000005	0.000011	0.000017	0.000063	0.000041	0.000016	0.000034	0.000003
	RCA		0.76	0.10	0.22	0.36	1.39		0.35	0.81	
Thailand	A	291	222	162	137	250	88	245	271	454	472
	B	650,508	702,854	894,469	636,831	743,758	712,243	887,210	1,298,738	1,592,660	2,005,600
	C	0.000447	0.000316	0.000233	0.000215	0.000336	0.000124	0.000276	0.000209	0.000285	0.000235
	RCA		6.78	4.30	4.39	7.22	2.75		4.61	8.73	
Malaysia	A	115	134	181	89	133	225	127	130	197	139
	B	1,294,469	1,177,035	1,204,014	1,412,274	1,849,546	1,531,464	1,384,546	1,791,678	2,111,000	2,505,300
	C	0.000089	0.000114	0.000150	0.000063	0.000081	0.000147	0.000092	0.000073	0.000093	0.000055
	RCA		2.08	2.77	1.29	1.73	3.27		1.60	2.20	
Korea Rep.	A	472	238	472	398	524	263	475	4,061	2,745	3,320
	B	1,750,488	2,125,376	2,185,339	2,444,505	2,924,486	3,028,312	3,471,446	4,728,092	6,069,638	6,237,720
	C	0.000270	0.000112	0.000216	0.000162	0.000179	0.000087	0.000137	0.000859	0.000452	0.000532
	RCA		2.05	3.98	3.30	3.85	1.93		18.97	10.57	
Japan	A	93,100	108,270	95,130	116,120	111,450	103,360	128,040	131,610	101,560	87,200
	B	13011550	15211650	13889410	14703800	16997110	17722070	21074180	23100750	26509900	27393200
	C	0.007155	0.007118	0.006859	0.007897	0.006557	0.005832	0.006076	0.005697	0.003831	0.003183
	RCA		130.17	126.36	161.09	140.82	129.68		125.81	90.41	
World	A		1,080,833	987,725	888,985	887,753	871,870	954,092	1,066,137	1,218,214	
	B	Million	1,976,754	1,838,110	1,813,416	1,906,630	1,938,599		2,354,400	2,875,000	3,095,000
	C		0.0054677	0.0054279	0.0049022	0.0046561	0.0044974		0.0045282	0.0042372	

S:FAO Trade Yearbook, International Trade Statistics Yearbook

*:A=Export Value of Agricultural Machinery(x10,000US$) B=Total Merchanod Export Value(x10,000US$), C=A/B

*:RCA=(Ccountry/Cworld)*100 (%)





RCA：顕示化された比較優位指標
(Revealed Comparative Advantage Indic

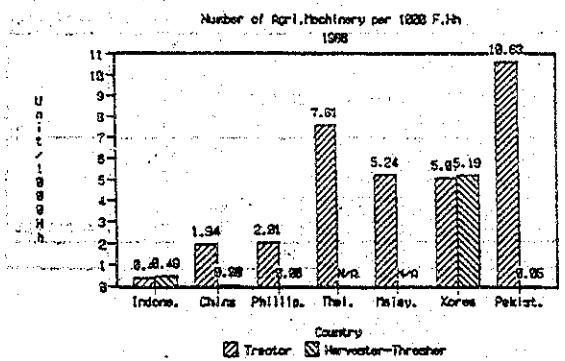
Farm Mechanization in Selected Countries 1988

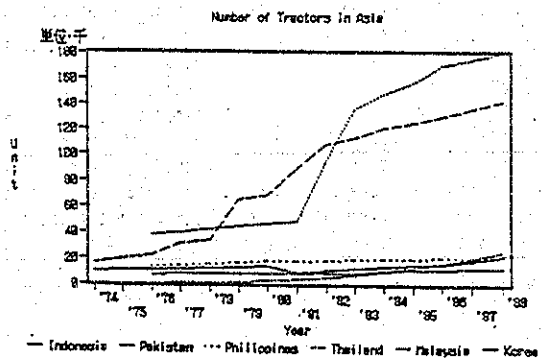
	F.H.hold x1000 A	GNP/Capita U.S.$ B	Land Use Arable L. x1000ha C	Other L. x1000ha *D	Number of Tractors E	Agr.Machi. Harvester-Threshers F	E/A	F/A	E/(C+D)	F/(C+D)	**Ratio of H.Tra.Price to GNP/Capita
Indonesia	34,351	440	15,800	17,220	13,800	17,000	0.40	0.49	0.42	0.51	4.4
New Zealan	139	10,000	487	13,814	78,400	3,100	564.03	22.30	5.48	0.22	0.2
Australia	412	12,340	46,806	425,227	332,000	56,900	805.83	138.11	0.78	0.12	0.2
U.K.	594	12,810	6,930	11,518	518,000	54,500	872.05	91.75	27.93	2.94	0.2
Potugal	811	3,650	2,040	1,240	77,000	4,750	94.94	5.86	23.48	1.45	0.5
Germany.Fe	1,172	18,480	7,261	4,654	1,460,000	140,000	1245.73	119.45	122.53	11.75	0.1
Argentina	1,223	2,520	26,000	152,150	210,000	47,500	171.71	38.84	1.18	0.27	0.8
France	1,459	16,090	18,267	13,020	1,512,000	151,500	1040.44	103.84	48.52	4.84	0.1
Spain	1,687	7,740	15,580	11,580	720,000	48,000	426.79	28.45	26.51	1.77	0.2
Italy	1,823	13,330	9,104	7,952	1,362,932	45,414	747.63	24.91	78.91	2.66	0.1
Malaysia	2,254	1,940	1,040	3,867	11,800		5.24		2.40		1.0
U.S.A.	3,058	19,840	187,881	243,499	4,870,000	840,000	1527.14	209.29	10.83	1.48	0.1
Japan	4,427	21,020	4,170	1,147	1,984,590	1,243,600	448.29	280.91	373.25	233.89	0.1
Korea Rep	4,859	3,600	1,997	229	24,616	25,226	5.07	5.19	11.06	11.33	0.5
Egypt	5,761	660	2,410	204	46,000	2,350	7.98	0.41	17.60	0.90	2.9
Philippine	10,222	630	4,550	4,640	20,500	620	2.01	0.06	2.23	0.07	3.1
Turkey	11,719	1,280	24,750	11,580	854,636	11,479	55.86	0.98	18.02	0.32	1.5
Brazil	13,525	2,160	68,500	181,050	715,000	44,000	52.87	3.25	2.88	0.18	0.9
Pakistan	16,936	350	20,473	54,270	180,000	820	10.63	0.05	2.41	0.01	5.5
Thailand	18,653	1,000	17,900	3,010	142,000		7.61		6.79		1.9
India	208,856	340	165,950	15,540	750,935	2,850	3.60	0.01	4.14	0.02	5.7
China	451,179	330	93,345	322,380	876,000	35,004	1.94	0.08	2.11	0.08	5.8
WORLD	1,082,920	3,470	1,373,404	3,313,982	25865088	4,007,011	23.88	3.70	5.52	0.85	0.6

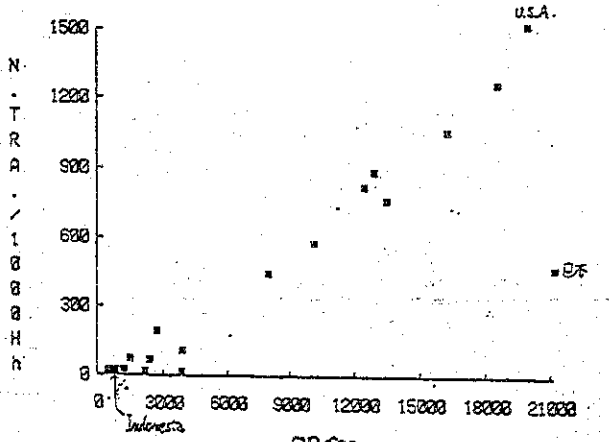
S:Production Yearbook 1989. FAO , World Development Report 1990. The World Bank

*:Other Land =land under permanent crops + permanent meadows + pastures

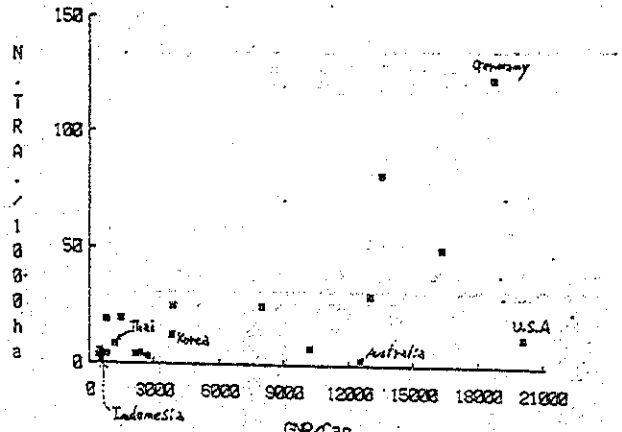
**:Standard Machine—Agrind TEA-90L(made in Indonesia)3,575,000Rp, 1US$=1950Rp.







Number of Tractors per 1000 Farm Households U.S.GNP/Capita



Number of Tractors per 1000ha U.S.GNP/Capita (Arable Land.Land under Permanet Crops.Permanent Meadows and Pastures)
(Exclude Japan)

Number of Tractors in Selected Countries (Unit)

Country	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88
Indonesia	10,000	10,500	10,800	11,300	11,800	12,300	13,000	8,704	10,504	11,716	12,993	14,288	15,376	17,658	21,120
New Zealand			94,800	94,600	94,400	87,000	92,349	93,000	94,000	85,926	75,000	70,000	81,441	79,900	78,400
Australia			332,000	332,000	332,000	332,000	332,000	332,000	332,000	332,000	332,000	332,000	332,000	332,000	332,000
U.K.	475,796	494,738	482,871	480,280	480,280	508,174	512,454	515,455	526,808	529,438	523,740	525,549	520,495	519,495	518,000
Portugal			49,784	57,238	61,484	66,066	71,890	73,987	76,000	82,734	81,146	81,000	75,548	78,520	77,000
Germany.Fe	1,424,949	1,441,778	1,452,661	1,452,661	1,462,251	1,450,210	1,463,131	1,465,256	1,467,175	1,471,681	1,480,730	1,485,000	1,483,019	1,469,956	1,460,000
Argentina	184,000	188,000	190,000	195,000	200,000	171,400	166,700	158,900	154,000	201,800	203,700	204,000	206,000	208,000	210,000
France	1,337,200	1,363,000	1,372,000	1,399,464	1,413,000	1,424,500	1,503,703	1,524,700	1,529,300	1,532,300	1,528,069	1,526,000	1,522,000	1,519,760	1,518,000
Spain			400,928	421,393	455,675	491,595	523,907	548,080	562,626	592,010	611,433	630,000	657,826	702,000	720,000
Italy	780,602	819,334	865,715	909,580	953,197	998,000	1,072,168	1,106,193	1,139,050	1,169,513	1,197,998	1,227,143	1,269,147	1,315,427	1,362,932
Malaysia			7,525	7,845	8,000	7,888	8,050	8,300	8,450	8,909	10,211	11,400	11,600	11,700	11,800
U.S.A.	4,585,000	4,485,000	4,380,000	4,370,000	4,370,000	4,880,000	4,740,000	4,655,000	4,600,000	4,671,000	4,676,000	4,676,000	4,670,000	4,670,000	4,670,000
Japan	550,000	721,090	800,000	952,000	1,050,000	1,095,800	1,095,750	1,412,900	1,526,000	1,584,300	1,650,300	1,853,600	1,833,900	1,904,070	1,984,590
Korea Rep	388	564	790	1,121	1,801	2,053	2,664	3,862	5,575	7,469	9,684	12,839	16,167	19,883	24,618
Egypt	20,889	21,500	22,000	22,468	23,500	24,500	25,000	38,639	40,000	41,000	42,000	43,000	44,000	45,000	46,000
Philippines			12,980	13,800	15,000	16,000	17,000	17,500	18,000	18,500	19,000	19,500	19,800	20,000	20,500
Turkey	199,812	242,456	281,479	324,669	370,259	401,935	435,281	457,425	489,813	512,282	555,227	582,291	611,052	635,526	654,636
Brazil			270,000	288,000	300,000	320,000	330,000	340,000	345,000	710,000	765,000	770,000	673,000	694,000	715,000
Pakistan			37,000	39,000	42,000	44,000	46,000	48,000	95,000	136,000	148,000	156,633	170,000	175,000	180,000
Thailand	15,993	19,173	22,000	30,500	33,000	64,443	68,000	89,202	107,528	113,116	120,918	125,000	130,000	136,000	142,000
India			250,884	271,836	292,680	378,714	418,116	458,000	500,000	502,581	553,555	807,773	648,932	697,568	750,935
China	180,000	190,000	200,000	450,000	500,000	667,273	745,315	792,612	812,590	841,600	848,133	862,071	876,463	891,952	876,000

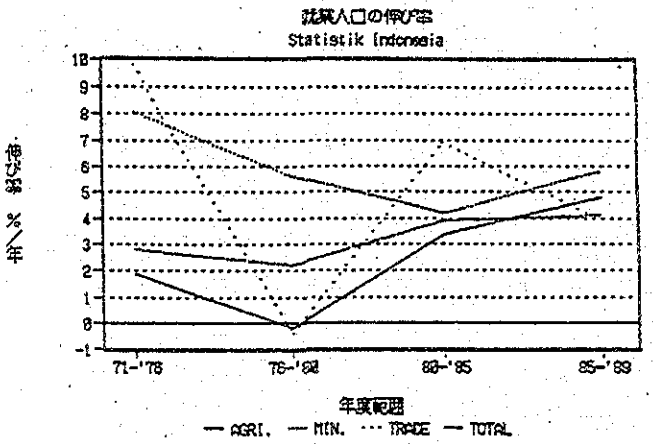
S:Production Yearbook.FAO, Agricultural Machinery by Province.BIRO PUSAT STATISTIK JAKALTA-INDONESIA

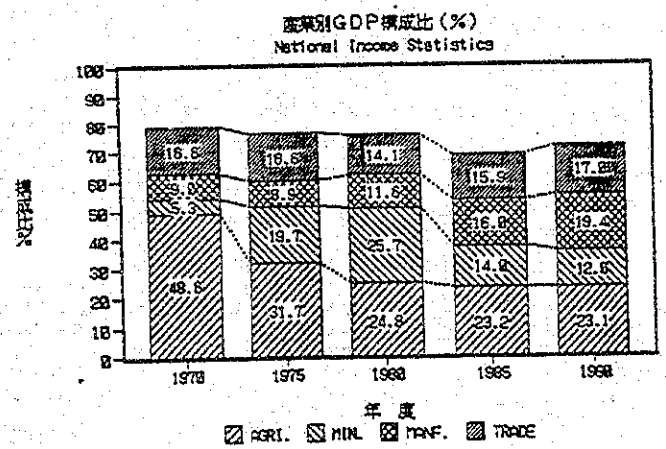
Number of Harvester-Threshers in Selected Countries (Unit)

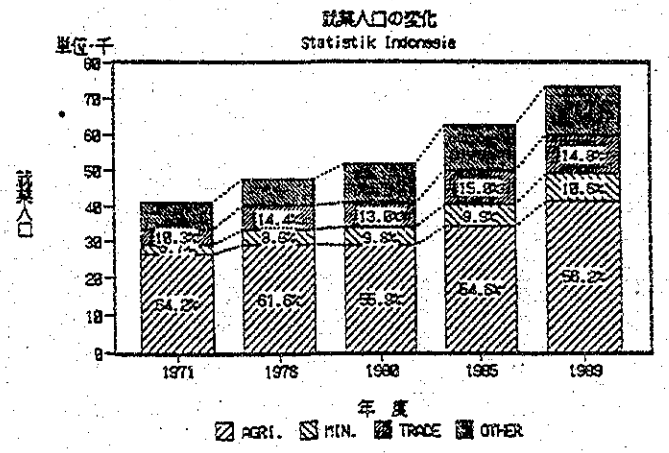
Country	'74	'75	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88
Indonesia										15,149	15,639	16,112	16,500	16,800	17,000
New Zealand			4,500	4,400	4,450	4,300	4,315	4,350	4,380	3,825	3,650	3,450	3,328	3,160	3,100
Australia			58,500	58,200	58,000	57,900	57,700	57,600	57,500	57,400	57,300	57,200	57,100	57,000	56,900
U.K.	62,000	61,500	59,400	57,820	56,300	57,564	57,350	57,213	56,765	56,765	54,987	50,507	54,520	54,500	54,500
Portugal			4,113	4,234	4,325	4,413	4,523	4,600	4,558	4,650	4,680	4,690	4,700	4,720	4,750
Germany.Fe	177,900	177,900	170,900	170,900	170,900	170,900	165,000	166,600	166,600	165,500	155,000	153,000	150,000	145,000	140,000
Argentina	39,000	40,000	41,000	42,000	43,000	33,500	44,000	44,500	45,000	45,300	45,500	46,000	46,500	47,000	47,500
France	156,000	153,000	153,000	145,010	147,800	149,900	142,400	142,000	146,800	148,000	149,236	149,349	149,500	151,365	151,500
Spain			41,218	42,037	43,368	44,669	41,568	42,361	41,781	44,025	44,686	45,000	47,113	47,555	48,000
Italy	26,912	27,774	28,766	29,564	30,589	31,500	35,185	35,700	37,908	39,142	39,993	40,616	41,953	43,722	45,414
Malaysia															
U.S.A.	678,000	655,000	645,000	635,000	635,000	669,000	671,000	674,000	675,000	676,000	645,000	645,000	640,000	640,000	640,000
Japan	344,086	428,010	500,000	638,000	730,000	747,100	883,900	916,300	974,200	1,011,900	1,041,800	1,109,500	1,150,020	1,201,101	1,243,500
Korea Rep	53	56	69	81	150	505	1,211	2,130	3,509	5,689	8,417	11,667	15,502	20,305	25,226
Egypt	1,880	1,900	1,950	2,145	2,200	2,300	2,400	2,500	2,130	2,150	2,170	2,200	2,250	2,300	2,350
Philippines			370	390	400	420	440	460	480	520	550	570	590	600	620
Turkey	10,796	11,841	13,147	19,874	21,771	12,583	13,667	13,100	13,477	13,615	13,497	13,611	11,457	11,794	11,479
Brazil			32,000	33,000	34,000	35,000	36,000	37,000	38,000	39,000	40,000	41,000	42,000	43,000	44,000
Pakistan			400	430	450	480	500	520	550	590	620	650	740	780	820
Thailand															
India			879	884	900	842	773	780	800	2,632	2,853	2,960	2,756	2,800	2,850
China						23,026	27,045	31,268	33,000	36,000	35,861	34,573	30,945	33,802	35,004

S:Production Yearbook.FAO, Agricultural Machinery by Province.BIRO PUSAT STATISTIK JAKALTA-INDONESIA

	産業別ＧＤＰ構成比（単位：％）				
	1970	1975	1980	1985	1990
Agri.	48.6	31.7	24.8	23.2	23.1
Min.	5.3	19.7	25.7	14.0	12.0
MANF	9.0	8.9	11.6	16.0	19.4
Trade	16.6	16.6	14.1	15.9	17.0
Other	20.5	23.1	23.8	30.9	28.5
TOTAL	100.0	100.0	100.0	100.0	100.0
	産業別就業人口（単位：千人）				
	1971	1976	1980	1985	1989
Agri.	26,473	29,117	28,834	34,142	41,248
Min.MANF.	0	0	0	0	0
Trade	4,262	6,814	8,679	9,345	10,891
Other	10,528	11,375	16,039	18,988	21,286
TOTAL	41,261	47,306	51,552	62,475	73,425
	産業別就業人口構成比（単位：％）				
	1971	1976	1980	1985	1989
Agri.	64.2%	61.6%	55.9%	54.6%	56.2%
MIN.MANF.	0.0%	0.0%	0.0%	0.0%	0.0%
Trade	10.3%	14.4%	13.0%	15.0%	14.8%
Other	25.5%	24.0%	31.1%	30.4%	29.0%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%
	産業別就業人口の伸び率（単位：％／year）				
	71-'76	76-'80	80-'85	85-'89	
Agri.	1.9	-0.2	3.4	4.8	
MIN.MANF.	8.1	5.6	4.2	5.8	
Trade	9.8	-0.4	6.9	3.9	
Other	-1.2	10.7	3.1	1.4	
TOTAL	2.8	2.2	3.9	4.1	







Number of Agri. Machinery in Indonesia(unit)

Year	Tractor		Sprayer		Rat Fumi.	Winnower	Thresher	Dryer
	Two Wheel	Four Wheel	Hand	Power				
1981	4,845	3,859	382,731	5,321	31,466	6,989	15,149	1,111
1982	6,443	4,061	464,922	5,536	28,575	5,851	11,731	837
1983	7,842	4,074	510,870	7,230	33,396	9,125	23,857	1,121
1984	8,881	4,122	570,339	6,059	35,927	22,279	34,424	975
1985	9,936	4,352	652,206	8,324	41,062	46,593	85,524	846
1986	11,219	4,175	724,121	9,237	45,792	38,408	82,146	1,009
1987	13,610	4,084	814,132	11,215	58,647	25,756	100,128	1,773
1988	16,804	4,316	905,062	13,837	64,125	29,120	103,019	1,229
1989	20,541	4,620	958,357	11,806	85,978	34,457	128,539	3,297

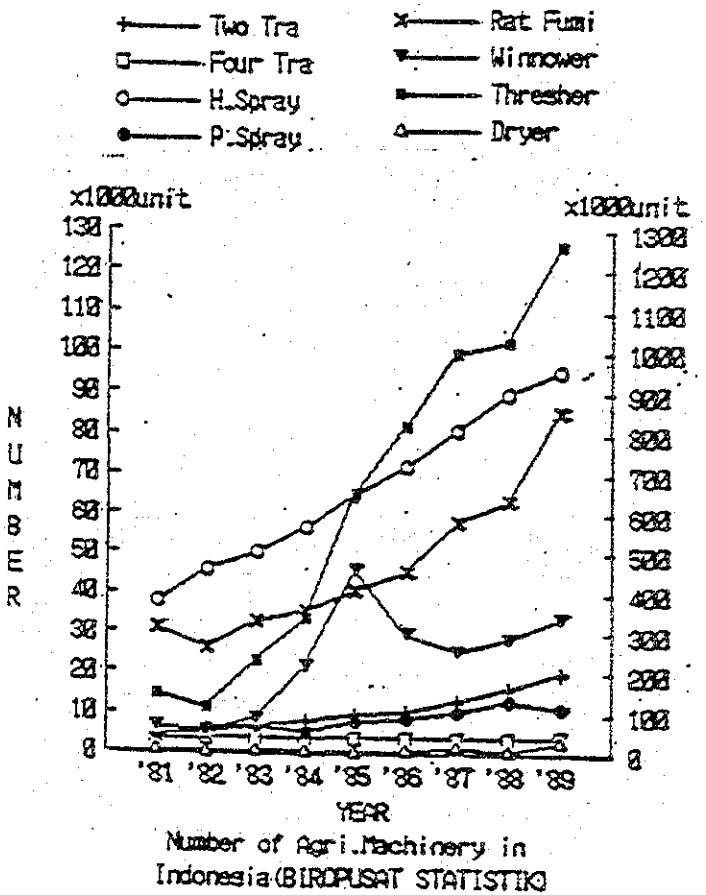
S:Agri.Machinery by Province 1989.

Rate of Extension of Agri. Machinery in 1987 (unit/100Hh)

	Tractor		Sprayer		Rat Fumi.	Winnower	Thresher	Dryer
	Two Wheel	Four Wheel	Hand	Power				
Number of Unit	13,610	4,084	814,132	11,215	58,647	25,756	100,128	1,773
Rate of Ext.	0.06	0.02	3.56	0.05	0.26	0.11	0.44	0.01

S:Agri.Machinery by Province 1987.

Note:Hh is Estimated by Statistical Year Book INDONESIA and Agri.Census 1983.



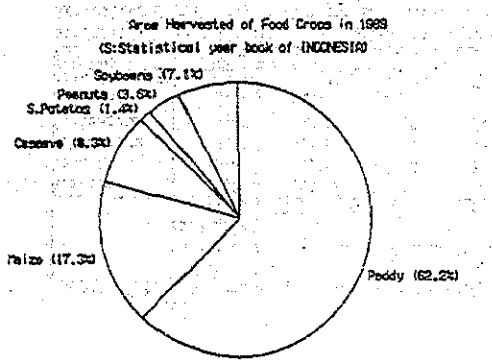
Number of Agri.Machinery in Indonesia(BIROPUSAT STATISTIK)

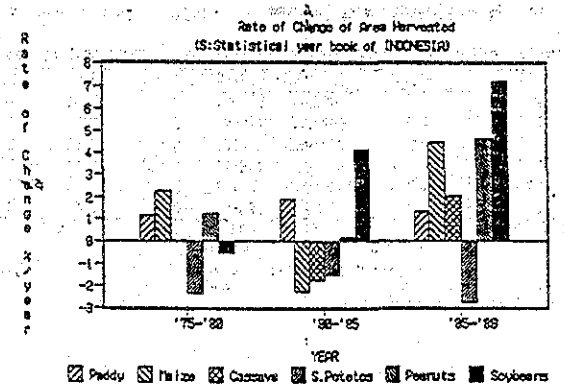
Productive Situation of Main Food Crops In Indonesia

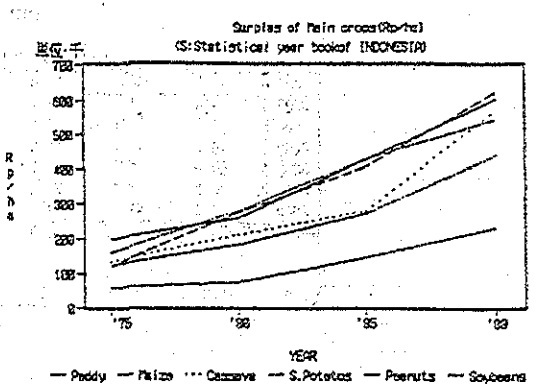
A	Area Harvested (x1000ha) '75	'80	'85	'89	Rate of Change(%/year) '75-'80	'80-'85	'85-'89
Paddy	8,495	9,005	9,902	10,453	1.2	1.9	1.4
Maize	2,445	2,735	2,440	2,910	2.3	-2.3	4.5
Cassava	1,410	1,412	1,292	1,402	0.0	-1.7	2.1
S.Potatos	311	276	256	229	-2.4	-1.5	-2.8
Peanuts	475	506	510	612	1.3	0.2	4.7
Soybeans	752	732	898	1,187	-0.5	4.1	7.3
B	Production(x1000ton) '75	'80	'85	'89	Rate of Change(%/year) '75-'80	'80-'85	'85-'89
Paddy	22,330	29,052	39,033	44,770	5.8	5.7	3.5
Maize	2,903	3,994	4,330	6,213	6.6	1.6	9.5
Cassava	12,540	13,774	14,057	17,091	1.9	0.4	5.0
S.Potatos	2,433	2,078	2,162	2,126	-3.1	0.8	0.0
Peanuts	380	470	528	615	4.3	2.4	3.9
Soybeans	590	653	870	1,301	2.1	5.9	10.6
C	Yield Rate(x100kg/ha) '75	'80	'85	'89	Rate of Change(%/year) '75-'80	'80-'85	'85-'89
Paddy	26.9	32.9	39.4	42.8	4.1	3.7	2.1
Maize	11.9	14.6	17.7	21.4	4.2	3.9	4.9
Cassava	89.0	98.0	109.9	122.9	2.0	2.2	2.9
S.Potatos	78.0	75.0	84.0	93.0	-0.8	2.3	2.6
Peanuts	8.0	9.3	10.4	10.1	3.1	2.3	-0.7
Soybeans	7.9	8.9	9.7	11.0	2.4	1.7	3.2
D	Production Value(Rp/ha) '78	'81	'84	'87	Rate of Change(%/year) '78-'81	'81-'84	'84-'87
Paddy	281,300	374,648	578,313	827,288	10.0	15.6	12.7
Maize	81,088	117,066	184,219	307,781	13.0	16.3	18.7
Cassava	147,617	247,102	321,658	675,025	18.7	9.2	28.0
S.Potatos	138,936	328,650	469,457	751,425	33/2	12.6	17.0
Peanuts	206,116	368,322	523,539	731,438	21.3	12.4	11.8
Soybeans	151,524	247,104	355,489	584,906	17.7	12.9	18.1
E	Total Cost(Rp/ha) '78	'81	'84	'87	Rate of Change(%/year) '78-'81	'81-'84	'84-'87
Paddy	85,099	110,934	151,603	222,324	10.8	9.1	13.6
Maize	21,931	43,354	39,000	78,335	25.5	-3.5	20.2
Cassava	17,042	37,125	41,932	104,476	29.0	4.1	35.6
S.Potatos	21,339	54,200	63,721	126,671	36.4	5.5	25.7
Peanuts	48,033	88,172	93,954	185,865	22.4	2.1	25.5
Soybeans	31,109	66,356	83,560	144,939	28.7	8.0	20.2
D-E F	Surplas(Rp/ha) '78	'81	'84	'87	Rate of Change(%/year) '78-'81	'81-'84	'84-'87
Paddy	195,301	257,714	426,650	604,964	9.7	18.3	12.3
Maize	59,157	73,712	145,219	228,446	7.6	25.4	16.5
Cassava	130,575	209,977	279,726	570,549	17.2	10.0	26.8
S.Potatos	117,597	274,450	405,736	624,754	32.6	13.9	15.5
Peanuts	158,083	280,150	420,585	545,573	21.0	15.3	8.3
Soybeans	120,415	180,748	271,929	439,967	14.5	14.6	17.4
E/A G	Rate of Total Cost in Production Val.(%) '78	'81	'84	'87	Rate of Change(%/year) '78-'81	'81-'84	'84-'87
Paddy	30.6	31.2	26.2	26.9	0.7	-5.6	0.8
Maize	27.1	37.0	21.3	25.5	11.0	-16.9	6.2
Cassava	11.5	15.0	13.0	15.9	9.2	-4.6	6.8
S.Potatos	15.4	16.5	13.6	16.9	2.4	-6.3	7.5
Peanuts	23.3	23.9	17.9	25.4	0.9	-9.3	12.4
Soybeans	20.5	26.9	23.5	24.8	9.4	-4.3	1.8

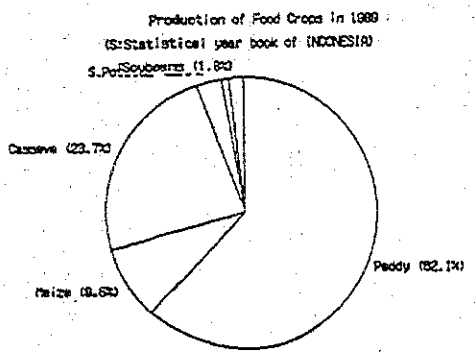
H	Labor Cost (Rp/ha) '78	'81	'84	'87	I/E Rate of L.Cost In Cost of Pro.(%) '78	'81	'84	'87
Paddy	48,604	70,647	89,673	125,421	56.6	60.4	59.1	56.4
Maize	12,444	22,009	20,093	35,843	56.7	50.8	51.5	45.8
Cassava	12,347	23,386	18,603	57,637	72.5	63.0	44.4	55.2
S.Potatos	15,115	35,652	38,207	71,601	70.8	65.8	60.0	56.5
Peanuts	22,953	36,449	39,885	75,123	47.8	41.3	42.5	40.4
Soybeans	15,391	34,184	42,800	61,992	49.5	51.5	51.2	42.8
I	Chemical Fertilizers Cost (Rp/ha) '78	'81	'84	'87	I/E Rate of C.F.Cost In Total Cost(%) '78	'81	'84	'87
Paddy	17,822	15,333	23,712	33,805	20.7	13.1	15.6	15.2
Maize	3,884	8,314	7,918	15,260	17.7	19.2	20.3	19.5
Cassava	1,178	1,967	1,237	4,917	6.9	5.3	3.0	4.7
S.Potatos	2,043	3,689	5,373	8,089	9.6	6.8	8.4	6.4
Peanuts	2,643	5,485	6,139	10,425	5.5	6.2	6.5	5.6
Soybeans	1,045	4,165	6,850	9,771	3.4	6.3	8.2	6.7

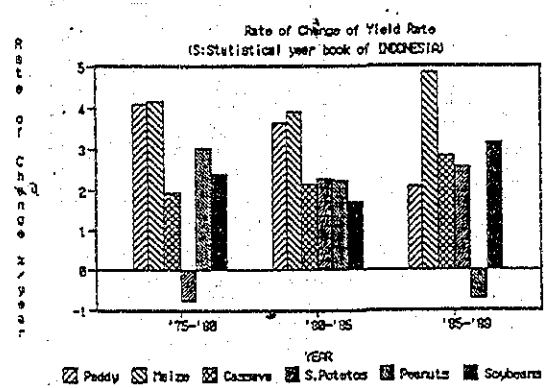
S:Statistical Yearbook of INDONESIA, Agri. Survey Production of Cereals in Indonesia

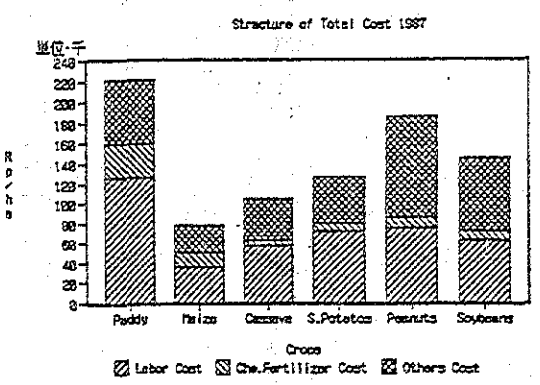

Area Harvested of Food Crops in 1989
(S:Statistical year book of INDONESIA)
Soybeans (7.1%)
Peanuts (3.6%)
S.Potatos (1.4%)
Cassave (6.3%)
Maize (17.3%)
Paddy (62.2%)


Rate of Change of Area Harvested
(S:Statistical year book of INDONESIA)
Rate of Change %/year
'75-'80
'80-'85
'85-'89
YEAR
Paddy
Maize
Cassave
S.Potatos
Peanuts
Soybeans


Surplus of Main crops(Rp/ha)
(S:Statistical year bookof INDONESIA)
Rp/ha
'75
'80
'85
'89
YEAR
Paddy
Maize
Cassave
S.Potatos
Peanuts
Soybeans


Production of Food Crops in 1989
(S:Statistical year book of INDONESIA)
Soybeans (1.8%)
Cassave (23.7%)
Paddy (62.1%)
Maize (9.6%)


Rate of Change of Yield Rate
(S:Statistical year book of INDONESIA)
Rate of Change %/year
'75-'80
'80-'85
'85-'89
YEAR
Paddy
Maize
Cassave
S.Potatos
Peanuts
Soybeans


Structure of Total Cost 1987
Rp/ha
Paddy
Maize
Cassave
S.Potatos
Peanuts
Soybeans
Crops
Labor Cost
Che.Fertilizer Cost
Others Cost

Number of Farm Household and several indexes about Farming by Province

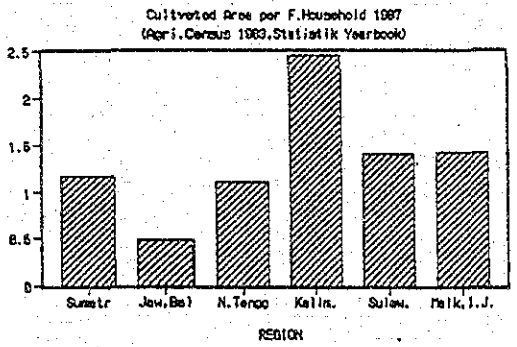
Province	A Number of Fa.H.holed *1000	Size of Land Controlled (ha)(%) L.T 0.05	0.5 to 1	1 to 2	2 to 3	M.T.3	total	B GRDP of Food Crop M.Rp	C Harvested Area ha	D Number of tractors unit	B/A x1000Rp/Hhx	B/C 1000Rp/ha	C/A ha/Hh	A/C Hh/ha	D/A Unit/100Hh	D/C Unit/100ha
1 D.I.Aceh	464	33.1	25.3	24.7	10.0	7.0	100.0	301172	437100	270	649	689	0.94	1.06	0.06	0.0006
2 N.Sumatra	1177	40.0	24.5	22.6	7.8	5.1	100.0	577894	945400	172	491	611	0.80	1.25	0.01	0.0002
3 W.Sumatra	592	39.6	29.8	22.5	5.5	2.6	100.0	281717	407700	289	476	691	0.69	1.45	0.05	0.0007
4 Riau	332	18.3	12.5	25.3	17.2	26.8	100.0	158138	709200	22	476	223	2.14	0.47	0.01	0.0000
5 Jambi	272	18.9	14.5	23.9	19.0	23.8	100.0	109492	646900	40	403	169	2.38	0.42	0.01	0.0001
6 S.Sumatra	665	15.8	19.5	30.9	18.1	15.6	100.0	337706	1014100	52	508	333	1.53	0.66	0.01	0.0001
7 Bengkulu	157	13.1	19.7	32.8	20.7	13.7	100.0	69882	214000	21	445	327	1.36	0.73	0.01	0.0001
8 Lampung	847	35.4	12.3	30.8	13.6	8.0	100.0	402937	910800	115	476	442	1.08	0.93	0.01	0.0001
9 D.K.I.Jakarta	27	86.7	7.6	3.6	1.3	0.9	100.0	73315	5900	33	2713	12426	0.22	4.58	0.12	0.0056
10 W.Jawa	4155	65.8	19.0	10.5	2.9	1.8	100.0	2110618	1928600	6732	508	1094	0.46	2.15	0.16	0.0035
11 C.Jawa	4189	61.7	23.2	11.3	2.5	1.3	100.0	2115714	1977800	2540	504	1070	0.47	2.12	0.06	0.0013
12 DI.Yogyakarta	502	62.3	19.7	12.9	3.7	1.4	100.0	188017	235000	193	375	800	0.47	2.14	0.04	0.0008
13 E.Jawa	4652	62.0	22.5	11.2	2.7	1.6	100.0	2948558	2212200	1739	634	1333	0.48	2.10	0.04	0.0008
14 Bali	405	46.0	27.0	17.6	5.5	3.9	100.0	327414	273900	356	808	1195	0.68	1.48	0.09	0.0013
15 W.N.Tenggara	465	47.2	23.8	18.0	6.4	4.6	100.0	221007	331900	9	475	666	0.71	1.40	0.00	0.0000
16 E.N.Tenggara	534	17.4	22.0	32.1	15.6	12.9	100.0	174051	687500	14	326	253	1.29	0.78	0.00	0.0000
17 E.Timor	133	18.2	12.6	26.3	18.7	24.1	100.0	22243	239900	0	167	93	1.80	0.56	0.00	0.0000
18 W.Kalimantan	460	13.5	10.7	21.2	14.5	40.1	100.0	131232	1843100	17	285	71	4.01	0.25	0.00	0.0000
19 C.Kalimantan	200	19.5	9.4	25.2	18.5	27.3	100.0	56613	480600	12	283	118	2.40	0.42	0.01	0.0000
20 S.kalimantan	374	37.1	22.7	22.4	10.9	6.9	100.0	166464	345400	42	446	482	0.92	1.08	0.01	0.0001
21 E.Kalimantan	135	19.8	15.5	27.7	19.5	17.5	100.0	76764	195500	20	568	393	1.45	0.69	0.01	0.0001
22 N.Sulawesi	339	28.6	22.7	26.0	11.2	11.5	100.0	128934	847100	57	381	152	2.50	0.40	0.02	0.0001
23 C.Sulawesi	243	14.0	17.1	28.9	19.4	20.6	100.0	80630	430300	316	332	187	1.77	0.57	0.13	0.0007
24 S.Sulawesi	937	31.5	26.4	26.0	9.9	6.3	100.0	557914	890500	461	606	638	0.95	1.05	0.05	0.0005
25 S.E.Sulawesi	174	19.5	20.6	30.4	17.9	11.5	100.0	75856	216500	38	435	350	1.24	0.80	0.02	0.0002
26 Maluku	223	16.8	15.2	27.1	16.8	24.1	100.0	69921	434100	0	313	161	1.94	0.51	0.00	0.0000
27 Irian Jaya	190	46.1	20.1	16.8	9.9	7.1	100.0	119512	158900	0	628	752	0.83	1.20	0.00	0.0000
INDONESIA	22854	49.0	21.7	16.9	6.6	5.8	100.0	11894815	18019900	13610	520	625	0.83	1.20	0.06	0.0007

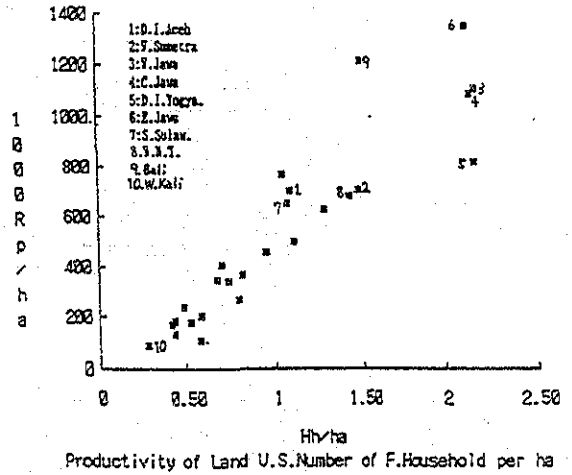
S:STATISTIC PERTANIAN 1987, Satistical Year Book of INDONESIA 1989,1985, Agricultural Census 1983, PROVINCIAL INCOME IN INDONESIA 1983-1987, Agricultural Mashinery by Provinse and District.
*:Estimation based on Population by Main Industry on Satistical Year Book of INDONESIA and Number of Farm Household on Agricultural Census 1983.

Number of Farm Household and several indexes about Farming

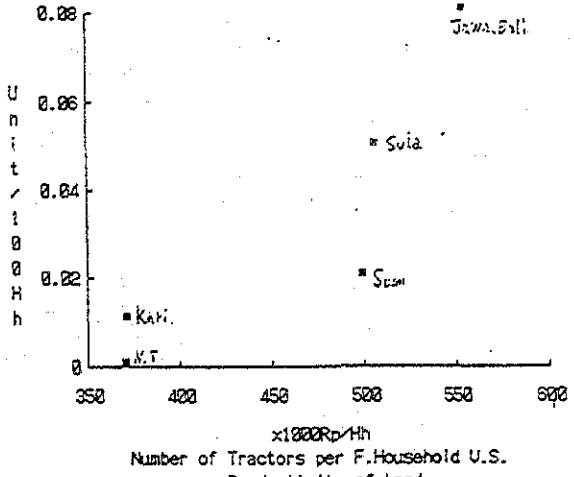
	A* Number of Fa.H.holed *1000	Size of Land Controlled (ha)(%) L.T 0.05	0.5 to 1	1 to 2	2 to 3	M.T.3	total	B GRDP of Food Crop M.Rp	C Harvested Area ha	D Number of tractors unit	B/A x1000Rp/Hhx	B/C 1000Rp/ha	C/A ha/Hh	A/C Hh/ha	D/A Unit/100Hh	D/C Unit/100ha
Sumatra	4506	26.8	19.8	26.7	14.0	12.8	100.0	2239038	5285200	981	497	424	1.17	0.85	0.02	0.0002
Jawa,Bali	13912	59.6	22.3	12.7	3.5	2.0	100.0	7691321	6627500	11610	553	1161	0.48	2.10	0.08	0.0018
N.Tenggara	1133	27.6	19.4	25.5	13.5	13.9	100.0	417301	1259300	23	368	331	1.11	0.90	0.00	0.0000
Karimantan	1169	22.5	14.6	24.1	15.9	23.0	100.0	431073	2864600	91	369	150	2.45	0.41	0.01	0.0000
Sulawesi	1693	23.4	21.7	27.8	14.6	12.5	100.0	853334	2384400	872	504	358	1.41	0.71	0.05	0.0004
Malk,Iri.Jaya	414	31.4	17.7	21.9	13.4	15.6	100.0	189433	593000	0	458	319	1.43	0.70	0.00	0.0000
INDONESIA	22854	49.0	21.7	16.9	6.6	5.8	100.0	11894815	#19008100	13610	520	626	0.83	1.20	0.06	0.0007

S:STATISTIC PERTANIAN 1987, Satistical Year Book of INDONESIA 1989,1985, Agricultural Census 1983, PROVINCIAL INCOME IN INDONESIA 1983-1987, Agricultural Mashinery by Provinse and District.
*:Estimation based on Population by Main Industry on Satistical Year Book of INDONESIA and Number of Farm Household on Agricultural Census 1983.
#:Exclude D.K.I.Jakarta

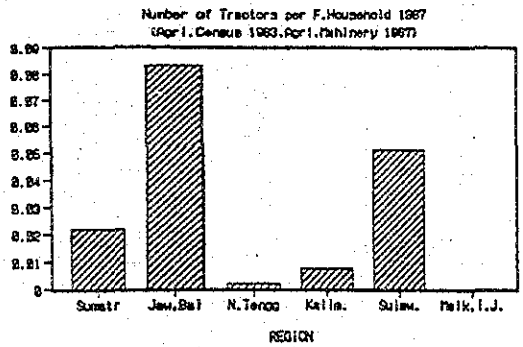


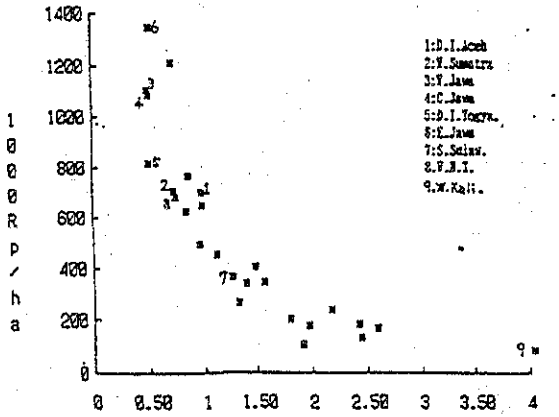


Productivity of Land U.S.Number of F.Household per ha

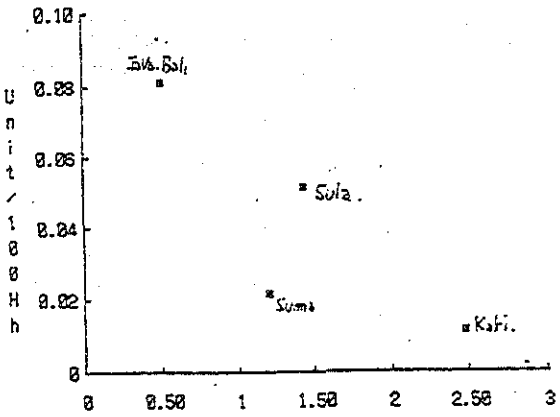


Number of Tractors per F.Household U.S.
Productivity of Land





Productivity of Land U.S. Cultivated Area per F.Household



Number of Tractors per F.Household U.S.
Cultivated Area per F.Household

Area of Technical and Semi Technical Irrigated Paddy, and Several Indexes

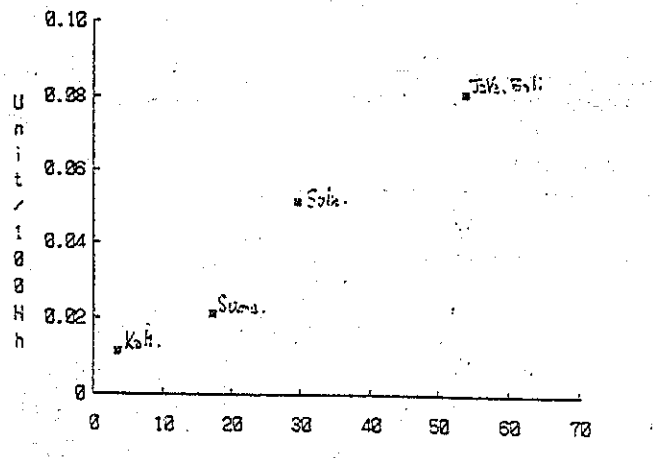
Province	Area Planted of Paddy (ha)					Number of Tractors	Productivity
	Tech.Irri. A	Se.T.Ir. B	C=A+B	G.Total D	% C/D*100	Unit/100Hh	x1000Rp/ha
1 D.I.Aceh	0	26274	26274	299706	8.8	0.06	689
2 N.Sumatra	41516	62578	104094	358661	29.0	0.01	611
3 W.Sumatra	9160	53827	62987	222417	28.3	0.05	691
4 Riau	0	1359	1359	207005	0.7	0.01	223
5 Jambi	850	8887	9537	247107	3.9	0.01	169
6 S.Sumatra	12550	5892	18442	411329	4.5	0.01	333
7 Bengkulu	7631	16783	24414	84188	29.0	0.01	327
8 Lampung	75776	16873	92649	218257	42.4	0.01	442
9 D.K.I.Jakarta	2301	1176	3477	7821	44.5	0.12	12426
10 W.Jawa	441949	135277	577226	1191375	48.5	0.16	1094
11 C.Jawa	326075	137597	463672	1016505	45.6	0.06	1070
12 DI.Yogyakarta	0	39955	39955	61394	65.1	0.04	800
13 E.Jawa	599412	140980	740392	1165763	63.5	0.04	1333
14 Bali	0	65515	65515	95059	68.9	0.09	1195
15 W.N.Tenggara	39783	77523	117306	198199	59.2	0.00	666
16 E.N.Tenggara	5360	16534	21894	118558	18.5	0.00	253
17 E.Timor	0	0	0	0	0.0	0.00	93
18 W.Kalimantan	700	3112	3812	427704	0.9	0.00	71
19 C.Kalimantan	1823	15395	17218	211856	8.1	0.01	118
20 S.kalimantan	6844	5005	11849	426171	2.8	0.01	482
21 E.Kalimantan	0	489	489	133531	0.4	0.01	393
22 N.Sulawesi	15017	15772	30789	59601	51.7	0.02	152
23 C.Sulawesi	15226	21203	36429	108602	33.5	0.13	187
24 S.Sulawesi	113495	37200	150695	564751	26.7	0.05	638
25 S.E.Sulawesi	81	8623	8704	48622	17.9	0.02	350
26 Maluku	0	0	0	0	0.0	0.00	161
27 Irian Jaya	0	0	0	0	0.0	0.00	752
INDONESIA	1715349	913829	2629178	7884182	33.3	0.06	625

S:Land Area by Utilization in Outer Java,and in Java 1988

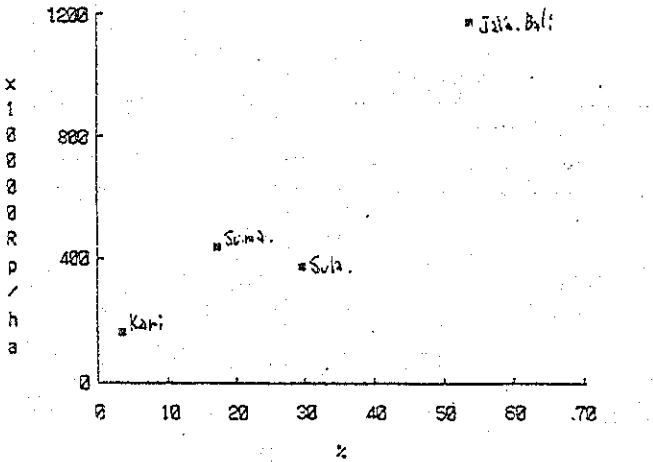
Area of Technical and Semi Technical Irrigated Paddy, and Several Indexes

Province	Area Planted of Paddy (ha)					Number of Tractors	Productivity
	Tech.Irri. A	Se.T.Ir. B	C=A+B	G.Total D	% C/D*100	Unit/100Hh	x1000Rp/ha
Sumatra	147283	192473	339756	2048670	16.6	0.02	424
Jawa,Bali	1369737	520500	1890237	3537917	53.4	0.08	1161
Karimantan	9367	24001	33368	1199262	2.8	0.01	150
Sulawesi	143819	82798	226617	781576	29.0	0.05	358
INDONESIA	1715349	913829	2629178	7884182	33.3	0.06	625

S:Land Area by Utilization in Outer Java,and in Java 1988



Number of Tractors per F.Household U.S. Rate of
Area of Tech.and Semi Tech.Irrigated Paddy Field



Productivity of Land U.S. Rate of
Area of Tech. and Semi Tech.Irrigated Paddy Field