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SUMMARY REPORT
ON
THE REMOTE SENSING ENGINEERING PROJECT
IN
THE REPUBLIC OF INDONESIA

March, 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

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FOREWORD

The Government of the Republic of Indonesia requested the Japanese Government for technical cooperation concerning remote sensing technology with a view to effectively implementing the collection of necessary data for irrigation and drainage plan of the country as well as the survey for selecting land suitable for agricultural development in connection with the plan for transmigration from Java to outer lands.

Following the above request the Japan International Cooperation Agency (JICA) dispatched to Indonesia a 5-men Preliminary Survey Team on Remote Sensing Technology for Agricultural Development in Indonesia, headed by Mr. Takashi Kawakami, Deputy Director of Planning Department, Water Resource Development Corporation from the 27th of November 1978 for a period of 12 days.

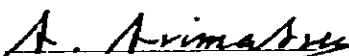
The Team conducted a survey and exchanged views with the Indonesian Authorities concerned on the establishment of remote sensing technology for agricultural development in Indonesia.

This summary report has been prepared based on the above survey and consultation.

I hope this report will be found useful as a reference material for promoting the technical cooperation project on remote sensing technology in Indonesia.

I wish to express my heartfelt appreciation to the Indonesian Authorities concerned for their kind cooperation extended to the Survey Team.

March 1979


Akira ARIMATSU
Executive Director
Japan International Cooperation Agency

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Glossary of Terms and Abbreviations

1. Administrative Organization (Local Administration)

Kab:	Kabupaten = Regency
Kec:	Kekamatan = Township
Desa:	Village
Camat:	Chief of Kekamatan
Kepala:	Chief of village

2. Organization for Water Resources Development

DPU:	Ministry of Public Works
DGWD:	Directorate General of Water Resources Development
Seksi:	Public Works Office at Regency Level
PLN:	Public Corporation of Electricity

3. Organization for Agricultural Development

BRE:	Indonesia People's Bank
BIMAS/INMAS:	Mass Guidance for Self-sufficiency in Food
DOLOG:	Provincial Rice Purchasing Agency
BUUD/KUD:	Agricultural Cooperative Organization
KIOS:	Kiosk
ADC:	Agricultural Development Center
REC:	Rural Extension Center
CRIA:	Central Research Institute for Agriculture
PPS:	Subject Matter Specialist
PPM:	Extension Surveyer
PPL:	Field Extension Worker

4. Other Local Terms

Sungai:	River
Palawijo:	Upland Crop
Pelita I:	First Five Year Development Plan
Pelita II:	Second Five Year Development Plan
Pelita III:	Third Five Year Development Plan

5. Area and Volume

m² :	Square meter
Ha:	Hectar
Km² :	Square kilometer

lit:	Liter
m ³ :	Cubic meter

6. Derived Measures based on the same symbol

m ³ /sec.:	Cubic meter per second
t/ha., ton/ha.:	Ton per hectare
m ³ /Km ² :	Cubic meter per square kilometer
mm/day:	Milimeter per day
lit./sec./ha.:	Liter per second per hectare
lit./day:	Liter per day
m ³ /Km ² /year:	Cubic meter per square kilometer per year
mmho/cm:	Millimohs per centimeter
mho/cm:	Micromhos per centimeter
mg/lit.:	Milligram per liter
me/lit.:	Mol-equivalent per liter

7. Electric Measures

KV:	Kilovolt
KW:	Kilowatt
KWH:	Kilowatt hour
MW:	Megawatt

8. Currency

US\$:	United States Dollar
Rp.:	Rupiah

US\$1 = Rp.415

1) INTRODUCTION

1. Objective and the Origin of the Survey Team

Increasing the food production and attaining to the self-sufficiency of foods have been regarded as most important subjects in the third five years plan of Indonesian Government.

And the Ministry of Public Works is in charge of making project for agricultural development by means of improving the irrigation and drainage system and for surveying potential areas for agricultural development with regard to the transmigration program to the outer territories especially Sulawesi, Kalimantan, and Sumatra, and the infra-arrangement of the said territory.

However, for collection and analyzing the informations collected from the vast outer territory, the personnel and the equipments are inadequate, and the demands for the personnel and equipments are supposed to increase within next five years of the third development program.

Therefore, the Ministry of Public Works requested to the Japanese Government for technical cooperation consisting of personnel dispatch, equipments and instruments supply, and training of personnel for the purpose of analyzing the subject areas, grasping classification of the land (topography, soil, hydrogy, etc.) and the actual condition of land usage (land used, agriculture, population density, transportation), by means of the informations obtained from the artificial satellite and aerial photo, which may be possible to be established in Indonesia by remote sensing technology.

The objective of the preliminary survey team was to study the possibility of technical cooperation and its content, for realizing necessary surveys with respect to the background and the content of the request made by the Indonesian Government.

2. Constitution of Survey Team

<u>Function</u>	<u>Name</u>	<u>Actual profession</u>
Leader	Takashi KAWAKAMI	Vice-director, Project Dept., Water Resources Development Cooperation
Member in charge of Development project	Takeshi NASU	Assistant Chief, Project Section, Improvement Dept., Ministry of Agriculture, Forestry and Fishery
Development of resources	Shinobu SAKAI	Project Sec., Structure Improvement Dept., Ministry of Agriculture, Forestry and Fishery
Cooperation Planning	Masaru MATSUKI	Same as above
Coordinator	Takumi OHASHI	Japan International Cooperation Agency

3. Schedule of the Survey Team (Nov. 27 thru Dec. 8, 1978)

Date	Activities	Place
Mon., Nov. 27	Tokyo to Jakarta	Jakarta
Tue., Nov. 28	Courtesy call on embassy of Japan and JICA office	Jakarta
Wed., Nov. 29	Courtesy call on Data Processing and Statistic Center of the Ministry of Public Works and First meeting with Indonesian officials concerned.	Jakarta
Thu., Nov. 30	Second meeting at D.P.S.C.	Jakarta
Fri., Dec. 1	Meeting within team members	Jakarta
Sat., Dec. 2	Third meeting at Irrigation Dept.	Jakarta
Sun., Dec. 3	Discussion on the draft of summary report.	Jakarta
Mon., Dec. 4	Fourth meeting at D.P.S.C.	Jakarta
Tue., Dec. 5	Draft making	Jakarta
Wed., Dec. 6	Final meeting at D.P.S.C., and submission the report	Jakarta
Thu., Dec. 7	Reporting to embassy of Japan and to JICA office	Jakarta
Fri., Dec. 8	Jakarta to Tokyo (CX710/CX500)	Jakarta

4. Visited Places and Persons

Tadahiko NAKAO	First Secretary, Embassy of Japan
Shigeru TAMESUE	First Secretary, Embassy of Japan
Takeichi ISHIKAWA	Second Secretary, Embassy of Japan
Moriya MIYAMOTO	Director, JICA Jakarta Office
Nobuo MIYASHITA	Representative, JICA Jakarta Office
Retsu SHINOURA	Representative, JICA Jakarta Office

Mr. Tubagus Haedar Ali	Center for Data Processing and Statistics, Ministry of Public Works
Mr. Tata Sukarta	Center for Data Processing and Statistics, Ministry of Public Works
Mr. Suroso	Center for Data Processing and Statistics, Ministry of Public Works
Mr. Wrahastirto	Bureau of Planning, Ministry of Public Works
Arata MASUMOTO	JICA Expert
Kiyoshi YAMASHITA	JICA Expert
Akemi NODA	JICA Expert

2) THE OUTLINE OF THE TECHNICAL COOPERATION FOR THIS PROJECT

1. The Necessities for the Technical Cooperation

For establishing the project of irrigation and drainage systems and selection of potential areas for agricultural development with regard to the transmigration project, numerous problems which cover vast area of the country must be solved.

Especially in the country like Indonesia, where exist vast natural areas to be developed in large scale every year, old surveying methods and technologies are considered as inadequate.

For example, in case of selectioning the potential area for agricultural development in accordance with the transmigration project, land and aerial survey for all over the islands of the outer territories would not be realistic for Indonesia in view of the expense, if they were carried out by means of old methods.

Accordingly some more efficient method is required to accomplish the objective of the project within limited period and funds.

The remote sensing method is recommended for the aerial surveys to collect the data necessary for making the thematic maps and/or evaluation maps by multi-spectral scanner and multi-spectral camera, to decide the area for agricultural development, through operation of the computer.

However, it is important to know that the remote sensing technology is not the device which provide us with all informations necessary for the areas to be consolidated for irrigation and drainage systems on the development projects.

Consequently, the establishment and utilization of remote sensing technology is the most efficient and potential mean to realize necessary surveys.

2. The Feasibility of Technical Cooperation

In the occasion of meetings held with the Indonesian Government authorities concerned, we suggested that the Indonesian Government must bear the expenses for maintenance of the equipments and instruments and for the land survey which may become considerable amount. The Indonesian Government authorities concerned, after consulting with the Ministry's staffs replied us their intentions of bearing the necessary expenses for the land survey and of training Indonesian personel and for the maintenance of the equipments.

The active intentions of bearing the local cost indicate that the Indonesian government has great expectancy to this project.

Most of the Japanese makers of hard wares relationed to remote sensing technology such as computer have their own branch offices in the South Eastern Asia and their technics in the soft ware such as mentioned technology are excellent.

Consequently, we believe that technical cooperation to this project has great possibility and Indonesian Government's requests and expectancy will be satisfied.

3. Important Matters to be Solved

1. The capability of bearing the local cost

The budget of the Indonesian Government, prepared to this project, is as mentioned above, and the budget, including the local cost must be earmarked for the annual budget.

And even more, it is necessary to increase largely the amount of the budget at the time of initial of this project. In this respect, the Indonesian Government authorities emphasized that they were sure enough to bear the local cost, however, they desired that the necessary expenses for the maintenance of the equipments might be born by Japanese Government during the period of cooperation. Taking it into consideration, we suppose that the Government of Indonesia has to make much effort to obtain this increased budget for this project.

2. The Indonesian technicians

Actually, the Data and Statistics Center has only one high grade engineer and three common technicians with respect to remote sensing technology, however, we noticed that the Indonesian Government recognized the indispensability of this project and had a strong intention of training necessary personel of remote sensing technology on the program of establishing the remote sensing system in the Republic of Indonesia.

4. Obligation of Japanese Side

a) Dispatch of Japanese experts

1. Long term

Leader	1
Soft ware development	1
Agricultural development	1
Total	3

2. Short term

Three Japanese experts in the following items are dispatched every year if necessary, staying around two months.

Hardware
Geology
Flora
Soil
Agricultural economy
Irrigation and drainage

b) Image Analyzing Device (hard ware)

The following devices are recommended for the program

(1) Analogue Image Disposer

- 1) Additive Color Viewer (A C V)
- 2) Zoom Transfer Scope (Z T S)

(2) Digital Image Analyzer

- 1) Center Processing Unit (C P U)
- 2) Console Type Writer (C T W)
- 3) Paper Tape Reader (P T R)
- 4) Magnetic Disk Unit (M D U)
- 5) Magnetic Tape Unit (M T U)
- 6) Pattern Memory (P. memory)
- 7) Color Image Display System (C I D S)
- 8) Drum Scanner (Dr. S)
- 9) Drum Printer (Dr. P)
- 10) High Speed Image Arithmetic Unit (H S I A U)

Constitution map of these equipments is shown in the equipments introducing program and some more spare parts and some adjustments for installment are necessary.

c) Soft ware

The functions of soft ware for image analysis in remote sensing are:

- 1) Data out-put
CCT in-out put

Drum Scanner In-put
Drum Printer Out-put
Color Display In-out put
Data Transference to the neighbouring equipments.

- 2) Pre and pro-process of data
Processing of the shadow-y part in the image data.
Removing noise (isolated point and periodical noise)
Smoothing
Differential calculus
- 3) Data modification
Geometrical modification
Transmissible function modification
- 4) Statistics and analysis
Clustering
Main components analysis
Histogram
Co-relation
- 5) Classification
Linear distinction function
Most probable distinction
- 6) Emphasis
Harmony operation
Imitation color
Density slice
- 7) Edition or compilation
Clipping
Joining
Piling up
Map projection

In case special soft ware be needed Japanese experts in charge will take care of providing.

d) Vehicles

Four vehicles in total will be provided:

- Two (2) for collection of ground data and sampling
- One (1) for transportation of the materials necessary for image data image analyzing system.

One (1) for liaison service between ministry and office.

e) **Training Plan**

The training of remote sensing technology for Indonesian technicians is carried out in both Japan and Indonesia.

(1) **Training in Japan**

Indonesian side desire to send total 16 technicians to Japan, however, it is recommended to send ten (10 trainees within five years, namely, two trainees every year.

Training term shall be two or three months to study fundamental course of remote sensing technology, taking into consideration that they will have much practical training after returning to Indonesia.

Training curriculum are as follow:

1) **Fundamental consideration**

Units of measure
Electromagnetic energy
Electromagnetic spectrum
Image characteristics
Vision

2) **LANDSAT imagery**

Multispectral scanner system
Image characteristics
Orbit paths
Indexing of images
Interpretation methods
Stereo Viewing of LANDSAT image
Seasonal influence on image
Plate tectonic interpretation
Advantage of LANDSAT images
Future LANDSAT missions

3) **Manned satellite imagery**

Gemini missions
Appollo program
Skylab

Space shuttle

4) Aerial photography

Interactions between light and matter
Film technology
Characteristics of aerial photographs
Black and white photography
Color science
IR color photography
Spectral reflectance
Multispectral photography and imagery
Aircraft multispectral scanner imagery

5) Thermal infrared imagery

Thermal processes and properties
IR detection and imaging technology
Characteristics of IR images
Conducting IR surveys
Thermal models
Heat loss surveys
IR images from satellites

6) Radar imagery

SLAR system
Radar return and image signatures
Image characteristics
Advantages of radar images
Comparison of SLAR and LANDSAT image
Radar scatterometer
Image interpretation procedure
Radar imagery from satellites

7) Digital image processing

Image structure
Image processing systems
Image restoration
Image enhancement
Information extraction
Strategy and hardware for image processing

8) Resource exploration

Mineral exploration
Mineral exploration in covered terrain
Geothermal energy
Other energy sources
Future imagery requirements
Future imagery requirements

9) Environmental and land-use applications

Marine environment
Monitoring industrial thermal plumes
Land-use mapping

(2) Training in Indonesia by Japanese experts

In Indonesia, the training will be made through the practical application of their knowledge of fundamental remote sensing technology in Japan, in the process of the real selection works of the agricultural development areas.

The training will contain the following items:

- 1) Making plans for image data collection
- 2) Practice of ground truth data collection
- 3) Operation of image analyzer
- 4) Development of soft ware necessary for selection of potential areas for agricultural development.
- 5) Making of thematic maps

Thematic maps necessary for the selection as follows:

Topographical map
Population density map
Road and access road map
Transportation map
Geology map
Natural vegetation map
Swamp map
Agricultural land map
Forest map
Hydrology map
Soil map
Geophysical map

6) Making of evaluation map

Evaluation map is made by evaluating the thematic maps as follow:

Map containing combinations of themes
Agricultural potential map

5. Obligation of Indonesian Side

a) Disposition of Indonesian officials

As conter-partner of Japanese experts, the following personel shall be disposed:

- 1) One (1) Coordinator
- 2) One (1) Expert (agricultural development)
One (1) Expert (regional development)
- 3) Two (two) Technician
- Total Five (5)

b) Office and facilities

Office and work shops should be as follows:

- | | |
|-----------------------------|-------------------|
| 1) Digital processing room | 50m ² |
| 2) Analogue processing room | 20m ² |
| 3) Data stock room | 30m ² |
| 4) Office room | 50m ² |
| 5) Map drawing room | 50m ² |
| Total: | 200m ² |

Office and work shop should be furnished as follows:

- 1) Air conditioner (Capacity 10kW)
- 2) Switch box (Capacity 50kW)
- 3) Drafter, table, desk

4) Shelf, locker

5) Others

c) Disposition of office personnel

The following personnel is necessary for office management

1) Office management 4 persons

Administration and custody of office

2) Technical official 5 persons

Assistants for the experts mentioned above and operator of machines. These five persons and other five persons (shown in a), total ten persons are considered as candidates for training in Japan.

3) Driver 4 persons

Drivers for the vehicles provided by Japan

4) Key pancher 1 person

d) Fuel, grease, etc.

Approximately 5,000.00 liters of fuel is necessary for one (1) vehicle and in case of oil and grease; as cost, equivalent to 3% of fuel, is needed per year. Also other expenses for the maintenance of vehicles must be considered.

e) Expenses for installing the equipments

Aprx. 5% of the total price of the equipments provided by Japan should be considered for transportation, labour, and materials to install them in the office.

f) Expenses for system operation

Expenses for image analyzing system operation such as electricity, expendables, repairs and maintenance.

Spare parts necessary for repairs and maintenance are provided by Japan and staff for maintenance will be assigned by Indonesian side, as possible to make lower expense.

According to the estimate of team, the expense for the system operation will be about 5% of the price of the equipments (hard ware) and soft wares to be used for the operation.

g) Expenses for the collection of image datas

LANDSAT films needed in the first stage can be obtained easily and cheaply from NASA and EROS of United States (about US\$ 40.- for one photo sheet, set/four bands).

For the general survey of the whole territory of Indonesia, approximately 200 photo sheets (185 kms x 185 kms each) are required, in the second stage, LANDSAT CCT 100 photo sheets which can be obtained from NAS and EROS (US\$ 200 per sheet) are necessary.

In the third stage, the unit price of the aerial infrared color films will differ greatly according to the quantity of the photos to be taken, however, according to the estimate of the team, one sheet will cost US\$ 200.- aprx. in case 200 sheets are taken, taking into consideration the difference of the expense and labour cost between Japan and Indonesia. Within the whole period of the cooperation, around 200 photo sheets will be taken every year for the selection of about 100,000.- ha suitable for the agricultural development out of proposed areas 500,000 ha.

h) Expense for completing

Expenses for completing the thematic maps and evaluation maps with the results of image analysis, which may cost US\$ 5,000.- to 15,000.- per year, consisting of expense of personel and expendables principally.

i) Expense for ground truth datas

About 1,000 men per year is necessary for the collection of ground truth datas, however, it is believed that in the later half stage of the whole period, number of personel will decrease somewhat. It is consist of expense for personel and travellings principally, however, US\$ 15,000.- will be enough per year, taking into consideration the difference of expenses between Indonesia and Japan.

j) Expense for paper tape perforation machine

About US\$ 10,000.- for purchasing a paper perforating machine to in-put complementary datas of soft ware into the image analyzing system.

6. Annual Plan of cooperation

The following is the annual execution program made in accordance with the co-operation program.

EXECUTION PROGRAM

1st YEAR	Collection of LANDSAT film image data. Analogical image analysis by LANDSAT film image data. Summarily survey of suitable area for agricultural development. Selection of 1st stage suitable area proposed for agricultural development. Making plan to collect LANDSAT CCT (Computer Compatible Tape).
2nd YEAR	Establishment of basic technique for digital image analysis by LANDSAT CCT. Making thematic maps, making evaluation map (1:250,000). Determination of 2nd stage suitable area for agricultural development. Making plan to collect aerial photo image data.
3rd YEAR	Collection of aerial IR color photo of 3rd stage suitable area proposed for agricultural development. Establishment of applied technique for image analysis using high speed image arithmetic unit. Making 1: 50,000 topographical map of objective area.
4th YEAR	3rd stage image data analysis. Making multithematic maps, making evaluation map (1:50,000). Determination of 3rd stage suitable area. Choice area where detail survey is necessary.
5th YEAR	Collection and analysis of detail survey image data. (1:5,000 - 1:10,000 IR color photo) Making final evaluation map. (1:50,000) Establishment of multistage survey technique.

In the figure 1, the structures of equipments and instruments for image analyzing system and the yearly program of introducing are shown.

According to this project, introduction of the equipments is divided in three years.

Fig. 1. SYSTEM CONFIGURATION AND HARDWARE EQUIPMENT ANNUAL PLAN

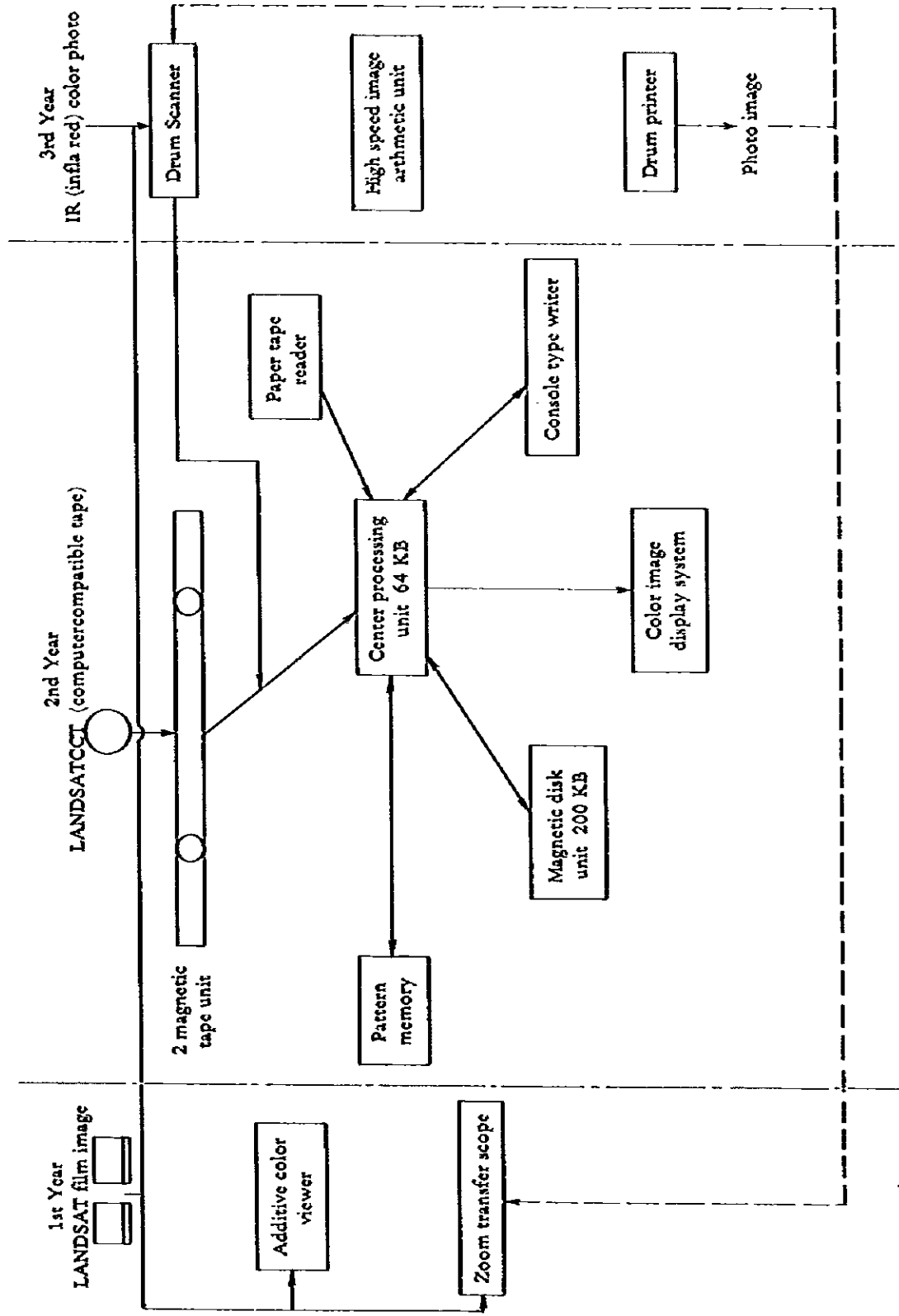


Table 1. TIME SCHEDULE OF TECHNICAL COOPERATION FOR REMOTE SENSING IN REPUBLIC OF INDONESIA

Const unit: 1,000 US\$

Matter	1st Year	2nd Year	3rd Year	4th Year	5th Year	Note
1. Japanese Assistance						
Leader (long term)	1 person					
Expert (long term)	1 person					
Expert (long term)	1 person					
Expert (short term)	2 month, 3 persons	3 persons	3 persons	3 persons	3 persons	Software development Agricultural hardware, geology, flora, soil, agri. economist, irriga- tion and dr.
Hardware	ACV 75	CPU 75	Dr. S 55			
Hardware	ZTS 20	MTU 45	HSIAU 60			
Hardware		MDU 67	Dr. P 58			
Hardware		PTR 5				
Hardware		P. Memory 65				
Hardware		CTW 6				
Hardware		CIDS 63				
(Adjust and test)						
(Adjust and test)						
(Spare parts)						
Software	-	Image processing 100	Statistical analysis 100	Special purpose 50	Special purpose 50	5% of hardware p. 5% of hardware p.
Vehicles	Ground trust 20 2 vehicles	Keep conce- 20 tion 2 vehicles				
Training acceptance	2 persons	2 persons	2 persons	2 persons	2 persons	
Total (1,000 US\$)	125	478	291	50	50	994

Table 1 TIME SCHEDULE OF TECHNICAL OF COOPERATION FOR REMOTE SENSING IN REPUBLIC OF INDONESIA
(Cont'd)

Constunit: 1,000 US\$

Matter	1st Year	2nd Year	3rd Year	4th Year	5th Year	Note
2. Indonesian Responsibility						
Co-ordinator	1 person					Counterpart for Japanese leader Counterpart for Japanese expert Counterpart for Japanese expert Trained in Japan
Expert agriculturalist	1 person					
Expert area agronomist	1 person					
Technician	2 persons					
Office accommodation	Total space 200 m ² (digital processing room, 50 m ² , analogue processing room 20 m ² , data stock room 30 m ² , office room 50 m ² , map drawing room 50 m ²)					
Office equipment	Air conditioner (10 kW), switch box (50), desk, shelf, etc.					
Office employee						
Office clerks	3 persons	4 persons				
Technician	2 persons	5 persons				
Driver	2 persons	4 persons				
Key puncher	2 persons	1 person				
Fuel and oil for vehicle	Gas 10,000 ltrs., 20,000 lts. Oil 30% of gas					
Installation of hardware	5	16	9	-	-	5% of hardware price
System management cost	5	26	40	43	45	5% of hard and soft ware total price
Cost for image data	LANDSAT film 200" 40\$ 8	LANDSAT CCT 100" 200\$ 20	Aerial IR 200" 200\$ 40	Aerial IR color 200" 200\$ 40	Aerial IR color 200" 200\$ 40	

Table 1 TIME SCHEDULE OF TECHNICAL OF COOPERATION FOR REMOTE SENSING IN REPUBLIC OF INDONESIA
(Cont'd)

Constunit: 1,000 US\$

Matter	1st Year	2nd Year	3rd Year	4th Year	5th Year	Note
Completion of image analysis	5	5	10	10	15	
Ground truth	1,000 man/day, 15	15	15	15, 670 man/day, 10 10	10	
Paper tape punch machine	10					
Total	48	82	114	103	110	Except office accomodations, equipments, personal expenses and fuel

SUMMARY OF DISCUSSIONS
ON
THE REMOTE SENSING IN ENGINEERING PROJECT
BETWEEN
JAPANESE PRELIMINARY SURVEY TEAM FOR
TECHNICAL COOPERATION FOR REMOTE SENSING IN ENGINEERING
AND
CENTER FOR DATA PROCESSING AND STATISTICS
MINISTRY OF PUBLIC WORKS

Jakarta, December 1979

**SUMMARY OF DISCUSSIONS
ON
THE REMOTE SENSING IN ENGINEERING PROJECT**

Following the request to the Government of Japan by the Government of the Republic of Indonesia for a Technical cooperation concerning the "Remote Sensing in Engineering Project", a preliminary survey team organized by the Government of Japan and the Japan International Cooperation Agency was dispatched to Indonesia.

Discussions were held on the "Remote Sensing in Engineering Project in Republic of Indonesia" between the Japanese Preliminary Survey Team for the technical cooperation for Remote Sensing in Engineering Project headed by Mr. Takashi KAWAKAMI, Deputy director, Planning Department, Water Resources Development Corporation and the Indonesian authorities concerned, during the visit of the Preliminary Survey Team to Republic of Indonesia from November 27 to December 8, 1978.

The followings are the summary of discussions.

1. The Indonesian authorities concerned explained about the background of the "Remote Sensing in Engineering Project" and the area of applying remote sensing engineering.

Projects in which the Remote Sensing Engineering is required are programs of development of agricultural irrigation area, management of flood area and development of potential area for resettlement and transmigration which is stipulated in Repelita-II and will be planned for Repelita-III, and are the responsibility of the Ministry of Public Works, need data information that has already transformed into maps for the purposes of planning of the Programs.

Quantity of such data information will increase in the future and quality of data/maps for planning purposes should be refined. Therefore, survey capacity of the Ministry of Public Works, especially at the Centre for Data Processing and Statistics, should be increased in the future.

The Government of the Republic of Indonesia has recognized such situation, and submitted and proposed to Japanese Government for technical cooperation to develop multi-stage survey method which covers land classification system (topography, soil, hydrology) and land system for present usage (land use, natural disaster, population density, transportation) by using Image Processing System Equipment.

Subject areas for applying Remote Sensing Engineering are as follows:

1-1 Irrigation Area

Intended extension of irrigation network is 2,000,000 ha in total.

Remote Sensing Engineering will be applied for surveying area of 200,000 ha per year which is 10% of the total area.

1-2 Flood Area

Total area of management of flood area is 750,000 ha and the Remote Sensing Engineering will be applied for surveying 75,000 ha every year (10% of total area).

1-3 Potential Area for Transmigration

Potential transmigration area to be developed within five years (Repelita III) is covering 1,000,000 ha to accommodate 500,000 families.

2. Remote Sensing Engineering System

The Indonesian authorities concerned explained about configuration of Remote Sensing Engineering System which is needed by the Ministry of Public Works.

3. Remote Sensing Engineering Project

The Indonesian authorities concerned submitted a proposal for the program of the Remote Sensing Engineering project which is supposed to be carried out during five years period as follows:

3-1 Orientation of Remote Sensing Engineering System by Japanese Government

3-2 Training of Indonesian Experts

3-3 Operation of the Project

3-3-1 Irrigation Network Area in Indonesia

3-3-2 Potential Area for Transmigration

4. The Indonesian authorities concerned asked for ideas of Japanese Survey Team about concrete configuration of some parts of hardwares and concrete function of some parts of softwares which are shown in the data flow chart presented by Indonesian authorities concerned. From the technical point of view, Japanese survey team showed possible configuration of hardwares and functions of soft-wares corresponding to the data flow chart.

5. The Indonesian authorities concerned explained the idea of making thematic maps and evaluation maps using the computer system (IBM 370-145) which is available at Ministry of Public Works.

Japanese survey team expressed their opinion that thematic maps and evaluation maps

could be made by using an Image Processing Computer System.

6. The Indonesian authorities concerned requested the consideration of the maintenance cost of Image Processing hardwares to be financed under the Japanese Technical Cooperation.
7. The Indonesian authorities concerned expressed that they expect the dispatching of Japanese Implementation Survey Team as early as possible.
8. Japanese Survey Team acknowledged the significance of establishing Remote Sensing Engineering in the Ministry of Public Works of the Republic of Indonesia, and will study furtherly on the possibilities of the establishment of such Remote Sensing Engineering under the Japanese Technical Cooperation.
9. The Japanese Survey Team expressed the appreciation for the cooperation and hospitality extended to the Preliminary Survey Team during their stay in Indonesia.

Done at JAKARTA on December 6, 1978



Takashi KAWAKAMI
Leader
Japanese Preliminary
Survey Team for
Technical Cooperation for
Remote Sensing in Engineering



Tubagus HEADAR ALI
Chief of
Centre for Data
Processing and
Statistics,
Ministry of Public Works

ATTENDANCE LIST

The Ministry of Public Works

Center for Data Processing and Statistics

Mr. Tubagus Haeder Ali

Mr. Tata Sukarta

Mr. Suroso

Mr. Wrahastirto

Bureau of Planning

Mr. Soekrisno

Directorate of Irrigation

Dr. Arata Masumoto

The Preliminary Survey Team

Mr. Takashi Kawakami

Mr. Takeshi Nasu

Mr. Shinobu Sakai

Mr. Masaru Matsuki

Mr. Takumi Ohashi

The Embassy of Japan

Mr. Tadahiko Nakao

JICA Jakarta Office

Mr. Tadashi Shinoura

