No. 8

BASIC DESIGN STUDY REPORT
ON
THE MONITORING AND EVALUATION SYSTEM
FOR
THE POVERTY ERADICATION PROGRAM
IN
THE KINGDOM OF THAILAND

January, 1983

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

In response to the request of the Government of the Kingdom of Thailand, the Government of Japan decided to conduct a Basic Design Study on the Monitoring and Evaluation System for the Poverty Eradication Program and entrusted the survey to the Japan International Cooperation Agency (J.I.C.A.). The J.I.C.A. sent to Thailand a survey team headed by Mr. Koichiro OKAZAKI, Head of System Development and Data Processing Division, General Affairs Department J.I.C.A. from August 30 to Octorber 8, 1982.

The team had discussions with the officials concerned of the Government of Thailand and conducted a field survey in Bangkok city. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Kingdom of Thailand for their close cooperation extended to the team.

January, 1983

Keisuke Arita

Keisuke Arita

President
Japan International Cooperation Agency

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SUMMARY

The Thai Government, in its Fifth National Economic and Social Development Plan (1982-1986), pointed out that rural poverty problem is the most keen and serious one in the course of economic and social development of Thailand, and regarded the Poverty Eradication Program as the most important task for the purpose of overcoming this rural poverty situation.

Rural poverty situation is remarkable especially in the eastern and northern areas where resources such as available land, forest, water, and fish are becoming exhausted and it raises unemployment ratio, which results in economic difficulties together with inflation to farmers. For this reason, the income gap between rural and urban areas has been growing larger. In 1979, the average income per head in urban area became 6 times higher than that of rural area.

The Poverty Eradication Program includes a wide range of projects which intend to encourage needy people to participate in various activities for the economic and social development accompanied by promoting decentralization of social services in the field of agriculture, irrigation, medical treatment, education, and so on.

Meanwhile, some efforts for poverty eradication had been made in the past by the Government, but it was not of any help to the people in the poverty area where they had been suffering from exhaustion of resources and low productivity. The failure was caused by ineffective policy making which might be made on the basis of insufficient informations regarding the actual status of rural area as well as improper management and evaluation of the development project.

Therefore, indispensable for efficient implementation of the Poverty Eradication Program is that establishment of a method for systematic policy making, budget allocation, monitoring and evaluation of the projects, and efficient coordinations and reviews by the related governmental agencies. To this end, construction of the imformation processing system for monitoring the rural poverty situation and evaluating the executed projects is necessary. For this, introduction of a large scale computer system which is able to process a large volume of data comes to be required.

This Project, named as "Project for Construction of the Information Processing System for Poverty Eradication", is to establish the Information Processing Institute and to construct the information processing system that performs the management and evaluation of information for the efficient implementation of poverty eradication at Thammasat University under the control of National Economic and Social Development Board (NESDB). For smooth implementation of the Poverty Eradication Program, clear undertanding of rural poverty situation and efficient planning of effective development projects are indispensable. Fot this reason, the information processing system requires the functions as indicated below:

1. Managing (retrieving, updating, etc.) the information on rural poverty conditions.
2. Managing (retrieving, updating, etc.) the information on development projects proposed by the rural governments.
3. Examining the propriety of expenditure, period and others of each project.
4. Selecting out projects corresponding to budget allocation.
5. Monitoring the projects under implementation.
6. Evaluating quantitatively the effects and impacts of the executed projects.
7. Improving the method of planning and screening projects.

To strat up this Project, the Thai Government has already established the implementation organization of the Project. Also, collection of data, partial development of the system, and improvement of facilities for computer installation such as lifting of floor board, wiring of electric supply, installation of airconditioners, and so forth at the computer room and the local terminal room have been begun.

However, the technical level of computer handling in Thailand is not necessarily high enough to meet with the advanced techniques (such as online system construction) due to limited experience in computer utilization. Therefore, to materialize earlier this information processing system, some support is necessary in regard to a portion of the system development. Judging from the examinations on the degree of technical difficulty, development priority, preparation of data, possibility of technical transfer, and influencing effect of techniques, it was dicided that system development on the online retrieval and update of data base shall be supported by the Japanese side.

In the city of Bangkok where the Information Processing Institute is to be established in the campus of Thammasat University, the commercial power supply (220V, 50 Hz) suffers from instant shut-offs due to thunderbolts during a rainy season. Moreover, even under normal conditions, fluctuations in voltage and frequency of the commercial power supply are very drastic. Hence some devices to protect computer power units from such fluctuations are required.

As for the procurement of computer related articles and data storage media, there is no problem since there are service offices of computer manufacturers and companies in Bangkok.

Taking these conditions into considerations, basic design on the computer system was conducted in line with the following fundamental policy.

1. The method of system development which has already been adopted in Thailand shall be basically applied for.
2. The part that is positioned as the basic foundation of the total system shall be developed so that further development and expansion of the system may be done in future.
3. Expansibility, generality, and capability of the system, and effectiveness of information processing shall be considered based on the request and technical level of Thailand.

Especially, as for the software, consideration was given from the viewpoint of speedy processing, accuracy, complete remote processing function, and automated documentation, and regarding the hardware, as well, consideration was given to establishing an operating environment that completely satisfies the operation of software, and fitting with the preparation status for acceptance of hardware and the electricity-telecommunication situation in Thailand.

The contents of the basic design that is made on computer hardware, computer software, and related equipments for construction of this information processing system are shown as follows:

1. Computer Hardware
   CPU (4MB) 1 unit

Magnetic Disk Drive (200 MB/spindle)	5 drives
Magnetic Tape Drive (800 BPI/1600 BPI)	6 drives
Line Printer Unit (Print speed: at least 1000 lines/min)	2 units
Card Reader Unit (Reading speed: at least 600 cards/min)	1 unit
Floppy Disk I/O Device (Data transfer rate: at least 60 KB/sec)	1 unit
Local Terminal (2 floppy drives/terminal)	15 terminals
Remote Terminal (2 floppy drives/terminal)	8 terminals
Data Entry Device (Key to floppy)	15 units
Magnetic Disk Pack (200 MB/pack)	15 packs

2. Computer Software

Basic Software

Operating System and Language Processor	1 set
Application Program Package	1 set

(Mathematical and Statistical Library, Linear Programming, Time-series Analysis, Economic Forecast, Scheduling Simulation, Information Retrieval System, General Purpose Data Base Management System)

Online System Development	1 set

File Structure Conversion Subsystem
Online Retrieval Subsystem
Updating Data Base Subsystem
Peripheral Service Subsystem
File Management Subsystem
Terminal Service Subsystem

3. Related Articles

External Equipment

UPS (50 KVA, 1 CVCF, 1 Battery)	1 unit
Power Distribution Board	1 unit

Computer Consumption Articles

Mangetic Tape (Full, Standard, Mini)	650 reels

Floppy Disk (250 KB/sheet)	800 sheets
Line Printer Ribbon	24 ribbons
Serial Printer Ribbon	80 ribbons
Equipment for Efficient Information Processing	
Land Cruiser	1 vehicle
Audio Visual Equipments	1 set
Public Relation Equipments	1 set
Information Arrangement Equipments	1 set
Equipments for Conditioning Circumstances	1 set
Information Recording Media	1 set

The Project implementation to develop, establish, manage, and operate the Information Processing Institute is to be carried out by Thammasat University under the control of NESDB. This Institute processes data gotten from rural areas via related Ministries, and performs the works on aggregating data, printing out evaluation reports and so forth with making possible of data retrieval at the display stations in each related Ministries including NESDB.

Presently, the Committee on Planning and Development of the University Computer has been organized for the purpose of consolidation of the foundation and development of the Institute, and is supposed to remain until the operation organization is established in Thammasat University. And the works on planning of staff allocation, management and coordination of various activities, design of system programs, analysis and evaluation of data, and so forth are under taken. Later, the Institute Administrative Commitee is to be established in the University as an operation organization of the Institute, and administrative service (administration and accounting, computer utilization service, and education), computer operation (engineering and machine control), and system management and development are to be performed.

It is expected that this Project will greatly contribute to the development of Thailand, since it will bring clear understanding of the poverty conditions, monitoring of the projects under implementation and evaluating quantitatively the effects and impacts of the projects, and consequently, it promotes effective allocation of the national budget and prompt and objective policy making. On the other hand, although the local

situation requires partial technical cooperation, this Project has been proceeding with almost sufficient technical background and elaborate preparation. Therefore, the possibility of realization and the propriety of implementation of this Project are judged to be very high.

In addition to the above, benefits of this Project is immeasurable. That is, effective project implementation of the poverty eradication covering 50,000 villages, realization of fair economic allocation and establishment of rural living foundation, well-planned control of resources, systematization and unification of policies, promotion of information exchange and cooperation among Ministries, raising of research and education level on social science by the research and development of this system, promotion of plural administrative information control, and so on.

In order to utilize this system more effectively and more constructively, the following suggestions are made.

1. Inviting academic leaders on computer system and economic analysis.
2. Improving the method of data evaluation.
3. Promoting and enlightening system utilization.
4. Making data arrangement effective and simplifying it.
5. Avoiding duplication of system development.
6. Securing a sufficient budget for computer maintenance.
7. Promoting evolution to a general purpose data base management system.
8. Giving incentives for working in the Information Processing Institute.

1. INTRODUCTION

The Thai Government gives the highest priority to the Poverty Eradication Program in the Fifth National Economic and Social Development Plan (1982 - 1986), and intends to estabish the Information Processing Institute and construct the information processing system for its efficient implementation in Thammasat University under the control of National Economic and Social Development Board (NESDB). To this end, the Thai Government requested the Japanese Government to provide the Grant Aid Cooperation and the Technical Cooperation for the introduction of the computer hardware and software.

In response to the request, the Japanese Government dispatched the Contact Mission to Thailand during the period from May 12 to May 17, 1982 under the auspices of the Japan International Cooperation Agency (JICA), and studied and investigated the possibility and direction of Japanese cooperation through confirming their basic idea to this Program and the contents of the cooperation request to Japan.

Based on the conclusions and recommendations made by the Contact Mission, the Japanese Government then dispatched the Basic Design Survey Team, headed by Mr. Koichiro Okazaki, Head of System Development and Data Processing Division, General Affairs Department, JICA, to Thailand for the period from August 30 to October 8, 1982 under the auspices of JICA, with confirming a reasonable justification of the development of the information processing system for the Poverty Eradication Program —— the system for monitoring the rural poverty conditions and evaluating the executed projects ——(for the survey team members, see Annex 1, and for the survey schedule in Thailand, see Annex 3).

The Survey Team discussed the assignment and responsibility to both Thailand and Japan for implementation of this Project (named as, "Project for Construction of the Information Processing System for Poverty Eradication") with confirming the contents of this Project, the background of the cooperation request, and the organization set up for the cooperation, and also asking a understanding on the Japanese Grant Aid Cooperation through explaining its concept, system and

enforcement method. And also, the Survey team investigated the site condition for computer installation, the progress in the related infrastructure preparation, the computer technology level, and the progress state of this Project implementation, and collected materials for estimation of the total project cost and evaluation of this Project.

After investigation and discussion, both countries came to an agreement on the purpose and contents of this Project and the assignment to both countries. Basic items were summarized in the minutes and signatures were put by Mr. Kosit Panpiemras, Director of the Rural Development Cooperation Center, NESDB and the head of the Basic Design Survey Team (for the minutes, see Annex 2).

Also, the Japanese Government despatched the Final Draft Report Explanation Team to Thailand for the period from December 5 to December 11, 1982 under the auspices of JICA to discuss and confirm finally the contents of the Basic Design Study Report. After an agreement on them by both countries, signatures were put by Mr. Pairoj Suchinda, Director of Rural Development Project Planning Division, NESDB and the head of the Japanese team (see Annex 4 for the explanation team members, Annex 5 for the minutes, and Annex 6 for the explanation schedule).

This report is to summarize the background, purpose, contents, final basic design, implementation structure, total project cost, evaluation, and suggestions for efficient implementation of this Project, based on the discussion with the Thai side and the analysis on materials obtained from the survey in Thailand.

The list of members with whom the Japanese survey team met in Thailand is shown in Annex 7.

2. BACKGROUND OF THE PROJECT

The first Economic and Social Development Plan in Thailand was made in 1962 by the Government. For the last 20 years (1962-1981), four consecutive National Economic and Social Development Plans had been implemented. During the period, the Gross National Product, which is an major economic index, has increased by 13.6 times from 60 billion bahts in 1962 to 817 billion bahts in 1981. As the result, yearly income per person has increased by 8 times from 2,200 bahts to 17,200 bahts during the same period. Export has also increased by 16 times from 9.9 billion bahts to 163 billion bahts.

However, this rapid economic growth has, on the other hand, caused an expansion of income gaps among industries as well as between urban and rural areas (see Table 2-1-1 and 2-1-2). It also has brought many problems, such as concentration of population into the urban area, unemployment, inflation and so on, which have resulted in the disturbance of healthy economic and social growth of the nation. In particular, the income in rural areas mainly relied on agriculture remains at an extremely low level and consequently the income difference between the northeastern area of the country and Bangkok was six fold in 1979.

Table 2-1-1 Income in Principal Occupational Sectors, 1976

OCCUPATION	ANNUAL INCOME PER PERSON (Baht)	INDEX
Agriculture	7,113	1.00
Industry	45,215	6.36
Commerce	70,339	9.89
Services	32,665	4.59
Average of all occupations	7,732	1.09

Source: The 4th National Development Plan, 1977-1981

Table 2-1-2 Distribution of Income among Regions, 1960-1979

ITEM	(YEAR)	NORTH	NORTH EASH	SOUTH	CENTER	BANG-KOK	WHOLE COUNTRY
GRP at constant prices (%)	(1960)	15.8	17.0	14.1	29.3	23.8	100.0
	(1970)	15.2	16.0	12.8	27.5	28.5	100.0
	(1979)	14.9	14.7	11.8	31.2	27.4	100.0
Regional income per person, at 1979 prices (Baht)	(1960)	1,496	1,082	2,700	2,564	5,630	2,106
	(1970)	2,699	1,822	3,858	4,622	11,234	3,849
	(1979)	8,781	4,991	12,683	17,655	30,161	12,067

Source: NESDB Executive Office

Also, economic resources such as available land, water, fish, and forest have been developed wastefully and recklessly without proper attempts for preservation. Moreover, it is widely recognized that only a small portion of the nation has been benefited from the past economic development and progress. In other words, it can be said that benefit of the development was not distributed equally to most of the people in the nation. Consequently many are still under severe poverty conditions apart from the benefit.

According to the statistics compiled by the World Bank, the amount of the population living in poverty in Thailand, which accounted for 57% of the total population in 1962, showed a decline due to the successfull agricultural development projects and registered 39% in 1968 and 31% in 1975. However, despite these efforts, nearly one third of the total population still exists in a state of extreme poverty, and 90% of these people are domiciled in rural areas, that is the northeastern, northern and southern areas of the country.

Under such circumstances, the Thai Government gave the highest priority to the Poverty Eradication Program in its Fifth National Economic and Social Development Plan (1982 - 1986). The areas subject to the Program are those rural poverty zones in the northeastern, northern, and southern areas, covering 246 districts (of which 30 are branch-districts) in 37 out of 71 provinces.

The Povety Eradication Program includes a wide range of projects which intend to encourage needy people to participate in various activities for the economic

and social development, accompanied by promoting decentralization of social services in the field of agriculture, irrigation, medical treatment, education, and so on. In other words, the Program is one that encourages the people to resolve the rural problems not with one sided assistance from the Government but with efforts of sef-help and to enhance the role of themselves.

From the above, three main targets are set for the economic development in poverty areas. That is, offering by the Government to people in the areas an opportunity of education and vocational training, securing for them a healthy life, and completing necessary conditions to keep a standard of living to be considered reasonable in other areas. To these ends, projects for fishery, water supply, buffalo bank, hospital, basic health service, soil improvement, salt-damage removal and so forth are to be prepared.

Such poverty eradication in rural area is expected to contribute greatly to the improvement of important economic and social problems, to which Thailand is encountering, by not only raising the productivity and living standard in the area, but also promoting expansion of the economy by rise of agricultural productivity, expansion of the domestic consumption market by rise of income standard in the agricultural area, restraint of the population flow into Bangkok by increase of the employment absorptivity in the agricultural area, and so on.

Meanwhile, some efforts for poverty eradication had been made in the past, but it was not of any help to the people in the poverty area where they had been suffering from exhaustion of resources such as available land, water, forest and so on, and low productivity. The failure was attributable to ineffective policy which might be made on the basis of insufficient information regarding the actual status of rural area as well as improper management and evaluation of the development project. More specifically, duplication of plans, confusion of implementation agencies, too many establishment of inefficient development committees and so forth resulted in ineffective policy making. For this reason, some powerful tool is earnestly desired so that with it the current state of poverty in each area may be understood in detail, budget allocation, monitoring and evaluation of projects may be systematically done, projects of the governmental agencies may be reviewed and coordinated reflecting standpoint of each

agency, and planning of a future desirable development form may be efficiently supported.

In other words, it is indispensable for efficient implementation of the Poverty Eadication Program to develop a system for monitoring the rural poverty conditions and evaluating the executed projects. For this, introduction of a large-scale computer system which is able to process a large volume of data comes to be required.

3. ENVIRONMENT AROUND COMPUTERS IN THAILAND

3-1 Use of Computers and Level of Technology

General purpose computers are currently being used in Thailand in a limited scope involving large enterprises, universities, research institutes and banks, and these computers are of a small or medium size scale. This indicates that computer utilization in Thailand has not become popular yet. Therefore, it can be said that the technological level of general users is not necessarily high and consequently computer manufacturers must provide a considerable amount of support. Moreover, the number of computer related technicians is not large and capable technological force is being concentrated on computer related enterprises.

(1) Thammasat University (TU)

- Computer center : Information Processing Institute for Rural Development Control
- Computer system : none at present

The Information Processing Institute for Rural Development Control will become the nucleus of this Project, and the necessary preparation is currently in progress. The following personnel are participating in the Project at the university: twenty three members responsible for computer education, six in statistical analysis, and seven external consultants from banks, other universities, and governmental agencies. They have already started some of the work required for the development of the information processing system for the Project with the use of computers of other related organizations. Although those who are currently engaged in this development can use computer languages (FORTRAN, COBOL), they only have a little experience in the development of a data structure which is closely related to a system, and thus technical assistance seems to be necessary.

(2) Asia Institute of Technology (AIT)

- Computer center : Regional Computer Center (RCC)
- Computer system : IBM 3031

Main storage capacity	:	6MB
Magnetic disk unit	:	12 units (2940 MB)
Magnetic tape unit	:	6 untis
Line printer	:	2 units
Local terminal	:	about 50 units

The system of this center is one of the largest computer systems in Thailand. It is operated by a staff consisting of about thirty members. It is mainly used for educational and research purposes, and can provide twenty four hour services during busy periods.

The center has developed a considerable number of systems, and they can meet the requests, if any, for outside processing and consultation.

This center offers seminars regularly not only for educating general students on computer languages such as FORTRAN and COBOL, etc., but also for fostering computer technicians through its advanced lectures on software, engineering, and so on.

(3) King Mongkut's Institute of Technology (KMIT)

- Computer center : Computer Research and Service Center
- Computer system : ACOS 300E

Main storage capacity	:	1.7 MB
Magnetic disk unit	:	3 units (300 MB)
Magnetic tape unit	:	2 units
Terminal	:	10 units

This center is operated by a staff consisting of ten members. It is mainly used for education and research purposes, but also is used for other ends

which include processing of general clerical work and student records of the university. It also does processings requested from the outside.

This center has been receiving Japanese technicians since ten years ago as part of Japanese Technical Cooperation, and the activities of these technicians has been instrumental in the progress of the center. Since this center was founded as a telecommunication technical school, its hardware related technology is advanced and it is currently engaged in research concerning the Optical Card Reader (OCR) development for the Thai language. The problem it is now facing is that its experienced staff members have tended to quit their jobs and move to general enterprises or manufacturers. Thus it is difficult to secure employees with a rich technical background on a permanent basis.

(4) Bank of Thailand

- Computer center : EDP Department
- Computer system : UNIVAC 1110/10

Main storage capacity	:	524 KB
Magnetic disk unit	:	6 units (1110 MB)
Magnetic tape unit	:	4 untis
Printer	:	2 units
Terminal	:	20 units

The staff of the EDP Department of this bank consists of thirty members, of which nineteen are programmers, and eight are system analysts. They are technically highly capable and have been improving the operating system by themselves.

The majority of jobs are processed on a batch basis, and terminals are mainly used for program development. Some terminals are used for business, and full-scale online operation of its business is currently being planned. Due to the vital nature of this computer center, i.e., the EDP Department of the bank, and the unstable commercial power supply in Bangkok, the Uninterruptible Power Supply (UPS) was installed for the

computer thus guarding against fluctuations of voltage and frequency of the commercial power supply, as well as instant power failure and black-out. Insidentally, the manager of the computer installation related division of the EDP Department is also a consultant for the hardware systems related facility of the Information Processing Institute for Rural Development Control in Thammasat University.

3-2 Procurement of Fixtures and Articles of Consumption

As for computer related articles of consumption and recording media such as computer printing paper, magnetic tape, and floopy disks, there is no problem since there are branches of computer manufacturers as well as companies handling these items in Thailand.

3-3 Electlicity and Telecommunication

In the city of Bangkok, the commercial power supply (220V, 50 Hz) often suffers from instant shut-offs, particularly during a rainy season, due to thunderbolts, and so on. Moreover, even under normal conditions, fluctuations in voltage and particularly frequency of the commercial power supply are very drastic. Hence some devices to protect computer power units from such fluctuations are required.

The business of telephone and telegram in Thailand is operated by the following two public corporations.

(1) Communication Authority of Thailand (CAT)

This organization is engaged in postal service, international telephone and telegram, domestic telegram, and so on.

(2) Telephone Organization of Thailand (TOT)

TOT is engaged in domestic telephone services.

Both of the above public corporations are currently expanding and consolidating their facilities in order to meet increasing demands for telephone and telegram services.

Online utilization of computers has not been diffused to the public. Only banks and some enterprises are presently using computers on an online basis. For the online computer utilization, only private lines are used, and public lines are not being used because of their low quality. Moreover, the capacity of a private line is low, and the online utilization is based on the permission of the concerned authority. For the promotion of this Project, the Information Processing Institute of Thammasat University is applying for the utilization of lines, and is expecting to receive permission since this Project is a national undertaking. The lines used for this Project will be used with 2400 BPS, and Thammasat University already received an answer from TOT which permits line utilization with 2400 BPS.

3-4 Other General Matters

Private enterprises in Thailand are currently showing increasing interest in office computers and micro computers. The demand for computers is increasing. Nevertheless, general purpose computers have not been diffused. Under such circumstances, the demand for computer related technicians is increasing and capable technicians are being hired by computer related enterprises for a considerably high salary. On the other hand, this is a big problem for the settlement of technicians to a public agency in which the salary is not necessarily high.

4. CONTENTS OF THE PROJECT

4-1 Target and Contents

The target of this Project is to develop the information processing system which would support the efficient implementation of the Poverty Eradication Program. To achieve the target, the information processing functions shown in Table 4-1-1 are required. The Information Processing Institute which accomodates these functions will be established in the campus of Thammasat University under the control of the National Economic and Social Development Board (NESDB).

Table 4-1-1 Information Processing Functions Required for the Poverty Eradication Program

1.	Managing (retrieving, updating, etc.) the information on rural poverty conditions.
2.	Managing (retrieving, updating, etc.) the information on projects proposed by the rural governments.
3.	Examining the propriety of each project, through refering to the information on the contents and budget of the project and the condition of the project's target area.
4.	Selecting out projects through judgement from the propriety of each one.
5.	Monitoring the degree of achievements and expenses of the projects under implementation.
6.	Evaluating quantitatively the effects and impacts of the executed projects through the time-series information on the poverty condition of the project's target area.
7.	Improving the method of planning and screening projects for the next implementation, based on the information on the effects and impacts of the executed projects.

4-2 Direction of the Project

(1) Structure of Information Processing

1) Structure of the Information Processing System

The information processing system which satisfies the target and contents of the Project can be roughly divided into two levels. The first level is the Data Base Management System which performs efficient management of information (creating, reporting, updating, and retrieving of the Data Base). It also has the function of expressing information managed in the data base in a systematic form. The second level is the Development Project Evaluation System which is used to conduct various evaluations and analysis of the information managed in the data base (Table 4-2-1). This system may be considered as an application with regard to the utilization of the data base created at the first level.

The Data Base Management System manages rural information and information of development projects. The rural information contains data regarding the economic and social situation of each rural area that includes the detailed information at the village level and the summarized information at the levels of district and province. The information of development projects consists of three types of data. The first type is the data which includes place, expenses, period and so forth of each development project proposed from a rural area. The second is the data describing the progress of projects which are under way. The third is the standard data such as the expenses, period, and so on for each type of development project. This system also provides basic information which can be utilized by local policy-makers during their decision-making process in both summarized and sorted forms. In addition, it can perform verification of data and establish relations between development projects and rural conditions and create various fixed form reports. These functions of the Data Base Management System will be expanded at any time the necessity arises.

The Development Project Evaluation System consists of the following three functions. The first function is to perform evaluations regarding the progress and management of a development project. The second function is to perform evaluation of the direct economic effects of a development project. The third function is to perform impact evaluations of a project. This third function evaluates the impact of a development project by means of a measurement of the poverty indicator before and after the project. The poverty indicator indicates the degree of poverty of a rural area based on its economic and social situation.

Table 4-2-1 Structure of the Information Processing System for the Poverty Eradication Program

SYSTEM	SUBSYSTEM	FUNCTIONS
Data Base Management System	Creating Data Base Subsystem	Constructing data base for the information of the rural economic and social conditions, the proposed projects, the situations of the projects under execution, and the standard contents of each project type, and managing these data effectively.
	Reporting Data Base Subsystem	
	Updating Data Base Subsystem	
	Retrieving Data Base Subsystem	
Development Project Evaluation System	Ongoing Evaluation or Monitoring Subsystem	Monitoring the degree of achievements and expenses of the ongoing projects through comparison with the standard budget and the allied projects.
	Effect Evaluation Subsystem	Measuring the economic direct effects of projects.
	Impact Evaluation Subsystem	Measuring the impacts through formulating the poverty indicator of each project's target area.

2) Structure of Data

The data required to satisfy the target and contents of the Project can be roughly divided into 2 groups. One is the information describing rural economic and social situations and the other is the

information concerning development projects (Table 4-2-2, and Appendix for details).

The rural information takes 3 forms. The first is the list of poverty stricken villages, indicating rural areas which are to be considered for the Poverty Eradication Program. The second is the summaries at the district and province levels indicating various economic and social situations. The third is the detailed information at the village level concerning the economic and social situation. This information provides important data for the selection and evaluation of projects.

There are 3 types of information concerned with projects. The first is the information concerned with projects which were proposed from rural areas. The second is the information indicating the state of progress of each project which is under way. The third is the standard information organized by project types in terms of expenses, period, and other items. This information is created after categorizing projects into different types.

The first type of information of proposed projects covers in six different formats. The first and the second are the information of proposed projects including their names, expenses, places, and periods at the district and province levels respectively. The third indicates whether or not each proposed project has been approved. The forth shows the contents of projects which have been approved. The fifth describes the implementation policy of approved projects. The sixth illustrates changes in project sites.

The information processing system conducts various processings and analysis based on these data. The data at first (FY1983) contain information concerning 26,000 projects covering 13,000 villages, but at the final stage (FY1986) it is supposed to contain information on 100,000 projects covering 50,000 villages.

Table 4-2-2 Structure of Data

INFORMATION CATHEGORY		PROCESS-SING	FORM	FORM NAME	DATA ITEM	DATA VOLUME	FRE-QUENCY
Economic and social information of rural area		processing	NRD.2A	List by Rank of Poverty Density in Village	poverty rank, village name, district name, . . .	50,000 villages x 80 chrs. = 4,000 KB	February once a year.
		processing	NRD.2B	Data for Estimation of Poverty Density in District	population, income, production, . . .	246 districts x 200 chrs. = 50 KB	
		processing	NRD.2C	Questionnaire for Poverty Density in Village	resource, public service, infrastructure, . . .	50,000 villages x 2,160 chrs. = 108,000 KB	
Information of development project	Information of proposed project	un-processing	NRD.2	Development Account of District	project name, target area, period of time, budget, disappraisal reason, changed target area, . . .	100,000 projects x 2,000 chrs. = 200,000 KB	3 weeks for proposal in January. 6 months for appraisal after that. Once a year.
		processing	NRD.3	Development Account of Province			
		processing	NRD.4	Appraisal Results of Development Plan			
		processing	NRD.5	Operation Plan of Development			
		un-processing	NRD.6	Policy Framework and Approach of Development			
		processing	NRD.7	Change of Target Area of Development			
	Information of activity results of project	processing	D.314	Acitivity Results of Development	expenses, amount of implementaion, . . .	100,000 projects x 2,800 chrs. = 280,000 KB	3 times a year.
	Standard infromation of each project type	processing	unspecified	Standard Information of Each Project Type	standard budget, standard period of time, . . .	100 types x 700 chrs. = 70 KB	Once a year.

Note (1) NRD.2 and NRD.6 are manual documentations.

(2) For details of each data, see Appendix.

(3) chrs. = characters

(2) Administrative Management Structure and Data Collection Flow

1) Administrative Management Structure

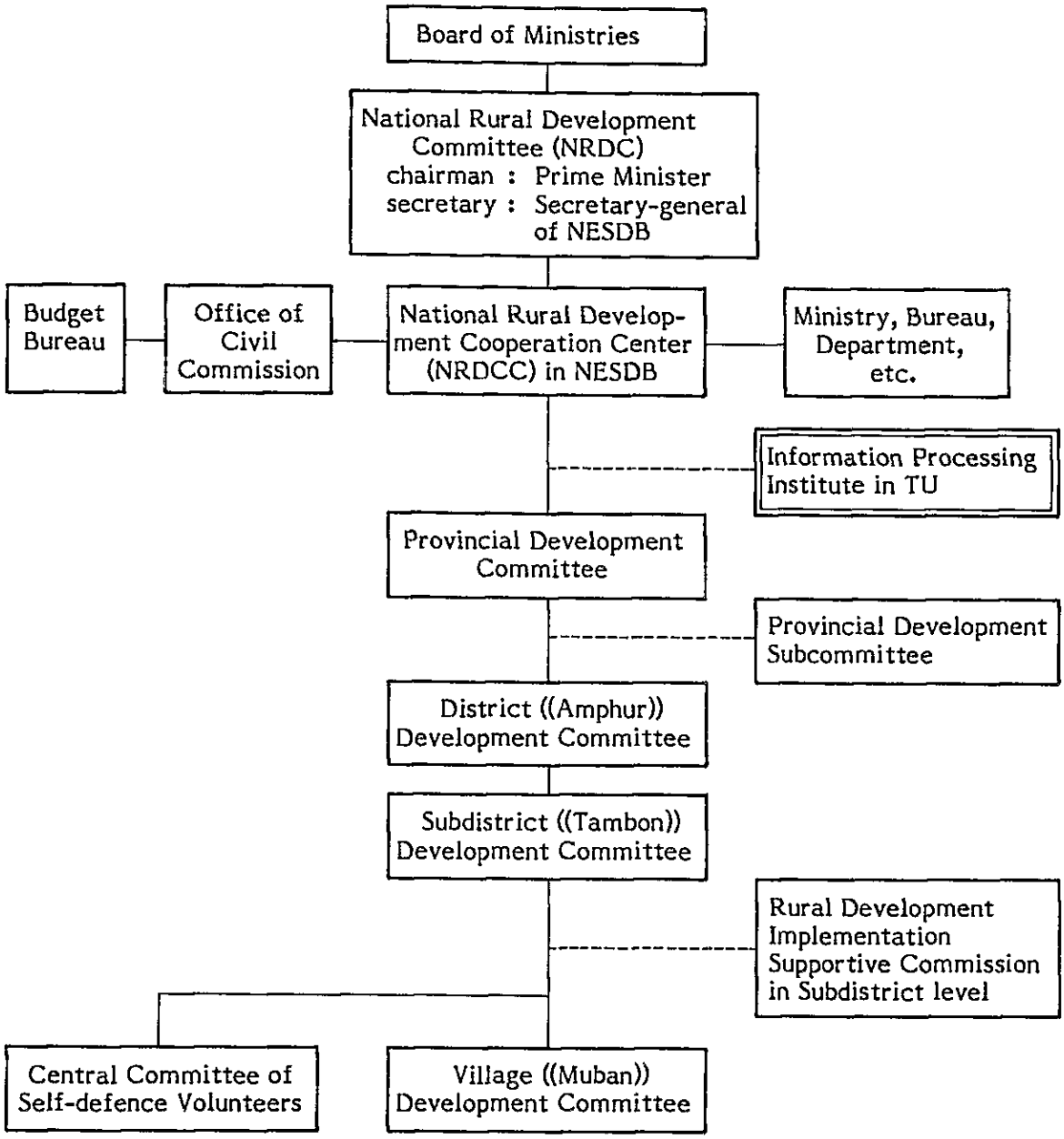
The project on establishing the Information Processing Institute and developing the information processing system was proposed by Thammasat University for the purpose of supporting the national development plan. This project is to be implemented under the administrative management structure from a new standpoint regarding rural development. It was approved by the organization under the direct control of the Prime Minister on January 25, 1981 (Figure 4-2-1).

The National Rural Development Committee (NRDC), with the Prime Minister as its Chairman and the Director of the National Economic and Social Development Board (NESDB) as one of its members and the secretary, studies problems presented at the national board. The National Rural Development Cooperation Center (NRDCC) will be established as a supporting organization of the NRDC under the supervision of NESDB. For the purpose of implementing the Program, the Development Committee will be established in every province and district, and similarly the Village Development Committee and the Central Committee of Self-devense Volunteers will be established in every subdistrict. In addition, a working group consisting of subdistrict officials will also be organized to support the Subdistrict Development Committee. Under this structure, the Information Processing Institute will support the undertakings of the NRDCC within the scope of the information processing system.

Within this structure, information flows in the following manner (Figure 4-2-2). The NRDCC prepares the standard survey form in order to obtain necessary information from each rural area. The officials of the Community Development Department in districts and subdistricts collect the information and send it to the Community Development Head Office. From here, the rural information is sent to the Information Processing Institute. The Institute then processes

the information it has received and periodically provides processed data to the NRDCC as well as upon request. The processed data is then sent to NRDC to be used as basic information for policy-making, replanning, and adjustment for ongoing projects. In addition, the NRDCC verifies the accuracy of information which the NRDCC acquired through its own surveys conducted in rural areas. After verification, the information is sent to the Information Processing Institute, and then transmitted to and displayed on the display stations of the NRDCC and the Community Development Head Office in related Ministries and Budget Bureau.

Figure 4-2-1 Structure of National Administration for the Poverty Eradication Program

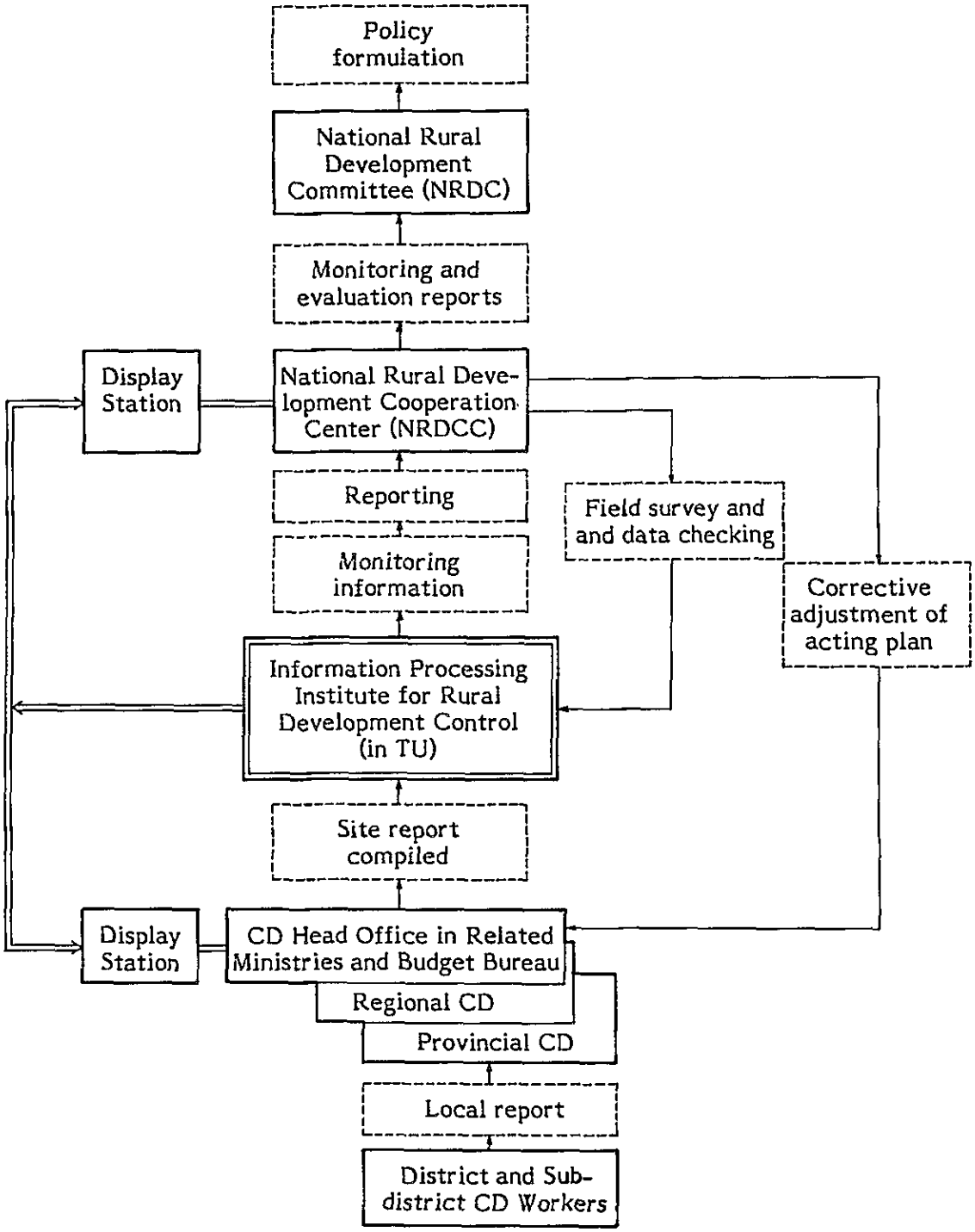


Note (1) (( )) shows Thai name.

(2) NESDB = National Economic and Social Development Board
TU = Thammsat Universtiy

(3) Source : Project Documentation (by TU)

Figure 4-2-2 Macro Information Flow for the Poverty Eradication Program



Note (1) ⟵ : Information flow
⟸ : Information retrieval flow through terminal
CD = Community Development
TU = Thammasat University

(2) Source : Project Documentation (by TU)

2) Data Collection Flow

The survey forms concerning the data collection of rural information (NRD. 2A, 2B, and 2C) and project information (NRD. 2, 3, 4, 5, 6, 7, and D. 314) have been designed by the National Rural Development Cooperation Center (NRDCC). The data collection flow for the two types of information are shown in Figure 4-2-3 and 4-2-4.

For the collection of the rural information at the village level, officials of the subdistrict who have received training are dispatched to obtain data on the survey questionnaire form (NRD. 2C). The data is then checked and compiled at the subdistrict, district, and province levels and sent to the Information Processing Institute in Thammasat University via the Community Development Department. At the district level various types of macro-statistical data concerning the economic and social situation are prepared, and the data in a compiled form (NRD. 2B) is also sent to the Institute in the same procedure as the village level data. At the province level, an overall understanding of the poverty conditions in rural areas is obtained based on the above-mentioned district and village level data, and the list (NRD. 2A) of 50 villages which have been determined to have the top 50 priorities for the Povety Eradication Program is created. This list is also sent to the Institute (Figure 4-2-3).

Among project information, that concerned with the proposed projects are compiled at the province level (NRD. 3) and will be used as original data to be processed by the computer. The project information is compiled once at the district level (NRD. 2) based on project proposed from villages and subdistricts, and then compiled again at the province level (NRD. 3) based on the NRD. 2 information. The collection of proposed projects compiled at the province level are sent to the related governmental agencies via the NRDCC, and these agencies determine which projects are to be approved after a careful study of each (NRD. 4). Each province is notified of the decisions. If any modification of project's target area is to be made,

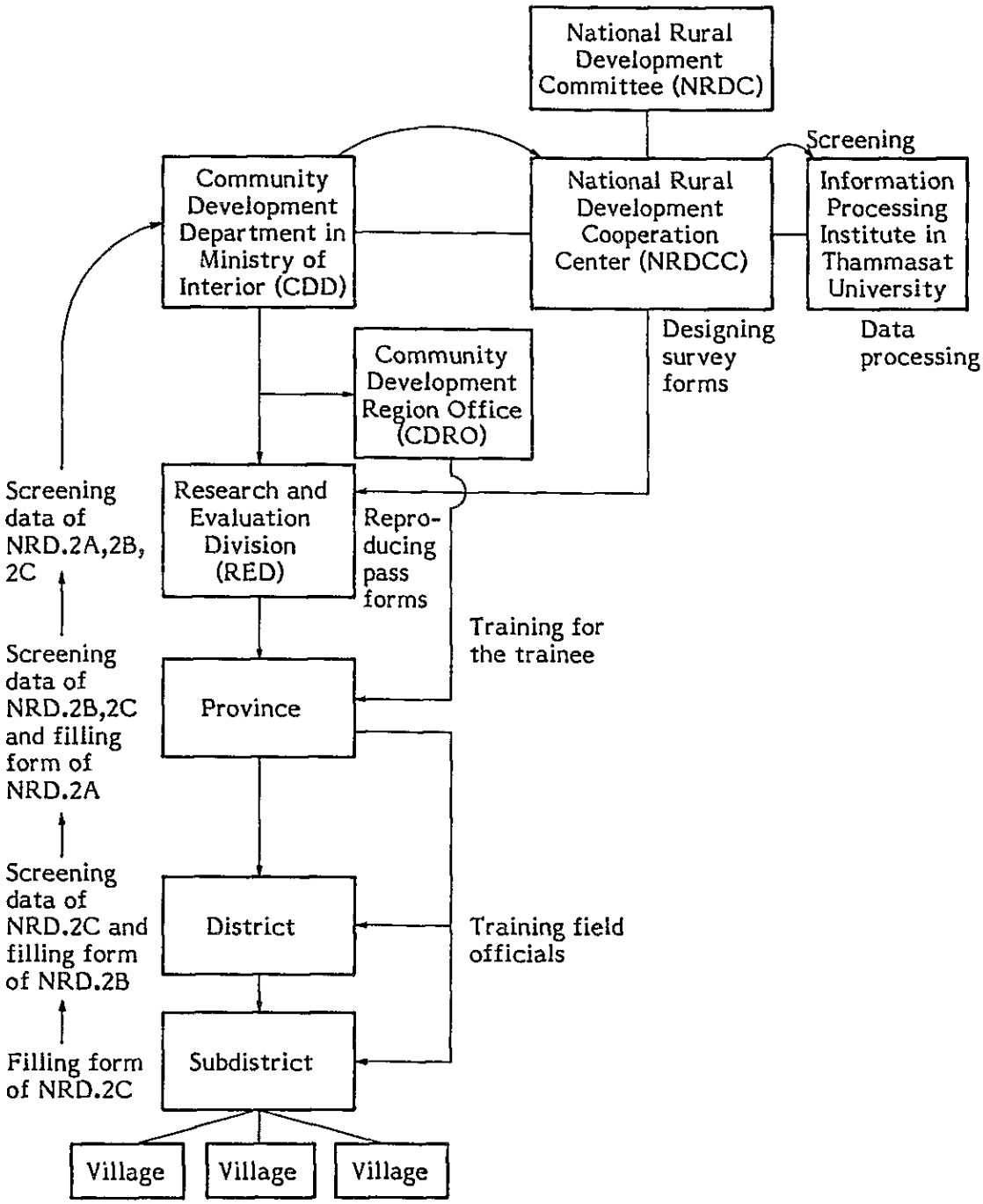
the proposed modification is submitted in a certain form (NRD. 7) to the NRDCC to obtain its approval. On the other hand, the decisions concerned with the approval or disapproval of projects (NRD. 4) are sent to the Budget Bureau and financing steps are taken there. When the NRDCC recieves a notice (NRD. 7) concerning the modification of project's target area from a province, it sends the notice to the related governmental agency. Then, the agency studies the modification and make a final decision on the project (NRD. 5). At this same time, through not related to computer processing, the implementation guidelines of the projects (NRD. 6) are prepared and then sent to corresponding provinces. The final decisions on projects (NRD. 5) are sent to the Budget Bureau to get final financing.

As for ongoing projects, the information (D. 314) is collected periodically from project sites by the Budget Bureau for the purpose of progress evaluation and control.

The standard management information by project type is prepared by the NRDCC once a year to be used as a guideline for approval, selection, and comparison of projects which is carried out based on the results of the previous year.

Based on the above-mentioned data flow, the Data Base Management System manages the basic data and the Project Evaluation System supports the decision-making processes.

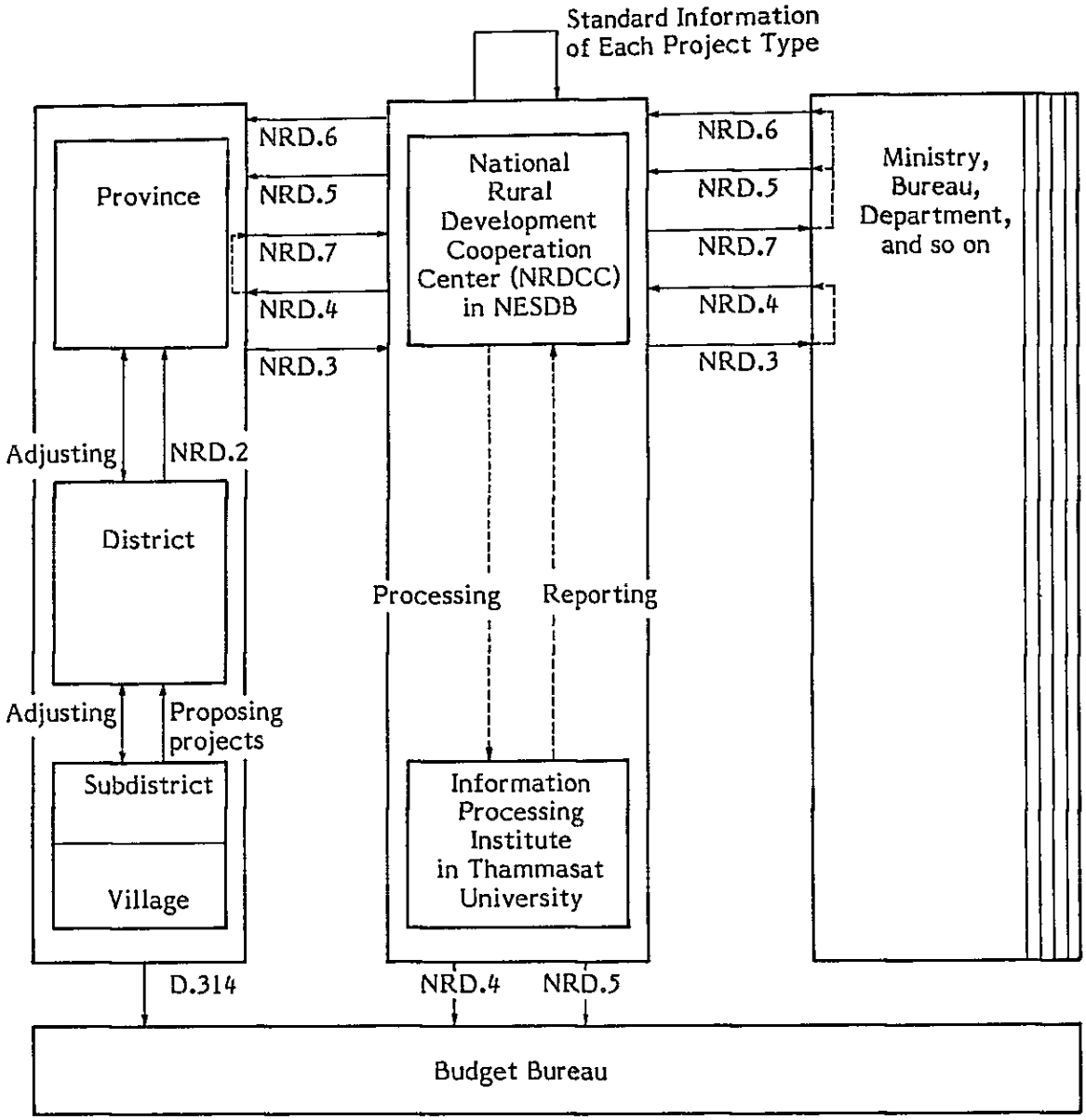
Figure 4-2-3 Flow of Data for Rural Information



Note (1) NRD.2A : List by Rank of Poverty Desnity in Village
NRD.2B : Data for Estimation of Poverty Desnity in District
NRD.2C : Questionnaire for Poverty Density in Village

(2) Source : Thammasat University

Figure 4-2-4 Flow of Data for Project Information



Note (1) NESDB = National Economic and Social Development Board

(2) NRD.2 : Development Account of District
NRD.3 : Development Account of Province
NRD.4 : Appraisal Results of Development Plan
NRD.5 : Operation Plan of Development
NRD.6 : Policy Framework and Approach of Development
NRD.7 : Change of Target Area of Development
D.314 : Activity Results of Development

(3) Soruce : Thammasat University

(3) Progress State of the Information Processing System

1) Progress in Data Collection

Table 4-2-3 shows the progress state of data collection for each type of data described earlier (Refer to Table 4-2-2). Input of the information of proposed projects has almost been completed and these data are being at the level which their systematization is capable. However, the input of other types of data has been taking somewhat more time. This is particularly true with regard to the detailed rural information (NRD. 2B and 2C), in which, although the data has already been collected, the study concerning the data form for computer input is still unfinished since the number of data items is quite large.

As for the information concerning project progress states, and the standard project information by project type, data collection has not even yet been started.

Table 4-2-3 Progress in Data Preparation (September, 1982)

FORM	FORM NAME	PROGRESS OF PREPARATION
NRD.2A	List by Rank of Poverty Density in Village	Data of 13,000 villages are already stored in magnetic tapes.
NRD.2B	Data for Estimation of Poverty Density in District	Answer forms of 246 districts during period from January to April, 1982 are collectd in IPI. Data coding form is under studying.
NRD.2C	Questionnaire for Poverty Density in Village	Answer forms of 13,000 villages during peirod from January to April, 1982 are collected in IPI. Data coding form is under studying.
NRD.2	Development Account of District	Data are not processed on computer. These are collected in each provinces as manual documentations.
NRD.3	Development Account of Province	Data for 1983 fiscal year are collected in IPI. These are not stored in magnetic tapes at only this time.
NRD.4	Appraisal Results of Development Plan	Data input will be finished by the last of September, 1982. Data are coded with NRD.3, due to the insufficient capability of computer utilization in 1982.
NRD.5	Operation Plan of Development	Data input will be finished by the last of October, 1982.
NRD.6	Policy Framework and Approach of Development	Data are not processed on computer. These are under preparation as manual documentations.
NRD.7	Change of Target Area of Development	Data input will be finished by the last of October, 1982.
D.314	Activity Results Area of Development	Data collection will start from October, 1982.
-	Standard Information of Each Project Type	Data are collected in Budget Bureau. Data coding form is under studying.

Note (1) IPI = Information Processing Institute in Thammasat University

(2) Source : Thammasat University

2) Progress in Software System Development

Table 4-2-4 shows the progress state of the development of each system. The staff members responsible for the system development for the project are currently doing partial data processing with the use of computers of other public organization and private computer centers. For this reason, they are being forced to use system specifications slightly different from what they had intended, because they cannot use computers as much as they expected.

Table 4-2-4 Progress in Software System Development (September, 1982)

SYSTEM	SUBSYSTEM	PROGRESS OF DEVELOPMENT
Data Base Management System	Creating Data Base Subsystem	Programs for storing data of NRD.3, 4, and 2A into magnetic tapes already exist. (Batch system)
	Reporting Data Base Subsystem	Two programs for reporting data of NRD.3, 4, and 2A will be completed by the last of October, 1982. (Batch system)
	Updating Data Base Subsystem	Programs for updating data on magnetic tapes will be completed by the last of October, 1982. (Batch system)
	Retrieving Data Base Subsystem	Programs are not developed now.
Project Evaluation System	Ongoing Evaluation or Monitoring Subsystem	System flow exists. Programs will be developed in six months after the computer installation.
	Effect Evaluation Subsystem	Same as above.
	Impact Evaluation Subsystem	Same as above.

Soruce: Thammasat University

3) Progress in Consolidation Relating to the Hardware Systesm

a) Computer Room (4th floor of Multipurpose Building in Thammasat University) (Figure 4-2-5)

1 Space of Computer Room

The space of the computer room depends on the computer system configuration. 50 - 60 m^2 will be required for the computer system for this Project. Though Thammasat University had already prepared a room of 50 m^2 for the computer system, presently works for room extension to 70 m^2 is under way and is scheduled to be completed by January, 1983.

2 Floor Height of Computer Room and Free Access Floor

The floor of the computer room shall be of a floor lifting structure with free access floor for wiring of the electric supply and signal cables. Generally, the floor height shall be more than 30 cm and the strength of the free access floor shall be more than 1,000 kg by final load. Presently, the floor height is 40 cm and the strength of the planned free access floor is 1,200 kg by final load, which satisfy the requirement.

b) Airconditioning Facilities for Computer Room

The cooling capacity of the computer room is decided depending on the computer system configuration. Generally, computer room shall be kept at $15^{o}C$ - $30^{o}C$ for operation of the computer. Thammasat University has already installed two airconditioners of 180,000 BTU/h (360,000 BTU/h in total). 200,000 BTU/h -230,000 BTU/h is required for the computer system for this Project, and the existing facilities satisfy the requirement.

c) Electric Power Source for Computer

For the purpose of stable operation of the computer, a good quality power source is required. Generally, allowance for

fluctuation of voltage is less than ± 10% for rated voltage and less than ± 1% for frequency. In case of sudden fluctuation of voltage or frequency, it is feared that the computer may malfunction. Therefore, Devices are required, which protect the computer from fluctuation of voltage and frequency of commercial power supply and intermitted power cut by thunderbolts and so forth especially during the rainy season in Thailand.

d) Local Terminal Room and Data Input Room (2nd floor of Multipurpose Building in Thammasat University) (Figure 4-2-6)

Works for these rooms started in December, 1982 and are to finish in March, 1983 (at present, works are one month behind schedule).

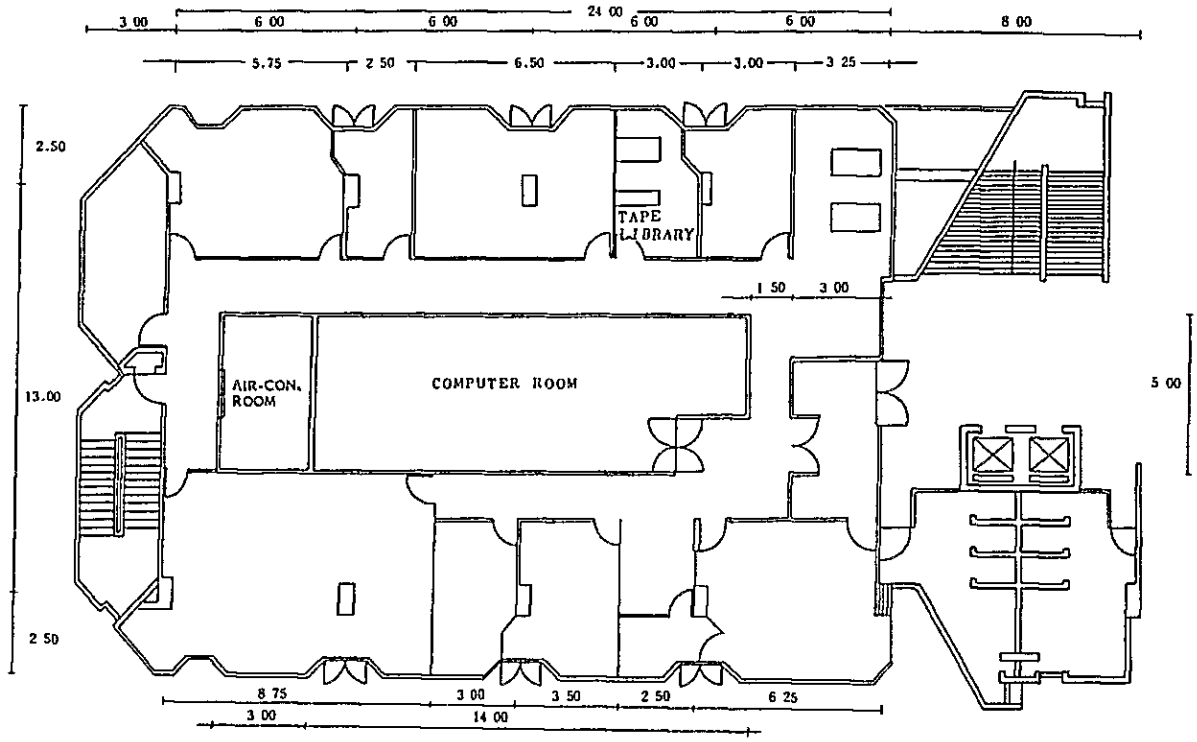
e) Carrying-in Way of Equipment

The computer room is located on the 4th floor of Multipurpose Building in Thammasat University. The way of carrying equipment into the computer room is either by an elevator, a window or stairs. The window cannot be utilized because every window has a pillar at a distance of 1.3m inside it. The width of the elevator entrance is 0.8m, the depth is 1.5m and the loading capacity is 650 kg, and therefore, it is feared that the elevator cannot be utilized for a large equipment such as a computer. After all, it will be necessary to seek a carrying-in method by manpower with utilization of the stairs.

f) Telecommunication Facilities

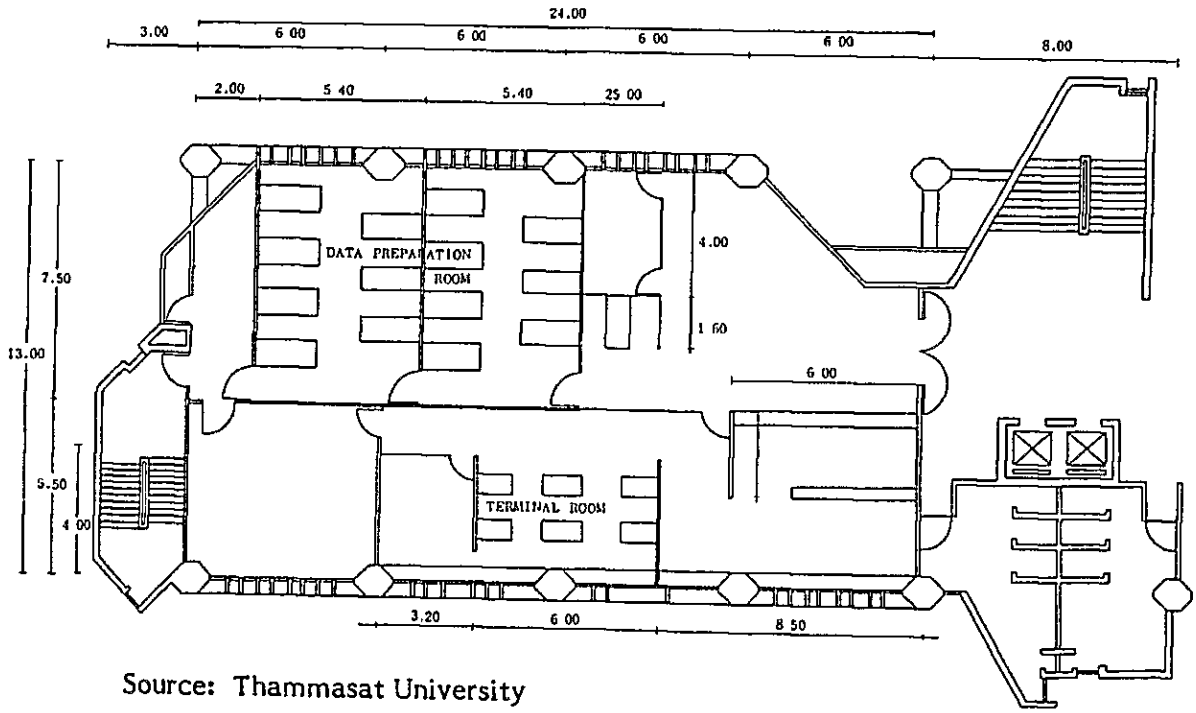
A Main Distributing Frame (MDF) for the circuit for remote terminals is to be installed separately from the existing MDF for the telephone circuit. This aims to make an inspection of the circuit for remote terminals easy and avoid confusion with the telephone circuit. The work is performed by the Thai side based on the Thai standard.

Figure 4-2-5 4th Floor Plan of the Information Processing Institute



Source : Thammasat University

Figure 4-2-6 2nd Floor Plan of the Information Processing Institute



Source: Thammasat University

4-3 Basic Design

The basic design is made according to the following steps:

1. Design on the software system.

2. Design on the basic softwares (that is, operating system, langauge processor, and general purpose application) that enable to construct and operate the whole software system.

3. Design on the hardware system required for the operation of the software system.

4. Design on another instruments required for effective implementation of the Poverty Eradication Program from collecting data to storing the processed data.

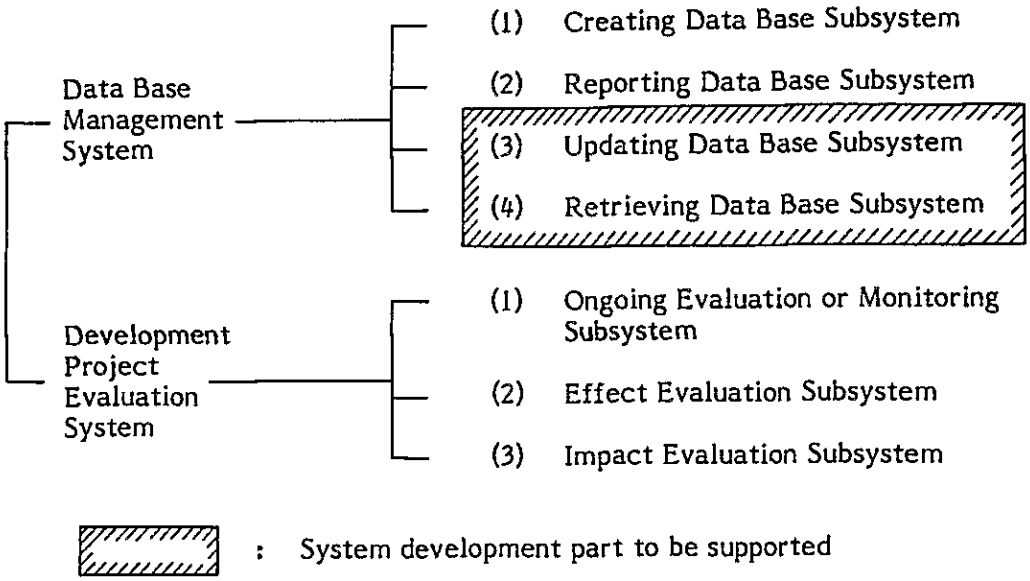
(1) Basic Policy

The informatin processing system for the Poverty Eradication Program is an extrmely large system. As mentioned earlier, a part of system is already under construction in Thailand. However, because of not necessarily enough studies on the data specifications and system procedures required for the construction of the system and also limited experience of system development, some parts of the system are difficult to develop early. Hence some support for a portion of the system development is required for starting an operation of the system and achieving effects in the period of implementation of the Poverty Eradication Program.

For the determination of the part of the system development cooperation, the technical difficulties, the development priority of the system, the progress state in data preparation and the influencing effect of techniques have to be considered. That is, to be a part that high techniques of system development is required, that gives large problem if the part is not developed early, that data are well prepared, that is expected to apply the techniques easily to another part, and so on. As a result of these exami-

nations, it is judged the most appropriate to support the development of the part indicated in Figure 4-3-1.

Figure 4-3-1 System Development Part to Be Supported



The selected part is used for screening the proposed projects by online, and is a basic part of the system. These systems requires higher technique than the others for realizing online system. On the other hand, this part of data is prepared enough. And the online processing is also required for the construction of the Development Project Evaluation System. Hence this part is the best in applying the know-how to others.

To considerate in the basic design is as follows.

- The method of system development which has already been adopted in Thailand shall be basically applied for.
- It is necessary to develop and expand from the high-priority part of the system step by step, because this system is very large and meanwhile, all the study on its systematization is not completely finished. The systems developed by Japan shall be considered to comprise the basic foundation of the total system.

- Based on the requests and the technical level of Thailand the most appropriate specifications shall be designed upon consideration of expansibility, generality, and capability of the sytem, and effectiveness of the information processing.

The Outline of the systems developed by Japan is shown below.

1) Systems

The Retrieving Data Base and the Updating Data Base Subsystem for the data of NRD.3, NRD.4, NRD.5, and NRD.7 have been developed based on the data files and programs prepared by Thailand.

2) Data to be processed

- NRD.3
- NRD.4
- NRD.5
- NRD.7
- Other data tables and files required for the system development

3) Subsystems to be developed

The subsystems to be developed by Japan are basically those indicated by the shaded area in Figure 4-3-1. In order to operate this part smoothly as a software system, the following subsystems by each function are also required.

- File Structure Conversion Subsystem
- Online Retrieval Subsystem
- Updating Data Base Subsystem
- Peripheral Service Subsystem
- File Management Subsystem
- Terminal Service Subsystem

(2) Overall Outline

Up to the previous section, from a macro viewpoint the overall structure of the systems and data was explained, focussing on the flow of data among organizations so as to improve the total understanding of the information processing system for poverty eradication.

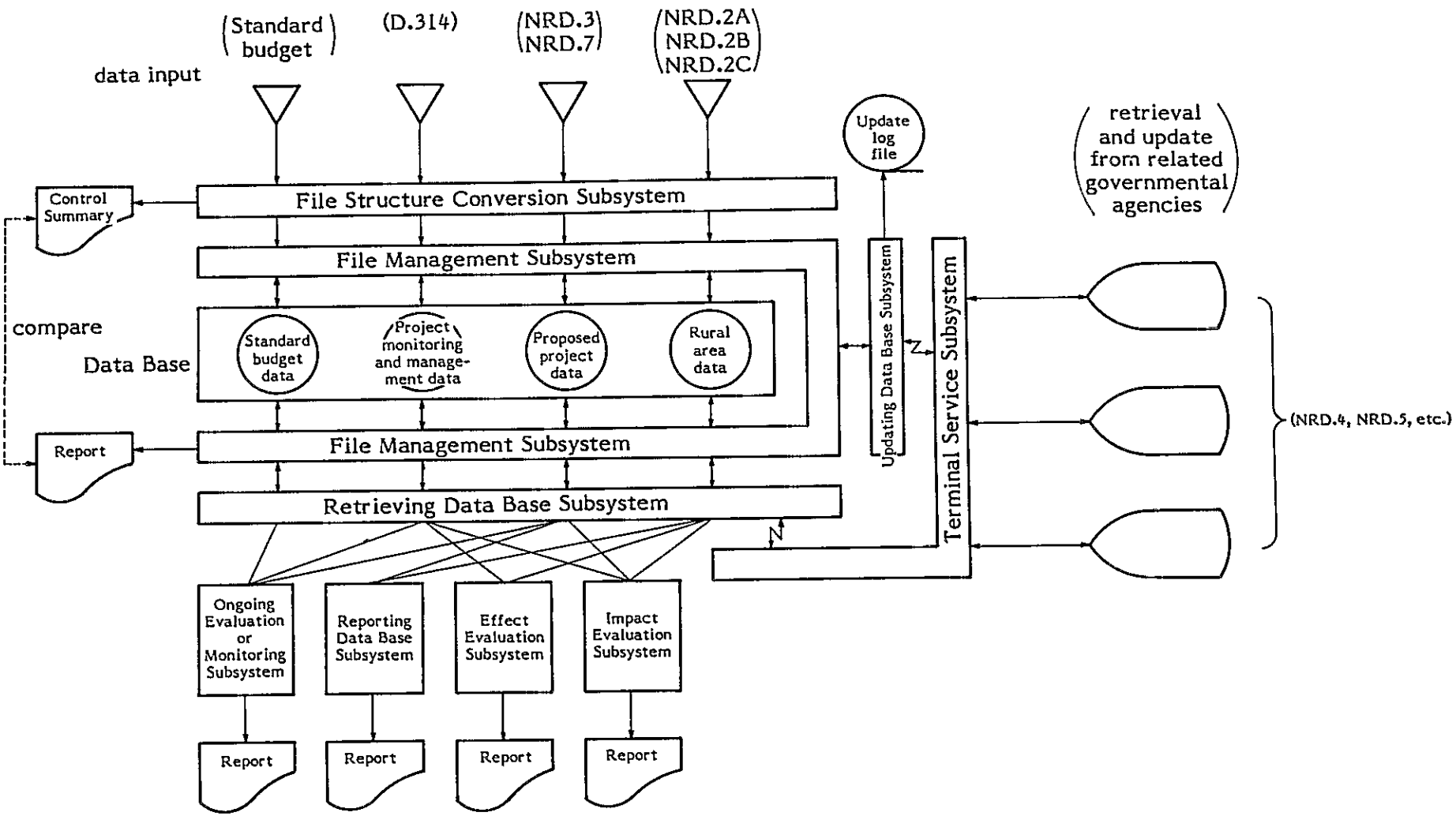
This section will clarify the detailed specifications of the total system, focussing on the relationship between the software systems and data and will indicate where the systems to be developed by Japan stand in the total system.

Table 4-3-1 shows the relationship between the subsystems and data, and Figure 4-3-2 shows the conceptual chart of the total system.

Table 4-3-1 Relationship Between the Subsystems and Data

SUBSYSTEM	FUNCTIONS	DATA SOURCE
(1) Creating Data Base Subsystem	- Constructing the Data base for the proposed project information - Checking the accuracy of the information. - Sorting and merging the information.	- The detailed information of proposed projects (NRD.3) - Village names (NRD.2A) - The detailed information of district and vilage conditions (NRD.2B and NRD.2C)
(2) Reporting Data Base Subsystem	- Making 2 reports on the project information used in related ministries and rural governments.	- The data base made in (1) (chiefly from NRD.3)
(3) Updating Data Base Subsystem	- Updating the approved or disapproved stages of proposed projects. - Inserting comments corresponding to the stage into the data base.	- The proposed project information and its screening stage (according to the form of NRD.4 and NRD.5)
(4) Retrieving Data Base Subsystem	- Retrieving the contents of the proposed projects by online.	- The data base made in (1) and (3).
(5) Ongoing Evaluation or Monitoring Subsystem	- Comparing and checking the each project budget with the standard budget of each project type. - Monitoring the progress state of the each project under execution. - Comparing and evaluating the achievements and expenses of the each project with the standard budget.	- The standard budget by project type - The approved annual budget (NRD.5) - The progress states of the projects under execution (D.314)
(6) Effect Evaluation Subsystem	- Evaluating the direct effects right after a project completion.	- The implementation states of projects (D.314) - The approved project information (NRD.5) - The detailed district information (NRD.2B)
(7) Impact Evaluation Subsystem	- Evaluating the project impacts at the last of fiscal year, by formulating the poverty indicator from the detailed district and village information.	- The data base made in (1) (chiefly from NRD.2B and NRD.2C)

Figure 4-3-2 Conceptual Chart of the Total System



(3) Software System

The basic design of the systems which will be prepared by Japan are described below.

1) Outline

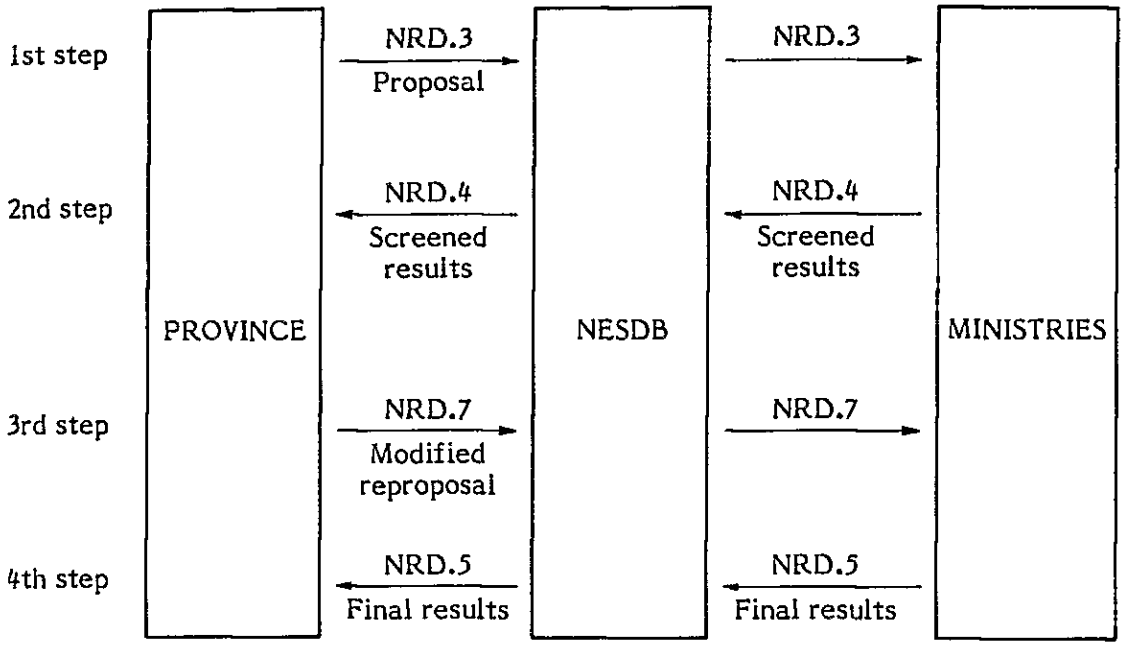
The system which is developed by Japan (hereinafter refers to as "this system") fulfils the function of promoting smooth and prompt reception, screening, and processing of projects submitted by each province.

The projects proposed from rural areas in a province are adjusted in the province and then presented to the central government in the form of NRD.3. The process, from the proposal to approval of a project, is illustrated in Figure 4-3-3.

As can be seen in the figure, the principal data handled by this system are NRD.3, NRD.4, NRD.5, and NRD.7, and this system functions consist of online retrieval and updating data base, and the auxiliary functions which allow for smooth operation of the aforementioned processes.

This system is operated through the remote terminals in the related governmental agencies, which are connected to the Information Processing Institute in Thammasat University.

Figure 4-3-3 Screening Process for Proposed Project



2) Direction of the Basic Design

a) Basic Functions

The basic functions which this system aims to fulfil are as folows:

1 Gain an understanding of project registration states.
2 Grasp the screening stage of a project.
3 See the contents of a project at a terminal.
4 Know whether a project has been approved or not.
5 Change the screening stage of a project, that includes its approval or disapproval result.
6 Add comments to its information which have become necessary due to the progress of the screening stage of a project.
7 Output information required for monitoring and management of a proposed project.

b) Basic Design Policy

1 Prompt processing

Proposed projects through the related governmental agencies should be processed promptly.

2 Accurate processing

In order to process the enormous quantity of proposed projects without delay, a proposed project should not be left unprocessed or undetermined in the middle of its total processing.

3 Support to remote processing

Since the processing of proposed projects is carried out at a number of governmental agencies, the time and labor required to transmit people and documents should be reduced.

4 Partial automation of making documentations

Documents which can be produced from the information stored in the computer will be prepared automatically.

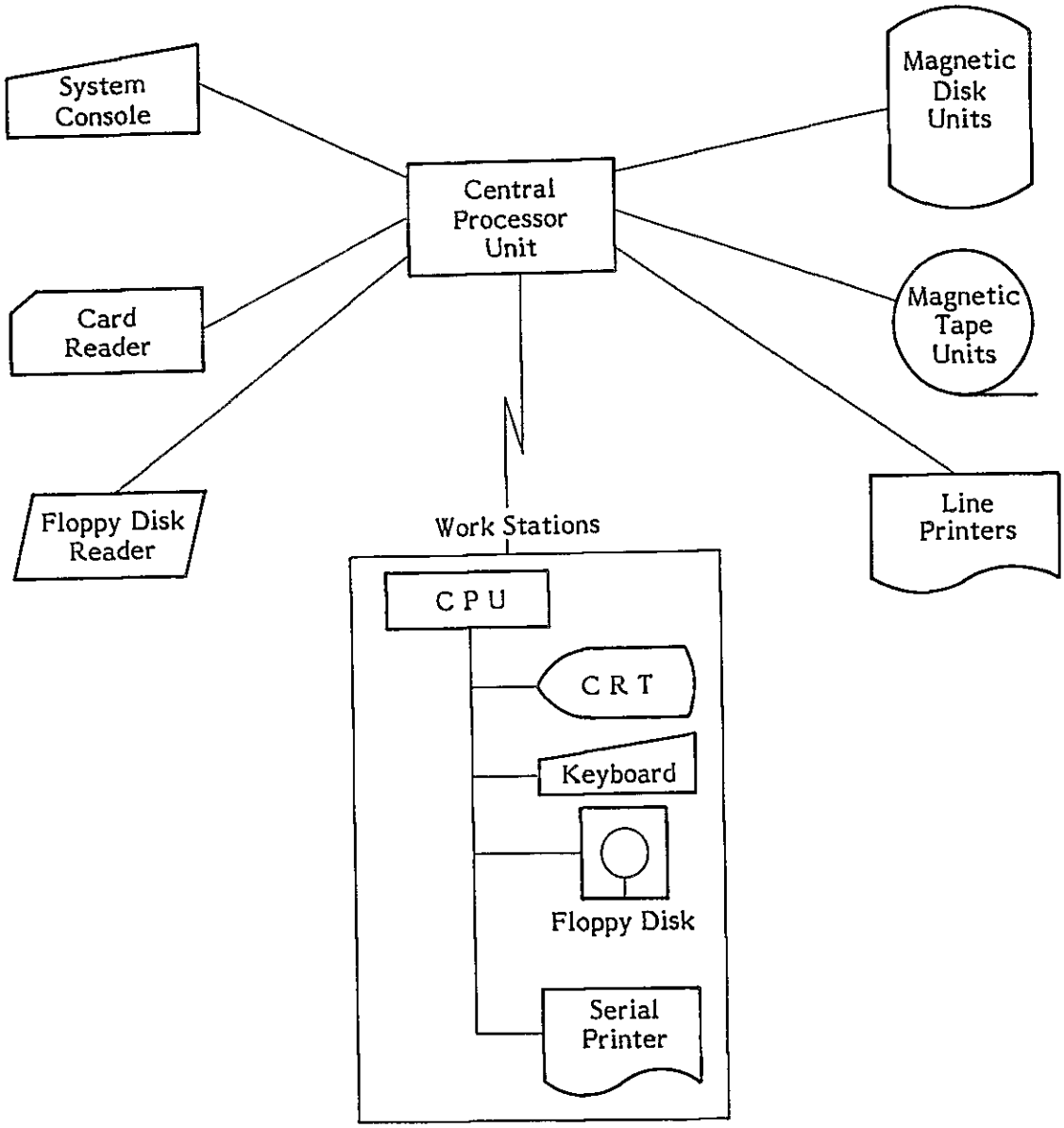
c) Prerequisits

Although it is a common practice to decide on the computer to be used for software development prior to the stage of basic design, this basic design was not prepared based on a specific computer since this was a part of the basic design study under Grant Aid Coorporation.

1 Hardware configuration

The hardware configuration of this system is shown in Figure 4-3-4. Specification for each unit will be described later. (Refer to the section 4-3-(5) of this report).

Figure 4-3-4 System Configuration



2 Processing method

This system handles both the online, real-time processing (for data retrieval) and batch processing (for report generation).

3 System development language

General purpose, high level languages (COBOL, PL/I, FORTRAN, and so on) and auxiliary languages (Assembler, Pseudo Assembler, auxiliary languages for online processing, and so on) are used for the system which stays in the CPU.

As for the system which stays in remote and local terminals, appropriate languages among those provided by a computer manufacturer are being used.

Exact programming languages cannot be specified here because the computer used for the devleopment has not been determined at this stage.

The reason why COBOL, PL/I, FORTRAN, and so on were chosen as the development languages for the system within the CPU, rather than a special sysem language provided by a computer manufacturer is as follows. This system, after the completion of its development, will be transfered to Thailand, and expansion and maintenance of the system will be carried out by Thailand. Therefore, the general-purpose languages which are well known world wide will facilitate the technical transfer of this system to Thailand.

4 Development scale

The scale of this system is expected to be 14,000 steps (by each function, it is expected to be 500 steps for the File Struture Conversion, 3,000 steps for the Online Retrieval, 3,000 steps for the Updating Data Base, 2,000 steps for the Peripheral Service, 3,000 steps for the File Management, and 2,500 steps for the Terminal Service).

5 Relation to the operating system (OS)

Since the computer which will be used for the development and operation of the system has not been determined, this basic design has to be carried out without the knowledge of specific matters concerning OS performance. Therefore, it is not possible to establish the prerequisites upon which special functions and special applications of each OS (e.g. general-purpose data base managemenet system) are utilized. For this reason, this basic design is being carried out in such a manner that the design can fit any computer. However, this decision does not indicate that positive utilization of OS functions were rejected. The staff who will be engaged in this system development will be informed of this after the decision on the type of computer.

3) Functions

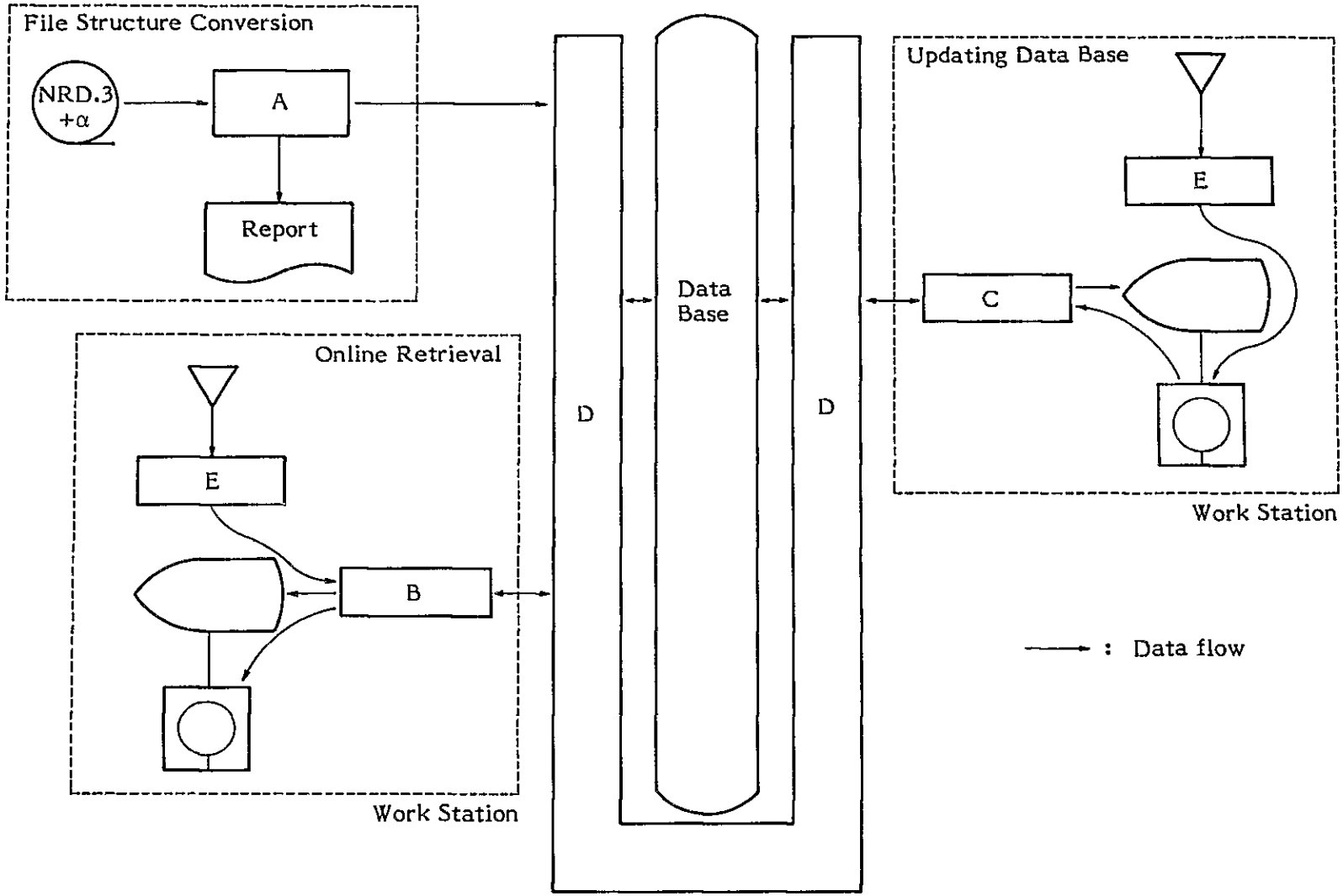
In order to realize the Online Retrieval Subsystem and the Updating Data Base Subsystem, some additional functions are required for this system's operation.

Table 4-3-2 and Figure 4-3-5 shows the functions of this system.

Table 4-3-2 Functions List

NO.	FUNCTION	RELATION WITH Fig.4-3-5	OUTLINE
1	Function of File Structure Conversion	A	To convert NRD.3 and additional information to the file structure suitable for online retrieval.
2	Function of Online Retrieval	B	To retrieve each project information according to retrieval keys.
3	Function of Updating Data Base	C	To update a part of the data base information.
4	Function of Peripheral Services	-	In order to operate this system smoothly, following functions are included. (1) Data Base Initialization (2) Data Base Reconstruction (3) Data Base Trouble Recovery (4) Data Base Management Reporting (5) Others
5	Function of File Management	D	To regist, update, delete, add and retrieve data to the data base phisically.
6	Function of Terminal Services	E	To make man-machine interface on the terminal's CRT.

Figure 4-3-5 Positioning of Each Function



4) Target Performance

a) Required Memory Capacity

The size of memory occupied by this system during its execution must be at most 600 KB upon consideration of processing effectiveness.

b) Volume of Files

The volume of files depends on the number of projects proposed by each province and the number of approved projects. It is estimated that each of 50,000 villages will propose two projects in the final fiscal year of the Poverty Eradication Program, and the volume of files at that time probably will not exceed 700 MB (refer to Table 4-2-2 in the previous section).

c) Processing Speed

The processing time depends on the operating conditions of terminals and how much data is transmitted from a terminal at one time. (The maximum value is determined based on the memory capacity of floppy disks.) There are two clusters of terminals: remote and local terminals. This system gives higher priority to processing at remote terminals. The online retrieval and data base updating are carried out at remote terminals. In both cases, the maximum processing speed (turn-around time) will be 5 seconds upon consideration of appropriate scale of CPU and data volume.

For other types of processing, a target value for the processing speed is not set because the computer for the development and operation of this system has not been determined. Therefore, the processing speed for another softwares may depend on the capability of the OS of the computer which has yet to be chosen.

d) Number of Terminals

The maximum number of terminals which can be handled is 15 for remote terminals and 15 for local terminals, totaling 30 units upon consideration of appropriate scale of CPU and expansibility of the system.

5) Input/Output Specifications

a) Screen Specifications

This section describes the specifications of a terminal's CRT screen for the online retrieval and data base updating which comprise the nucleus of the system prepared by Japan.

1 Online retrieval

The data which is input to the Online Retrieval Subsystem consists of the following:

- Control data which determines the processing of the Online Retrieval Subsystem.
- Control data which determines the processing of the Terminal Service Subsystem.
- Key data for data retrieval

All of these types of data are input from a terminal.

The key data consists of a province code, ID code (target area), stage, date, ministry, registration number of a proposed project, and project number (Figure 4-3-6). Among the above, the province, ID code, stage, and ministry are expressed by code numbers. The code table can be displayed on a screen when a certain code is unknown.

The screen is divided into the following three fields.

- Input field for retrieval keys
- Field for comments and error messages
- Additional information field for the descriptions of input keys.

Figure 4-3-6 Kinds of Input Data

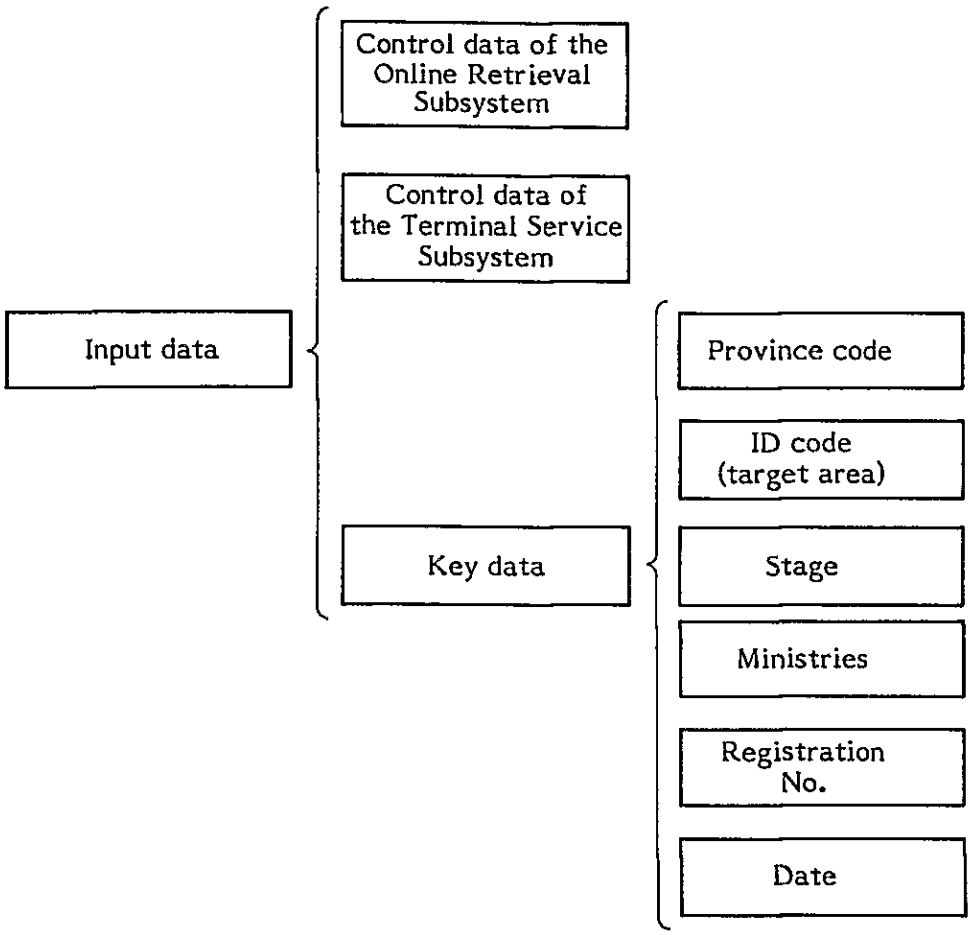


Figure 4-3-7 shows the field layout of a screen. Figures 4-3-8 through 4-3-11 show the images of the input and additional information fields. At the design stage, all the English sentences in the figures will be changed to Thai. Therefore, these layouts may quite possibly be subject to changes depending on the Thai characteristics. They are presented here as references.

Figure 4-3-12 shows an example of a screen display of retrieval results. This is presented here simply as a reference for the same reason as above.

Figure 4-3-7 Screen Layout

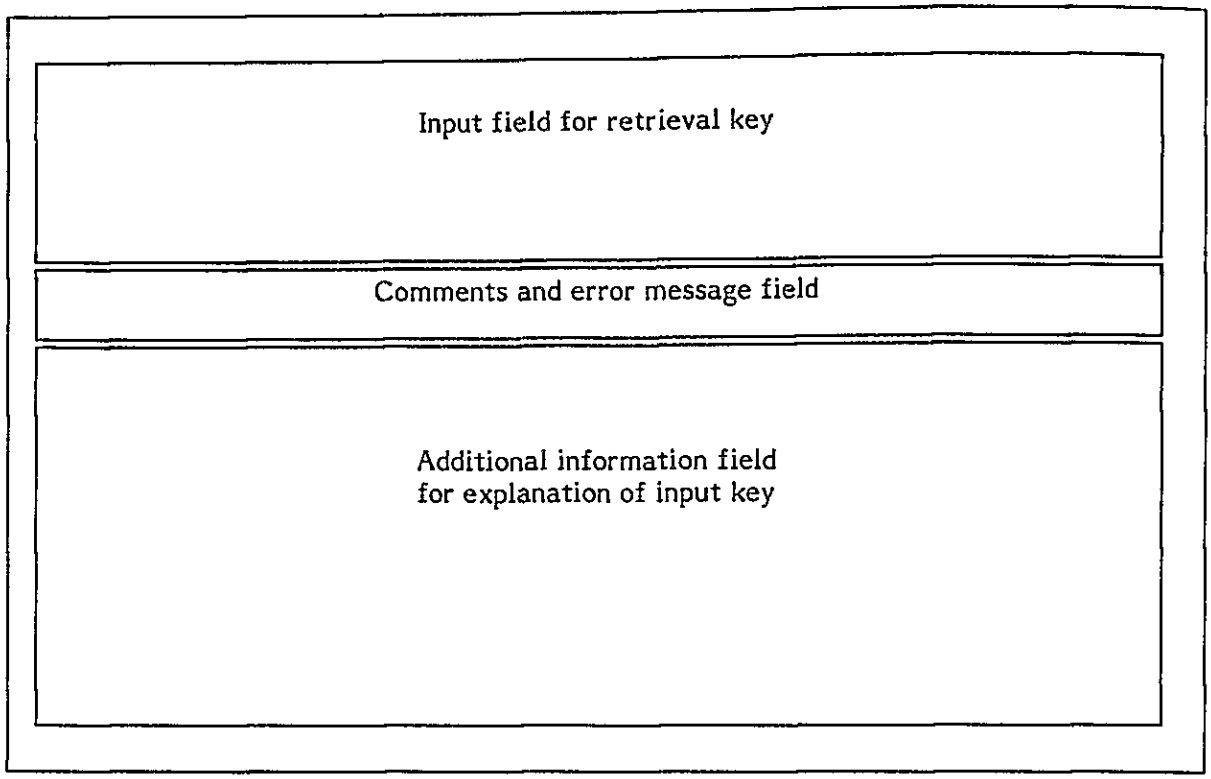


Figure 4-3-8 Display Format for Retrieval (sample)

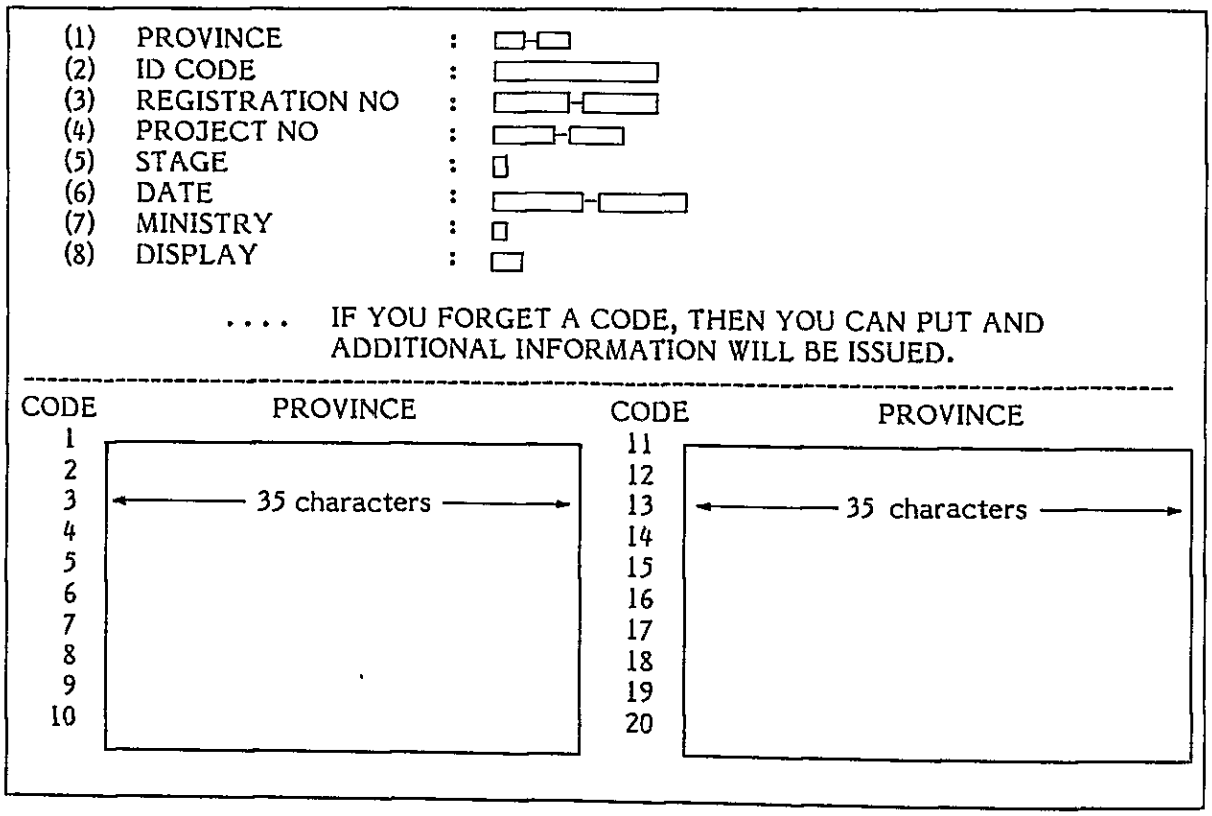


Figure 4-3-9 Display Format for Retrieval (sample)

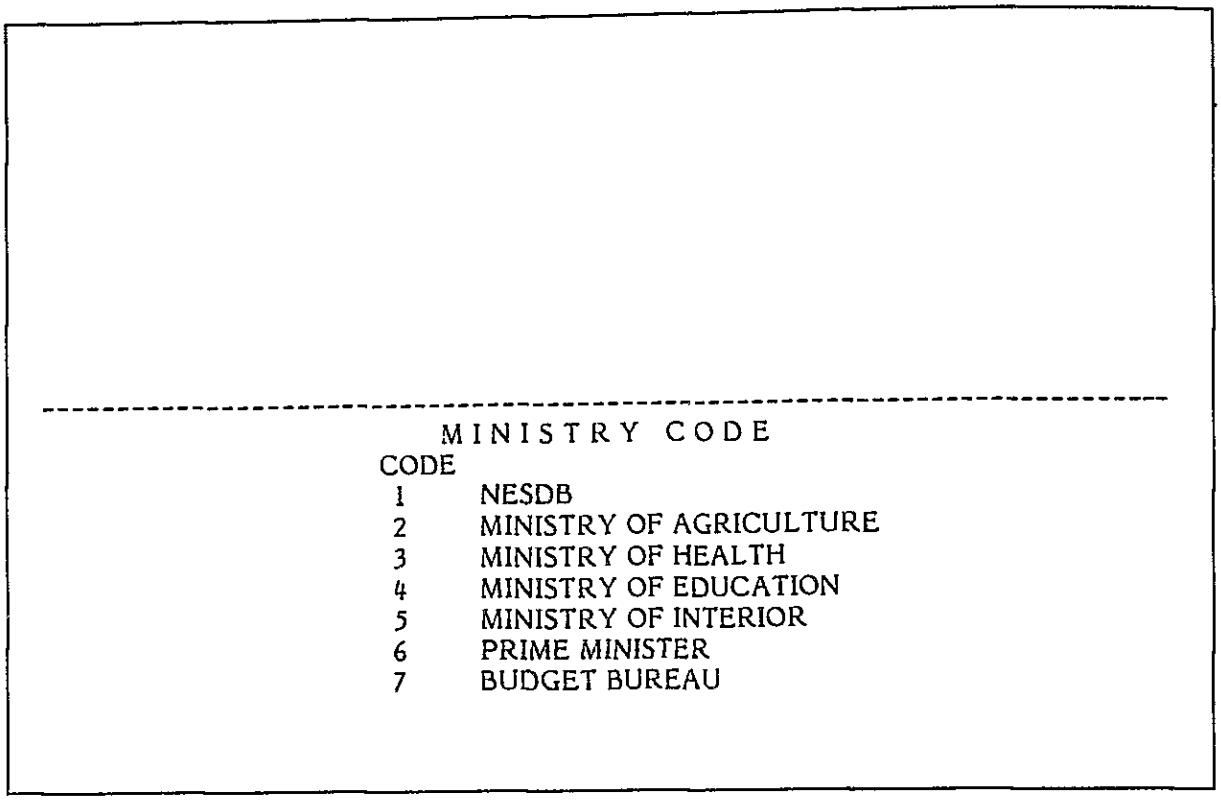
```
ID CODE FORMAT = ABBCCDDEEFF

        A    =  REGION CODE
        BB   =  PROVINCE CODE
        CC   =  DISTRICT CODE
        DD   =  SUBDISTRICT CODE
        EE   =  VILLAGE CODE 1
        FF   =  VILLAGE CODE 2
```

Figure 4-3-10 Display Format for Retrieval (sample)

```
                        S T A G E
CODE
  0  REGISTERED
  1  PASS THROUGH PRELIMINARY CHECK
  2  APPROVED BY MINISTRY
  3  APPROVED BY NESDB
  4  APPROVED BY NRDC
  5  CONFIRMED BY BUDGET BUREAU
  6
  7
  8
```

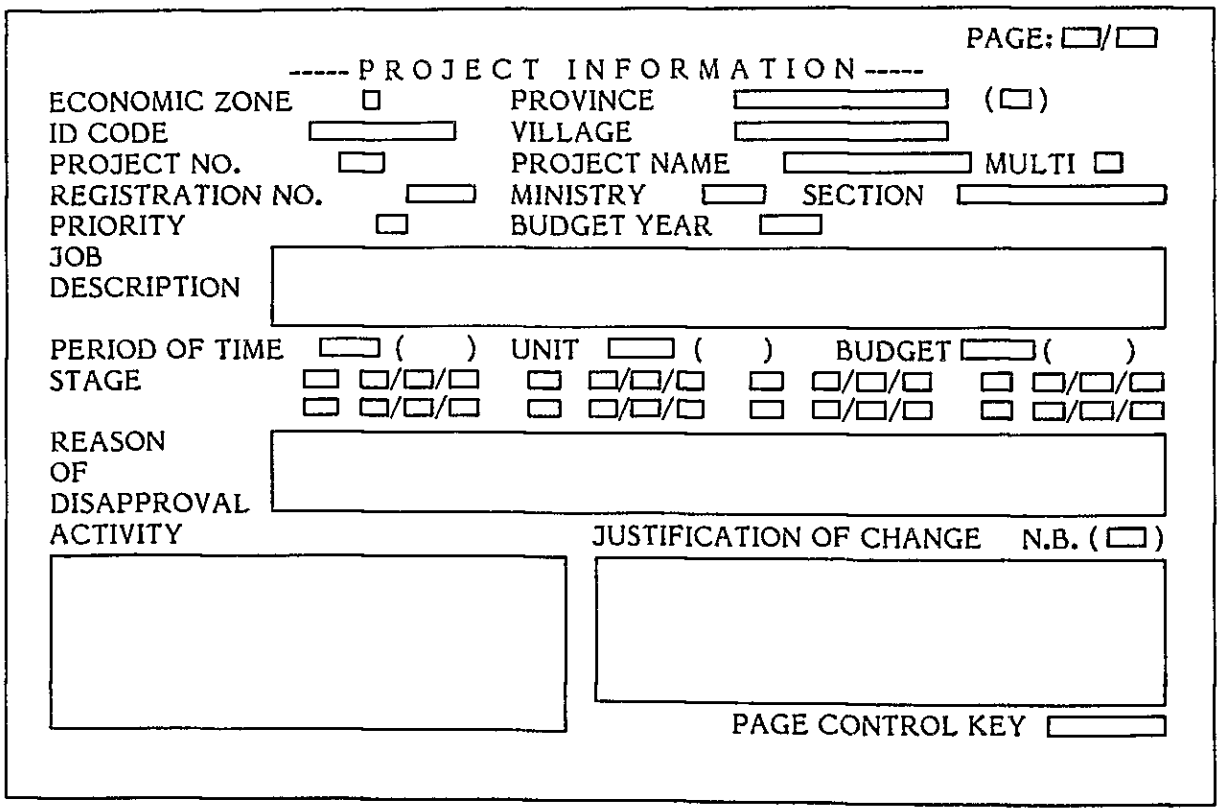
Figure 4-3-11 Display Format for Retrieval (sample)



MINISTRY CODE

CODE	
1	NESDB
2	MINISTRY OF AGRICULTURE
3	MINISTRY OF HEALTH
4	MINISTRY OF EDUCATION
5	MINISTRY OF INTERIOR
6	PRIME MINISTER
7	BUDGET BUREAU

Figure 4-3-12 Output Display of Retrieval (sample)



PAGE: □/□

----- PROJECT INFORMATION -----

ECONOMIC ZONE □ PROVINCE □ (□)

ID CODE □ VILLAGE □

PROJECT NO. □ PROJECT NAME □ MULTI □

REGISTRATION NO. □ MINISTRY □ SECTION □

PRIORITY □ BUDGET YEAR □

JOB DESCRIPTION □

PERIOD OF TIME □ ( ) UNIT □ ( ) BUDGET □ ( )

STAGE □ □/□/□ □ □/□/□ □ □/□/□ □ □/□/□

□ □/□/□ □ □/□/□ □ □/□/□ □ □/□/□

REASON OF DISAPPROVAL □

ACTIVITY

JUSTIFICATION OF CHANGE N.B. (□)

PAGE CONTROL KEY □

2 Updating data base

The data which is input to the Updating Data Base Subsystem consists of the followings.

- Control data which controls the processing of the Updating Data Base Subsystem
- Control data which controls the processing of Terminal Service Programs
- Update data

These types of data are all input from a terminal. The contents of the update data differ from phase to phase in the screening of a proposed project, and hence the information displayed on a screen is also different from phase to phase.

The update data consists of the following items.

- Ministry
- Stage
- Date
- Department within ministry
- Reasons for disapproval
- Quantity
- Budget
- Activity

Figures 4-3-13 through 4-3-17 illustrate how display contents and update data change at each phase of the screening of a proposed project. In these figures, ▨ indicates display contents and ▧ , update data. These figures are presented here merely as references since they do not reflect the specifications in Thai characters.

Figure 4-3-13 Display Format for Update (sample)

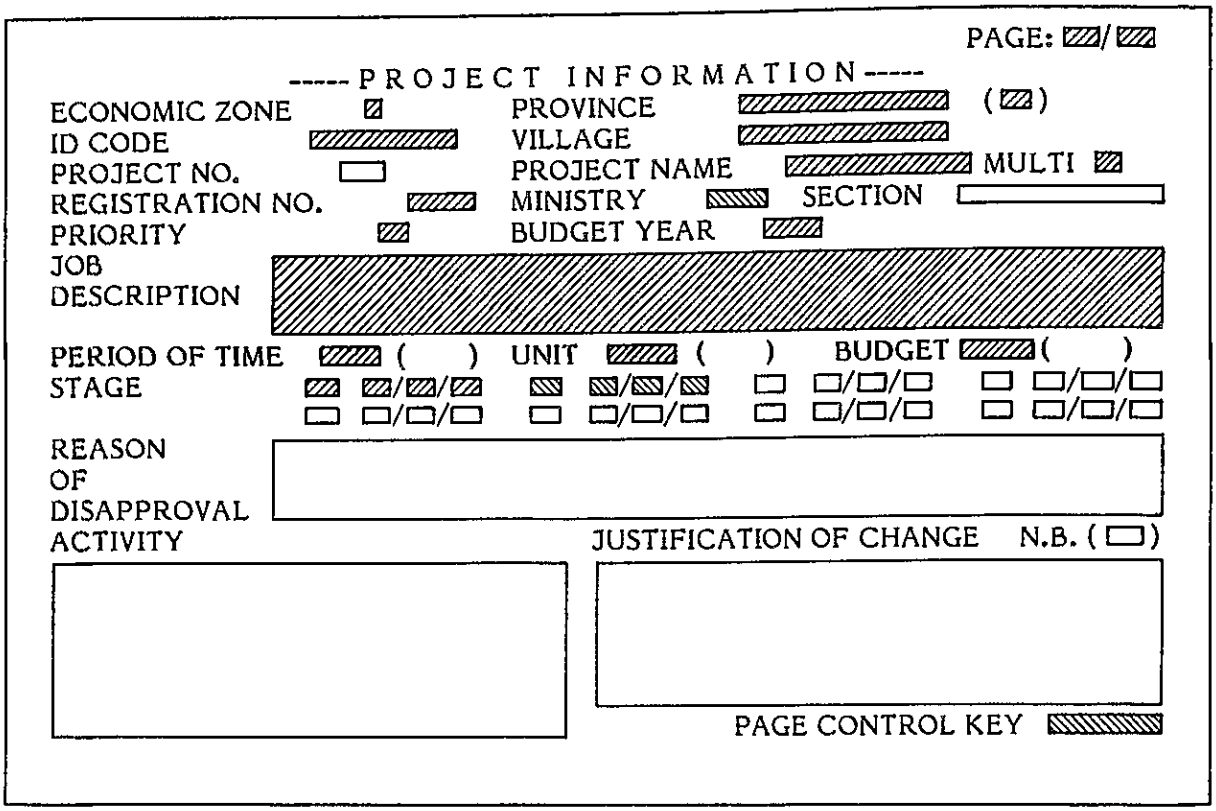


Figure 4-3-14 Display Format for Update (sample)

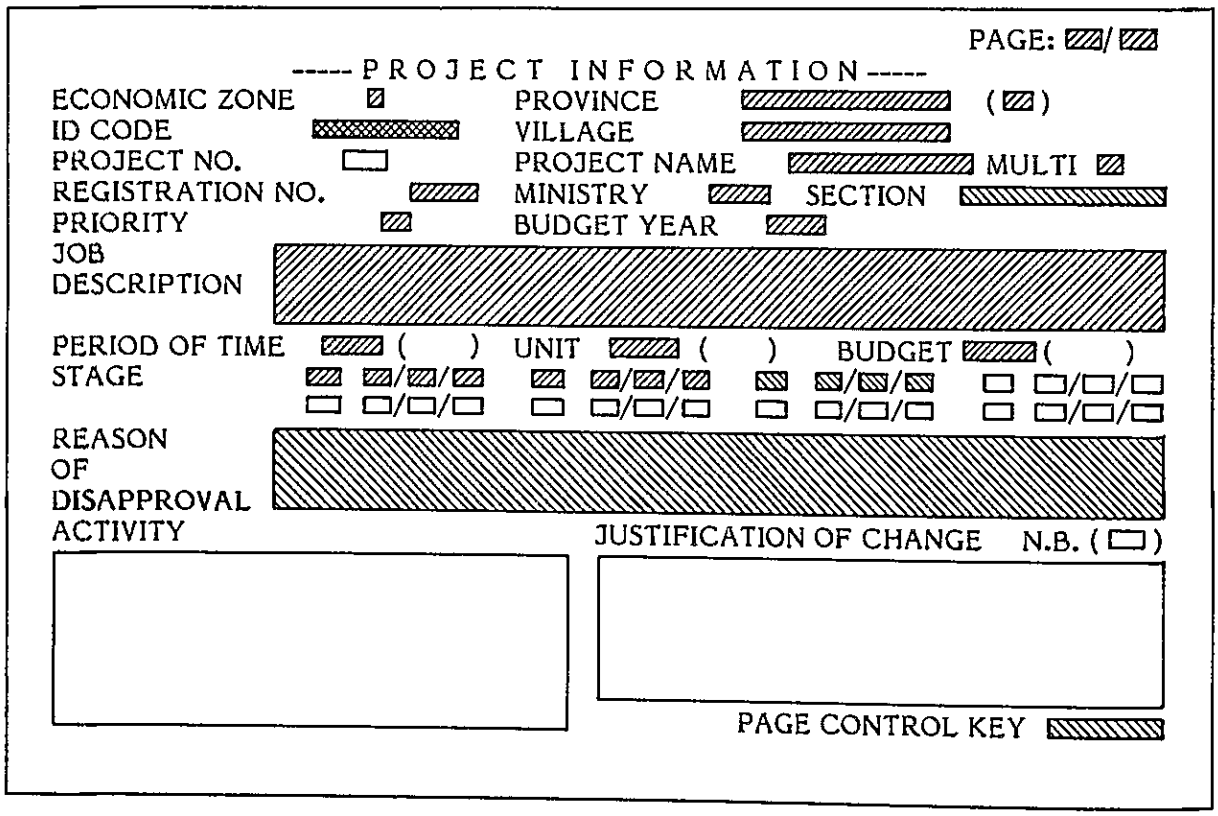


Figure 4-3-15 Display Format for Update (sample)

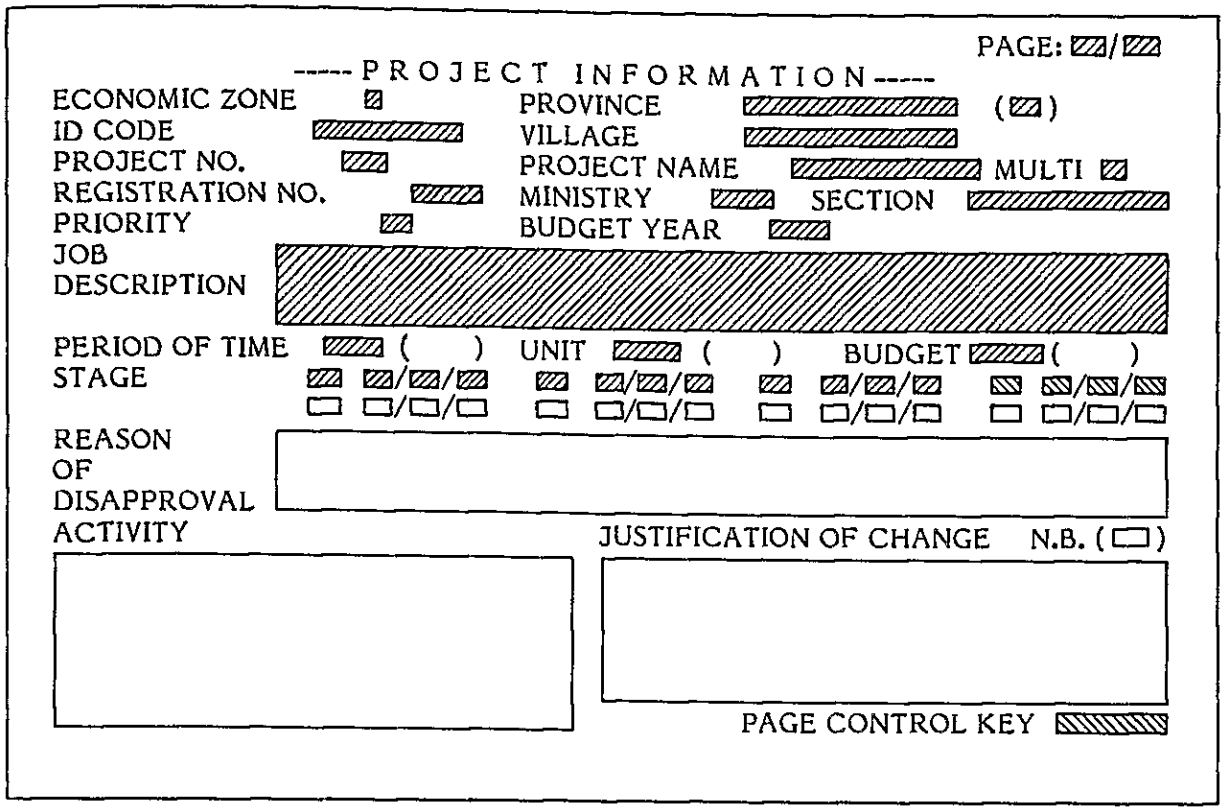


Figure 4-3-16 Display Format for Update (sample)

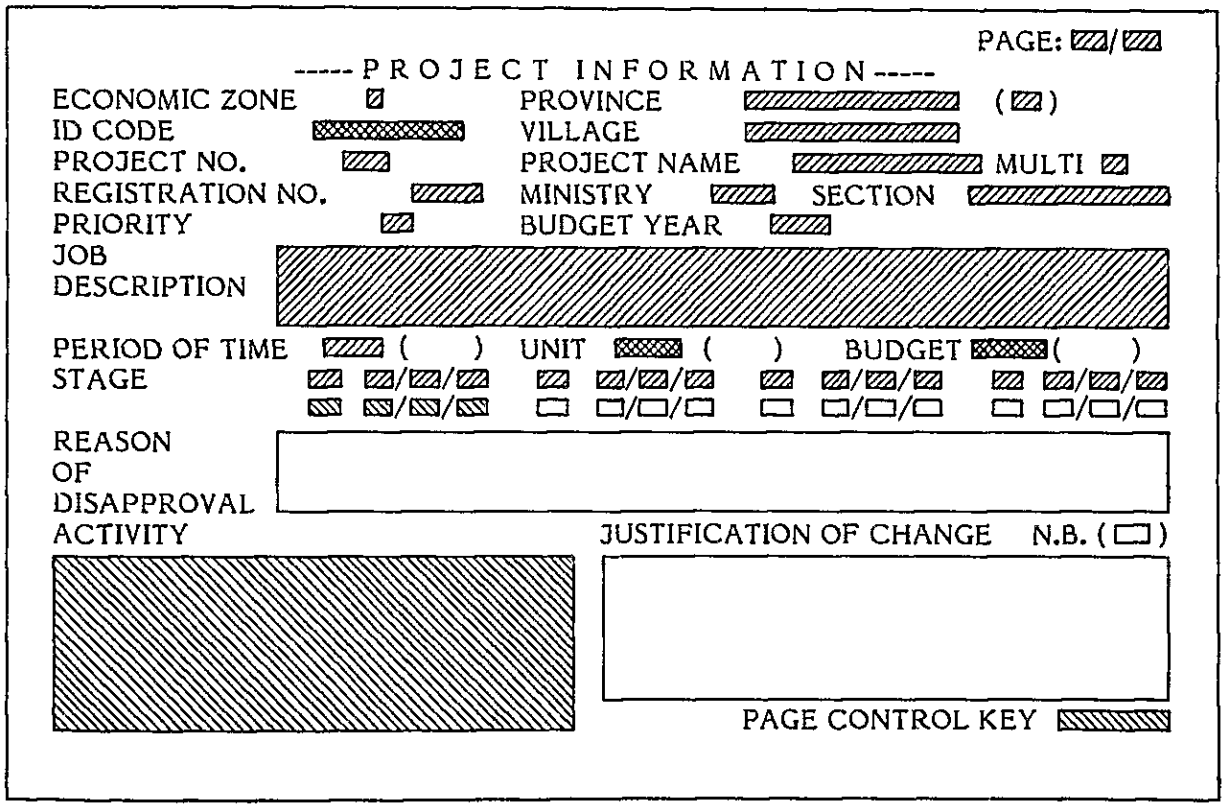
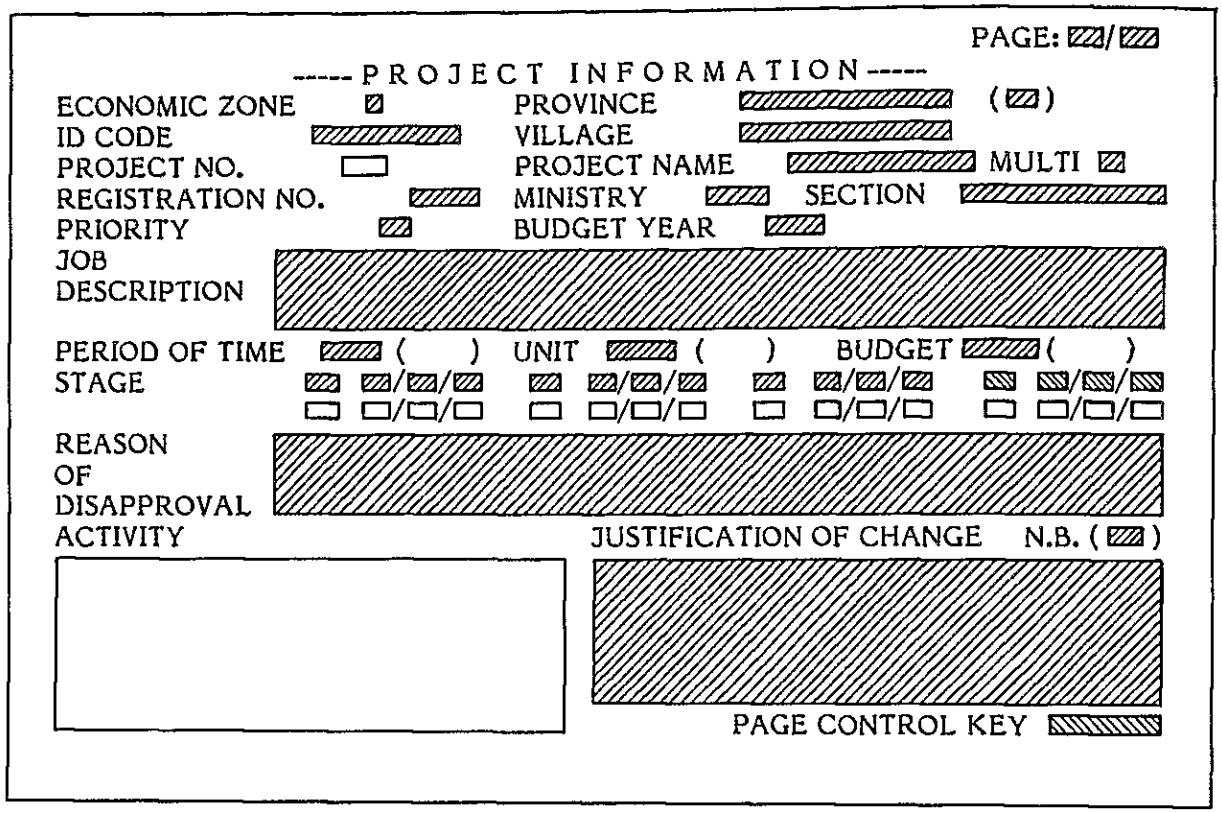


Figure 4-3-17 Display Format for Update (sample)



b) Input Specifications

i File Structure Conversion Subsystem

Data which the function of file structure conversion handles are based on the project proposal form (NDR.3). The input information required for this function is shown in Table 4-3-3.

Table 4-3-3 Input Information Required for the Function of File Structure Conversion

ITEM	DESCRIPTION
Region Code	Region number of the province in which the project is proposed.
Province Code	Province number
Target Area	Target area code for the project that consists of district, sub-district and village codes. ID code is made from the Region Code, Province Code and this code.
Project Name	Name indicating the contents of the project
Priority	Priority sequence of the projects in a province
Budget Year	The year of setting budget
Job Description	Job contents to be worked
Period of Time	Period of the project implementation
Unit	Unit of the project implementation (ex; meter, kilogram)
Quantity	Volume of the project activity
Budget	Expense needed for the project
Expected Benefit	Expected Benefit from the project implementation
Stage	Stage of screening the proposed project
Date	Date corrsponding to the stage
Justification of Change	Reasons in case of making a project change according to form NRD.7. Difference between NRD.3 and NRD.7 is indicated by the stage.

2 Online Retrieval Subsystem, Updating Data Base Subsystem, and Terminal Service Subsystem

The screen specifications are also applicable here.

3 File Management Subsystem and Peripheral Service Subsystem

Established with respect to the system design.

c) Output specifications

Established with respect to the system design.

6) File Specifications

a) Outline

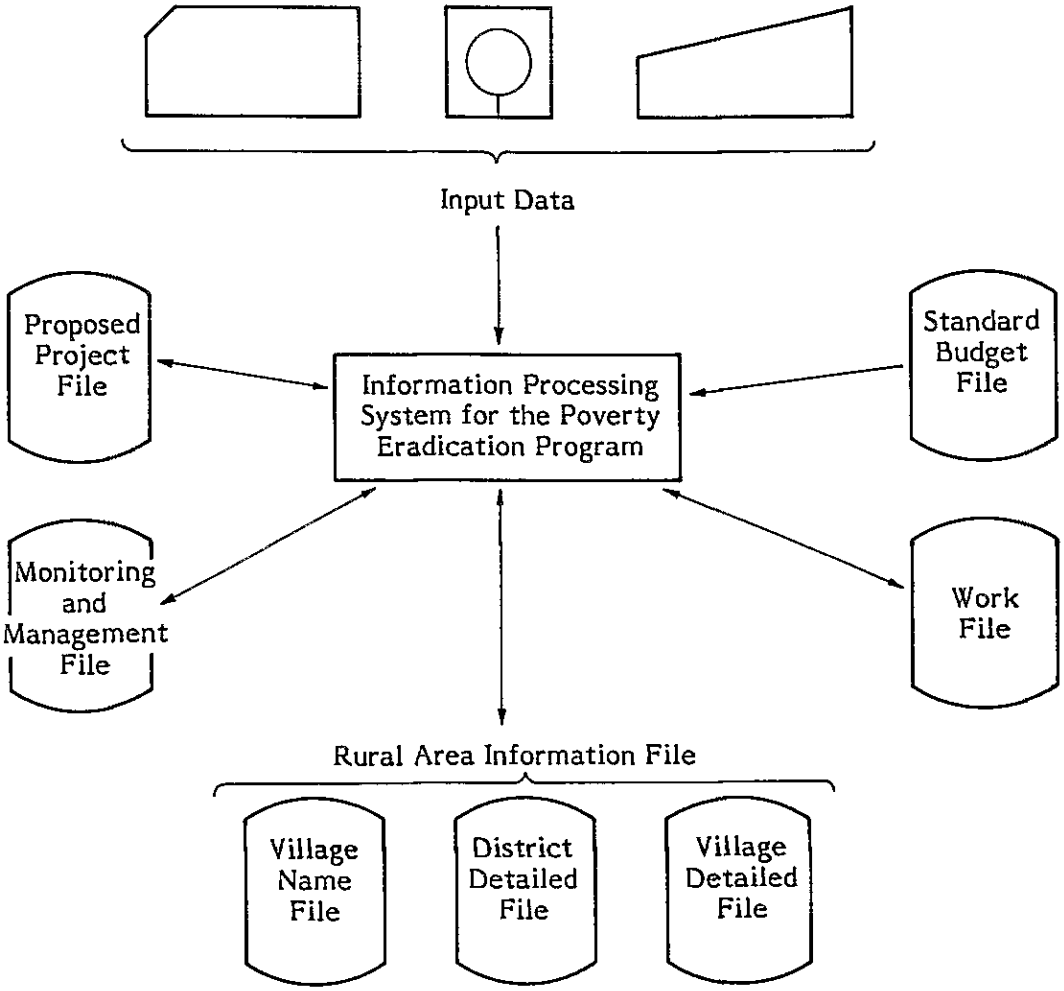
1 File system

The following five types of files are used for the information processing system for povety eradication.

- Proposed Project File
- Information File of Rural Areas
- Project Monitoring and Management File
- Standard Budget File
- Work File

The Information File of Rural Areas consists of the village name file, the district detailed file, and the village detailed file (Figure 4-3-18).

Figure 4-3-18 Files Used in the Information Processing Systems for the Poverty Eradication Program



2 File classification

The classification of the files used by the Information Processing System for poverty eradication is shown in Table 4-3-4.

3 Files for the system prepared by Japan

Among the files shown in Table 4-3-4, those which are used directly for the system developed by Japanese side are the

Proposed Project File and the Work File. After the transfer of the system to Thailand, however, they must be linked with other files. Therefore, the design was made with the idea of giving common features to the file structures.

Table 4-3-4 Files Used in the Information Processing System for the Poverty Eradication Program

FILE		ATTRIBUTE (MEDIA)	NO. OF FILES	DESCRIPTION	DATA SOURCE
Proposed Project File		Direct or IS (Magnetic Disk)	1	File of storing the information of projects proposed from each province and its screening information	NRD.3 NRD.4 NRD.5 NRD.7
Rural Area Information File	Village Name File	Direct or IS (Magnetic Disk)	1	File of storing the name and poverty rank of villages	NRD.2A
	District Detailed File	Direct or IS (Magnetic Disk)	1	File of storing the economic and social information of each district	NRD.2B
	Village Detailed File	Direct or IS (Magnetic Disk)	1	File of storing the economic and social information of each village	NRD.2C
Monitoring and Management File		Direct or IS (Magnetic Disk)	1	File of storing the information of tracing and monitoring the project under execution	D.314
Standard Budget File		Direct or IS (Magnetic Disk)	1	File of storing the standard budget of each project type	Standard budget
Work File		- (Magnetic Disk or Floppy Disk)	some	Files needed as work area in the information processing	-

Note (1) The attributes should be decided based on re-study after decision of OS type.

(2) IS = Indexed Sequencial File

b) File Organization

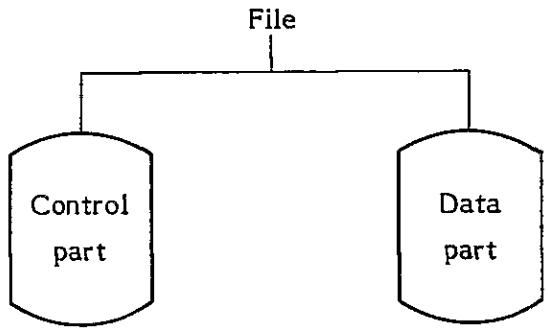
1 Method of file management

The general structure of a file is established in the following manner (Figure 4-3-19):

The data section contains data to be stored in a file. The control section stores the index (address) required to remove desired data from the data section quickly.

A file is divided into fixed length pages. A page is considered a unit for I/O and it consists of a diverse number of records. The size of a page is determined by a system designer. The size and format of a record is decided on the basis of an estimation with this basic design in mind.

Figure 4-3-19 General Structure of a File



2 Data part of the proposed project file

Data is generated and registered upon submission of a project. At the time of registration, a registration number is automatically assigned to the project by the system. This registration number is then randomized by the randomizing routine in order to create the key. Data is then stored in the file based on this key (Figure 4-3-20).

The information contained in the data section of a proposed project file is shown in Table 4-3-5.

Figure 4-3-20 Storing Method for the Data Part

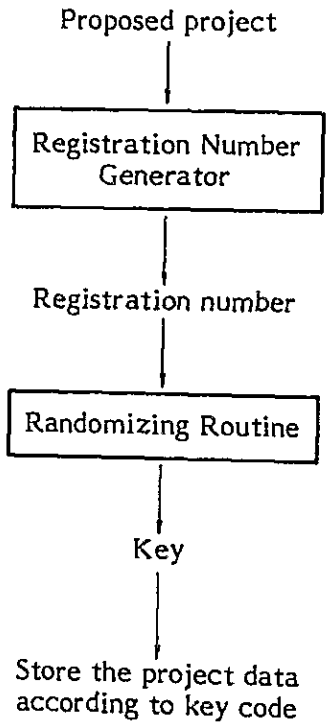


Table 4-3-5 Information of the Data Part of the Proposed Project File (1/2)

ITEM	DESCRIPTION
Economic Zone	Economic zone number of the province in which the project is proposed.
Region Code	Region code of the province in which the project is proposed.
Province Code	Province number
Target Area	Target area code consisting of district, subdistrict, and village codes. ID code is made from Region Code, Province Code and this code.
Project Name	Name indicating the contents of the project
Project Number	Number given to the approved project
Registration Number	Sequence number of proposed projects
Priority	Priority sequence of the projects in a province
Budget Year	The year of setting budget
Job Description	Job contents to be worked
Period of Time	Period of the project implementation
Unit	Unit of the project implementation (ex; meter, kilogram)
Quantity	Volume of the project activities
Budget	Expense needed for the project
Expected Benefit	Expected benefit from the project implementation
Stage	Stage of screening the proposed project
Date	Date corresponding to the stage
Reason of Disapproval	When the project is disapproved, the reasons are shown.
Activity	Concrete executing items of the project
N.B.	Comments in case of project change according to form NRD.7
Justification of Change	Reasons in case of making a project change according to form NRD.7 Difference between NRD.3 and NRD.7 is indicated by the stage.

Table 4-3-5 Information of the Data Part of the Proposed Project File (2/2)

ITEM	DESCRIPTION
Ministry	Code number of the ministry for the project
Section	Executing section in the ministry for the project

3 Control part of the proposed project file

The Fixed-length pages which comprise the control part of the file are linked by pointers (refer to Figure 4-3-21). The first page contains the information regarding the following pages, and it resides in a memory unit upon the opening of the file and is released to a disk immediately before the closing of the file. The first page contains the information shown in Table 4-3-6 as the master table. The structure of the master table is shown in Figure 4-3-22.

The items concerned with province, ID code, date by screening stage, and ministry are divided into an appropriate number of groups, and a proposed project is assigned to an unspecified group by the randomizing routine.

The details of the province table (Figure 4-3-22) are shown in Figure 4-3-23. Other tables, such as the ID code table, have the same structure as that of the province table. The pages indicated by the top pointer and the bottom pointer are hereinafter referred to as the data pages. The information and the structure of the data pages are shown in Table 4-3-7 and Figure 4-3-24 respectivley.

Unused pages are linked to the blank table.

4 Work file

The system developed by Japan uses several work files. The media is magnetic disks and floppy disks. The details of the work file will be determined by a system designer.

Figure 4-3-21 Page Linkage

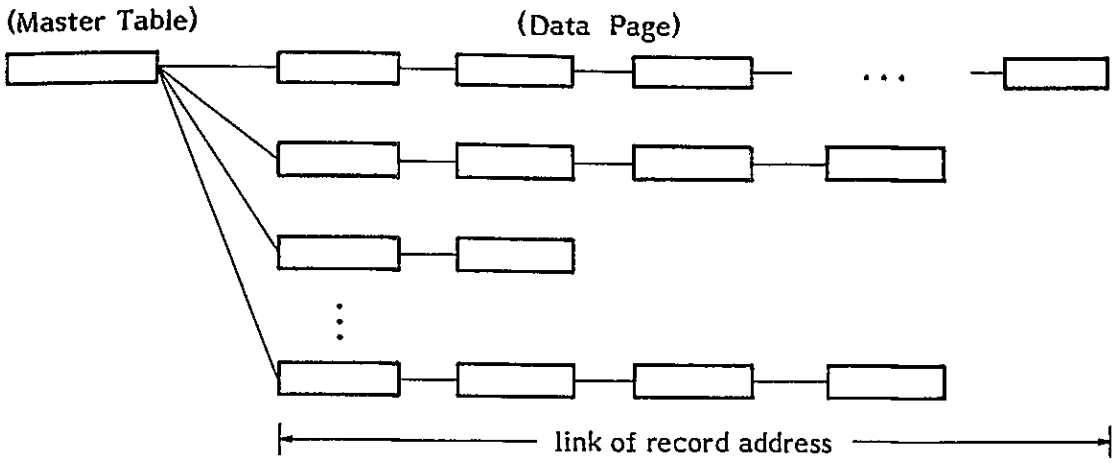


Table 4-3-6 Information in the Master Table

ITEM	DESCRIPTION
Constant value	Constant values and character strings needed for the construction of the Proposed Project File (ex) Number of dividing the Province Table Number of dividing the ID Table Number of dividing the Date Table Number of dividing the Ministry Table Number of the proposed projects ⋮
Province	Pointer and number of pages to the top and the bottom of data page
ID code	Same as above
Date corresponding to the stage	Same as above
Ministry	Same as above
Project Number	Same as above
Blank	Same as above

Figure 4-3-22 Outline of the Master Table

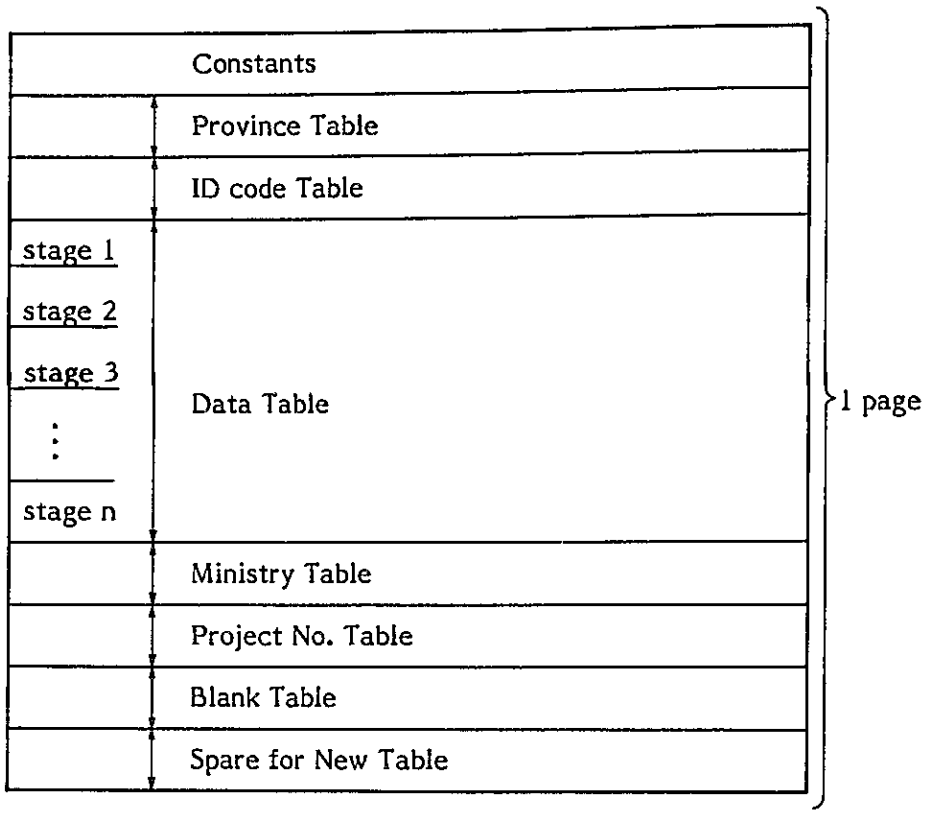


Figure 4-3-23 Contents of the Province Table

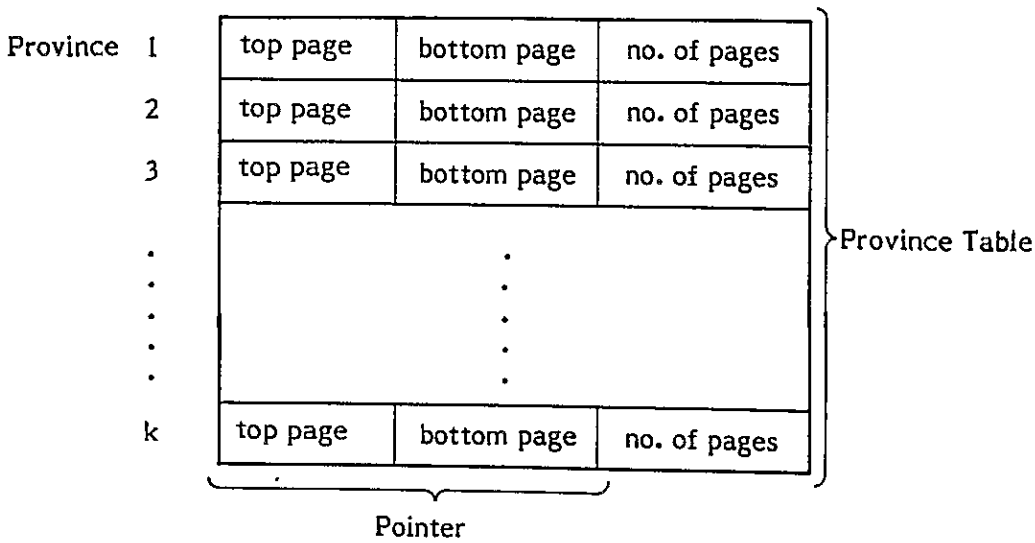
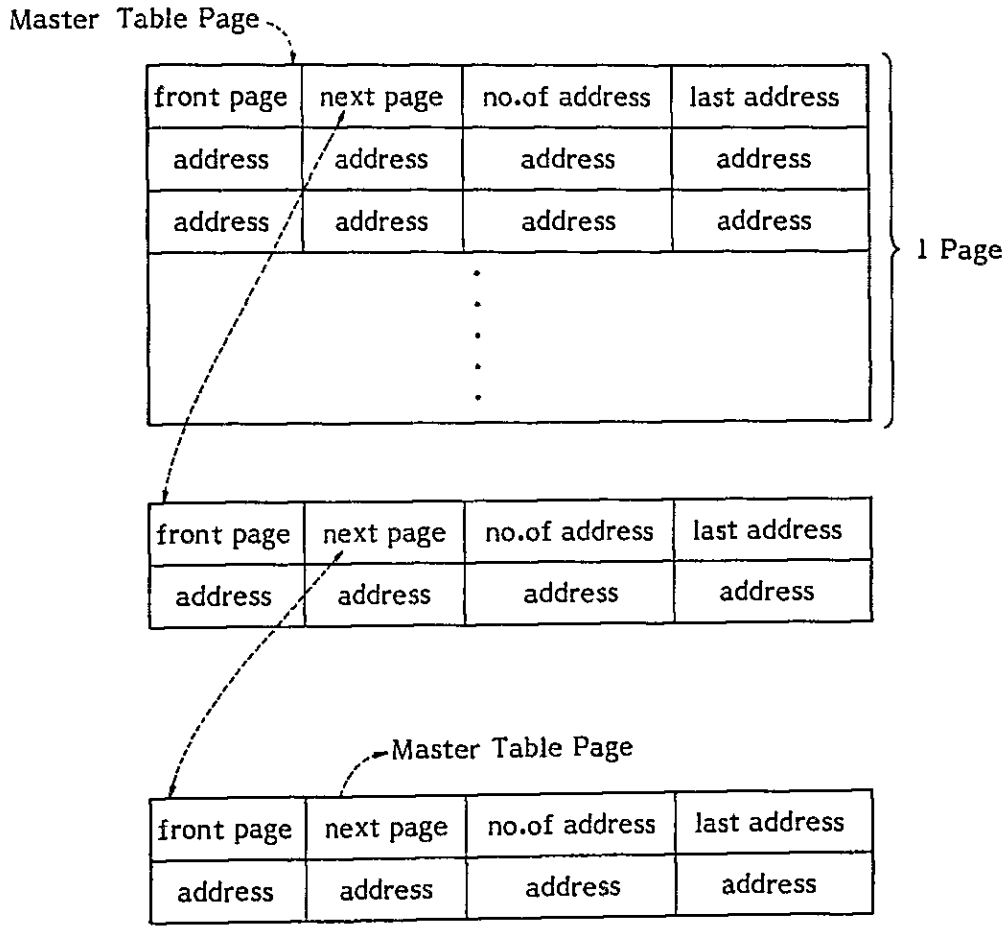


Table 4-3-7 Information in the Data Page

ITEM	DESCRIPTION
Previous Page	A page address of the previous data page linked with this data page. The contents of the top data page indicates the address of the Master Table.
Next Page	A page address of the next data page linked with this data page. The contents of the bottom data page indicated the addresses of the Master Table.
Number of addresses	Number of addresses stored in this data page.
Last address	Position of the last address stored in this data page.
Address	Physical address of the data part in which the data of the proposed projects are stored.

Figure 4-3-24 Contents of Data Pages and Linkage



7) Details of the Functions

The system functions to be developed by Japan are as follows:

Japanese side system
- a) File Structure Conversion Function
- b) Online Retrieval Function
- c) Updating Data Base Function
- d) Peripheral Service Function
- e) File Management Function
- f) Terminal Service Function

a) File Structure Conversion Function

This function receives the proposed project data (NRD.3), the reproposed project data (NRD.7), and other related data. These are in the form of a sequential file and are then converted into a random or indexed sequential file. (depending on the support functions of OS).

1 Input of a sequential file and checking it against input rules

2 Data Base generation function

3 Automatic generation function for certain data (e.g. economic zone, registration number).

b) Online Retrieval Function

This function performs data retrieval using the key indicated on a terminal. Although the Japanese system conducts data retrieval only from the proposed project file, this function can be expanded in such a way as to enable data to be retrieved from other files.

1 System initialization

2 System control function

With regard to 1 and 2 above, they can be taken out from this function and made independent after the determination of the computer and OS, if a system designer considers it advisable.

3 Input data inspection function

4 Interface with terminals
This performs transmission and reception of data between the online retrieval function and terminals.

5 Interface with the file management function.

Data retrieval is utilized by means of any one, or a multiple number (multi-key method) of the following keys.

- Province
- ID code
- Registration No.
- Project No.
- Stage
- Date
- Ministry

All of these keys are in the form of codes, thus allowing for data to be retrieved with short input. When a key operator does not know the code of his desired key, the necessary information is displayed on a screen. These operations are performed by the terminal service function. The online retrieval function only handles the retrieval of information prepared in a certain form.

c) Updating Data Base Function

This function carries out modification of a project screening stage and insertion of comments upon the data base from the terminals at the governmental agencies concerned with the Poverty Eradication Program.

Since this system maintains the data concerning all the projects ever proposed, regardless of approval or disapproval (reflecting Thailand's request), total deletion of proposed project data will never occur once the project is registered.

1 Interface with terminals

This carries out transmission and reception of data between the updating data base function and the terminals.

2 Integrity and security of update data

Once data is updated, the appropriate previous data is destroyed. Therefore, this function guarantees that the data to be updated is the proper data. It also performs the checking required to protect the data base from illegal data modification by an unqualified person.

The method for the checking might be as follows.

- Confirmation based on the governmental agency code.
  A matching between the terminal or terminal user code and the code of the governmental agency which is responsible for a proposed project.
- Project code
- ID code
- Registration code

3 Interface with the file management function

4 Update

d) Peripheral Service Function

This function is not a group of functions which are needed to realize one single objective, but rather it has the multiple objectives and functions that are required for the smooth operation of the Japanese system.

1 Absorption of data base into magnetic tapes

In order to safe-guard the data base, an existing data base is absorbed into magnetic tapes.

2 Initialization of data base
The data base is established and various tables are initialized.

3 Generation of data base update reports
Modifications to the data base are made from a number of terminals. A data base update report is generated every day at the end of update work.

4 From magnetic tape to data base
The current data base is reproduced from the magnetic tapes created in the above 1 and from the logging of information.

5 Generation of NRD.4 and NRD.5 reports
The NRD.4 and NRD.5 reports are generated from the information input from terminals and the proposed project data.

e) File Management Function

This is the function which directly manages the data base. All access to the data base is handled by this function.

1 Opening, closing, and initialization of files.

2 Physical input to and output from the data base
This function performs the physical input/output of the proposed project data and the management information.

3 Management of the data base management information
In order to enable prompt retrieval from the data base, the address of data allocation corresponding to a group of several keys is maintained. Since this management information also serves as a data base, it is also necessary to

manage the management information itself. As for the file structure, refer to 6) of this section.

A file is basically divided into blocks of records and each block is called a page.

The method of management for the data page in the control section will be described here:

- After initialization of a file, all of its data pages are linked to a blank-key chain.
- The addresses of the top and bottom pages for other retrieval keys in the master table have the value of 0 at the time of initialization.
- When an empty data page becomes required, one data page is removed from the blank-key chain and then linked to a chain of the retrieval key which is in need of a data page.
- When record addresses of the proposed project data are to be stored in a data page, it must be done sequentially from the beginning.
- When a record address is to be deleted, its corresponding record address in the data page must also be cleared.
- The record address in the data page which has been cleared is deleted after the completion of update work.

4 Logging function

Whenever an addition or update has been carried out against data in the data base, its history is recorded.

5 Area control function

Area control of a file is performed to cope with overflow.

6 Data protection function at times of update
This will be achieved based on OS, language processor, macro commands, and so on after the determination of the computer to be installed.

f) Terminal Service Function

This function should be realized on the side of terminals. In other words, this system assumes the use of intelligent-type terminals. This terminal service function is designed to satisfy the two main objectives described below.

- Improvement of the man-machine interface funciton.
- Reduction in the load of CPU during online operations.

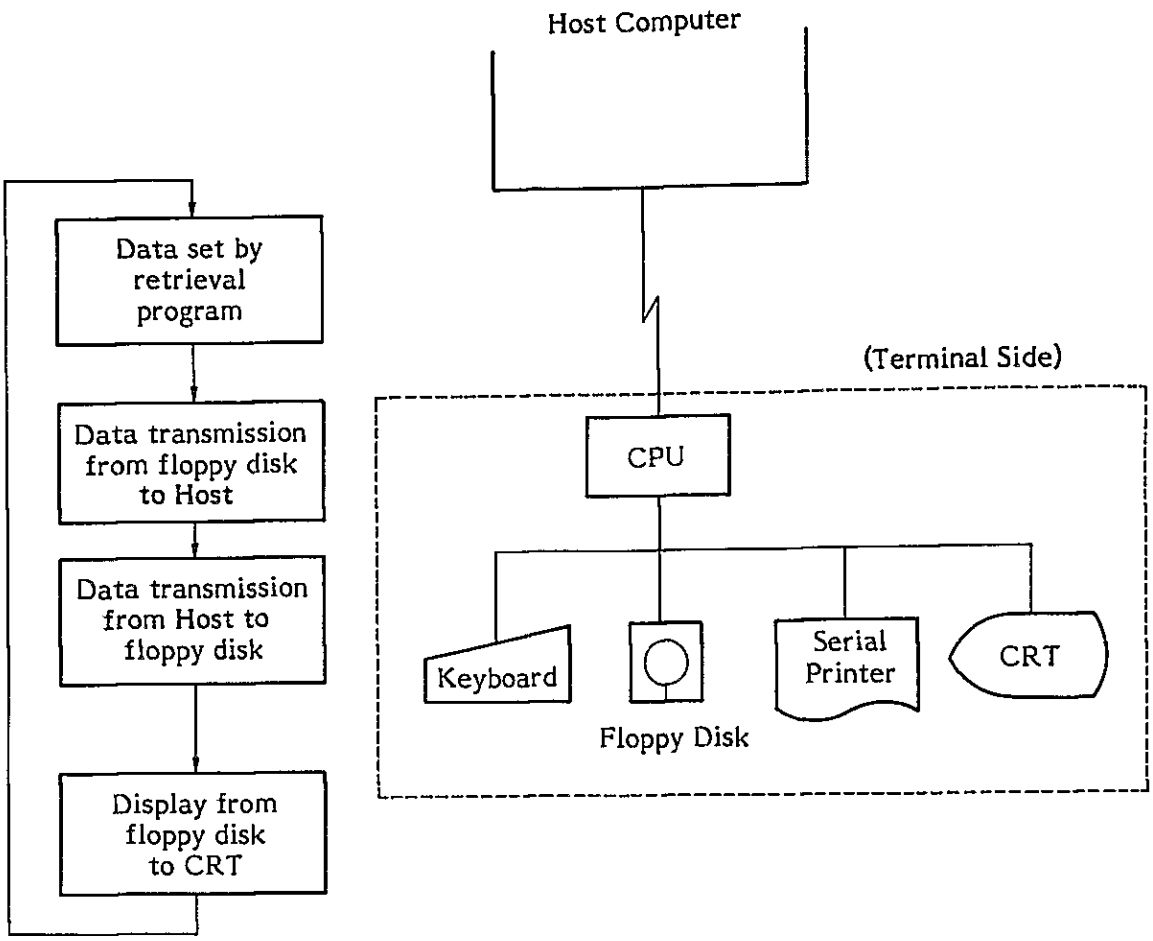
With this in mind, depending on the computer to be installed, it may become difficult to achieve the following functions. if it is found difficult, the online retrieval and the updating data base function may possibly bear increased functional loads.

1 Input function for retrieved information
2 Display function for the information input by the above 1 .
3 Display function for retrieved project data
4 Input and analysis function for update information
5 Interface with the online retrieval function
6 Interface with the updating data base function

8) Way of Processing

The method of processing depends to a greater extent on the hardware specifications, the OS capability, and another factors, more than on the function design. For this reason, only the conceptual chart of the processing (Figure 4-3-25) will be measured here. The descriptions of the processing functions are shown in Table 4-3-8.

Figure 4-3-25 Outline of the Processing



(Outline of the Processing in Terminal Side)

Table 4-3-8 Outline of the Processing Procedure

SIDE	PROCEDURE
Terminal	- Open a session from a terminal side. - Load the retrieval program from a floppy disk. - Input retrieval keys helped by the retrieval program. - Transmit retrieval keys stored in a floppy disk to the host computer. - Get Information from the host computer. Information is display information (ex; error message, etc.) or file information (ex; results of retrieval, etc.). It is judged from head data of transmitted information whether display information or file information. The specification of protocall is decided in system design. - Display information on a CRT. - Write file information to a floppy disk. - Display the results of retrieval on a CRT from a floppy disk.
Host Computer	- Make interface with a terminal by a online resident program. - Judge the processing according to the protocol of the transmitted information from terminal side. - Make a needed task according to a kind of processing. - Process transmitted information by the task. - Task jobs are re-entrant programs.

(4) Basic Software

1) Operating System

The operating system must have the following functions in order to enable the smooth development and operation of the information processing system for poverty eradication to take place.

a) The operating system must have a job entry subsystem, perform comprehensive management of input/execution/output of jobs, and contain the automatic spooling function.

b) Priority function

The operating system must provide the function which can specify the job input priority, execution priority, and job output priority, as well as the function which permits an operator to control priorities freely.

c) Processing forms

The operating system must be able to support both the local and remote batch processings, TSS (Interactive), CRJE (Conversational Remote Job Entry), online real-time, and online data base.

d) Trouble recovery function

This function performs analysis of and recovery from, a system trouble when it occurs in the CPU, storage devices, or channels. It also detects a trouble and its causes at an early stage so as to shorten the time required for its repair and maintenance.

e) Accounting function

This function maintains the job accounting system, and keeps the information containing CPU, the number of I/O and the number of outputs (line, page) used by jobs, and provides summarized reports to users.

f) Thai characters

In addition to the alphanumerics and special characters, Thai characters are also supported.

g) DB/DC

The operating system must be able to utilize the DB/DC (Data Base System/Data Communication).

h) Resource management

The operating system must offer the function which measures the state of resource usage and can generate reports on it, in order to promote the efficient utilization of the computer system.

i) Data management

The operating system must be able to utilize a data management function and support buffer management and various access methods

j) Utilities

1 Sort/merge
2 Sort/merge by Thai characters
3 Printing of Thai characters
4 Media conversion routine
The operating system must permit transmission, copy, and conversion of data among both the same and different media as shown below, within the scope illustrated in Table 4-3-9.

Table 4-3-9 Media Conversion Routes

INPUT \ OUTPUT	Magnetic Disk	Floppy Disk	Magnetic Tape	Line Printer
Magnetic Disk	o	o	o	o
Floppy Disk	o	o	o	o
Magnetic Tape	o	o	o	o
Computer Card	o	o	o	o

2) Language processing programs

The arrangement of the following language processing programs is required to establish the environment for system development.

a) FORTRAN compiler and execution-time library
(Level: in accordance with JIS FORTRAN standard 7000)
b) COBOL compiler and execution-time library
c) ASSEMBLER or pseudo ASSEMBLER
d) BASIC compiler or BASIC interpreter
e) RPG compiler and execution-time library
f) PL/I compiler and execution-time library
g) PASCAL compiler and execution-time library

3) Application Packages

The following application packages for system's analysis are required to increase the effectiveness of the Poverty Eradication Program.

a) Mathematical library program package

Use: To support the mathematical analysis for conduct the evaluation and planning of the Poverty Eradication Program.

b) Statistical library program package

Use: to support statistical processing carried out for the evaluation of development projects.

c) Linear programming program package

Use: to provide the linear programming method, which is a powerful tool for solving the problem of resource distribution, and for the planning of projects.

d) Time-series analysis program package

Use: To support problems which involve time item in the planning and evaluation of projects.

e) Economic forecast program package

Use: To support an economic forecast method which is a necessary prerequisite for project planning.

f) Scheduling program package

Use: To support scheduling of projects.

g) Simulation program package

Use: To support the techniques to assess the methodology and implementation of project.

Packages : DYNAMO
GPSS
Continuous-system simulation package

h) Information retrieval system program package

Use: To support simple retrieval techniques through the use of information or codes.

i) General purpose data base management package

Use: To support technique for general purpose data base management.

(5) Hardware System

1) Basic Design Policy

The basic design policy of the hardware systems is described below.

- To establish an operating environment in which the software system can operate satisfactorily.
- To take account of the conditions of preparations for computer introduction into Thailand.
- To suit for the condition of telecommunications in Thailand.

2) Operating Environment for the Hardware System

Table 4-3-10 shows the operating environment which is demanded by the systems developed by Thailand and Japan.

3) Scale of the Hardware System

The scale of the hardware system is determined by the operating environment for the hardware system and the specifications of the basic software. Table 4-3-11 shows the scale of the hardware system and the justifications behind it.

4) Specifications of the Hardware System

The configuration of the hardware system, and the specifications of each device are shown in Table 4-3-12.

5) Layout of the Hardware System

The layout of the computer hardware which will be installed at the Information Processing Institute in Thammasat University is illustrated in Figure 4-3-26.

Table 4-3-10 Operating Environment Required for Each Subsystem (1/2)

SUBSYSTEM	FUNCTION	INPUT FREQUENCY	INPUT VOLUME	PROCESSING	OUTPUT
Creating Data Base Subsystem (Thai side)	- Creating data base from the detailed information of proposed projects	- Every year - From the 3rd week of January	- The initial information of the projects (Part of NRD.3) Max 100,000 records x 80 bytes/record - The list of village name (NRD.2A) 50,000 records x 80 bytes/record - The detailed district information (NRD.2B) 246 records x 2,000 bytes/record - The detailed village information (NRD.2C) 50,000 records x 2,160 bytes/record	- Batch processing - Processed in about 3 weeks by the 2nd week of Feburary - File - The initial information of projects: 8 MB - The list of village name, and the detailed information of districts: 5 MB - The detailed information of villages: 108 MB	- The reports of the proposed projects: 7,000 pages - The reports of the data base maintenance: 10,000 pages
Reporting Data Base Subsystem (Thai side)	- Making reports for the related ministries from the information of projects	-	-	- Batch processing - More than 4 times during period from February to September - 3 reports at each time (2 copies/report)	- 3 x 2 x 4 x 7,000 pages
File Structure Conversion Subsystem (Japanese side)	- Converting from the file made in Creating Data Base Subsystem to the file structure for online retrieval	- Every year - From the 2nd week of February	- The detailed information of the projects (NRD.3,4,5, 7) 200,000 records (2 projects x 50,000 villages x 2 forms) x 1,000 bytes/record	- Batch processing - For a week - File - The detailed information of projects: 200MB	- 1,000 pages

Table 4-3-10 Operating Environment Required for Each Subsystem (2/2)

SUBSYSTEM	FUNCTION	INPUT FREQUENCY	INPUT VOLUME	PROCESSING	OUTPUT
Online Retrieval Subsystem (Japanese side)	- Retrieving from local terminals	- Inputting from terminals in the related ministries.	-	- Online processing - At any time, especially from March to September	- For small volume of output, it is printed at terminals - For large volume of output, it is printed at central machine 60 times/year x 8 ministries x 50 pages/time = 24,000 pages
Updating Data Base Subsystem (Japanese side)	- Updating a part of the information of the data base	- Done by the related ministries - Input from local terminals	- The updating information-volume: 1,000 bytes/record x 500 records = 0.5 MB	Remote job entry processing - Editting the input data at local terminals by offline	- The updating reports
Peripheral Service Subsystem (Japanese side)	- Initializing the files and supporting the efficient system operation	- At any time	-	- Batch processing	- Unspecified at present
File Management Subsystem (Japanese side)	- Managing the Data Base physically	- At any time	-	- Online processing	- The data transmitted between CPU and terminals
Terminal Service Subsystem (Japanese side)	- Editting and retrieving the data at the terminals	- From March to September	- The volume of the updating information 1,000 bytes/record x 500 records = 0.5 MB	- Editting and desplaying the data on the terminals	- The data transmitted to CPU
Ongoing Evaluation or Monitoring Subsystem (Thai side)	- Monitoring and Evaluating the ongoing projects	- 3 times/year	- The management information of the ongoing projects (D.314) 100,000 records x (2 projects x 50,000 villages x 2,800 bytes/record	- Batch processing - File - The management information of the projects: about 280 MB	- The evaluation reports: 3 x 8,000 pages
Effect Evaluation Subsystem and Inpact Evaluation Subsystem (Thai side)	- Evaluating the project achievements	- 3 times/year	-	- Batch processing - File - 100,000 records (2 projects x 50,000 villages) x 80 bytes/record	- The evaluation reports 2 x 3 x 8,000 pages

Table 4-3-11 Contents and its Justification of Computer Hardware System (1/4)

ITEM	JUSTIFICATION	NUMBER
CPU	The main part of the Information Processing System for the Poverty Eraductaion Program is to construct the Data Base Management System by online. There are some available operating systems for the construction of this system. Some examples follows. IBM MVS (4341-11 class) FACOM OS IV/F4 (M160 class) NEC ACOS-4 (ACOS 350, 450 class) HITAC VOS-3 (M170 class) The main memory capacity required for these operating systems is shown as follows. Resident area about 2 MB Common area about 1 MB Total 3 MB If the memory capacity required for user area is minimum 1 MB, the total memory capacity of this system will be 4 MB (operating system 3 MB + user area 1 MB = 4 MB) This 4 MB is separated two parts. One part is the resident of operating system, the other is the working area. The working area is shared by common and user area.	Main Memory: 4 MB
Magnetic Disk Drive	- Contents of file volume for this system The detailed information of village (NRD.2C) 108 MB Project data base 200 MB Project monitoring information 280 MB System file 200 MB Work file 150 MB Other data 5 MB Total 943 MB Other data consists of the name list of poverty villages (NRD.2A) and data for poverty indicator presumption (NRD.2B,2C). The volume of system file depends on the spool area. Example of the volume of operating system's system file follows. FACOM OS IV/F4 200 - 500 MB NEC ACOS-4 150 - 300 MB	5 drives

Table 4-3-11 Contents and its Justification of Computer Hardware System (2/4)

ITEM	JUSTIFICATION	NUMBER
	The system file volume required for large scale system is more than 500 MB. Hence, the system file voume of this system has not surplus. - Number of disk unit: $\frac{1000\ MB}{200\ MB/unit}$ = 5 units	
Magnetic Tape Drive	- The auxiliary device for magnetic disk - Three way sort/merge in the Creating Data Base Subsystem 4 - Archive of the data base 1 - Buck up for the data base 1 Total 6 drives	6 drives
Line Printer Unit	- In time of updating the project information by NRD.4,5, and 7, printing 35,000 pages should be done in three or four days. Printing output time Output page: 35,000 pages Number of line/page: 60 lines Print speed: 1,000 lines/min $\frac{35,000 \times 60}{1,000 \times 60}$ = 35 hours Print sheet chainging time Number of sheet: 2,000 sheets/box Number of copy: 4 copies $\frac{35,000}{2,000}$ x 4 = 70 boxes 70 x 5 minutes/box = 6 hours Total 35 + 6 = 41 hours It takes 4 days to print out these reports. Since there are many print outputs except this job, 2 line printers are required for this system. - Thai charactrer prints is needed for officials of the central and rural governments to read these reports.	2 units
Card Reader Unit	- Input for data and programs which already exsists in TU, in order to reduce load of the floppy disk I/O devices.	1 unit

Table 4-3-11 Contents and its Justification of Computer Hardware System (3/4)

ITEM	JUSTIFICATION	NUMBER
Floppy Disk I/O Device	- I/O device for data and programs. - Data and programs of this system is stored in floppy disks through data entry devices.	1 device
Local Terminal	- Correcting data for proposed projects and reproposed projects, and detailed information of village. - Inputting information of activity results of each project and administration data. 1. Summary of input $\frac{\text{13,000 Village's data}}{\text{1,000 Village's data/terminal}} = 13$ 2. System construction and RJE = 2 Total 13 + 2 = 15 terminals	15 terminals
Local Terminal Control Unit	- Controlling Local Terminals	1 unit
Remote Terminal	- Approving projects proposed by related Ministries and offices. NESDB 2 Budget Bureau 1 Ministry of health 1 Ministry of Agriculture 1 Ministry of Interior 1 Ministry of Education 1 Prime Minister's Office 1 Total 8 terminals	8 terminals
Communication Control Unit	- Controlling communication lines and remote terminals.	1 unit
Modem	- 2 modems is required for 1 terminal. Total 2 modems x 8 terminals = 16 modems	16 units
Data Entry Device (Key to Floppy)	- 2 stations/device. - Inputting and correcting data of proposed projects for the Creating Data Base Subsystem should be done in 7 days. Summary of device Input volume : 8,000,000 bytes Input operation time : 6 hours/day Input speed : 100 tuches/min Number of station : 30 stations	15 devices

Table 4-3-11 Contents and its Justification of Computer Hardware System (4/4)

ITEM	JUSTIFICATION	NUMBER
Disk Pack	It takes $\frac{8,000,000}{7 \times 6 \times 60 \times 100 \times 2}$ = 15.8 devcies = 15 devices - System file 5 - Buck up file 5 - Temporal and extensive data file 5 Total 15 packs	15 packs

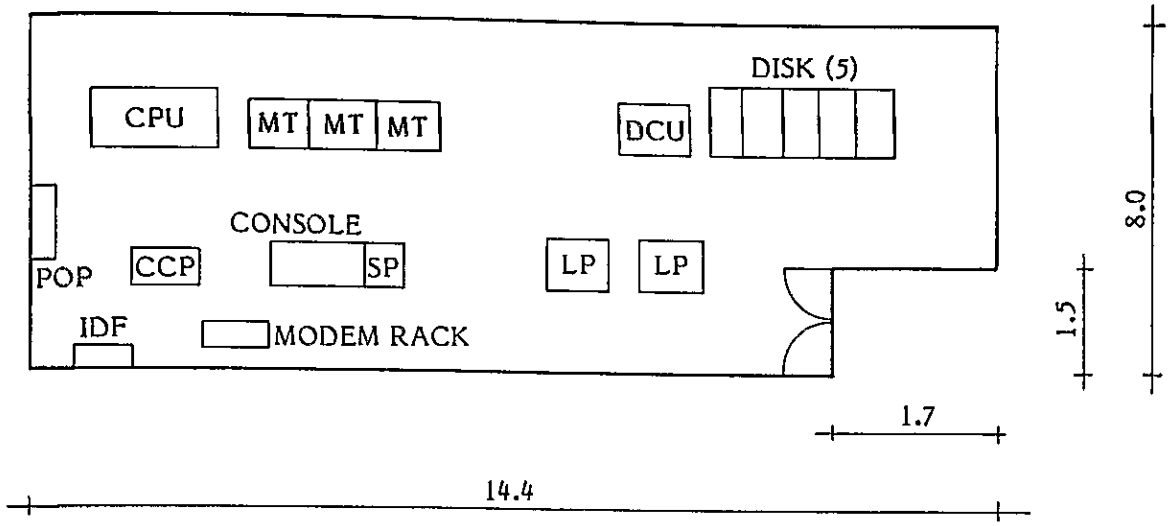
Table 4-3-12 Specification of Hardware System (1/2)

EQUIPMENT	NUMBER	SPECIFICATION
1. CPU Central Processing Unit	1	- Processing performance: at least 0.5 MIPS
I/O Channel	3 units	- Capability to connect 6 channels - Total data transfer rate: at least 3 MB/sec
Main Memory	4 MB	- Cycle time: not more than 600 ns/4 bytes - Single bit error correction. Multiple error detection
2. Operator Console	1	- Display unit: 80 characters x 25 lines - Keyboard: Alphanumeric Key, Function Key - Serial printer for hard copy of log
3. Magnetic Disk Drive	5 drives	- Total storage capacity: 1,000 MB - Storage capacity: 200 MB/spindle - Removable disk drive - Average seek time: not more than 35 ms - Average rotationnal latency: not more than 10ms - Data transfer rate: at least 750 KB/sec
4. Magnetic Disk Control Unit	1 unit	- Capability to control minimum 8 drives
5. Magnetic Tape Drive	6 drives	- Record track: 9 tracks - Record density: 800 BPI/1600 BPI - Data transfer rate: at least 120 KB/sec (1600 BPI)
6. Magnetic Tape Control Unit	1 unit	- Capability to control minimum 8 drives
7. Line Printer Unit	2 units	- Print speed: at least 1,000 lines/min (Alphanumeric, and special character) - Character set: Alphanumeric character, special character, and Thai character - Print position at least 132 characters/line - Capacity of print copy: 5 copies (including original)
8. Card Reader Unit	1 unit	- Card: 80 column card - Reading speed: at least 600 cards/min - Code: Binary code, EBCDIC code

Table 4-3-12 Specification of Hardware System (2/2)

	EQUIPMENT	NUMBER	SPECIFICATION
9.	Floppy Disk I/O Device	1 device	- 2 drives/device - Floppy disk: Single Surface, Dual Surface - Data transfer rate: at least 60 KB/sec (Dual Surface 1 MB)
10.	Local Terminal	15 terminals	- Display: 80 characters x 25 lines - Display character: Alphanumeric character, special character, and Thai character - Serial Printer Character set: Alphanumeric character, special character, and Thai character Print speed: at least 120 characters/sec Print Position: 136 characters/line - 2 floppy drives/terminal - Key board: Alphanumeric character key, special character key, Thai character key, and function key - 2 drives/device - Functions Screen editor function by offline RJE and TSS terminal by online
11.	Local Terminal Control Unit	1 unit	- Capability to control minimum 15 terminals
12.	Remote Terminal	8 terminals	- Communication line: 2400 BPS leased line - Other specification is same as Local Terminal's
13.	Communication Control Unit	1 unit	- Number of line: at least 15 lines (full duplex) - Communication mode: full duplex/half duplex - Applicable line: leased line/public line
14.	Moduler/Demoduler	16 units	- Communication speed: 2400 BPS - Applicable line: leased line (half/full duplex)
15.	Data Entry Device (Key to Floppy)	15 devices	- Display: at least 40 characters x 16 lines - Display character: Alphanumeric character, special character, and Thai character - Key board: Alphanumeric key, special character key, and Thai character key - Screen editor function for data entry - 2 stations/device
16.	Magnetic Disk Pack	15 packs	- 200 MB/pack

Figure 4-3-26 Layout Plan of Computer Room (4th Floor)



(6) Other Necessary Instruments

In order to proceed with the smooth development of the information processing system for poverty eradication, the following items are also required, in addition to the software system, basic software, and the hardware system.

- Devices external to computers (UPS, power distribution board, etc.)
- Articles of computer consumption (magnetic tapes, ink ribbons, etc.)
- Support accessories for information processing (data collection vehicles, visual and audio devices, etc.)

The details of the above items, and the reasons behind their inclusion are shown in Table 4-3-13, 4-3-14, and 4-3-15.

Table 4-3-13 Contents and its Justification of External Equipment

ITEM	JUSTIFICATION	NUMBER
UPS	Uniterruptible Power Supply (capacity 50 KVA) with 1 CVCF unit and 1 Battery (10 minutes) unit, for protection from serious blackout of the unstable commercial power supply in Bangkok.	1 set
Power Distribution Board	For power distribution to the computer system equipments and their protection.	1 board

Table 4-3-14 Contents and its Justification of Computer Consumption Articles

ITEM	JUSTIFICATION	NUMBER
Magnetic Tape	Data media for back up and work area - 2400 ft tape (Full tape) 250 - 1200 ft tape (Half tape) 200 - 600 ft tape (Mini tape) 200	 Full 250 reals Half 200 reals Mini 200 reals
Floppy Disk	Data media for terminals and data entry devices - Remote terminal 8 terminals x 9 sheets = 72 sheets - Local terminal 15 terminals x 12 sheets = 180 sheets - Data entry device 15 devices x 30 sheets = 450 sheets Total 800 sheets	800 sheets
Line Printer Ribbon	1 ribbon/month x 2 units x 12 months = 24 ribbons	24 ribbons
Serial Printer Ribbon	0.3 ribbon/month x 23 terminals x 12 months = 80 ribbons	80 ribbons

Table 4-3-15 Contents and its Justification of Equipments for Efficient Implementation of the Poverty Eradication Program

ITEM	JUSTIFICATION	NUMBER
Land Cruiser	For the survey in rural areas. (4 wheel drives with airconditioner)	1
Audio Visual Equipments	For the survey in rural areas and its lecture. - Color video set (1 camera, 1 deck, and 1 monitor) - Slide projector - Over head projecter - Camera - Cassette tape recorder	 1 1 1 1 2
Public Relation Equipment	For the public relations in rural areas. - Amplifier, microphone, and speaker set for setting up to a vehicle - Portablbe amplifier for serveyor	 1 2
Information Arrangement Equipments	For the efficient management of the rural area information - Microfilm instruments (1 projecter and 1 reader-printer) - Copy machine (with reduction capability) - File cabinet (100 files/cabinet) - Tape cabinet (100 tapes/cabinet) - Disk cabinet (2 packs/cabinet) - Tape carrier - Disk carrier	 1 1 5 8 5 2 1
Equipments for Conditioning Circumstances	For conditioning the circumstances of computer and terminal rooms. - Airconditioner for terminal room (35,000 BTU) - Cleaner for computer room - Automatic recording instrument of the temperature and humidity for computer room	 1 1 1
Information Recording Media	For recording and preserving the survey information of rural areas. - Video tape (for 4 hours) 2,500 villages x 15 minutes - Cassette tape (for 90 minutes) 150 serveys and conferences x 60 minutes - Color film (for 36 sheets) 600 villages x 3 sheets - Color slide (for 36 sheets) 600 villages x 3 sheets	 150 100 50 50

5. PLAN OF THE UNDERTAKING

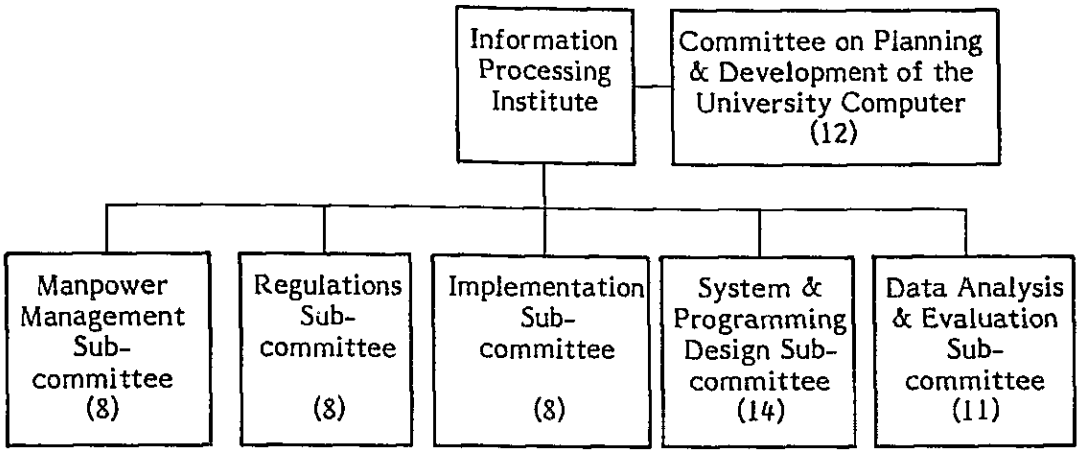
5-1 Implementation Structure

(1) Development Structure of the Information Processing Institute

Thammasat University plays, under the control of the National Economic and Social Development Board (NESDB) (refer to Figure 4-2-1 in the previous chapter), a crucial role in the development of the system and the consolidation of the Information Processing Institute. The University will organize one committee and five subcommittees consisting of forty university staff members in total, as shown in Figure 5-1-1, under the government budget. Table 5-1-1 illustrates the role of each comittee and subcommittees. This structure will be kept in existence during the period of development for the Information Processing Institute and the system (2 or 3 years starting from 1982), and afterwards it will be taken over by the operation structure.

Currently, 14 members out of the forty are engaged in system development, and a few score of students are doing data consolidation as part-time workers. Since the amount of work required for data consolidation (coding of raw data) is gigantic, it is unavoidable for the time being to use part-time student help within the internal management structure. Nevertheless, in order to insure smooth operation of the Information Processing Institute in the future, it may be necessary to make the work of data consolidation independent from this structure or to entrust it to outside companies.

Figure 5-1-1 Development Organization of the Information Processing Institute in Thammsat University



Note (1) ( ) shows staff numbers, including duplication (total 40).

(2) Source: Project Documentation (by TU)

Table 5-1-1 Functions of Each Section in Development Organization of the Information Processing Institute in Thammasat University (1/2)

SECTION	FUNCTIONS
The Committee on Planning and Development of the University Computer	1. Consider an installation of the computer inside the university. 2. Do the planning and development work, in order to encourage the use of computer. 3. Facilitate staff and computer training programs. 4. Determine and process the demand of additional positions through transfer or newly established procedures. In addition, short and long term budget accomodation is made to encourage the use of computer. 5. Determine readjustment of the place and surroundings for the installation of the computer. 6. Study the systems and arrange the manual for the computer.
Manpower Management Subcommittee	1. Indicate qualifications for selecting the staff. 2. Indicate strategies of manpower management to accord with the implementation. 3. Organize positions and training programs. 4. Indicate functions and rewarding methods. 5. Do any task, as assigned by the Committee.

Table 5-1-1 Functions of Each Section in Development Organization of the Information Processing Institute in Thammasat University (2/2)

SECTION	FUNCTIONS
Regulations Subcommittee	1. Provide materials. 2. Request for more staff, as well as budget. 3. Arrange short and long term budget. 4. Organize accounting and finance work. 5. Send the staff out for computer training. 6. Do purchasing, bidding, and recieving. 7. Do any task, as assigned by the Committee.
Implementation Subcommittee	1. Repair or readjust the location appropriately, and estimate the expenses. 2. Control the installation and test the machine. 3. Indicate ways to improve the building. 4. Design for improving the surroundings, as well as required materials. 5. Arrange necessary budget and expenses. 6. Control the construction. 7. Control the installation of the computer. 8. Do any task, as assigned by the Committee.
Systems & Programming Design Subcommittee	1. Determine the master plan. 2. Study and test the system. 3. Determine the specification of the system. 4. Produce the manual of computer use. 5. Cooperate with Data Analysis & Evaluation Subcommittee. 6. Do any task, as assigned by the Committee.
Data Analysis & Evaluation Subcommittee	1. Indicate the wants of different kinds of data in information processing work. 2. Produce questionnaire, as a tool in data collection, by coordinating with Systems & Programming Design Subcommittee, so as to enable the data to be processed by computer. 3. Determine the calculating methods. 4. Arrange the data survey systems and criteria, and the manual of data collection. 5. Do any task, as assigned by the Committee.

Source: Project Documentation (by TU)

(2) Operation Structure of the Information Processing Institute

The policy of the management system of the Information Processing Institute is as follows.

1) The Information Processing Institute shall be managed by Thammasat University under the control of the National Economic and Social Development Board (NESDB).

2) The objective of the work accomplished by the Information Processing Institute established by Thammasat University is to support rural development projects.

3) The computer system equipments as well as programs will belong to Thammasat University. With respect to this, the Government shall be responsible for adjusting its budget and making the necessary allowances (including aid from the Japanese Government) for the equipment. On the other hand, Thammasat University shall be responsible for the consolidation and maintenance of the peripheral equipments (airconditioner, security systems, and so on) necessary for the introduction of computer, as well as the support of the staff members.

4) When an external organization wishes to use information prepared by the Information Processing Institute, it shall be responsible for installing the necessary communication lines and renting them.

5) When a person wishes to utilize rural development information and its processed information in the Information Processing Institute, he shall make the necessary payment for the output paper, data cards, magnetic tapes, and floppy disks he uses.

6) This service shall be provided under the operations of the Internal Administrative Committee appointed by the Council of Thammasat University. During its early stages, representatives of NESDB and the Ministry of Interior shall participate in the Commitee. The Director of the institute shall also act as a member and secretary of the committee.

7) The internal management structure of the Institute shall consist of a Director, 3 divisions (Administrative Service Division, Operation Division, and Systems Division), 6 sections (Administrative Section, Computer Service Section, Academic Service Section, Engineering Section, Machine Control Section, System Management Section, and System Development Section), and the internal organizations and faculties of the University which need the information processing services of the Institute.

The operation structure of the Information Processing Institute is roughly divided into 3 divisions (Figure 5-1-2 and Table 5-1-2). The first is the Administrative Service Division which consists of the Administrative, Computer Service, and Academic Service Sections. The Administrative Section is responsible for general administrative affairs of the Institute including personnel, accounting, and public relations. The Computer Service Section is responsible for receiving applications for computer jobs concerned with processing, data punching, and so on from users. It is also responsible for the adjustment and scheduling of computer processing in conjunction with its overall workplan. It will carry out preparation and consolidation of information with the data for the Poverty Eradication Program. This Computer Service Section also manages the utilization of data input devices and local terminals of the Institute. The Academic Service Section is mainly responsible for computer education and training as well as consultation concerned with user programs.

The second division is the Operation Division consisting of the Engineering and Machine Control Sections. The Engineering Section is responsible for the management of hardware related devices. The Machine Control Section is responsible for computer operation and its daily scheduling. It is also responsible for the management of articles of consumption and media such as paper and magnetic tapes, and also the control of user utilization of tapes.

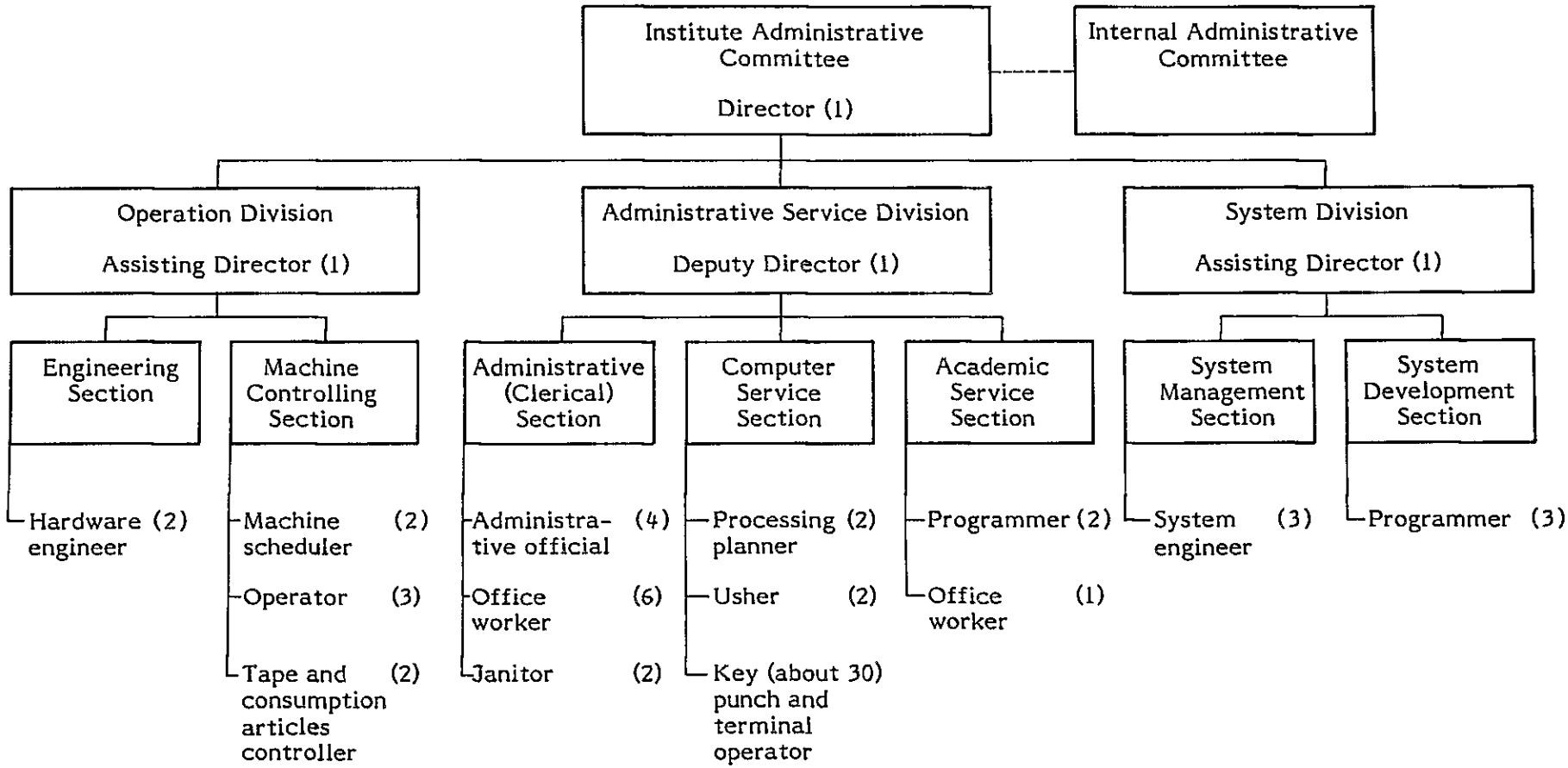
The third division is the Systems Division consisting of the System Management and System Development Sections. The System Management Section is responsible for the management and consolidation of basic sets of software required for computer operation. The System Development Section is responsible for the development and consolidation of general purpose software applications which will meet needs of users, as well as the management of the software system for the Poverty Eradication Program.

Under this operation structure, the Information Processing Institute processes the data gotten from rural areas via the Community Development Head Offices of the related Ministries, and performs the works on aggregating data, printing out evaluation reports, and so forth with making possible of information retrieval at the display stations in the Ministries including NESDB (refer to Figure 4-2-2 in the previous chapter).

In order to proceed with personnel assignments for the staff members of the Information Processing Institute in a step-by-step manner, the minimum sections which have to be consolidated in the first step are the Computer Service, Engineering, Machine Control, and System Management Sections. It may be advisable that, at an earlier stage, the organizational structure of the Information Processing Institute which is to be consolidated receive step by step support from the aforementioned development structure as well as from the internal organization of Thammasat University.

About 30 persons are required for the input and correction of data related to the Poverty Eradication Program in order to make utmost use of the local terminals and data input devices in the Institute. It may be also advisable therefore to manage these personnel under an organization (for instance, NESDB) independent from this structure of the Institute.

Figure 5-1-2 Operation Organization of the Information Processing Institute in Thammasat University



Note (1) ( ) shows staff numbers (total 38 + puncher about 30).

(2) Source : Project Documentation (by TU)

Table 5-1-2 Functions of Each Section in Operation Organization of the Information Processing Institute in Thammasat University (1/2)

SECTION		FUNCTIONS
Director		1. Assume command on the adminstration of the Institute. 2. Lay down projects for the expansion of the Institute. 3. Introduce the budget to be approved by the Institute committee.
Internal Administrative Committee (members: - Director as chairman - Deputy director - Assistant directors - Section heads - Representatives of the University - Administrative section head as secretary)		1. Lay down Institute administering policy to be in line with the objectives. 2. Set up the Institute's administrative regulations. 3. Be in charge of the budget and financial work. 4. Plan the computer technology promotion and the efficient use of the computer. 5. Consider the performance of the staff and give suggestions on their appointments to appropriate academic positions. 6. Give advice and opinion to the director.
Operation Division	Engineering Section (2 workers)	1. Determine the specification of the instruments and adjust their installations. 2. Administrate the hardware systems. 3. Administrate the peripheral instruments.
	Machine Control Section (7 workers)	1. Control the computer and tape operation. 2. Prepare reports and various statistics relating to the computer and their use. 3. Schedule the computer operation. 4. Control consumption articles and media.
Administrative Service Division	Administrative Section (12 workers)	1. Deal with public relations. 2. Deal with accounting. 3. Deal with manpower management. 4. Deal with purchasing materials. 5. Coordinate external office.
	Computer Service Section (4 workers + about 30 punchers)	1. Deal with inquiry work (program, data punch, and so on). 2. Make plan of job processing. 3. Prepare data for the Poverty Eradication Program. 4. Administrate the use of the local terminals and the data input devices.
	Academic Service Section (3 workers)	1. Give advice to general public or programming. 2. Provide computer teaching and training. 3. Collect and evaluate informations on the usage of the computer.

Table 5-1-2 Functions of Each Section in Operation Organization of the Information Processing Institute in Thammasat University (2/2)

SECTION		FUNCTIONS
Systems Division	System Management Section (3 workers)	1. Administrate the operating system. 2. Make plan of the computer resources allocation. 3. Administrate the general purpose application programs.
	System Development Section (3 workers)	1. Develop the general purpose application programs. 2. Control the software systems for the Poverty Eradication Program.

Source: Project Documentation (by TU)

5-2 Training Program for the Staff

The basic training program required for efficient operation of the computer system will include the following courses:

(1) Course A

Trainee: Operaters and hardware related managers: seven

Duration: 1 week. After the course, on-the-job training is conducted.

Contents: Operating system, system basics, and manipulation of operating system

(2) Course B

Trainee: System engineers and operation managers: five

Duration: 4 weeks

Contents: General view of operating system, various cotrol programs, assembler language, and data communication system

(3) Course C

Trainee: Professional programmers: five

Duration: 1 week

Contents: Basics of system operation, usage of operating system, and manipulation of terminals

(4) Course D

Trainee	Punchers:	approximately thirty
Duration	1 week	
Contents	Manipulation of data input devices	

5-3 Work Assignment to Thailand and Japan

In the "Project for Construction of the Information Processing System for the Poverty Eradication Program", the work assignment to Thailand and Japan is shown respectively in Table 5-3-1. The table can be summarized making Japan responsible for the consolidation of the basic part of the Project and based on the work done by Japan, Thailand will be made responsible for the environmental consolidation required for efficient implementation and operation of the Project, as well as for application and evolution of the Project.

Table 5-3-1 Work Assignment to Thailand and Japan

ITEM	THAI SIDE	JAPANESE SIDE
Computer hardware	Arrange the computer site (building, airconditioner, communication, and so on).	Provide the computer hardware system (computer hardware and the peripheral equipments).
Computer software	Progress the Data Base Management System and develop the utility programs for it.	Develop the data base management system by online. Provide the general purpose software applications.
Others	Establish the Information Processing Institute (organization, staff members, budget, and so on).	Provide another equipments required for the efficient implementation of the Poverty Eradication Program.

5-4 Implementation Schedule

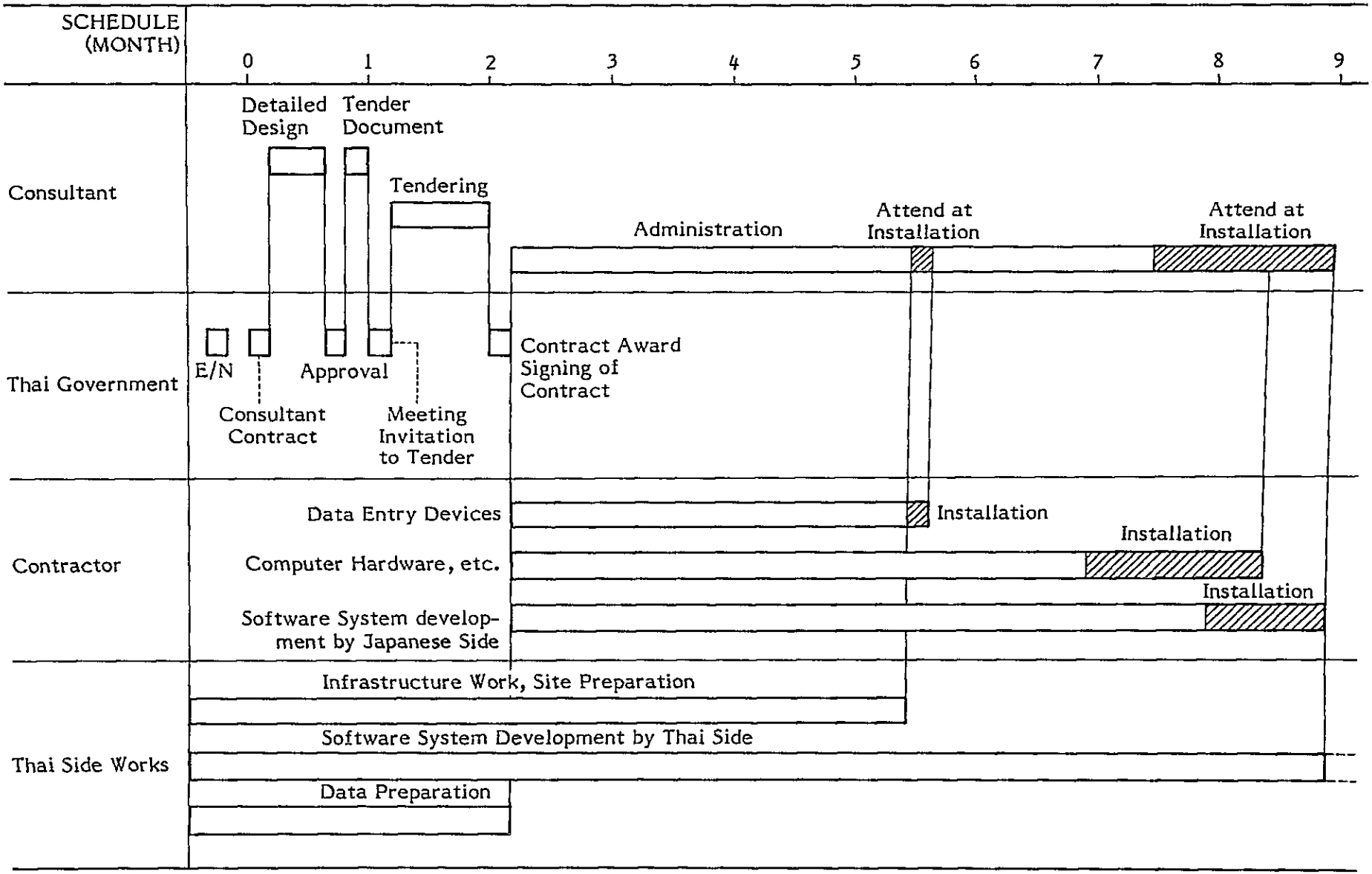
The implementation of the Project shall be promoted under the schedule shown in Table 5-4-1 in order to start the operation of the information processing system in October, 1983 (start of the new fiscal year in Thailand).

Preparation of facilities for the computer installation such as wiring of electric supply, lifting of floor board, installation of airconditioner and so forth shall be completed by the first computer installation.

Preparation of data shall be completed in the form of magnetic tapes before the Japanese side starts software development, and data samples shall be delivered to Japan. The data preparation shall be completed between October and early February every year.

System development shall be continued by the Thai side even after the start of the information processing system, and efforts to expand, consolidate, and improve the system shall also be continued.

Table 5-4-1 Implementation Schedule After E/N



5-5 Budget Plan

Table 5-5-1 shows the funds which have been received and which are to be received.

The consolidation of the building for computer installation has almost been completed in this fiscal year, 1982. The fiscal year of 1983 will be the initial year of operation of the Information Processing Institute. Appropriate funds have already been secured to meet the schedule.

As for overseas grant aids, the Project received 3 million bahts for system development from the International Bank for Reconstruction and Development, and 0.65 million bahts for data analysis from the United Nations Development Program as technical aids.

In addition, funds for personnel salaries corresponding to 60 key punchers (2 shift operation) and 20 operators for local terminals (2 shift operation) have been secured in other accounting.

The planned budget after FY 1984 (shown in Table 5-5-1) is judged appropriate for the efficient operation of the Information Processing Institute from the number of staffs, the capacity of facilities, the way of operation and so on. It is expected for the operation of the Institute to take annually about 6 million bahts.

Table 5-5-1 Budget Plan

(Baht)

EXPENSE ITEM	ACTUAL RESULTS			PLAN		
	1981	1982	1983	1984	1985	1986
Salaries	28,620	-	261,420 (13 staffs)	1,271,460	1,451,700	1,530,600
Wages	12,960	38,340	174,870 (12 staffs)	289,580	291,140	292,700
Ordinary expenses	-	30,000	290,000	352,000	435,000	530,000
Utilities	-	7,500	500,000	600,000	720,000	860,000
Consumption articles	-	448,000	1,052,000	1,600,200	1,591,800	1,516,600
Computer maintenance	-	-	1,150,000	1,200,000	1,200,000	1,200,000
Enduarable articles	46,400	667,720	877,210	40,200	19,800	16,600
Construction	-	2,354,539	-	-	-	-
Subsidies	-	-	-	20,000	20,000	20,000
Others	-	-	-	390,000	420,000	450,000
Total	87,980	3,546,099	4,305,500	5,763,440	6,149,440	6,416,500
Financial aid, etc.	-	-	3,000,000 (for system development from IBRD) 650,000 (for data analysis from UNDP)	-	-	-

Note (1) IBRD = International Bank for Reconstruction and Development
UNDP = United Nations Development Program

(2) Source : Thammasat University

6. EVALUATION OF THE PROJECT

The social and economic evaluation by the implementation of the project for construction of the information processing system for the Poverty Eradication Program is shown as follows:

(1) For the Poverty Eradication Program, which is the highest-priority program within the Fifth National Economic and Social Development Plan of Thailand, the information processing system which is the aim of the project for construction of the information processing system for poverty eradication will allow for prompt and accurate understanding of the poverty conditions in rural areas, strict administration of development project, and quantitative evaluation of the effects of the development project. This, in turn, will promote efficient distribution of the national budget and prompt and objective policy making. Thus, this Project will contribute greatly to the further progress of Thailand.

That is,

1) it enables efficient and impartial allocation of social services and establishes a firm rural living foundation with restraining enlargement of urban area.
2) it prevents from waste of limited national resources and enables the well-planned control and efficient utilization.
3) it enables evaluation and consideration on plural information and promotes enforcement of systematized and unified efficient policy, as a result of accurate and quick management of a large volume of data in the process of policy making.
4) it smooths exchange of information among various governmental agencies and promotes mutual role assignment and mutual cooperative relationship effectively.
5) in the process of development of the information processing system, it raises technical level of computer utilization and promotes rise of research and education level in systems engineering, social science and political science through the

research on the rural poverty indicator, the project evaluation and so on.

(2) Thailand has already started the preparation work for the implementation of this Project. 1) Data collection is under way (Data collection for FY1982 has already been completed). 2) The building for the installation of the computer is almost ready after its remodeling. 3) The structure for the implementation has already been clarified. 4) Specific concepts of the computer system, though not yet completely established, are ready to serve as basic foundations. 5) The training of the staff members is partly under way. Thus, Thailand is enhancing this Project by means of its thorough preparation. From the above, it was concluded that the implementation of this Project is quite feasible.

(3) The technical level of the local staff members engaged in system development, at this stage, is not necessarily high due to their lack of experience (Thammasat University does not have a computer). They have not yet reached the point where they can do the whole system development by themselves. Nevertheless, they are capable of handling applications and carrying out system evolution. Therefore, it can be concluded that as long as the Japanese side carries out the basic aspects of the system development, the local staff are quite capable of performing evolution and expansion of the system, as well as long-term operation.

(4) An annual budget more than approximately 6 million bahts is required for the maintenance and operation of the Information Processing Institute. The national budgetary decisions in the past were inefficient because the decisions have been made intuitively. Now, effective utilization of the system will allow the Government for efficient implementation of the Poverty Eradication Program which covers 50,000 villages. Thus, the benefits which will be brought about by the system are inmeasurable in comparison with the investment required for it.

(5) This system aims to manage information for poverty eradication but the functional structure is one that performs plurally the making and management of a plan. Therefore, this system has a development potentiality to a general information management system for not only the Poverty Eradication Program but also various fields of administration. In the future, it is expected that, as it were, the Planning and Management System for Administration, which handles wide-ranging information covering the whole Thailand, can be developed and evolved based on the structure of this system.

7. CONCLUSIONS AND SUGGESTIONS

As a result of consideration of the implementation period and method of the Poverty Eradication Program, the information contents and volume for this Program, the present technological level in the Thai side, and so on, it was concluded that the contents of this basic design on the construction of the information processing system for the Program satisfied those aspects neither too much nor too little.

The following suggestions are presented to promote more effective and constructive utilization of the computer system in the future.

(1) Study and develop a method for effective utilization of the system by inviting academic leaders from the fields of computer systems and economic analysis to the Institute.

(2) Promote research on the methodology of data evaluation and analysis and develop a system which actively supports the process of policy decision-making.

(3) Enhance the general utilization of data retrieval services by governmental agencies and try to obtain for people a better understanding about the effects of the system and to keep the system working on a permanent basis.

(4) This system suffers from a bottle neck in that it has to handle an enormous amount of data. Therefore, it is necessary to carry out data collection and accumulation of information in the form of computer data efficiently in a short period of time. For this reason, it is necessary to improve and simplify data forms in such a manner as to improve computer processing, and to set up an independent and reliable organization which handles data work.

(5) Proceed with expansion and consolidation of the information processing system by dividing the system into small parts (modularization), and

promoting consolidation of the specification documents so as to avoid redundant development efforts.

(6) Secure a sufficient budget for maintenance of the computer hardware.

(7) Promote evolution to a general purpose data base management system once all the forms of data processing are established. This should be done to achieve efficient management and operation of data, to improve data maneuvability, and to expand system functions, all of which will result in expansion and promotion of the use of the system as well as the data.

(8) Give some thought to work incentives for the staff members of the Information Processing Institute in order to keep them at the Institute.