REPUBLIC OF INDONESIA
MINISTRY OF AGRICULTURE

A Planning Guidline For The Regional Agricultural Development

SUBJECT AND DRILL BOOK FOR THE REGIONAL PLANNER

JUNE 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN CITY PLANNING

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VOLUME ONE

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VOLUME ONE

Preface

Upon the request of the Government of Republic of Indonesia, the Government of Japan has cooperated with the formulation of the South Sulawesi Regional Agricultural Development Plan.

In order to provide the above-mentioned cooperation, Japan International Cooperation Agency dispatched five long-term specialists and twenty-one short-term specialists to Indonesia and the formulation of the program was completed in June, 1979.

- Purpose

  This project, with a view of contributing to promotion of regional agriculture, is intended to make over-all review of the plans for the development of Agriculture in the Province of South Sulawesi, to give advisory guidances onthem, to possibly improve methods and techniques of planning for the development of regional agriculture and thereby to improve the planning capabilities of the officials in charge.

- Scope of activities

  — Survey analysis concerning agriculture in the Province of South Sulawesi.
  — Review of the Regional Development Plan formulated by the BAPPEDA and of other existing projects, and recommendations thereon.
  — Drawing-up of sector plans in conformity with the Plan mentioned above paragraph.
  — Drawing-up of the implementation plans including project preparation and feasibility study for agricultural develpment projects in certain regencies in conformity with the said plans.

Of the purpose and the scope of activities, the point which was especially emphasized and valued was that the cooperation was provided not in the form of formulating the master plan and the implementation plan for a development project for a specific area based on the master plan but with the aim to improve the method and techniques of formulating plans and also to increase the planning capability of planners.

In other words, the cooperation was carried out as what might be described as a manpower project to increase the technical capability of Indonesian planners with Japanese specialists giving them necessary advices, recommendations and support to help them formulate their own plan.

On the basis of the above-mentioned background, the report was intended,

- To serve as a technical guide to the formulation of a regional agricultural development planning; and
- To contribute to the improvement in the level of planning techniques.

Accordingly, this report has been compiled as a reference guidebook for administrators (particularly those technical planners concerned with local government) who will be engaged in future planning and also as teaching material for training.

The Japanese Government hopes that this report will contribute to the improvement in the technical level of Indonesian planning officers.

Finally, our sincere thanks are due to the Indonesian officials listed below and other concerned for their cooperation in compiling this report.

Drs. Ir. A.T. Birowo
Director of the Bureau of Planning,
Ministry of Agriculture

Mr. A.R. Malaka
Chief of the BAPPEDA of South Sulawesi

Drs. Djoko Soejatno
Chief of the South Sulawesi Regional Office,
Ministry of Agriculture

June, 1979

Shoji Kanatsu
Director of the Agricultural Development
Cooperation Department,
Japan International Cooperation Agency

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Introduction

1. Record of the Studies

In order to complete the compilation of a report in accordance with the purpose and objectives of its application set down by the Preface, the following works were carried out:

1-1. First Field Survey

A field survey was conducted for about three weeks from December 5 to 25, 1978, by Hiroshi Matsuo (Regional planning specialist). The purpose of the survey was to find out what manual of planning techniques was required for regional planners engaged in provincial administration of Indonesia, to collect information and data and also to hold a series of consultations with the Project Team for the purpose of compiling the report.

The results of the survey are contained in the draft report given below.

1-2. Submission of the Draft Report (dated December 25)

This draft report was submitted to JICA and other related authorities as an outline of the final report. Accordingly, it was in general composed in the same way as the final report, though the contents in concrete terms were left to the latter, and the center of further studies was to be placed on the establishment of the target under the master plan and the method of developing the means to achieve it.

1-3. Second Field Survey

Another field survey was conducted for about three weeks from March 1 to 21, 1979, by Hiroshi Matsuo (Regional planning specialist) and Sachihiko Kobori (Economist).

The purpose of the survey was to collect supplementary information on the spot necessary for the compilation of the present report and to clarify the method of formulating the plan suitable for the area concerned.

As for the main spot works, the First Field Survey was augmented and a case of a general regional development project (The Integrated Development Plan of The Kilimanjaro Region, Tanzania, JICA project prepared in 1977) was presented with slides at the Third Seminar.

Among the results obtained were the report on the master plan for the province under the ATA-140 Cooperation Project, planning information available at BAPPEDA and the Provincial Government and other related data. In addition, through the seminar and the consultations with the team, the technical level and the basic approach of the Indonesian counterpart to the project were also ascertained.

Further, through the evaluation of the project by the accompanying evaluation team (four members led by Mr. Nobuharu Sasano), the necessity of the compilation of teaching material for classroom training was ascertained, clarifying one aspect of the nature of this report.

1-4. Consultation with JICA Staff

As a result of a series of consultations with Mr. Nobuharu Sasano (National Research Institute of Agricultural Engineering), Mr. Terushi Egashira (International cooperation Division, International Affairs Department, MAFF) Mr. Mitsuhiko Ota, Division of Agricultural Development Cooperation, JICA (members of the aforementioned evaluation team) and other related persons, it was decided to stress the viewpoint from agricultural operations in the present report and to augment the method of planning formulation aimed at the improvement in agricultural income.

1-5. Submission of the Present Report (dated June 30)

Submission of the present report concludes the present study.

2. Purpose of the Study

The prupose of the present study is to understand the master plan formulated under the ATA-140 Cooperation Project and existing related plans and to prepare a report which may be used as a guide to increase the planning capacity of regional planners engaged in provincial administration of Indonesia, who are to formulate a more intensified master plan in future under various conditions concerning the formulation of the project for the area concerned.

Accordingly, the purpose of the study was set as to clarify the four points given below.

2-1. Basic Consideration for Plan Making

In order to indicate tasks concerning the basic question of what is in fact planning, definition of planning, conditioning of planning, criterion of evaluation of planning and other topics, basic consideration to planning are to be sorted out.

2-2. Methods of Planning

In order to indicate tasks concerning the method of formulating a master plan, contents of planning, planning procedure, planning process and other topics are to be taken up to sort out information required for planning, contents of achievements, basic approaches, cases, etc.

2-3. Planning Techniques

In order to indicate the question of what planning techniques are necessary for master planning, several important planning techniques are to be taken up to sort out the definition, function, method, examples and drills for each technique.

2-4. Planning Data and Information

In order to find out how much data are prepared to be fed to master planning for South Sulawesi at the present juncture, publications of related public organs, maps, scope of the development project under PELITA II and related projects obtained by the survey are to be sorted out.

3. Findings and Approaches

Based on the two field surveys, consultations with the project team (Leader Setsuzo Kikkawa, Japanese speicalist team and the Indonesian counterpart) and JICA staff, the following approach was selected to achieve the objectives given under 2. Purpose of the study.

3-1. To Present Themes for Increasing Planning Capacity to Respond Promptly to Various Problems Arising at the Time of Planning

It is important that each regional planner take part from an integrated point of view as well as from each specialist field.

As for the guides to sectional and specialized planning, there are many which may be referred to; attempts were made in this report to refer to as many references as possible.

The present report is intended to serve as a guide to integrated planning and adjustments necessary in various sections.

3-2. To Present Themes Appropriate for Components of BAPPEDA which Is Responsible for Integrated Adjustments and Final Arrangements of Various Provincial Projects

Agricultural sector in South Sulawesi consists of 1) Food crops; 2) Estate Crops; 3) Fishery; 4) Animal Husbandry; and 5) Forestry. When a development project covering the entire province is formulated, it is to correspond to planning techniques of an appropriate section corresponding to the above-mentioned sub-sector. At the same time, it is to correspond to the field of planning under BAPPEDA responsible for the PELITA project.

The present report is to be arranged as a guide to the three fields of BAPPEDA planning to be described later: 1) Economy and Finance; 2) Social and Political and 3) Physical and Land Use.

3-3. To Present Themes so that It May be Used as A Manual or as A Textbook

This report is to be arranged in such a way that regional planners engaged in the provincial administration of South Sulawesi may use it for quick reference in their planning and that all planners may use it as a textbook to maintain a certain level in their technical capacity.

4. Summary of the Study

The contents of the present study may be outlined for each chapter as below.

4-1. To Gain the Basic Consideration for Plan Making

In Chapter I, definition of planning as to what kind of plan is to be formulated was introducted. In other words, Who, For whom, Why, When, Where and What were ascertained. Then, conditioning of planning, or the creation of conditions for legislation, is to be carried out, sorting out the purpose, scope, procedure and steps. Finally, the criterion of a good plan was introduced.

4-2. To Formulate A Master Plan

In Chapter II, the procedure and contents of planning were divided into four units, and themes were presented concerning the method for each unit such as those given below.

1) Finding of problems;
2) The target of development is to be set;
3) The strategy of development is to be determined;
4) Development projects are to be extracted.

The basic approach to the above-mentioned themes, necessary data, contents of achievements, items of studies and the process were sorted out.

As for 2) The method of setting the development target and 3) The method of formulating the development strategy, explanations were given with actual examples.

4-3. Study of Various Planning Techniques as Tools to Be Used at the Time of Planning

According to the planning procedure, processing and analysis of survey results and data, forecast, various models and basic planning techniques deemed necessary for the evaluation of effects were compiled according to a certain style (explanation of the meaning of each technique, capacity and method, introduction to examples, drills, and reference books) and the contents were outlined in a simple form.

4-4. To Be Useful for Future Studies

Out of the data available at present for the area concerned, those data obtained by the survey, related data (issued by the related government agencies), maps (topographic, land use, etc. of 1/2,500,000–25,000) and existing projects (contents of the projects and related plans) were arranged as a table.

5. How to Use and Read This Report

The present report consists of three volumes: the one containing the Preface, Introduction, Chapters I and II; the volume two Chapter III; and the volume three Chapter IV.

The volume one is arranged in book form and themes develop with chapters. The volume two is arranged in card form so that it may be taken off if necessary. It is also possible to add new planning techniques. The volume three is arranged in note form for possible note-taking.

Further, since the editional policy for the present report placed the emphasis on Subjects and Drills to regional planners, each chapter is arranged, as the table below shows, to show how the themes given in the report may be used by the teacher and the trainee.

	Trainee	Shown in this Report	Trainer
Chapter I *Basic Consideration* for Plan Making	Reading/ *Questions*/ Answers selected	Guide	Hints to be provided Study of the principle of planning
Chapter II Methods for Planning	Reading/ Comprehension/	Commentary on outline (examples given)	Methodology to be developed. Presentation of other methods
Chapter III Planning	Reading/ Comprehension/ Questions Drills	Commentary on summary *Cases* Exercises	Study and summary of *other* techniques
Chapter IV Useful Notebook for Planning	Arrangement/Note-taking	Arranged table	Presentation of a new arranged table

This report uses the reference system for quick and easy reference. Denotation of codes adopted from the playing cards given in Chapter III as a sidenote is as below.

- ♠ *Spade:* Reference within the same chapter.
- ♣ Clover: Reference to other chapters such as I, II and IV' The code is followed by the heading of the appropriate chapter.
- ◆ Diamond: Difficult technical terms and special terms are explained.
- ♥ Heart: Reference given for further reading and understanding regarding each technique.

Chapter I
Basic Consideration for Plan Making

This chapter is to explain about the three subjects given below which should be given basic consideration in formulating a plan before the description of actual planning techniques from Chapter II onward.

1) What kind of plan is to be formulated?;
2) What conditions are to be created for making the plan?;
3) What is in fact a good plan?

The first subject as to what kind of plan is to be formulated is definition of planning. Several definitions employed in agricultural development plans are introduced here as hints; they are presented to provide the framework for defining the plan concerned.

The second subject as to what conditions are to be created is to clarify the conditions of formulation facing what is about to be planned. Several methods of setting conditions for agricultural development plans are introduced here as hints to provide the framework for setting conditions of the present planning

The third subject as to what is a good plan is to ascertain the criterion of evaluation to be applied to the planned project. Several criteria of evaluation for master plans are presented here as hints to provide the framework for setting the criterion of evaluation to be applied to the present project.

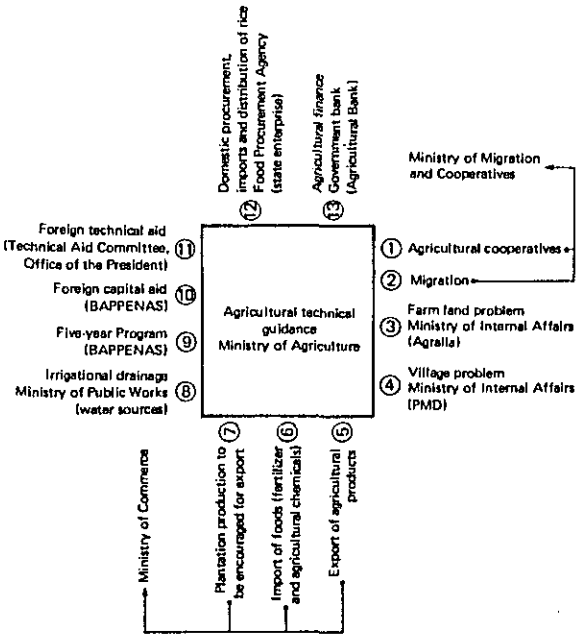
1. What Kind of Plan is to be Formulated?

In the narrow sense, planning for promotion of the agricultural production of a region means thinking of ways to improve the agricultural production of the region through study of agricultural land use, supply and demand with respect to water supply for agricultural production purposes, production technology, farm management structure, labor and income distribution, production materials, product maketing, and farmer organization.

A plan may be defined through the process of ascertaining what the plan is faced with, e.g., Why, Who, For Whom, When and Where.

Below are four ways of thinking which may be useful in defining the South Sulawesi Regional Agricultural Development Planning in Indonesia, followed by the framework of definition using the concepts of Why, Who, When, Where, What and How.

1) The problems that arise in development planning are inseparable from the various phenomena involved and cannot be solved merely with planning in a single sector or field. The following figure indicates which public entities are in charge of which of the various planning tasks involved in agricultural development. As one can see from it, regional development planning involves many fields and many government agencies.



2) With change in recent years in basic thinking regarding agricultural development, it has become necessary to incorporate the agricultural community in such planning as a very important element. In other words, in addition to the basic tasks of increasing agricultural production and raising agricultural income through improvement of agricultural technology, importance has come to be attached to such diversified efforts as increasing employment opportunities in rural communities, promotion of industries in the region economically and socially related to agriculture, and improvement of the living environment of rural communities and the lives of the people in them. The following is a summary of the recommendations regarding comprehensive rural development policy and systems that were made at a meeting of FAO experts in Jakarta, Indonesia, in December 1975.

"The general purpose of comprehensive rural development planning is to make the people in rural communities, and particularly the poorer people, aware of their potential energy and capability, motivate them in the direction of improvement of the quality of their lives for both their own sake and the sake of society as a whole, and to organize them and increase their practical power. More specific goals are i. raising of production capability in various rural sectors through more efficient use of production factors, particularly human resources, ii. guaranteeing of fair income distribution and more employment opportunities, iii. provision of better social, economic, and physical substructure in rural areas for the benefit of the majority of the people in them, and iv. increasing the political and administrative influence of rural people by having them participate more widely in decision making and the activities of local society."

3) Repelita III represents a major step in the direction of such development goals in that it puts greater stress on social welfare than past development plans. The main goals of Repelita II and Repelita III are listed below. As one can see, Pelita II aimed for improvement of the standard of living and the consolidation of a strong foundation for subsequent development, and Pelita III aims at improvement of the technological level and welfare of the people and greater equity.

- Repelita II Goals

  Improvement of the standard of living and the welfare of all the people and building of a strong foundation for subsequent development. Increase of employment opportunities.
  Increase of enterprise opportunities.
  Equitable distribution of national income and the fruits of development among different social strata and different areas of the country. Provision and improvement of social facilities.

- Repelita III Goals

  Besides the above five items, stategic goals, in eight areas, including basic needs such as food, housing, and clothing, education, medical care, income distribution, employment opportunities, and participation of residents in development, all for the purpose of improving the technical skills and welfare of the people.

4) The growing significance and role of the development of South Sulawesi province.

In Repelita II this province was classified by BAPPENAS as Block VIII of Zone D and given ample opportunity for development as a food production base of eastern Indonesia and its capital Ujung Pandang as an economic and social and cultural center. Furthermore, on the basis of a realization that development during Repelita was insufficient, much is expected during the period covered by Repelita in the way of the province's development as a priority area from all angles, including economic development, with the emphasis on agricultural production and agriculture-related industries, trade, culture, and society, and for this purpose a large number of comprehensive development projects and plans have been formulated on the basis, among other factors, of foreign technical and economic assistance.

1-1. Why Formulate Regional Development Planning?

Regional agricultural development plans are for different purposes and are differently motivated according to the region and the target year. In any case, however, each has its particular goals and particular applications. The most important start in such planning is that of narrowing down and defining such goals.

The following items can be listed as those generally included among such planning goals and applications. Which ones apply in the case of the plan that you are involved with now? Try selecting and weighting them.

1) Planning Goals

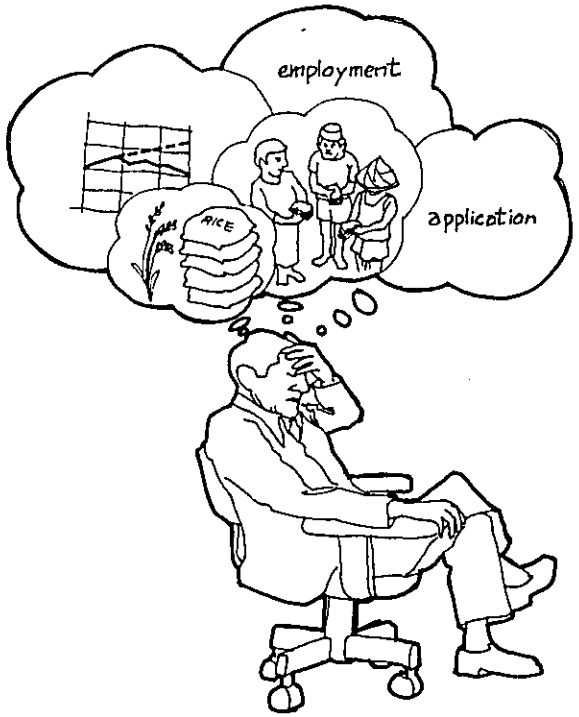
- Increasing agricultural production (for instance, increasing the rice production of the entire province by 20%).
- Increasing agricultural income (for instance, to the average level for other industries).
- Providing more employment opportunities in agriculture (for instance, reducing unemployment among agricultural workers by 50%).
- Greater equitability of income and employment between different areas, sectors, and income levels (for instance, raising the income of those with less than one-third of the average agricultural income to near the average).
- Improvement of social welfare services (for instance, raising the nutritional intake in the province to the level of some other province which is rather high).

2) Plan Applications

- As administrative guidelines for long-term agricultural development (for instance, explanatory literature for Repelita).
- Materials for internal adjustment between different agricultural sectors (for instance, land use adjustment between fields and fish ponds).
- For comprehensive adjustment with other sectors than agriculture (for instance, migration and water resource development).
- For adjustment with the central government (for instance, smooth impelementation of development requests from the central government).
- To have the opinions of rural people better reflected (for instance, getting the consensus and cooperation of those who will benefit in the project area).
- For relating particular programs and projects more to one another (for instance, putting national projects and foreign assistance projects or provincial and county projects in a single framework).
- For systematic guidance and control of private capital.
- For coordination with lower administrative levels such as kabupaten, kecamatan, and desa (for instance, notification of provincial plans).
- For establishment of planning administrative system (for instance, definition of planning data control systems, i.e., data banking).

3) Hints

- The above items are strongly related to one another, usually forming a multi-purpose mix.
- For ease of planning, however, goals should be limited as far as possible.
- It is also vital that you clearly indicate the particular standpoint from which you are planning.



1-2 Who Will Be Involved in the Planning?

Since, as we have already seen, planning usually consists of a multi-purpose mix, it is necessary to adjust the interests of many different people and groups involved in the process and obtain consensuses with respect to many matters. The three main categories of those involved, however, are: 1) the entiry requesting the planning, 2) those who are to be affected by the planning, and 3) the planners themselves. The first step in planning is therefore to identify who belongs in which category.

The following are examples of who usually falls in each of these categories. Which ones apply in the case of the plan you are now working on? Try selecting and weighting them.

1) Entity Requesting the Planning

The Ministry of Agriculture of the central government or a multi-ministry group (the Bureau of Planning and the Secretariat-General of the Ministry of Agriculture in the case of South Sulawesi R.A.D.P. ATA-140 and these agencies plus the Ministry of Manpower and the Ministry of Immigration and Cooperatives in the case of East Kalimantan TADP PTA-46/ATA-140.

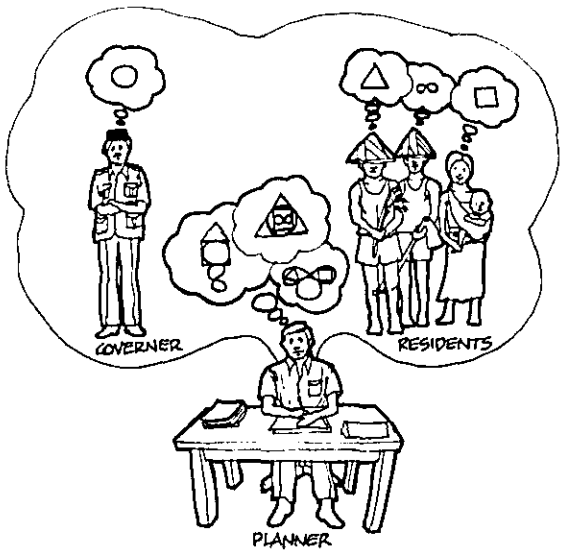
- The agricultural sector alone or a number of sectors of the provincial government.
- Combination of the above two or some other combination.
- Others

2) Those Affected by the Planning

- All people in the province engaged in agriculture, forestry, fishing, or livestock breading or all of the residents of the province.
- Residents of particular areas or particular income strata.
- Others

3) Hints

- What is meant by the "entity requesting the planning" is the public agency in charge of the particular field covered by the plan and which is responsible for the plan and for making policy decisions concerning it during the planning process.
- What is meant by "those affected by the planning" is the residents of the area covered by it, or those who directly or indirectly benefit from or are adversely affecty by it.
- What is meant by '.the planners themselves'. is those who are assigned the task of doing the concrete work of the planning from a neutral standpoint, taking into account both the wishes of the public entities in charge and the views of those who will be affected by the planning.
- Depending on the kind of plan that it is, there are cases where the public agency in charge will itself do the actual planning work. In such cases, however, it is important that a clear distinction be made between policy decisions such as selection of one of two alternatives and the formulation of alternatives from which to choose.



1-3 Where Is the Area Involved?

Physically speaking, if the project is a provincial one, the entire province is expected to be the projected area, or the entire county if it is a county project. However, when the location of the projected area, e.g., its socio-economic position or its historical and geographical position, is examined, the projected area will be extended; conversely, it will be reduced when the structural and areal contents of the area are examined.

Accordingly, when the projected area is defined, three viewpoints may be considered.

1) The extent of the object when denotative positioning is to be made.

2) Physical extent.

3) The extent of the object when connotative positioning is to be made.

The diagram below shows the projected area of the plan to be formulated in diagram form. Which one is the appropriate one? Make an attempt in selection or weighting.

1-4 When Is the Target Year?

The plan which is to be formulated is to be digested within the period to achieve its target. The length of the period may be over twenty years at the longest or may be as short as one year in the case of a yearly project.

For the sake of convenience, projects are classified into four categories according to the nature of the project:

1) Perspective planning lasting 15–20 years;

2) Long-term planning lasting 10–15 years;

3) Medium-term planning lasting around 5 years; and

4) Short-term planning lasting 1 year.

Try now to determine the target fiscal year for the plan which is to be formulated, taking account of the explanation given below.

1) The main purpose of a perspective planning is to provide a background for a planning of a shorter term. Accordingly, any task to be solved over a long period of time is to be incorporated in a shorter planning for consideration.

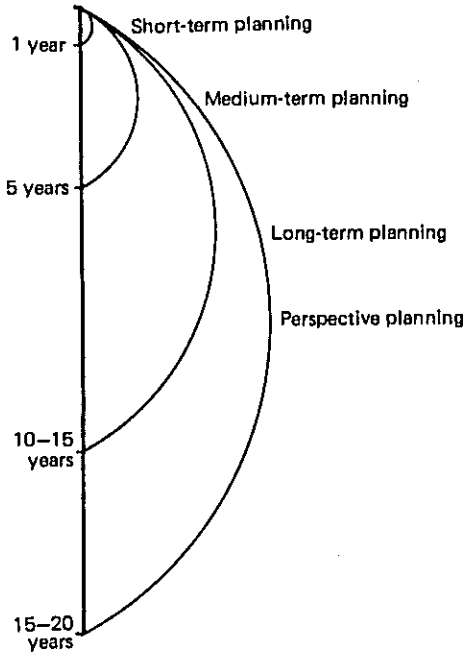
Though the perspective planning is examined in the widest perspective compared with short-term planning, it is difficult to look into the extremely distant future. Basically, those factors whose effects may be evaluated accurately over a long period of time such as population growth and the influence of education or the growth of general technical factors which have developed with relative regularity are considered.

2) Long-term planning is often handled as a regional master plan. This is formulated when it is necessary to project a more specific plan, e.g., the master plan of a specific area or industry, aimed at by a policy, in a specific target and environment. Accordingly, the main purpose of this planning is to provide a firm guide line for the medium-term planning explained below.

3) Medium-term planning is adopted in many countries and regions of the world as the target year for construction planning and is called the First (Second.....) Five-Year Program. The medium-term here may be regarded as the period in which most the investments during the first year can be recovered and often corresponds to the unit in political life.

The main purpose of this project is to ascertain what has to be achieved during the period and what should be done afterwards. Since it has somewhat higher accuracy compared with long-term planning, the emphasis is placed on the possibility of future development.

4) Short-term planningis formulated in direct link with an annual budget of the government which is responsible to it. Accordingly, the government policy is implemented under concrete investmen planning or laws endorsing plans.



1-5. What Are the Problem? What Are to Be the Tasks of the Plan?

What is meant here by problems is problems regarding the planning itself and problems regarding what is to be developed. Here and there throughout the planning process it is necessary to develop problems usually as a process of identification, clarification, structuring, and solution.

1) Problems Regarding the Planning Itself

- Insufficient identification and analysis of existing conditions (for instance, uncertainty as to where the necessary planning data can be obtained and its accuracy or lack of sufficient systematic analysis in conformity with the goals that have been set).
- Inadequate macro-planning (for instance, inadequate consideration of long-term production and income goals and the outlook with regard to the financial resources that will be required by the total scale of investment).
- Inadequate planning in individual agricultural sectors (for instance, lack of clarity with respect to amounts of investment, labor, land use, organization, etc.).
- Inadequate coordination between such sectors (for instance, failure to gieve systematic consideration to compatibility of different land use allocatons and overall unity of different organizational components).
- Failure to clearly identify sources of funds for the various works that have ben planned (for instance, failure to distinguish between national, provincial, IMPRESS' kabupaten, desa, and private sources of funds).
- Insufficient consideration of action program for plans and projects (for instance, failure to clearly indicate what preparations are needed in the way of organization, funds, staff, engineering processes, etc.).
- Inadequate implementation of the projects selected (for instance, inadequate consideration of construction, production, management, and operational bottlenecks).

2) What are the problems in development?

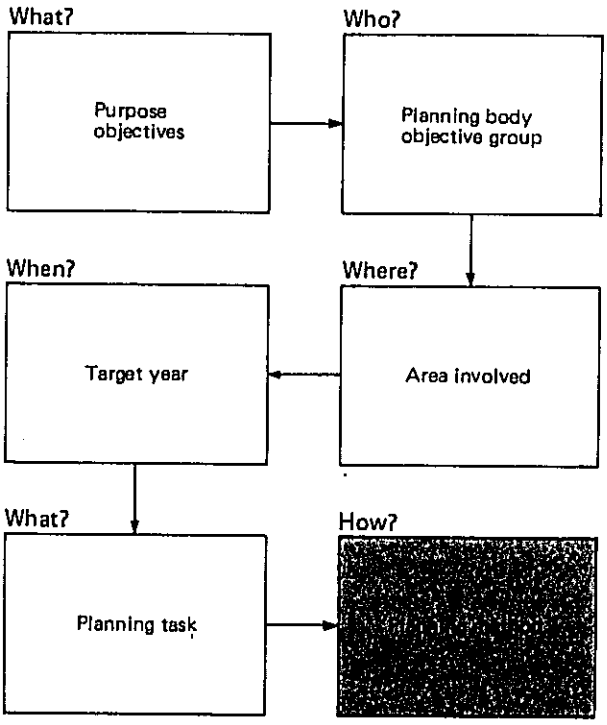
- Changes in value concept based on economic growth and the priority given to the growth of production (for instance, as adverse effects of the "Green Revolution", unequal distribution of income, development unaccompanied by welfare, various problems in development facing the province in developing countries).
- Imbalance in land utilization (for instance, incomplete adjustments in land use such as between fish pond and paddy field, food crop and cash crop, discarding of forest land, various problems due to monoculture).
- Proceeding destruction of environment (felling of mountain forests for burnt fields and uncontrolled land use causing destruction of river and soil).

1-6 How to Formulate Plans?

The concepts of Why, Who, Where, When and What are notional, but they suggest as to how a plan should be formulated as described below.

- What is the plan formulated for? — Let us determine the purpose of the plan and the objectives in operation.
- Who need the plan? — Let us determine the planning bodies and the object group.
- Where is the area involved? — Let us determine the extent.
- When is the target year? — Let us determine the duration.
- What is the task in the plan? — Let us determine the task.

By ascertaining the above five items, it is possible to define what is facing the plan which is about to be formulated. In other words, it becomes possible to ascertain the purpose and the contents of the plan.



2. What Conditions are to be Created for Making the Plan?

1) Under what condition is the formulated plan to be carried out?, 2) What scope is the plan to have?, 3) What contents is the plan to have?, 4) What procedure is the plan to have?, 5) What process is the plan to have?, 6) Who is to carry out the plan? and, 7) How long is the plan to be carried out?.
Needless to say, conditioning is subject to the purpose of the plan and, even more, to the environment legal, administrative and financial regulations) which restricts the formulation of the plan.

Accordingly, general conditioning present the four subjects given below on the assumption that it can be interpreted freely according to sub-objective or environmental conditioning.

- What is the level of planning?
- What can be planned or not?
- Methodological procedure to be determined.
- Process to be determined.

2-1. What level should be attained in planning?

Planning may be positioned as a means of achieving the policy objective. However, the range of its application is extremely wide from a plan as a means of reflecting a long-term policy covering the entire province to the one reflecting a short-term measure for a specific sector. This means, conversely, that unless the plan is formulated according to the level of the policy or the measure it loses in many cases the integrity in planning.

In other words, as has been mentioned in connection with the definition, if a plan is positioned as a preparatory action for actual production or construction with the upper ranking basic policy as the frame, while incorporating lower ranking conditions and maintaining coordination with other sectors in planning, it will be extremely difficult to solve varied problems at once.

At the same time, it is clearly different in level from the plan responding to the hierarchy of decision-making mechanism and also to the opportunity to reflect the wishes of residents who are the beneficiary.

Accordingly, three levels are presented here to ascertain to what level the proposed plan should respond in reference to the range of the projected area.

1) Policy formulation level (national planning).

This is the level to formulate the uppermost ranking planning concerning regional agricultural development judged from the national viewpoint of Indonesia, and a concept for extremely long-term and wide-ranging development is normally to be presented. The scope of the policy to be determined forms the future goal of the province concerned endorsed by the concept; in agricultural development planning the long-term future outlook and the possibility are to be studied in respect of agricultural technology, prices, income, production, management, distribution, finance, employment, etc. and coordination between them.

Under the national construction concept presented by REPELITA, the country is divided into four development blocks from the point of view with South Sulawesi belonging to Block VIII in Zone D. (Southeast Sulawesi, West Nusa Tenggara and East Nusa Tenggara also belong to the block).

For decision-making at this level the Central Government, the highest ranking organization, has the initiative, and it is to be operated as the framework for the program formulation level to be described below to form the vision of local development and improvement. What is most important at this level is to discover the concept of regional development and determine the target for development in the area concerned. At present, major development programs in Indonesia are being implemented in this so-called "top-down" form. Recently, however, expectations are rising for planning formulation by feedback through the preparation of the program level described below, or the "bottom-up" form.

2) Program formulation level (regional planning).

This is the level for each province of Indonesia to formulate planning concerning agricultural development judged from the regional viewpoint of the province concerned, and most comprehensive development strategy based on the concept above is to be presented.

The scope to be determined includes the means of achieving the target based on various measures covered by law; for agricultural development it contains the examination of the possibility of development which takes into account the characteristics of the region and the concept while coordinating various sectional plans.

From such a point of view, the REPELITA formulated by each province is, in the case of South Sulawesi, divided into five development blocks with the development strategy shown for each block.

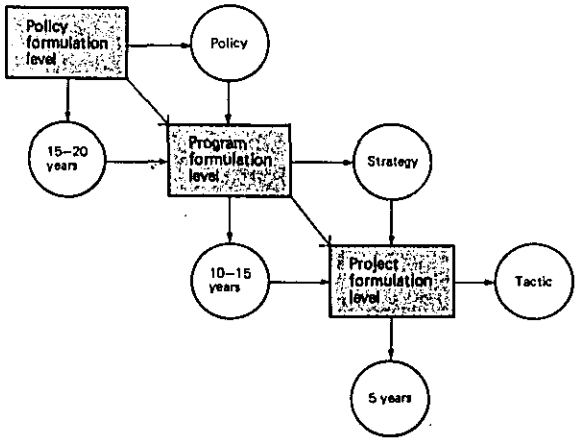
The local government has the initiative in decision-making at this level which is to be used as the master plan for the development and improvement of the area concerned, i.e., the framework for the project formulating level described below. What is most important in connection with this level is to discover the strategy for regional development and to determine the target of development adjusted and integrated to the policy. Further, it is important to examine the contents which may serve as a firm guide line for the project formulating level described below.

3) Project formulating level (district planning).

This level is for each province, Kabupateu, Kecamaton or desa to formulate agricultural development planning for its area and the strategy for actual development in the area concerned based on the program above is presented. The contents to be determined here are the means of implementing the program based on various operations endorsed financially; for agricultural development it contains the examination of the possibility of development which takes into account the characteristics of the area and improvement policy shown by the program above while coordinating various projects.

The implementing body of each project has the initiative in determining the level which is to be operated as the development project of the area, i.e., as the framework for the implementation of the project.

What is most important in connection with this level is to discover the strategy for the development of the area and to determine the actual scope of development adjusted and integrated to the program.

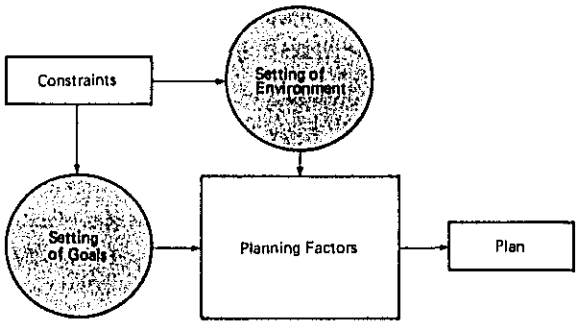


2-2 What Can Be Planned and What Cannot?

In planning, there are both given conditions that are decided from the outstart and normally cannot be changed at all and variables that can be freely changed during the planning process, the former being called constraining conditions and the latter planning factors.

There are two main aspects of the planning process in which constraining conditions come into play. For one thing, in setting goals it is necessary to analyze needs regarding the reasons for the planning and the process of growth to such goals, and external factors often dominate such considerations as given conditions that the planners have to accept as they are. Secondly, there are the given capacities of existing land, labor, and investment that act as limitations on the setting of environmental conditions.

Planning factors, on the other hand, offer a range of choice within which the planners can manipulate the plan, and the flexibility of the plan depends on this range of choice.



In the above figure the setting of goals has been designed as a given condition, but in reality it is often difficult to answer the question of what the goals of the plan should be as they are not clearly determined. Therefore it is necessary to classify each plan into one of the following four categories:

1) Plans the goals of which are given and have only to be followed.

2) Plans the goals of which are set by the planners themselves.

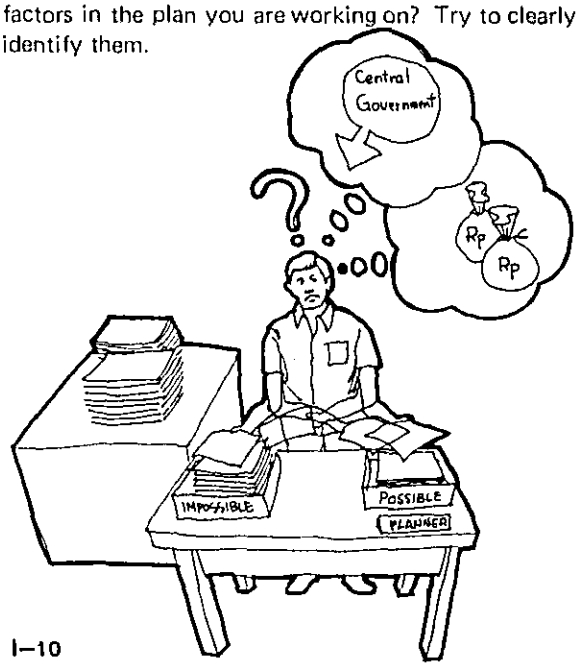
3) Plans the value criteria for setting the goals of which are given.

4) Plans the value criteria for setting the goals of which offer a range of choice to the planners.

Furthermore, from the standpoint of planning creativity, an active effort must be made to transform the environment to a more favorable one for achievement of the goals of the plan. Needless to say, the environmental conditions will determine the scope of the plan. In other words, the environment may be considered as a given in the case of one plan and as something to be produced in the course of the planning in the case of another plan. For instance, in food production planning the demand arising from the consuming population can be considered as an environment. In other words, the future population is a given, and it is considered that the production plan will not affect the demand from that population. However, such demand should be considered to be determined by overall national socioeconomic planning. In other words, it will depend on resource allocation and population distribution from a nationwide standpoint and on change in the structure in demand brought about by transformation in the national pattern of consumption along with growth in income. In such a case, the future population is a planning factor rather than a constraining condition, and the scope of the planning will be wider than it would otherwise be.

Thus, judgment regarding the range of flexibility in setting the environmental conditions and goals of the plan will in itself determine what can and what cannot be planned.

What are the constraining conditions and the planning factors in the plan you are working on? Try to clearly identify them.



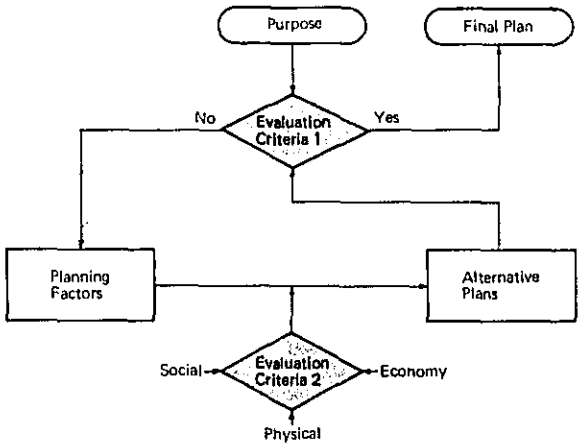
2-3. Methodological Planning Procedure to be Determined

Normally in the case of master plans the goals that are set are more complex than in the case of short-term plans or lower echelon plans. Furthermore, there is often considerable difference in the interpretation of such goals.

At the same time, the diversity and large quantity of the information required in such planning (or, conversely, extreme limitation of availability of information) often makes it difficult for the planning work to proceed smoothly.

Through precise planning procedures, however, it is possible to avoid some of the confusion and improve the situation to a certain extent. In other words, the complexity of the goals, the different value criteria, and the diversity and quantity of the information, etc. can be overcome by proper placing in a clearly defined flow made possible by the application of methodological tools.

What this means is that in spite of their varying interests, the different organizations involved in the planning will at least have a common measure with respect to it, and this will make the planning more democratic.



The above figure shows the flow from the setting of the planning goals to adoption of the final version of the plan. As one can see, this flow includes two evaluations. The first is evaluation of various alternatives formulated after conversion of the initially set goals of the plan to targets, and the second is evaluation of the actual effectiveness of the content of the plan as already developed on the basis of various information, that is to say, judgment of how satisfactory the plan will be with respect to the given goals, the particular environment in which it will be applied, and other constraints.

The procedure, therefore, is first to decide what targets to set for the given goals and develop means of attaining them, then to judge which of such means will be most effective under the given conditions and indicate acceptable alternatives, and finally to decide whether or not the alternative adopted will satisfy the initial goals. If it does, it will be the finalized version of the plan. If it does not, the contents of the plan will have to be reconsidered.

2.4. What process is to be selected?

The term, process, here is used to mean the steps to reach the target of planning operation and their interrelations with various factors in each step.

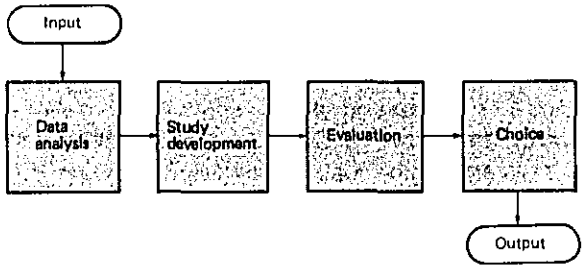
Selection of the process is to clarify the relations between the steps and the various factors.

2-3 Under the planning procedure, the method of formulating a plan which fits the objective of planning.

The subject here is to find the steps of operation to satisfy the procedure and various factors relating to each step and also to set up networks between the factors.

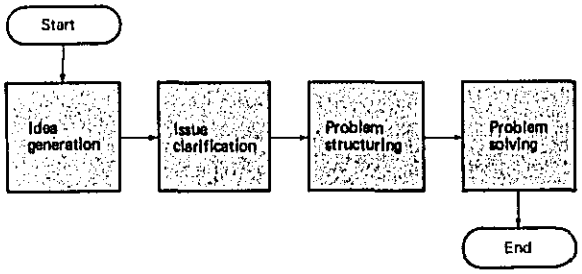
In selecting the step, it will be necessary, if it is to be effective at all, to have the stage of collecting information as input to be processed and analysed and to select what seems to be the best from several results developed.

For instance, let us think of a case of carrying out a plan to increase income. In that case, what has to be considered first is to collect data (data for ascertaining the present such as the present income level, national and regional averages, economic condition of industry and living, etc., and also those for examining the future outlook) and process and analyse them according to the rules of planning such as appropriate mathematical formula, empirical thinking, etc. (structural ascertainment of the present condition by approach from various sectors in planning such as economic, social and physical, and forecasting). With these as the basic data, means of achieving the targe are to be developed to select what seems to be the best one (judgement based on evaluation standards such as the feasibility of each means, comprehensive effects, cost balance, etc.).



As for the discovery of factors and the networks between them, what is basically necessary to find the solution to a certain problem is to isolate, elucidate and structurally ascertain factors and to consider how they are or should be related to one another.

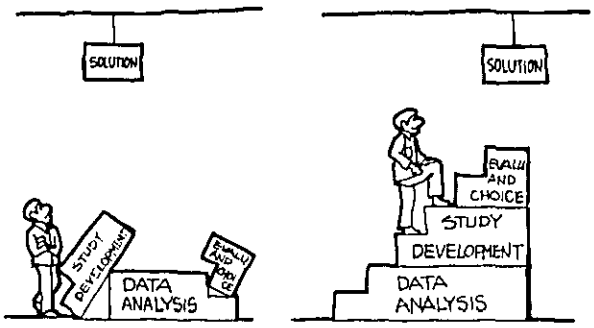
For instance, in carrying out the plan to increase income, what has to be considered first is to isolate factors: how can income increase?; what are the factors as means (reduction in production cost by increased production of cash crops and economy on labor)?; what are the factors as causes of low income (low land productivity, low production prices, excessive supply, etc.)? These factors are then to be elucidated (to what extent can income increase by increasing the production of crops and by reducing the production cost through labor-saving or which is more effective?).
Further, how these isolated and elucidated factors are structurally related to one another (how an increase in the production of a crop is related to the production cost and the producer price or an increase in one factor is directly linked with that in another factor and, conversely, an increase in one factor leads to a decrease in another factor or indirectly connected through yet another factor) is to be ascertained in search for the direction of solution.



The steps in planning operation and the method of solving the problem by the structuralization of factors are in combination to form the planning process.

Thus, in order to carry out planning operation systematically, it is important to select a clear process: what steps to be taken, what are the factors and how they are to be related.

Exercise: Try to select the process for the plan being formulated.



3. What is in Fact a Good Plan?

The formulated plan is finally evaluated in various aspects and it is then determined whether the plan is good or not.

However, what is the criterion for judging the plan? Let us now consider this subject.

3-1. Two Aspects for Evaluation

Generally the following two items may be considered in evaluation.

1) How the resulting plan fits the purpose of planning.

2) If the process is clear and convincing.

1) Becomes clear when the objective of the formulated plan (in other words, Question) and the final plan (in other words, Answer) are compared.

2) Becomes clear when analysis is made of the linkage between the objective and the proposed plan (data used, criterion for judgment, parameter, etc.).

In order to explain the above in simple terms, let us consider the case of mountain climbing.

Let us assume that the objective in this case is to reach the top of the mountain and that there are three climbing routes. There is to be a time limit for climbing and expenses are also to be limited.

Evaluation–1 will be satisfied by readhing the top of the target mountain.

Since planning is to forecast, it is to propose a plan whereby the mountain can be climbed, i.e., which route may be selected to climb the mountain under the given conditions.

Evaluation–2 is not concerned with whether the target mountain has been climbed; it is concerned with which route has been selected.

In the case of planning, characteristics of routes, the climber, merits of the transport firm and the impact on natural environment are to be studied so that the

suitable route may be selected according to the conditions.

In this case, th plan is evaluated according to the object, the depth of contents and the criterion of judgment.

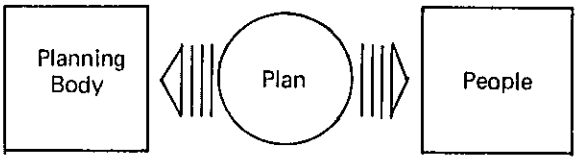
Thus the object of evaluation in planning has two aspects.

3-2. Who Is to Conduct Evaluation?

The following two may be mentioned in conducting evaluation.

1) Planning body entrusted with evaluation in operating as a policy tool.

2) Residents affected by the implementation of the plan.



1) This may be judged by ascertaining whether the planning body can serve as an influential material in the form of recommendation, report, publication, securing of budgetary funds, coordination, etc. for other related bodies (in the case of the Ministry of Agriculture, other related government agencies and rural organizations).

2) There is hardly direct impact at the time of policy-making by the parliament or the formulation of a plan. It is to be judged by those residents directly affected by the implementation of the plan who evaluate the executing body on the ground of whether the plan will form a regional merit on the basis of the rights and duties of the residents.

Similarly, let us consider the case of mountain climbing.

Since Subject 1 is the organization which is to organize and guide climbing, it is to carry out restrictions and guidance measures on participating residents (Subject 2) who are to conduct mountain climbing.

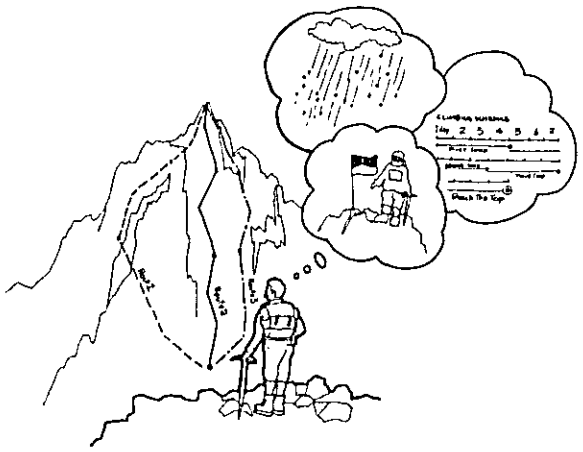
It is also to consult with those concerned as to whether such a plan is socially and economically acceptable.

In this case, it is necessary for Subject 1 to justify the purpose of climbing, i.e., good for the health of residents, group control, recreation, etc. Further, guidance based on adequate examination as to whether the climbing can be executed safely and comfortably will be necessary.

On the other hand, Subject 2 is a mixed group of different cases: opposition, opposition to the selection of the mountain, not very willing to participate, taken ill during the cimb, discouraged during the climb and those who get lost during the climb.

In order to lead those residents with different wishes and values so that climbing may be executed at a desirable pace, it is necessary to adopt the method with sufficient room for their free will and uncertainty during the climb and which can be replaced.

Further, since values held by participants and mountain conditions change with the passing of time, it is necessary to plan in response to changing circumstances Here is the significance of Up Dating of this plan.



3-3. Updating

Updating implies in this case that the plan is to be reviewed and modified constantly in response to the changing needs and varied value concept of the times so that it can be brought up to date.

Especially in the case of a master plan, since the direction of long-term regional development is determined qualitatively and project evaluation is made based on the relative development priority at a given time, the formulated plan is subjected to various conditions at that time (input data, evaluation criterion, planning mechanism and other restrictive conditions, and target conditions such as those policies which bring out the target of development and the demand for development).

In operating the plan, therefore, the nature of planning is to be ascertained and the plan is to be capable of updating, i.e., it can be reviewed and modified according to the needs, so that it can be brought up to date.

3-4. Items for Evaluation

The items for evaluation given below can be used to evaluate a master plan for a region on the assumption that the above-mentioned updating is possible which is required in planning.

Flexibility

Flexibility in planning is very important in relation to the needs of the times, upper planning, lower planning and the varied concept of value. In other words, the plan is to have a certain extra capacity in actual operation, accompanied by alternative plans.

Compatibility

We may well say that planning is formulated by coordination. Especially the master plan has a multiple purpose and, consequently, various criteria for evaluation, development means and projects are formulated in one plan. Accordingly, they are not to contradict one another in the plan.

In other words, in order to eliminate contradictions, planning is required to present a scale for bringing out various common factors such as the concept of optimum and the common denominator.

Comprehensibility

As coordination described under Compatibility, planning clarifies various points through integration.

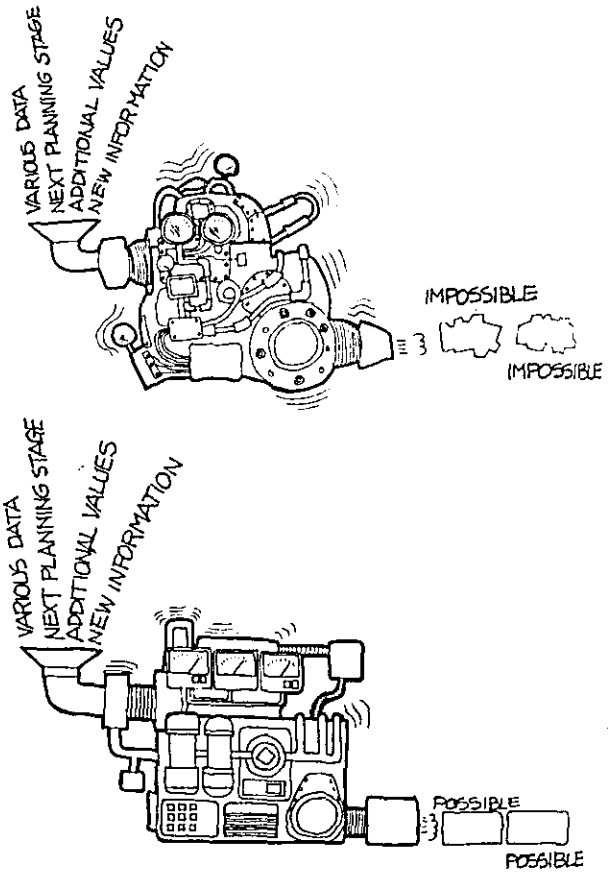
As human personality is required to have integrity, comprehensibility is required of a plan.

The comprehensibility referred to here can be satisfied when it forms an integrated scenario for each field of planning regionally and time-wise.

Practicability

Practicability of planning is determined by the method of operation. Clear presentation of proposals and recommendations made by the plan leads to the practicability.

Generally, the practicability of the plan can be increased by its economic viability, social acceptability and technical feasibility. However, what is basically important is that they are expressed in concrete terms at the administrative level.



Chapter II
Methods of Planning

The chapter is to describe planning methods based on what may be termed as prerequisites for formulation of a plan explained in Chapter I.

Planning methods mean to combine 1) contents; 2) procedure; and 3) process in planning.

With regard to contents under 1), i.e., what is to be planned, out of the projects related to the master plan formulated under ATA-140 and other projects, those contents deemed most necessary are to be arranged as 2-1: Contents of the plan.

As for the procedure under 2), i.e., steps to be taken to determine the contents, the determination of the target which may be regarded as the substance of the master plan and the method of developing the means to achieve it are to be arranged under 2-2: Planning procedure.

As for the process under 3), i.e., actually examined contents for accomplishing the operational target and inter-relations of the contents, the process based on the above-mentioned procedure is to be arranged under 2-3.

Further, the process is divided into the study units given below. From 2-4 to 2-8, input/activity/output, basic consideration and study procedure are explained with examples for each unit.

Work units: 1) Problems finding; 2) Macroframe making; 3) Strategy setting; 4) Projects finding.

This chapter was developed on the assumptions given below to avoid excessive expansion of themes in terms of concept or general coverage.

1) **Purpose of the plan:** to present constructive measures to realize the agrarian structure for the stable improvement in income and living standards by promoting agriculture, particularly resident farming.

2) **Planning body:** Provincial Government (cooperation of the Central Government included).

3) **Beneficiary:** all farmers of the region.

4) **Projected area:** the Province (for instance, South Sulawesi).

5) **Target period:** 15 years

6) **Tasks in planning:** improvement in come from agricultural production and feasible improvement in living standards.

1. Planning Unit

Fig. II–1 shows the scope of operation divided into four and items to be determined and presented as results in each operational unit.

2-1. Operational Unit 1 has the task of finding answers questions; what is the agricultural problem facing the area concerned, what has to be improved and what is the development aimed at;

Accordingly, it is necessary here to establish the system of problems by computing and analysing information of various kinds. The five items listed below are considered indispensable for comprehensive discovery of problems presupposing regional agricultural development as they serve to give information classification and fields of examination.

1) Nature and Land

Land and water form the greatest resources for agricultural development and can also be the greatest restrictive conditions. Thus, natural conditions represented by them are to be ascertained and translated into materials for planning.

2) Economy and Industries

Basic economic conditions are to be ascertained and translated into materials for planning as they serve as indicators showing the target of regional development and form one of the most important factors in evaluating the effects.

3) Social and Living

Population, employment, living and income are to be ascertained and translated into materials for planning as indicators as in the case of 2) and as factors in evaluating welfare effects.

4) Infrastructure

Infrastructure such as roads, water supply and drainage, electricity, etc. which serve as actual means of development, agricultural production, distribution and those facilities relating to rural life are to be ascertained and translated into materials for planning.

5) Organization and Institution

If 4) refers to hardware, these may be called software. Present conditions of organization and institution concerning agriculture, rural development, management, production, living, etc. are to be ascertained and translated into materials for planning.

Above decisions have to be made in this unit.

1-2. Operational Unit 2 the task will be to establish target values for the long-term development of the province as a whole.

Accordingly, it is necessary to set objectives of the plan based on the problems ascertained in Unit 1 and to establish a system of target values which may achieve the objectives.

The five items under Unit 2 are considered indispensable for indicating long-term targets for the province as a whole.

1) Target Value for Agricultural Income

This is normally one of the most important targets of development, which is to improve the agricultural income of the province as a whole. In other words, it means an increase in average income level per farmer (Rp./person).

2) Target Value for Agricultural Production

This is normally one of the most important economic targets of agricultural development, which is to increase agricultural production of the province as a whole.

3) Target Value for Agricultural Employment

This is expressed in the form of employed population against population or agricultural population, and serves, as 1) and 2), as an important target for social and economic development (normally expressed in percentage).

4) Target Value for Equalization

This is to distribute the benefits from the development justly and equally in the form of equalization in income, employment opportunities, education, medical service, participation in the development, clothing, food, housing and development opportunities. (Equalization in income is expressed in the form of Rp./person.)

5) Target Value for the Improvement in Social Level

If the ultimate purpose of development is the improvement in welfare, the determination of this target value has an important and comprehensive meaning. (There are various welfare indicators expressed as targets.)

Above decisions are to be made in Unit 2.

1-3. Operation Unit 3 has the task of ascertaining effective means of development by province (or by stematic geographical unit such as block) and by development phase (long-term development divided into phases).

Accordingly, it is necessary to establish a system of development strategy (when, where and what improvement is most suitable) fitting the target set in Unit 2.

The five items for Operational Unit 3 outlined are considered indispensable as they express the contents of development strategy.

1) Zone Designation Plan

This is to show the framework for land use as a means of achieving the future objective. It shows the basic approach to the problem of securing agricultural land necessary for achieving social and economic objectives set in Unit 2.

2) Agricultural Land Use Plan

This is to set down how the agricultural land designated under 1) is to be used for each land category and crop if the desired form of land use is to be realized.

3) Infrastructure Improvement Plan

This is to set down what infrastructure is to be improved if the land use is to be induced and restricted to its future image.

4) Agricultural and Rural Facilities Improvement Plan

As in the case of 3), this is to set down what facilities are to be improved in the process of agricultural production to distribution and consumption and also to realize the desired agricultural environment.

5) Related Organizations and Institutions Improvement Plan

This is to indicate what kind of organization is to arrange, manage and control the development and what kind of institution is to be improved (legal or financial system) to ensure successful operation of each project.

Above decisions are to be made in Unit 3.

1-4. Operational Unit 4 has the task of setting down priority projects which are to be the objects of initial investments.

Accordingly, it is necessary to establish a system of projects and programs which suit the development strategy ascertained in Operational Unit 3.

The five items outlined for Operational Unit 4 are considered indispensable as they express the contents of the development project.

1) Policy and Kind of Improvement Project

This is to set down the improvement policy mainly for the purpose of examining whether the improvement in the selected infrastructure and other facilities will contribute to the accomplishment of the target determined in Operational Unit 2.

2) Outline of Project

Scope, volume, construction and management costs, economic, social and environmental effects, and process of each operation is to be ascertained.

3) Beneficiary

The extent of the benefiting area, benefiting farmers (organization), and benefiting priority crop are to be ascertained.

4) Development Method

Organizational structure, source of funds to cover the operational costs and the system of management and control of new structures are to be ascertained.

5) Relations with Other Projects (Adjustments, Recommendations and Various Actions)

Adjustments with public projects such as roads and waterways, social projects such basic living facilities, educational and medical facilities and other related projects, recommendations concerning crop prices, system of landownership or to upper-ranking related government agencies, and various actions to be taken to realize these projects are to be ascertained.

Above decision are to be made in Unit 4.

2. Methodology

With a view to acquire results skillfully by examining all the points explained in the contents of planning operation in II-1, it is necessary to set up a method for planning work.

Methodology here means to creat a theory for inducing a final result by using what sorts of sequence and process and on what basis of information and judgment in connection with the methodization of planning work.

In discussing methodology, however, it becomes more concrete if we consider what should be done in order to examine the matter from as much overall view as possible or as much precise way as possible with a view to achieve better planning within the immovable frame work of target conditions and environmental conditions, which the project to be planned is facing. The exposition of methodology in generic and conceptual nature is therefore excluded from this chapter. And we would like to offer here only the aspect of reorganization of the matters by way of a game, on the assumption of the planning operational units explained in II-1, while having in mind the twofold surveys, reports made in ATA 140 and the contents of discussions made with the regional planners in South Sulawesi.

2-1. Summaritical Positioning of the Concerned Regions which Becomes the Premise for the Proposition of Methodology

The state of South Sulawesi, of which population is 5,969,000 as of 1976, is functioning as the granary of Indonesia and as the social and economic center of the East Indonesian zone (the population of its central city Ujung Pandang is 400,000 as of 1979). This region has vast farm lands for rice crops in the main, and it is advanced in the agricultural development, particularly food production increase, promotion of various cash crops, fishery centered round shrimps, livestock industry and forestry development preparation.

On the other hand, the slash-and-burn of the mountains and cutting woods in order to make use of weedy lands have ensued the destruction of rivers and soil erosion. And the proverty of circulation structure of various crop items and the unplanned production increase of cash crops including tangerines have been raising the problems to cause fear for heavy price drop in the future and unequalization of income in the

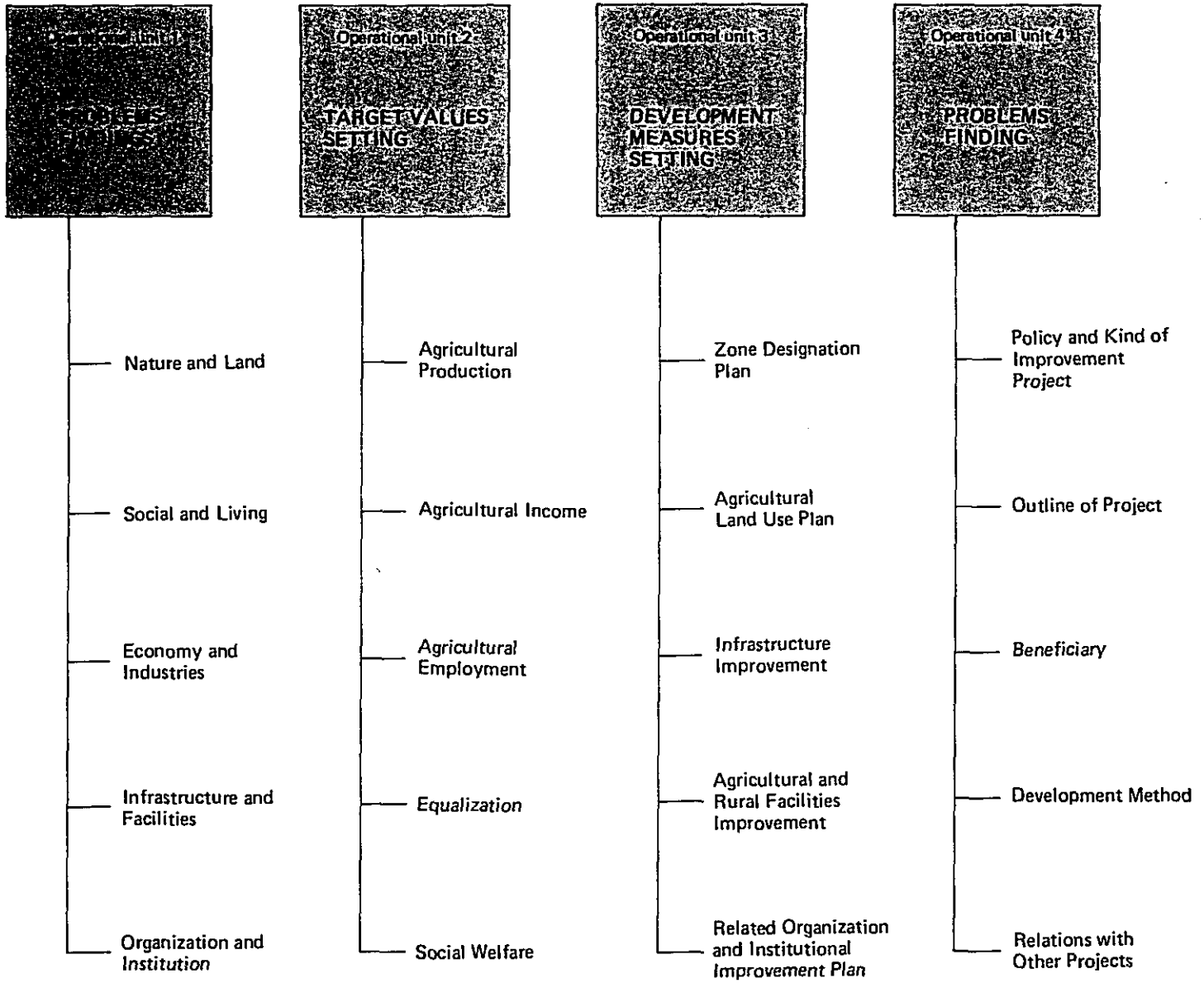


Fig. II—1 Operational Units

fishing villages and mountain villages. Thus the state of South Sulawesi is promising for development preparation within the short period or long period as the firmly advanced region in the East Indonesian zone. But at the same time, it is facing various problems to be solved as mentioned above.

2-2. Purpose of Development and Approach for Solution

Suppose the positioning of the region explained above is made. We can find out two methods here in considering the methodology of planning. One is a method to find out the key for solving the conditions of problems such as what are the problems and what are the matters to be improved. This is called an deductive approach. The other is the method to find out the measures for solution in connection with the future image of the region, i.e., what type of region it should be developed. This is called an inductive approach.

The operational unit–1 shown in the contents of plan in II-1 was to discuss the theme what is the point to be improved in the fivefold planning fields. It is desired to take the deductive approach in advancing this study. The operational unit–2 was intended to set up the development target in the region. It is desired to take the inductive approach in advancing this operation.

There is one thing, however, to be decided prior to selecting an approach as such. This is, what is the purpose of development. This becomes clear if examinations and discussions were made sufficiently on the point – what kinds of purpose the desired development ought to be possessed of – on the basis of assumption that regional planners work out development plan for their region.

Let us set up a case here by way of a game that the development in this region attempts for the promotion of income and further for the promotion of welfare in the future, even though the development demand from the Central Government tends to be sided for the production increase.

2-3. Target of Planning Work

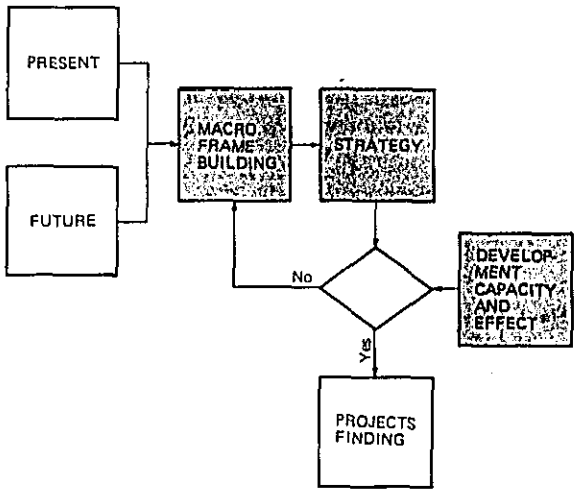
Now, the target of the regional agricultural development was set to lie in the promotion of regional income. Taking up the case of this income promotion for the purpose of development, consider what is the problem here from the deductive approach, and how it ought to become in the future from the inductive approach.

set upon how much promotion of income can be planned or is needed to be planned by setting various development means and works.

2-4. Thinking Course

The figure below indicates the pathway for planning operation. By grasping the actual condition from the aforesaid deductive approach and by grasping the future image from the inductive approach, a macro frame of the regional agricultural development should be built. Based upon this frame, means for development should be thought about. Then their evaluation should be conducted from the twofold standpoints of effect and capacity which are possessed by each means of development.

Next, out of each means, the one which has sufficient development effect and capacity (the limit of capacity in receiving economic, social and environmental contents when the project is to be carried out) becomes the object of project finding.



If the purpose of development lies in the promotion of income, its actual condition should be found out first of all, then its target for the future should be set up. Macro frame building is to examine the long-term prospect of the state on the whole in order to reduce this gap. Strategy is to discuss when and where the most effective and possible means is desired to be applied on the basis of this prospect.

In planning the project on the level of a master plan, the operation of building this macro frame and strategy occupy the most important position.

As was explained in 1-3, "What is in fact a good plan?", the process which should be clear-cut as well as of accurate nature is required in these twofold operations.

2-5. Actual Method

In order to explain the above-mentioned approach in concrete terms, the method of constructing the macro frame and the strategy for the purpose of raising the income level and ultimately the level of welfare will be described below.

The figure below shows the flow of macro frame and strategy for increasing agricultural income, fair distribution of income and improvement in welfare by taking the three steps.

The reasons for carrying out the operation in three steps are 1) the higher the step the more sophisticated and comprehensive the objective becomes; and 2) if the objective is only to increase the average agricultural income, with the completion of the first step we can proceed to the next step of finding the projects.

The three steps may be termed as Methodology–1, 2 and 3 for convenience sake, each including macro frame, development measures, evaluation of effects and capacity and a few conceivable projects for reference (Table II-2).

Under the Methodology–1, the standard farming household is set up for the agricultural operation type which can serve as the target in order to achieve the target inthe provincial average agricultural income. Then, based on the strategic concept of the right crop for the right land, analysis of the suitability of land for each crop and regional placement using the locational model for farming household are to be made.
These operations are then to be evaluated as to whether production increase, economy on expenses and the projected income increase may be achieved and whether the capacity is sufficient regarding labor, development and improvement costs and the technical level of planting. If the findings are positive, the operation will proceed to projects finding such as reclamation, improvement in the planting system, improvement in the production system and the improvement in the extension system. Conversely, if the findings are negative, e.g., insufficient land, we have to feedback the macro frame to review the selection of the projected crop, production of each crop and the income level so that the above-mentioned process may be re-examined.

Similarly, under Methodology–2, the method of finding the target for the fair distribution of income, employment opportunities and development is outlined. Under Methodology–3, the method of achieving and evaluating the target for desirable welfare society and also the method of projects finding are outlined.

As for their details, 2-5 in this Chapter and Technique-32 in Chapter III should be referred to regarding the macro frame, and 2-6 in this Chapter and Technique-18 in Chapter III for the strategy. Planning techniques in Chapter III should be referred to regarding the analysis of type of agricultural operations, analysis of economic basis, distribution of income and land evaluation.

3. Planning Process

Based on 2-2 Methodology, this section will describe the steps in planning operation and the network of planning factors.

Fig. II– 3 shows the planning process for regional agricultural development planning, which consists of the four steps given below.

- Step–1; Problem Finding and Analysis of Data

It is the process in Unit–1 under 2-1. For further details, 2-4: Systematic problem finding is to be referred.

- Step–2: Target Setting and Construction of the Macro Frame

It is the process in Unit–2 under 2-1. For further details, 2-5: Systematic construction of the macro frame is to be referred.

- Step–3: Extension of Development Measures and Strategy Setting

It is the process in Unit–3 under 2-1. For further details, 2-6: Systematic strategy setting is to be referred.

- Step–4: Project Finding and Plan Finalization

It is the process in Unit–4 under 2-1. For further details, 2-7: Systematic project finding is to be referred.

(see Fig. II–3 Planning Process)

Fig. II–2 Methodological Planning Flow Chart

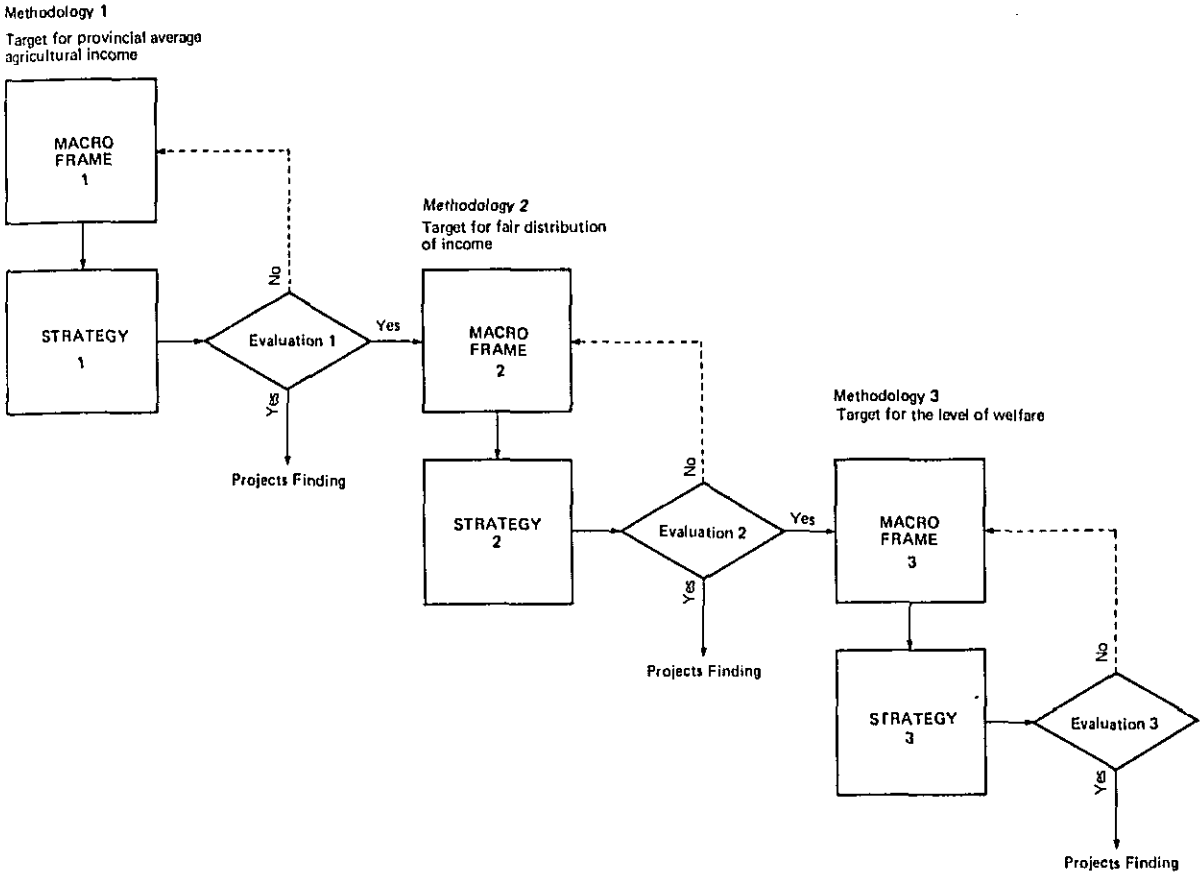
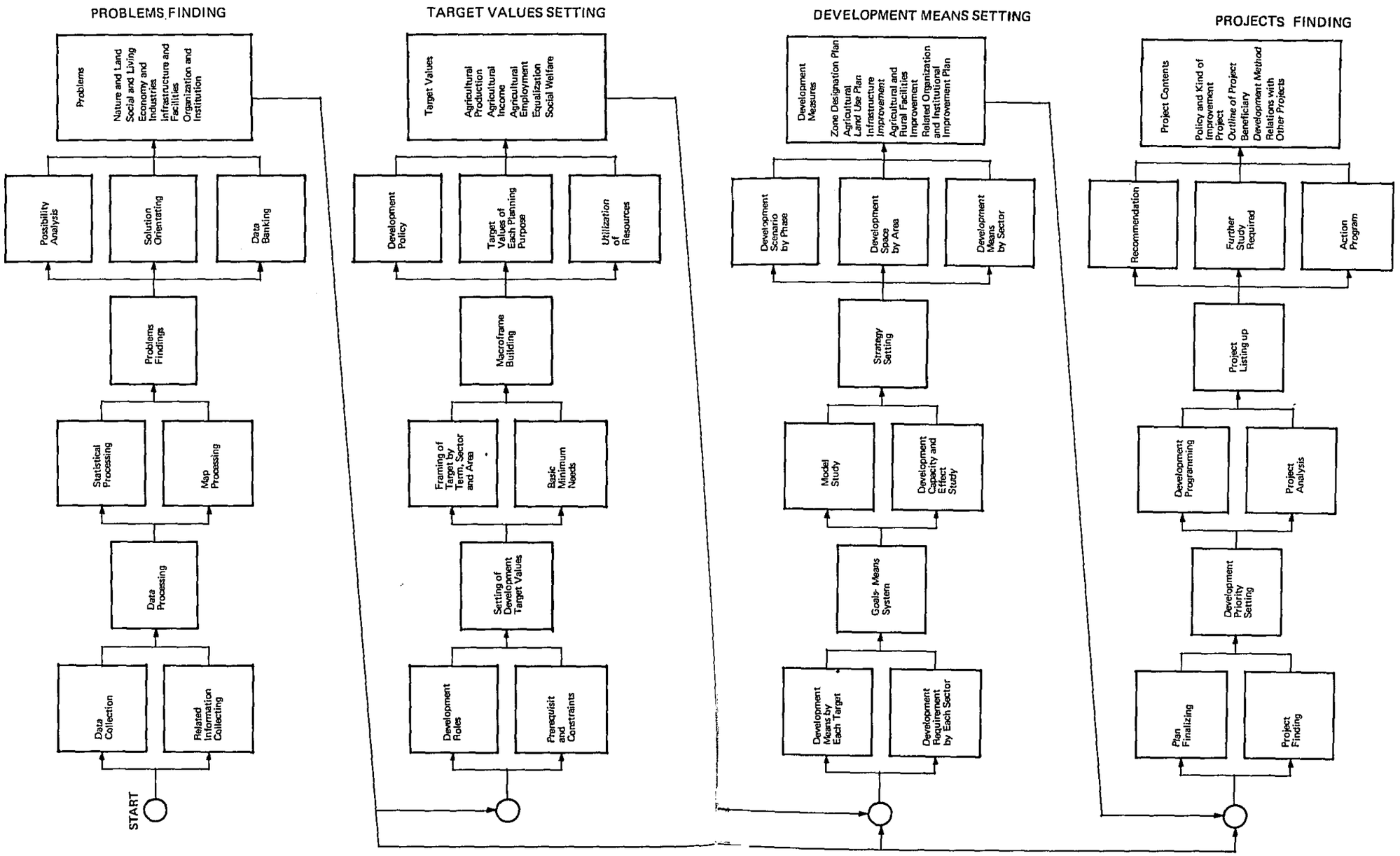


Table II–2 An Idea of Macro Frame Building and Strategy Setting for the Regional Agricultural Development Planning

	Macro frame Building	Strategy Setting	*Evaluation*		Project Findings
			Capacity	Effects	
Methodology 1 Right crop for the right land	Target for provincial average agricultural income Selection of priority crops Production target for these crops Standard number of farming households by management pattern	Analysis of the crop/production zone Method of increasing production Location model of management pattern	Land Labor Development and improvement costs Planting techniques, etc	Production increase Economy on expenses Higher income level	Reclamation Improved system of farming Improvement in production system Improvement in the extension system
Methodology 2 Optimum supply and demand zone	Target for fair distribution of income Income level by management pattern Income distribution by area Income distribution by income bracket and by industry	Analysis of the production/consumption zone Income model by area, income bracket, industry, phase and re-distribution	Re-deployment of population Structure of economic basis Financial sources of agriculture	Fairer consumption Fairer income distribution Fairer labor *Fairer* development	Various operations relating to the production, distribution and sales in agriculture
Methodology 3 Rural living zone	Target for the level of welfare Level of public services Increased paying capability of residents Target for comprehensive regional development	Analysis of industry/living zone Balance model of industrial structure and living structure	Re-deployment of resources Remodeling of the structure of social basis Local financial sources	Complehensive improvement Improved welfare Improvement in social life	All operations relating to every aspect of industry and living.

Fig. II–3 General Planning Flow Chart



4. Problems Finding

4-1 Profile of this Study Unit

1) Purpose:

The purpose of this Unit is to find out about such problems as What is the agricultural problem of the area concerned?, What has to be improved?, What should the development aim at?, etc.

For that purpose this Unit is to collect necessary information for the discovery of problems, to ascertain and clarify problems, and also to ascertain the structure so that solution may be found.

2) Input:

- Natural and land conditions
  (Land, climate, hydrology, environment, land scape, land use, water use, etc.)
- Social and living condition
  (Social basis, population, living environment, village, etc.)
- Economy and industrial condition
  (Economic zone, agriculture, other industries, etc.)
- Infrastructure and facilities conditions
  (Transport, communications, basic production facilities, living environment facilities, etc.)
- Organizations and institutional conditions
  (Administration, finance, related program, etc.)

3) Activities:

- All obtainable related data and information to be collected.
- Implementation of special surveys deemed necessary (sample survey, household budget survey, etc.).
- Arrangement of data on maps of a certain scale and cards.
- Analysis of location and conditions of land (international and national positioning, regional characteristics, conditions of land).
- Processing and analysis of past and present statistics of various kinds (minimum 5 years, 10 – 15 years if necessary).
- Examination of the reliability of data.

4) Output:

- Problems to be listed.
- Causation linkage map of problems.
- Planning material to determine the possibility and the limitation of development.
- Time series and the direction of solution of regional series.
- Banking of various input material relating to planning obtained from survey and analysis.

5) Remarks: Important points in this Unit may be outlined as below.

- Various data are to be arranged in such a way that they will function effectively in future planning. That is, emphasis should be given to those data deemed useful for later Units.
- Since the results obtained will become important factors in determining the possibility and the limitation of development, the input data should have the highest reliability and accuracy. Further, it should be able to add new data while the project is in progress.
- When the relevant data are not available, it is important to put in tentative data if the project cannot proceed without it.

4-2 Planning Flow Chart

Fig. II–5 shows the planning process of this Unit, roughly consisting of three steps: 1) collection of data and information deemed necessary; 2) processing of the data to be used for planning; and 3) problems to be clarified and their solutions are to be given a direction.

4-3. Contents of Input Data and the Contents of Analysis

As they occupy the most important position in this Unit, we should know how much relevant data are available and from what viewpoint we should analyze them. Table II–1 lists the kinds of data necessary for the formulation of a master plan and the items for analysis.

4-4. Causal Linkage Flow Chart

Fig. II–6 shows the causal relations between various factors in regional agricultural development in a graphic form. It is presented as a sketch map to show where the causes of problems lie.

For instance, low agricultural income is due to high production cost and low prices of production; the low income level presses the provincial finance and invites the low level of consumption in the private sector. The Figure shows these causal relations.

Here, it shows only general and basic factors and indicates the method of discovering problems by clarifing and structurizing them. The preparation of such a causal linkage map will help clarify the problems.

Fig. II– 4 Operational Unit-1: Planning Flow Chart of Problems Finding

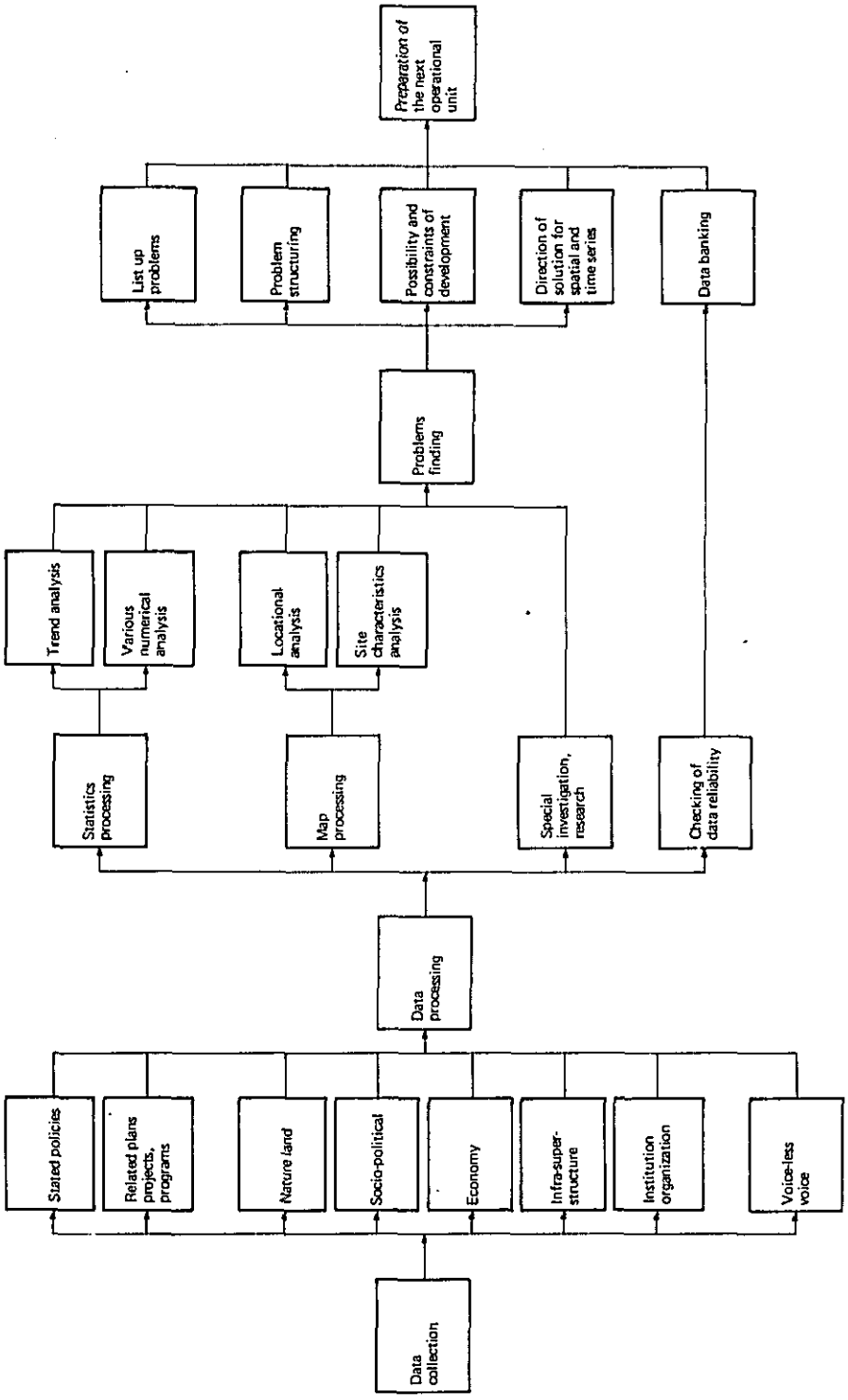
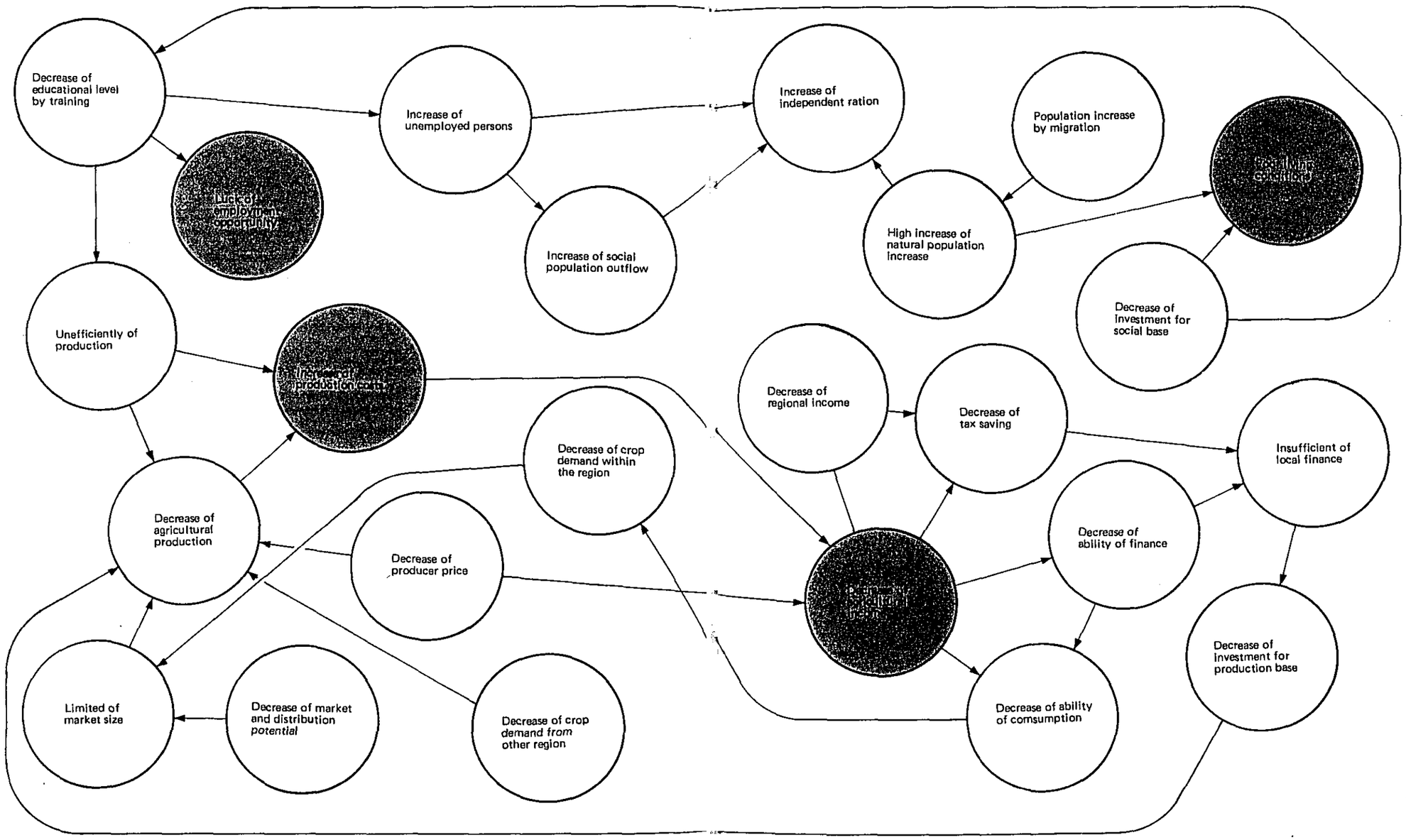


Table II–2 Survey for Input Data and Contents of Analysis

Items (contents)	Survey items	Analysis items
Categories		
A. Natural and land conditions		
A-1. Land	Topography (topographic maps of 1:500,000–1:25,000 to be used)	Analysis by model
	Aerial photograph (Orthophoto, black and white, color, etc.)	Analysis by remote sensing
	Slope (distribution map)	Reference to land use
	Geology (geological maps of 1:1,000,000 – 1:50,000 to be used)	
A-2. Climate and hydrology	Air temperature (annual and monthly average, annual maximum and minimum, etc.)	Analysis covering around 10 years
	Precipitation (annual and monthly average precipitation and others)	Analysis covering around 10 years
	Wind direction (annual and monthly prevailing direction and others)	Analysis covering around 10 years
	Rivers (flow, names of rivers, observation points, catchment area and others)	
A-3. Environment	Disasters (climatic disaster, terrestrial disaster, man-made disaster and others)	Analysis of disaster potential
	Pollution (air pollution, water pollution, soil pollution and others)	Examination standards to be translated into figures
A-4. Landscape	Vegetation (species, density, growth condition, change and others)	Impact analysis
	Animals and plants (species, density, growth condition, change and others)	Impact analysis
	Cultural properties (species, density, growth condition, change and others)	Impact analysis
A-5. Land use	Division of use (present utilization, land tile, change, characteritiscs and others)	*Land productivity, potential* development land
	Land ownership (division of ownership, land rental, transactions and others)	Difficulty in conversion to development land
	Land prices (distribution of prices, secular trend and others)	Difficulty in land expropriation
A-6. Water use	Irrigation water (system, facilities, water rights, water quality, economy and others)	Condition of provision and *management*
	Groundwater (geological structure, gagin pumping and others)	Reserve, recharge mechanism
	Drainage (system, facilities, processing, economy and others)	Condition of provision and *management*
B. Society and living conditions		
B-1. Social basis and population	Total population (natural and social increases, and others)	Analysis of increase and decrease in population
	Population structure (by age, sex and others)	Comparison with the national and provincial averages analyzed
	Number of households (number per household, structure, etc.)	
	Migration (inter-province migration, condition, etc.)	
	Employment structure (employed population, commuting population, seasonal labor force, etc.)	
	Living zone (commuting zone, tilling zone, schooling zone, medical zone, shopping zone, etc.)	Community analysis
	Group organization (name, kind, scope of activities, scale, management method, etc.)	Community analysis
B-2. Living environment	*School education (kindergarten, elementary, junior high school, university, etc.)*	
	Social education (adult education, library, meeting hall, women/yough center, etc.)	Level of service, utilization
	Medical and health (hospital, clinic, pharmacy, family planning office, etc.)	Level of service, utilization
	Consumption (market, restaurant, barber, etc.)	Level of service, utilization
	Social welfare (day nursery, old people's home, labor welfare, livelihood protection, etc.)	Level of service, utilization
	Recreation (gymnasium, park, festival, etc.)	Level of service, utilization
	Public safety, fire prevention (fire, crime, fire station, police station, etc.)	Level of service, utilization
	Supply and processing (water supply, power, etc.)	Level of service, utilization
	Transportation (vehicle ownership, road paving ratio, road ratio, etc.)	Level of service, utilization
	Communications (diffusion of telephone, radio, TV, newspaper, etc.)	Level of service, utilization
	Housing (public housing, supply-demand of housing, living environment, etc.)	*Level of service, utilization*
B-3. Village	Location (name, position, area, public facilities, zoning, etc.)	Comprehensive examination of village unit
	Land use (natural and land conditions, etc.)	

Items (contents) Categories	Survey items	Analysis items
C. *Economy and* industrial conditions		
C-1. Economic basis and income	Economic zone (agricultural production, distribution, sales and consumption zoning, etc.)	Regional function split
	Income (by industry, size and farm management pattern, etc.)	Equality in income
	Employment and wage level (income level, income differential, source of income, etc.)	Potential productivity
C-2. Agriculture (Applies to forestry, livestock and *fisheries)*	Farm land (arable land area, condition of use, change, etc.)	Analysis of agricultural operation type
	Farming household (number of households, full-time, part-time, employment employment and labor entrusted, etc.)	Analysis of agricultural operation type
	Operation (gross earnings, operation cost, non-agricultural income and expenditure, tax, household expenses, properties, production cost, etc.)	Analysis of agricultural operation type
	Production and distribution (production value, production scale, distribution of goods, facilities, organization, processing, storage, etc.)	Analysis of agricultural operation type
	Machinery (diffusion, ownership, condition of use, economy, etc.)	Analysis of agricultural operation type
	Facilities (diffusion, condition of use, etc.)	Analysis of agricultural *operation type*
	Organization (name, kind, position, range, scope of activities, function, scale, etc)	Analysis of agricultural operation type
C-3. *Oter Industries*	*Mining (name* of operation, kind, distribution, scale, scope, employees, wages, etc.)	Relations with agriculture and future positioning of each industry
	Construction (name of operation, kind, distribution, scale, scope, employees, wages, etc.)	Relations with agricultural and future positioning of each industry
	Manufacturing (name of operation, kind, distribution, scale, scope, employees, wages, etc.	Relations with agricultural and future positioning of each industry
	Wholesale and retail (name of operation, kind, distribution, scale, scope, employees, wages, etc.)	Relations with agricultural and future positioning of each industry
	Services (name of operation, kind, distribution, scale, scope, employees, wages, etc.)	*Relations with agricultural and* future positioning of each industry
	Other industries (name of operation, kind, distribution, scale, scope, *employees, wages, etc.)*	Relations with agricultural and *future positioning* of each industry
D. Infrastructure and facilities conditions		
D-1. Transport and communications	Transport network (regional network, intra-regional network, OD, etc.)	Accessibility
	Transport means (road, air service, shipping service, bus, etc.)	
	Communications means (radio, TV, post, telephone, closed circuit, etc.)	
D-2. Basic production facilities	Water utilization facilities (water source, irrigation, drainage facilities)	Level of provision
	Agricultural facilities (facilities listed under C-2)	Level of provision
	Other industrial facilities (facilities listed under C-3)	Level of provision
D-3. Basic living facilities	Living environment facilities (facilities listed under B-2)	
E. Organization and institutional conditions		
E-1. Administration and finance	Local administration (resolution, implementation, organizational structuion of supporting organs, etc.)	Rationality
	Local finance (accounts, structure of revenue and expenditure, etc.)	Investment capacity
E-2. *Related* program	*Upper ranking program (concept of national and provincial land* comprehensive development, area designation, etc.)	*Relations with the program* under discussion
	Related program (industrial and living construction and improvement program special promotion program, etc.)	Relations with the program under discussion

Fig. II– 5 Causal Linkage Flow Chart



5. Macroframe Building System

5-1. Profile of this Study Unit

1) Purpose:

The purpose of this Unit is to determine the target or the desirable form of the agriculture of the area in future. For that purpose, the target value suitable for the purpose of the development and the basic policy for the long-term development for the entire province are to be determined.

2) Input:

Output of the studies in Unit–1.

3) Activities:

- The national role of the area concerned and the role of agricultural development in the province are to be ascertained.
- To qualify the purpose of the development and the selection of indicators expressing it.
- Frame for determining the regional target by time and field and the framework from (B.M.N.) Basic Minimum Needs are to be set.
- Translation of the target into figures.

4) Output:

- Basic policy for long-term development and improvement for the entire province.
- Figures of indicators expressing the target for the development.
- Direction of utilization of resources such as land, labor and water.
- Target of agricultural operations.
- Target for the improvement in production techniques, distribution and sales systems.

5) Remarks: Some important points in this Unit:

- Whether it is the production target or the income target, priority is to be given to either one; or as variables, which is to be the preceding one and which is to be the subordinate one has to be decided first.
- The target figures to be set here are based on the premise that they may be re-set according to the examination in the Unit below and, therefore, they are to be clearly set for easy amendment.
- However, since they are to be achieved, feasible figures are to be set by taking account of as much strategic thinking as possible.

5-2. Planning Flow Chart

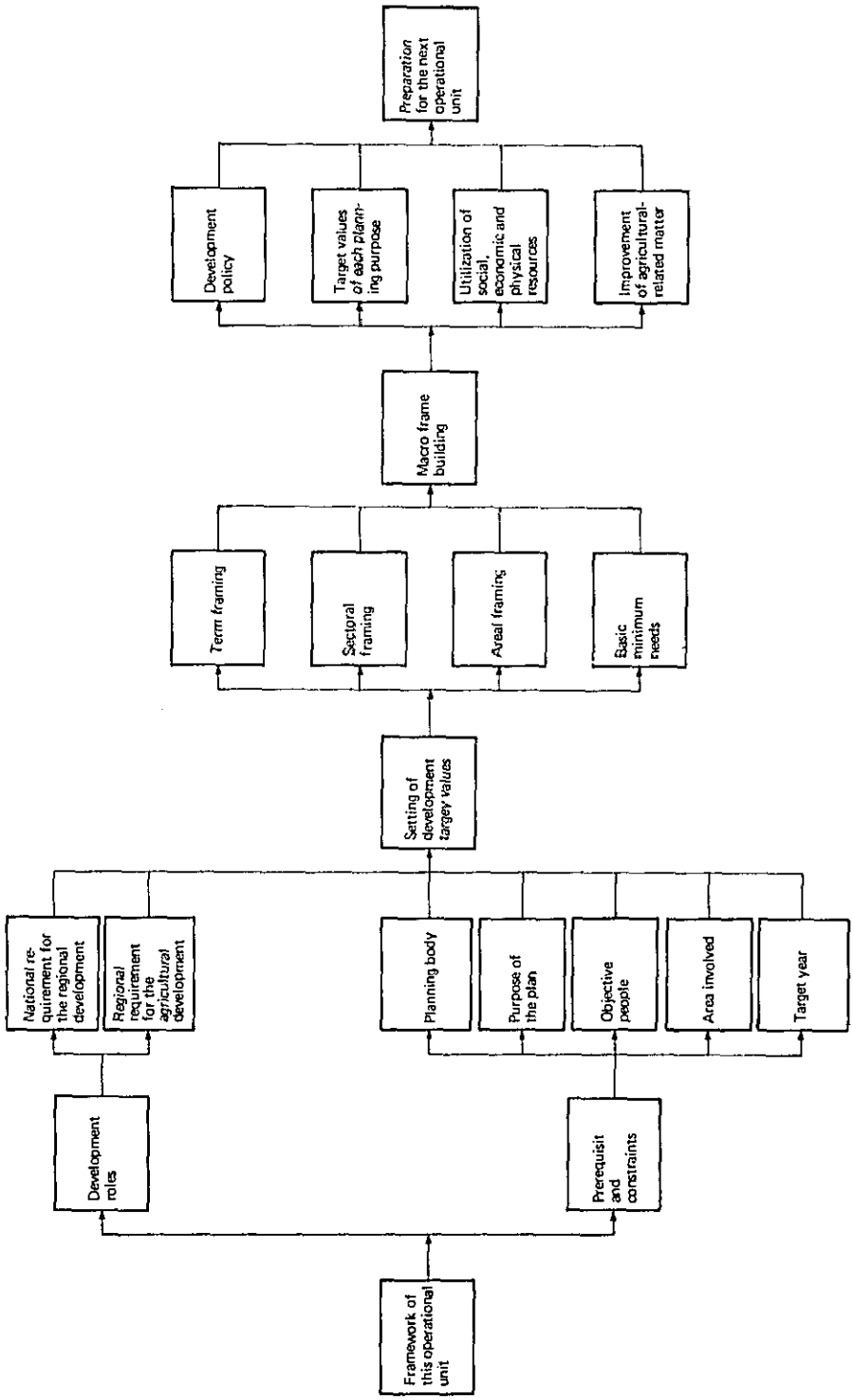
Fig. II–6 shows the planning process of this Unit, roughly consisting of three steps: 1) framework for macro frame building studies which includes the role of agricultural development from national and regional point of view, and planning constraints and prerequisit such as a planning body, area involved, target year etc.; 2) target values setting of production volume, income, employment, welfare and so on the basis of consideration of development term, sectoral, areal and also B.M.N; 3) building of development policy such as guideline of utilization of natural, social and economic resources, and orientation for improvement of agriculture-related organization, institution and system for instance market and distribution, cooperation, community and rural life.

5-3. Target System of a Regional Development

Fig. II–7 is to show inter-relations between general items for the development target in regional agricultural development. It also shows which ministry or agency they come under. In other words, it shows adjustments or consultations with which ministry or agency will be necessary when setting the target. (Since it is based on the data obtained by the study, it is not known if this is expressing the whole.)

By preparing such a sketch-map will it be possible to ascertain which target should be raised to what level or such a possibility by referring to the causation linkage map in Unit–1.

Fig. II– 6 Operational Unit-2: Planning Flow Chart of Macro Frame Building



5-4. How to Make Macro Frame

The system of target values with respect of population, labor, production, income, employment, and other major economic indicators serve as a macroframe in regional agricultural development planning. Since the goals of regional planning have already been discussed in qualitative terms, we will now show how they can be quantified. Take income, for instance. The target can be set of raising income per working person in the region by a certain percent to a certain figure by the target year. Furthermore, the goal can be set of reducing the income gap between this and another region by a certain percent. As for production targets, they can be set for different crops, for gross production, for net production, and so on. Also, targets can be set as concrete figures and percentages not only for total population but also for employment in different agricultural subsectors (farming, forestry, livestock raising, fisheries, etc.). Generally, income targets are deflated with consumer or wholesale price indices to discount the effect of price fluctuation.

1) Main Planning Items

- Income Targets

  Income per individual in working population.

  Living cost per household member.

  Regional production income for different sectors.

  Production income per worker in different industries.

- Production Targets

  Regional production in different sectors.

  Production per worker in different sectors.

  Production breakdown by different crops in different sectors.

- Working Population Targets

  Working population for different sectors.

  Breakdown of working population by sector.

2) Methods of Estimating Target Values

- Trend Method

This method consists of making tentative estimates on the basis of past trends and repeatedly revising them on a trial and error basis to increase compatibility with various constraints, policy considerations, and so on.

- Simultaneous Equations Method

This is a method of determining the target values of various economic indicators by establishing and solving systems of simultaneous equations representative of the structure of the regional economy, first deriving the factors that are to be set as policy goals.

3) Procedure for Setting Targets

There are two different procedures for setting goals as follows:

- Method Whereby Production Goals Are First Determined

In this case production in sectors particularly important to regional development is determined first under various constraints, industrial development being considered the driving force in regional development, and then the target values for the various economic indicators are derived on this basis.

- Method Whereby the Level of Income Is First Determined

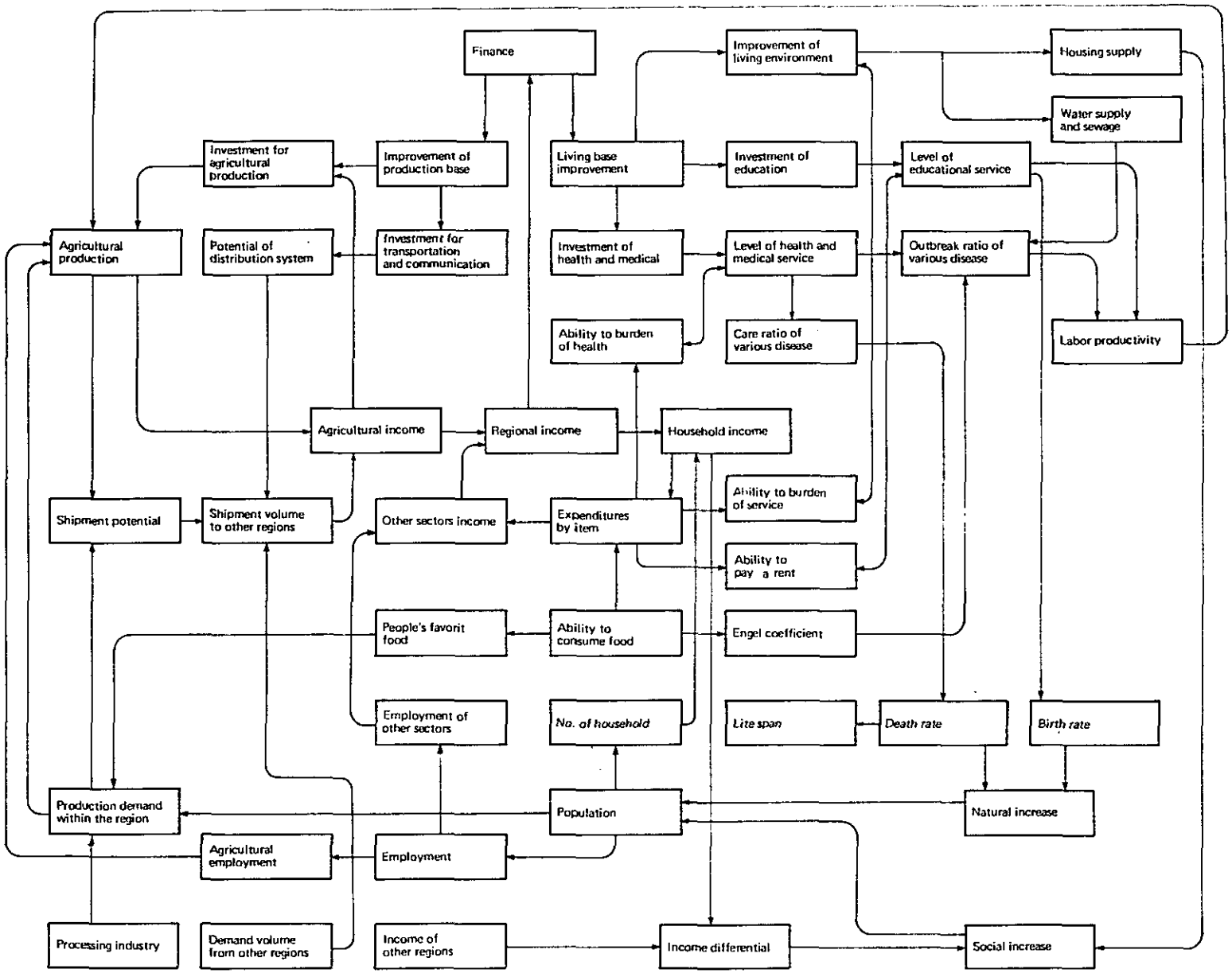
This method sets a certain regional income level or target for correction of an income gap between the region and some other region or national average and then considers what measures will be needed in order to attain such a goal. In many cases estimates are made of the amounts of production in different sectors and the amounts of social infrastructure investment that will be needed for the anticipated future population.

In both cases compatibility with the target values is checked in terms of distribution and encouragement of *farm management under various constraints, with crop* production, labor demand, etc. as unit rates for each type of agriculture.

There are two aspects that must be kept in mind in this respect: The production aspect (crop breakdown, amount of production, production technology and types of agriculture, marketing, and distribution system) and the aspect of how to improve the structure of regional agriculture. With respect to the latter there are many problems that cannot be dealt with in terms of the agricultural sector alone, it being necessary not only for coordination with other sectors but also for improvement of social capital in fields relating to daily life.

Thus, in developing the macroframe it is necessary to have not only a micro approach from the viewpoint of making individual farming operations possible but also a macro approach involving wide areas relating to other industries and even daily life. Generally, the factors

Table II--7 Target Flow Chart



relating to one another are determined in a process of great deal of intricate thought in order to come up with suitable solutions incorporating such factors as introduction of rural industry and migrant labor in or commuting to the cities. Among the quantitative techniques used in this respect are regional models based on simultaneous equations and analysis of relationships between different industries. However, the details of these will not be discussed here. (See Chapter III for explanations of them.)

5-5. Method of Determining the Target

Fig. II–8 shows the procedure of determining the target value giving priority to the improvement in agricultural income while bearing in mind that the improvement in agricultural management is to be planned strategically.

In this method, the future population of the area concerned will first be forecast, followed by the demand for major crops in the area. Then, the external demand for major crops will be obtained through market study. Further, the final demand for production (by major crop) in the area will be obtained by determining the self-dependency ratio of the area.

Further, based on the future population, the employment ratio will be determined through the employment forecast for other industries to obtain the target for agricultural employment in the area. From these computations the forecast amount of the demand for agricultural production and the forecast amount of agricultural labor supply.

On the other hand, through the analysis of type of agricultural operations the income target for each pattern is to be determined. Then, the target levels of future production, costs and prices of products which meet the target are to be estimated.

From these computations the forecast volume of agricultural production supply per standard farming household based on the income target and the demand for labor may be obtained for each type of agricultural operations.

Final computation is to determine the total number of households by type of agricultural operations in the area balancing the forecast volume of demand for agricultural production and the forecast volume of labor supply and the composition.

If the objectives for the macroframe are the increase in agricultural production, agricultural income and employment opportunities, and the equal distribution of income and the improvement in welfare, the first three may be computed according to the model.

Though it is possible to incorporate the equal distribution of income and the improvement in welfare in the model, these are to be determined by social policies (welfare indicators such as B.M.N.).

Further, exercises in this model are given in Chapter III, Technique–32: Work Sheet Study for reference.

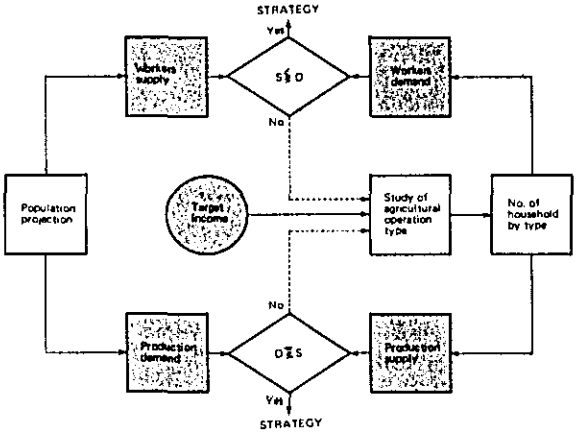
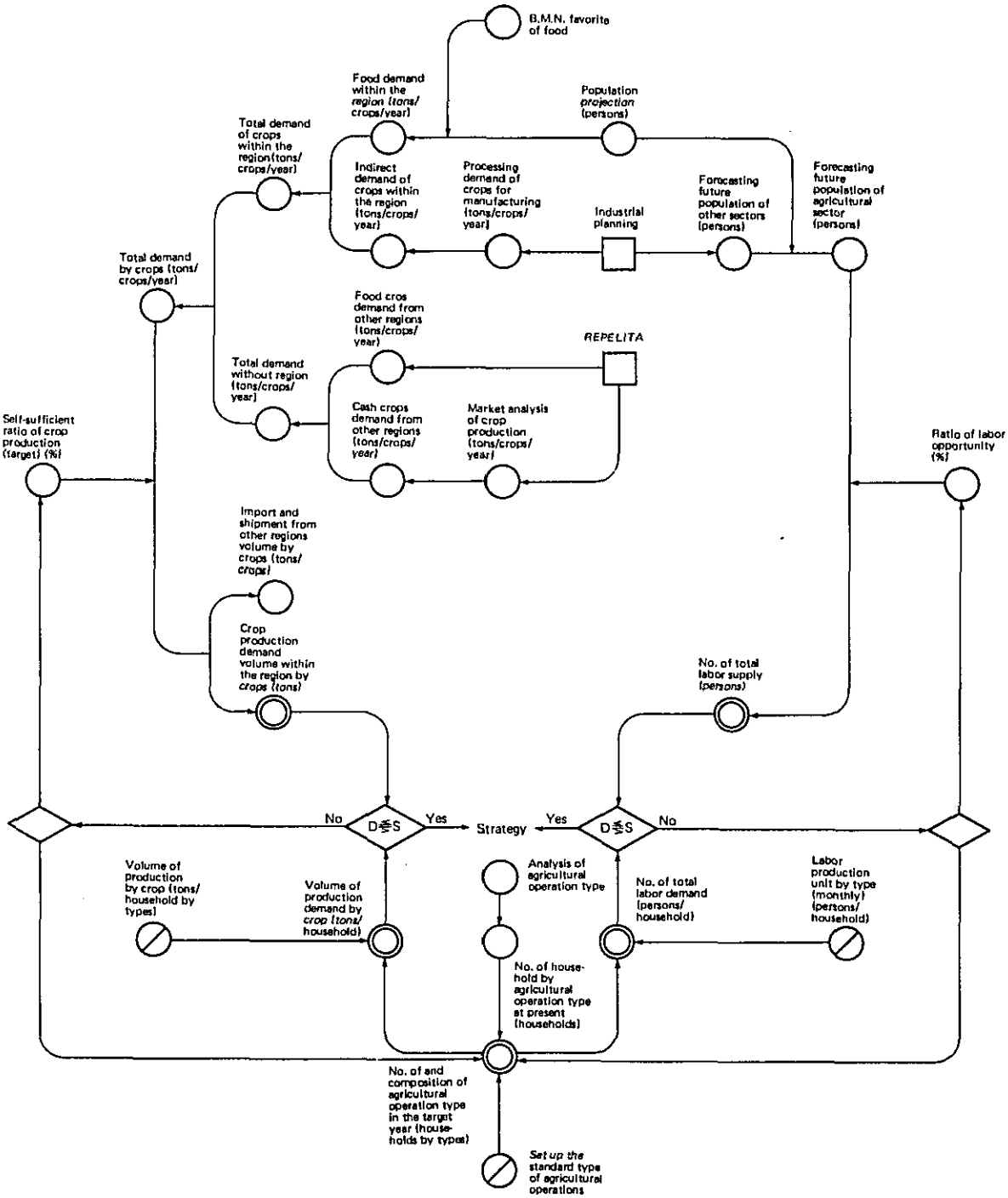


Fig. II–8 Macro Frame Building Model



6. Strategy Setting

6-1. Profile of this Study Unit

1) Purpose:

The purpose of this unit is to determine how to materialize the targeted value decided in the previous unit by adopting what kinds of means and by performing when and where. In view of this think out here as many means as possible that enable to materialize the target. From these groups of means, it is required to evaluate and select the most effective means within the work of the given conditions (targeted value, target year, planning scope, etc.) and the present capacity (physical, economic and social), and it is finally required to determine the concrete direction of the development project temporarily and spatially.

2) Input:

- Output of the studies in Units 1 and 2.

3) Activities:

- Confirmation and setting up of the given conditions.
- Analysis of the development capacity.
- Development of the means of achievement by targets.
- Collection and organization of the development requirements by sectors and fields.
  Selection and evaluation of strategic alternative plans.

4) Output:

- Development targetted value and development *measures by each sector and field.*
- Phasing of the development project and development scenario of each phase.
- Appointment of zones regarding prior and special development areas, land utilization and facilities preparation, etc.

5) Remarks:

- Why a strategy is necessary? — As the planning scope grows further, that is, as the targeted value increases more, the means to be utilized increase radically. In this case, means which work positively for a certain set of goals-means have high potentiality to become the negative factors for the other purposes. For instance, a means of mechanization works positively for the promotion of productivity and the increase of product volume, but it becomes a negative factor for the target of increasing the labor opportunities. In this way, in such a complex system of goals-means, it is required to have a strategic consideration of the sets of goals-means as to their mutual adjustment, precedential ranking, temporal distribution and proper usage in each region.

- In order to make a strategy much surer — In general, a plan is made on the supposition that the given conditions and capacity do not change during the planning period. However, in order to make a strategy much surer, it is necessary to have a substitute plan against the possible changes to occur in the project environment, or to formulate the structure of strategy flexible enough to enable to cope with these changes.

6-2. Planning Flow Chart

The following chart indicates the process of strategy setting. Strategy setting largely takes the following four steps:

1) Comprehension of the goals and present capacity.

- Analyze up to the steps which enable you to understand the causal relations between the objective and means.
- Divide the present capacity relevant to the objective into nature, economy and society, and indicate them by index.

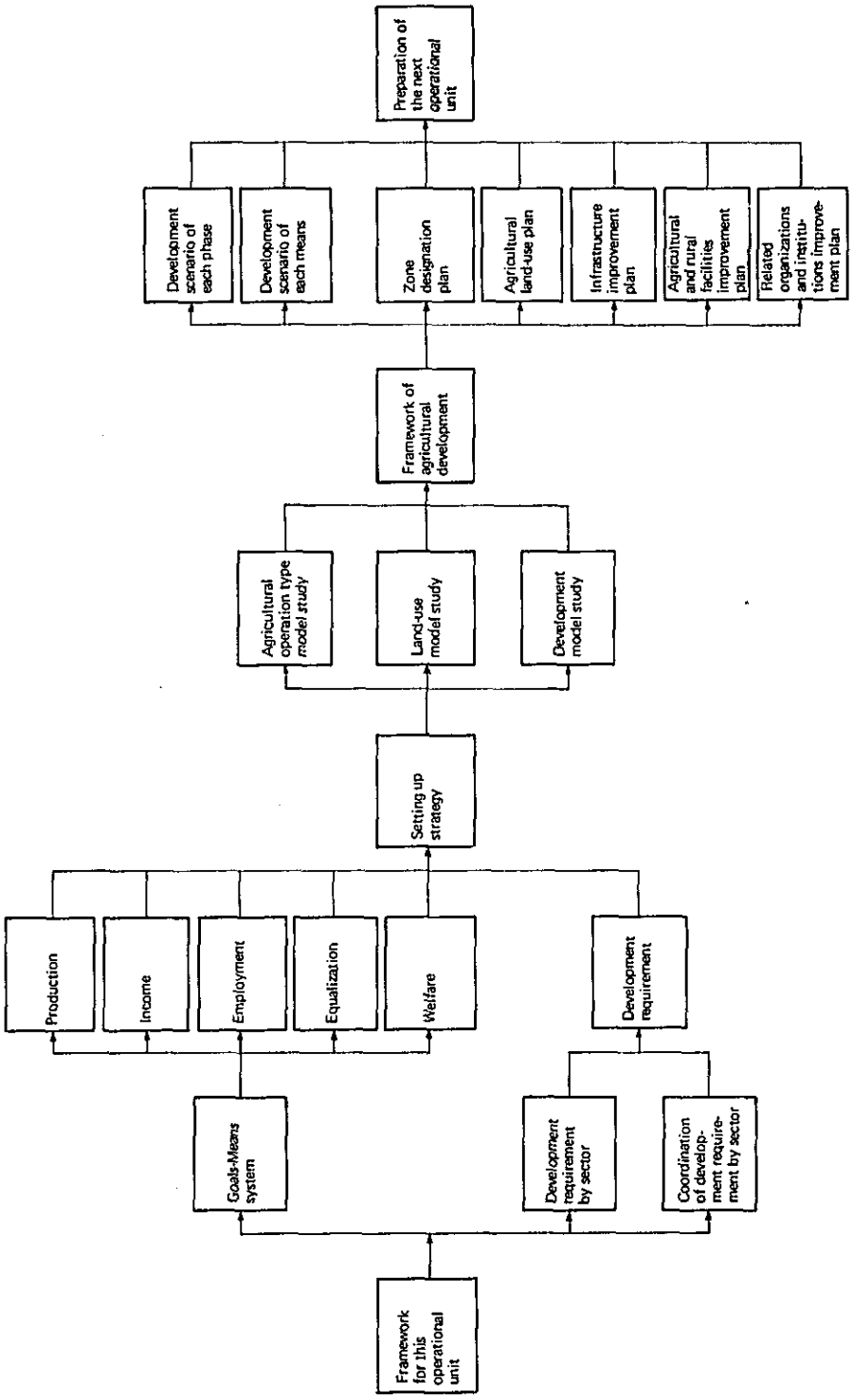
2) Development of goals-means system (Building a strategy)

- *Consider the means for individual targets. In this* case, improve them so that they become the more effective means by way of constantly feeding back to 1).
- Think out the causal relation among the means, and establish a lineage of goals-means.

3) Evaluation (Evaluating the strategy)

- In the synthesizing step in 2), a certain number of alternative plans ought to be formulated. Place all of them as the objects of evaluation in their own individual capacity, instead of trying to formulate a single plan out of them.
- Judge whether the required effects are attainable, or whether the given conditions and capacity can be satisfied when the project is performed accord-

Fig. II– 9 Operational Unit-3: Planning Flow Chart of Strategy Setting



ing to each goals-means system.

- Care should be taken in this case not to select one just because it contains satisfactory standards. But it is desired to have an attitude to understand the natures of each alternative plan (what kinds of effective nature it has in each field and sectors, temporarily and spatially) by checking it against the evaluation criteria.

4) Strategy setting (Setting up strategies)

- Based on the results obtained in 3), develop the frame work for the direction of temporal and spatial development by each sector and field.

6-3. How to Draw the Goals-Means System Chart

The goals-means system chart is a tool that plays an important role for strategy setting. By showing concretely and visually the original purpose of a strategy that effectively makes use of a series of the groups of means against several different purposes, this method works effectively to clarify the operation of concepts and enables to attain the common recognitiin in the cooperative work.

1) Development of Means

List up the means that are conceived to be effective for the target. However, if the effectiveness alone in aimed at in this stage, it tends to confine the scope of ideas. The effectiveness of means is to be concretely evaluated later, therefore it is desired to produce bold ideas from as free position as possible. There are the following methods of idea generation.

- Method of solving the controversial points

  The problematical points discovered in Unit 1 can be the targets for improvement in reality, therefore give the first preference to the solution of the points at issue.

- Ideal model method

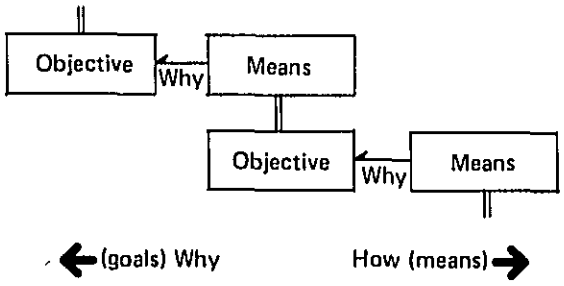
  Take up the elements which are relevant to or considered to be relevant to the target, and think about a model by which these work out ideally. By using this model, find a means through the comparison with the actual condition. For instance, consider whether the land is used to the maximum limit, or whether there is no waste in the technique of agricultural operations, and ponder upon the ideal targets such as maximization, minimization or optimization in distribution structure, additional job, etc.

- Case study method

  Refere to the past cases or similar cases in foreign countries. It is empirical, but it enables to produce the results which are of comparatively less mistakes. However, if it ends in no more than an imitation, there is no progress. It is desired to generalize and theorize the case on the basis of knowledge derived by experiences, and think about its application to the other individual cases.

2) Rearrangement and Classification of Means

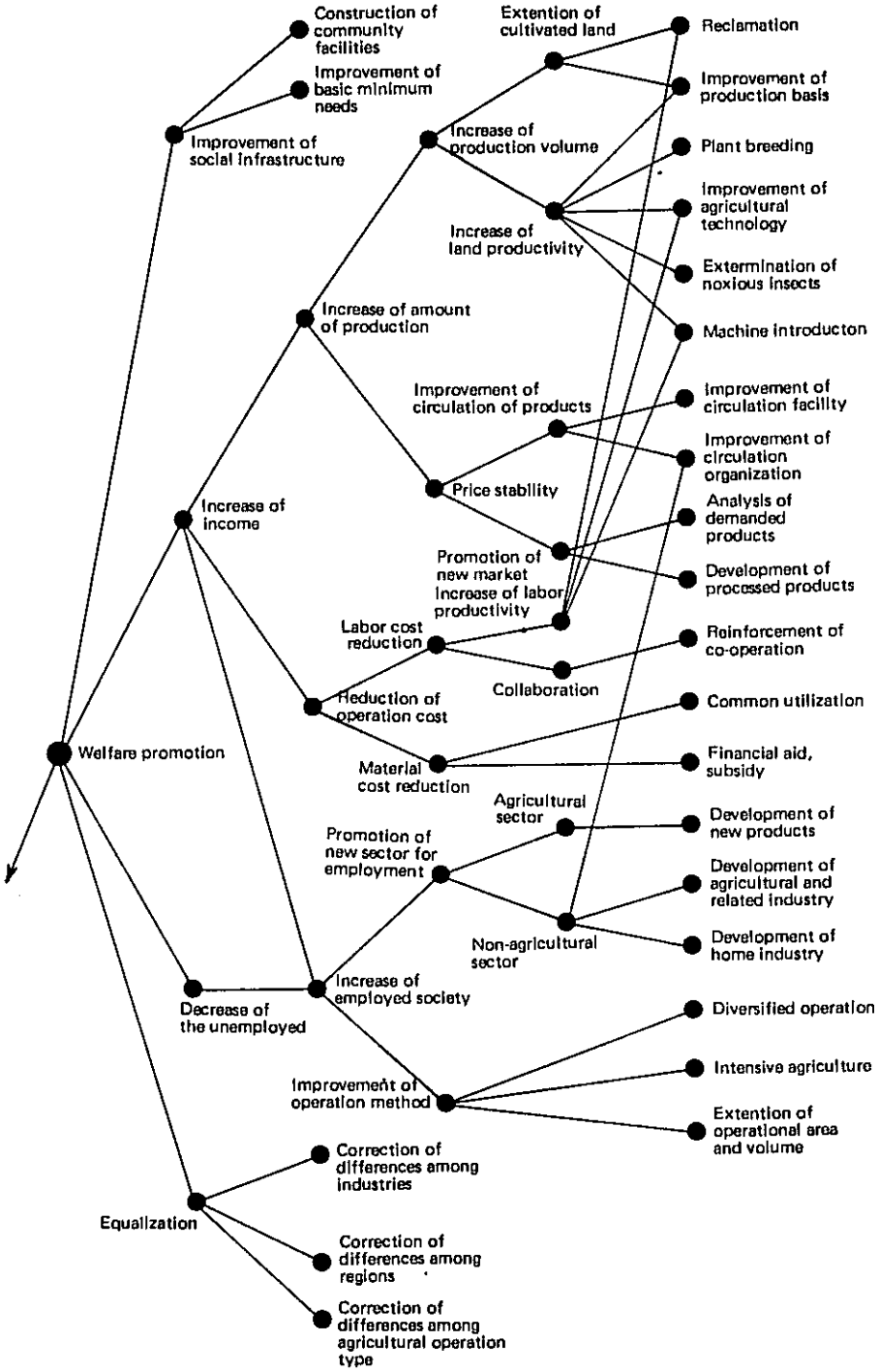
Many means obtained in 1) must be diverse in scope, field, level, etc. as to their objects, but it is necessary to systematize them by arranging and classifying them. In this method, it is important to repeat a question, "Why this method is necessary?" When a certain means is taken up for the purpose of thinking why it is needed, more concrete objectives should be found out, instead of just getting directly concerned with the primary objective. By conducting this operation on all the means, a system chart linked by the relation of goals-means is established. A certain means is meant for the upper ranking purpose, but it should be placed in the position of the purpose of a lower ranking means. The chart below indicates this relation.



3) Completion of Goals-Means System Chart

By combining the goals-means system relevant to the individual objectives, establish and overall goals-means system which is all inclusive of the objectives of this project. In this case, a certain means can be possible to be the means to accomplish more than two objectives. And really speaking, as effective plan can be made if such duplication becomes more intensified.

Fig. II–10 Goals–Means System Flow Chart



Objectives ← Why (Goals) How (Means) → Project

6-4. Evaluating Strategies (Evaluation criteria)

Effectiveness of strategies for their targets can be evaluated by the following two points:

1) Degree of effectiveness for targets and 2) Degree of satisfaction in the given conditions and development capacity.

1) Effect

With a view to obtain better strategies, one's vision should be widened to the multiple and secondary effects without being deceived by the one-sided effect. Effect in development can be arranged in the classification table below:

	Direct effect	Indlrect effedt
Economic effect		
Social effect		
Physical effect		

In this case, it is desired to express effect as concretely and quantitatively as possible. This does not mean to exclude qualitative effect, but it is necessary to try to think qualitative effects quantitatively. For instance, the judgment of effects by "cultivation" can be expressed by quantity through the difference between the crop volume increase in maximum cultivation and the crop volume in non-cultivation. But, it cannot be judged to be the correct evaluation unless the additional effects such as the labor opportunity increase and contribution to social development are considered quantitatively.

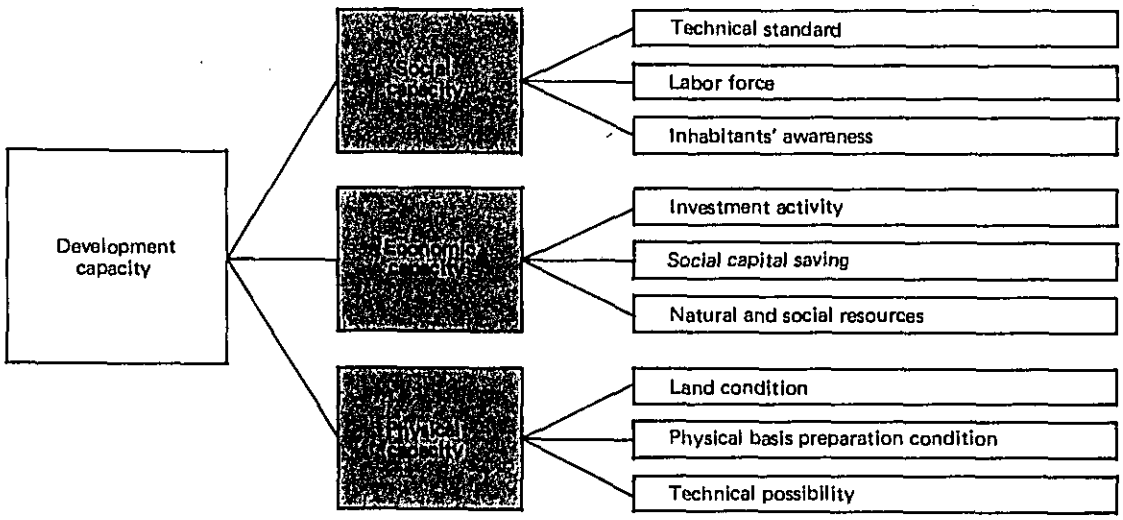
2) Capacity

In order to carry out a certain means, a condition should be kept not to go beyond the development capacity. Unless this condition is satisfied, howsoever effective a means may be, it ensues difficulty on the whole by breaking the balance of society and economy.

The following chart explains the development capacity in the three divisions of social, economic and physical.

Capacity gets never fixed constantly, but it varies according to the changes of time and circumstances. And it is more important to make efforts to expand the upper limit of this capacity and raise up the lower limit by the development plan.

Fig. II–11 Development Capacity



6-5. Setting up Strategies (Temporal phasing and spatial allocation of the means to achieve targets)

Each means which has been previously proposed and evaluated can become a concrete strategy for development. The following points should be noted down in this connection:

1) Temporal Phasing of Means

- How long is the effective term of each means?
- What is the percentage of a target intended to be achieved by the target year? Is it allowed to go below the capacity?
- Does the target seek for the speedy effect or step by step effect?

2) Spatial Allocation of Means

- Is the means fitting for the local features?
- Is the effect by spatial accumulation expectable?
- How much is the degree of spatially influencing effect?
- Is the land utilization adjustment made in connection with the other sectors?

The following units constitute the strategic system set up in the final form. It should be considered as the concrete frame work for project finding.

The following chart expresses the strategic system of South Sulawesi agricultural development plan.

Strategy 1 The most suitable production method by suitable production in suitable land

Strategy 2 Stable production by the optimum supply-demand zone

Strategy 3 Welfare standard promotion by setting up living zone

Table II–3 Development Scenario by Phase and Sector (Example)

Sector	Development Means	PHASE I				PHASE II
		Targetted value	Zone	Budget	Effected Value	Targetted
Agriculture	Cultivation Base preparation Farming technique					
Circulation	Circulation facility Transportation network					
Life	Social facility					

7. Projects Finding and Plan Finalization

7-1. Profile of This Study

1) Purpose:

The purpose of this Unit is to establish the high priority development tasks from among the various strategis measures to achieve development objectives. For that purpose, projects belied to be promising will be searched out, selected and established upon exhaustive appraisal and study of their degree of priority from various points of view.

2) Input:

Results of analysis in Units 1, 2 and 3.

3) Activities:

- Grouping of development strategy by duration for long-term, medium-term and short-term development and detailed studies necessary for this Unit;
- Formulation of programs for various types of development;
- Elaboration of the contents of and schemes for the development in each district;
- Project evaluation and establishment;
- Future activities to be considered.

4) Output:

- Short, medium and long-term development plans (contents).
- Various programs and development schems for each district.
- Project list for the following items:

  Variety and development policies.
  Outline (scale, cost, effect, progress schedule, etc.)
  Beneficiary (area, residents, crop, etc.)
  Development method (administrative, financial and organizational mechanisms regarding development, management and use).
  Relations with other projects
- Preparations for future planning activities such as additions, related operations, recommendations, action programs, etc.

5) Remarks:

Some important points in the Unit:

- Since priority is to be given to economic, social and physical (technical and environmental) feasibility, development is to be limited to those projects with clearly expected results (increased crop production, effects of labor saving, effects of maintenance and control costs saving, etc.) and with adequately studied restrictive conditions (financial condition, cost-bearing capacity of residents, technical level, etc.).
- Adequate survey and analysis of relations with other projects and of compensations are to be made and, in some cases, evaluation and establishment may have to be made rather as joint or comprehensive projects.
- Since the contents determined here are to form the framework for project implementation planning which follows master planning, it is necessary to prepare several alternative plans regarding the scale, cost, schedule, development method, etc. so that reviewing and amendments during execution may be adequately dealth with.

Table II–12 shows the process of planning this Unit, which consists of three major steps.

The first step is to draft a development preparation i.e., long term, medium term and short term, by summarizing the means for development by areas and phases that were discussed in the systematization of development strategies setting.

The second step is to find and evaluate the works that can become the objects of investment in the early period in the abovementioned development preparation plan. The points to be prepared for evaluation are five, as so indicated on the chart, 1) types of works and direction of preparation, 2) an outline of works, 3) objects of benefit, 4) development method, and 5) other works.

The final step is to make a list of projects selected by the evaluation. It is required in this step to clarify the contents prepared for the future activities to promote the projects.

7-4. Contents of Output

As they occupy the most important position in plan making, se should know how much items are need in a master plan and what contents we should achieve them. Table II–3 lists the kind of contents necessary for the finalization of a master plan and the items to be achieved.

Fig. II–12 Operational Unit-4: Planning Flow Chart of Projects Finding

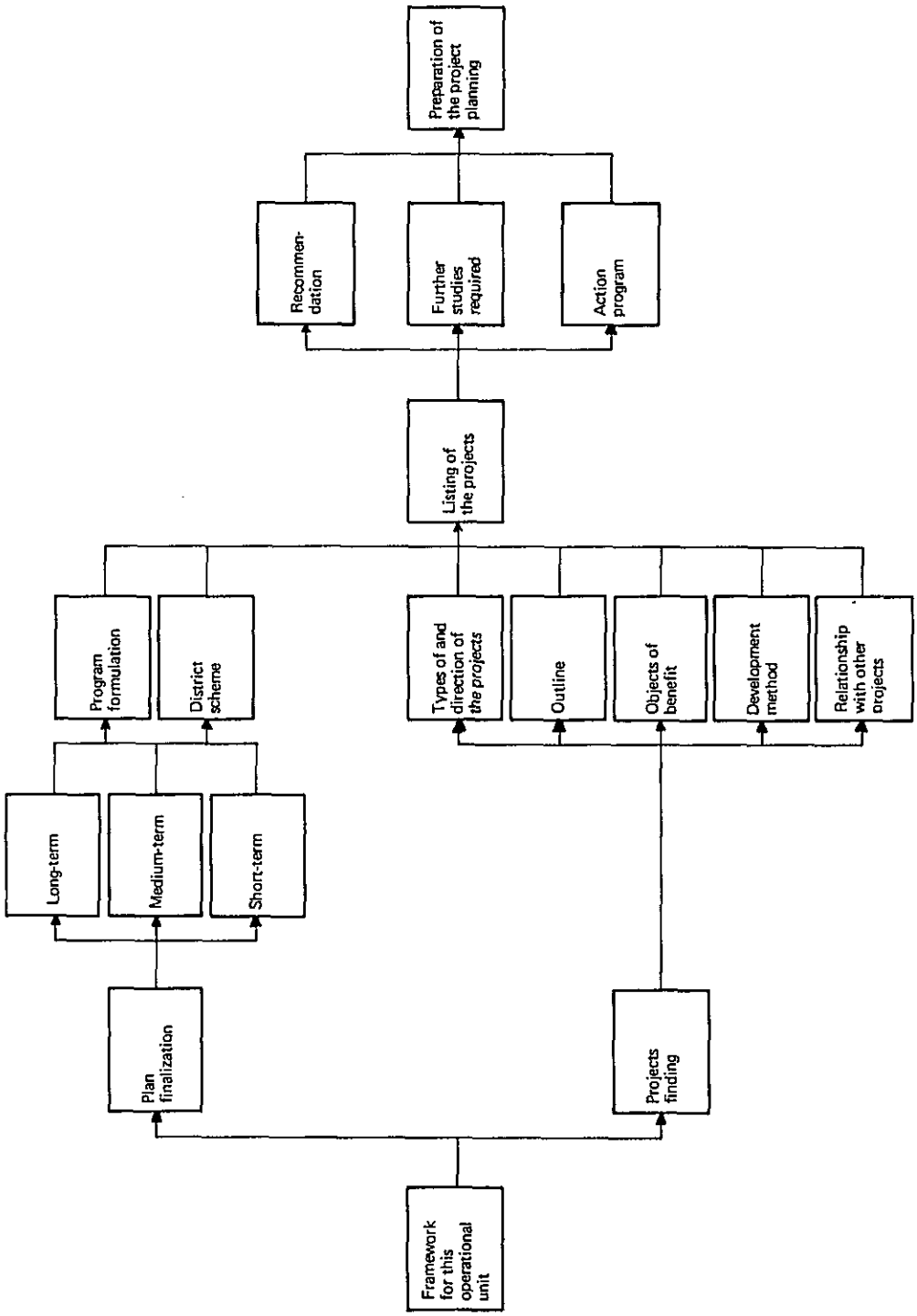


Table II–4 Items of Achievement in Master Plan and List of Contents

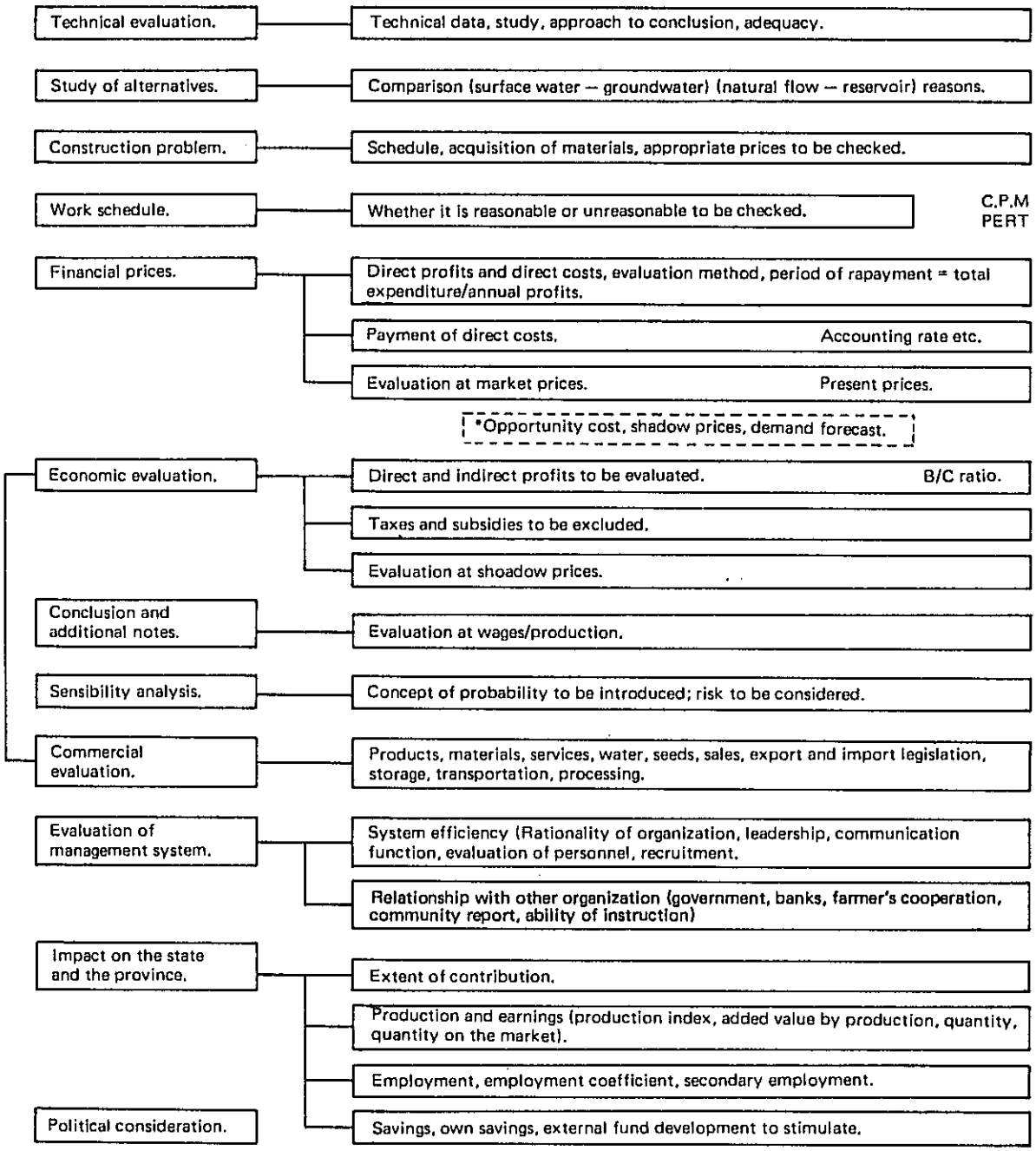
Items (contents)	Items of achievement and contents
A. Land and water use	
A-1. Land use plan	Area division (city area, farm area, forest area, natural area, etc.)
	Land use (farm land, forest, wild field, water surface, road, housing land, etc.)
	Utilization regulations (rules for utilization purpose based on legislation and administration, introducing areas, etc.)
A-2. Water use plan	Supply and demand (water for agriculture, industry, living, etc.)
	Water source (facility, specifications, position, water rights, etc.)
	Intake, conveyance, diversion (facility, type, purpose, position, intake volume, etc.)
	Water for agriculture (for irrigation, for farming, system, organization, etc.)
	Water for industry (facility, system, organization, etc.)
	Waterworks (service population, area, supply volume, facility, system, etc.)
	Drainage (facility, system, organization, etc. for farm land drainage and community drainage)
A-3. Environment preservation plan	Nature protection (adjustment with various preparation plans, legislation, management, etc.)
	Preservation of scenic view (preservation of green land, historical remains, cultural property, scenic site, etc.)
B. Society and living conditions	
B-1. Social basis and *population plan*	Social objectives (employment rate, equalization of income, welfare, consumption, public service, etc.)
	Future population (total population by sex, age, etc.)
	Number of families
	Employed population (labor force population, employment rate, inside region, etc.)
	Population arrangement (population density, migration distribution, city, village, etc.)
	Living zone (community structure, public service facility distribution, etc.)
B-2. Living environment plan	School education (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Social education (service standard, network, facility, organization, institutional condition, staff, members, etc.)
	Medical and health (service standard, net work, facility, organization, institutional condition, staff, members, etc.)
	Consumption (service standard, network, facility, organization, institutional condition, staff members etc.)
	Social welfare (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Recreation (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Safety and fire prevention (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Supply and processing (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Transportation (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Communications (service standard, network, facility, organization, institutional condition, staff members, etc.)
	Housing (service standard, network, facility, organization, institutional condition, staff members, etc.)
B-3. Community plan	Community arrangement (structure, road network, land utilization, public facility, etc.)
	Overall plan (population, number of families, production, living, etc.)

Items (contents)	Items of achievement and contents
C. Economy and industry	
C-1. Economic basis and income plan	Economic objectives (production, income, employment rate, etc.)
	Basic agricultural promotion plan
C-2. Agricultural plan (applies to forestry livestock and fisheries)	Basic agricultural promotion plan (land utilization, production, technique, management, circulation, etc.)
	Farm production (priority crop items, production volume, production technique, etc.)
	Circulation and sales (facility, organization, processing, storing, price, etc.)
	Agricultural management (contents of training by farming type)
C-3. Other industrial plan	Mining (basic promotion plan, production, employment, relation with agriculture, etc.)
	Construction (basic promotion plan, production, employment, relation with agriculture, etc.)
	Manufacturing (basic promotion plan, production, employment, relation with agriculture, etc.)
	Wholesale and retail (basic promotion plan, production, employment, relation with agriculture, etc.)
	Service work (basic promotion plan, production, employment, relation with agriculture, etc.)
	Other industries (basic promotion plan, production, employment, relation with agriculture, etc.)
D. Infrastructure and facilities	
D-1. Transport and communications facility plan	Transport network (demand estimate, traffic volume, traffic entwork, preparation standard, etc.)
	Transport facilities (route, bridge, terminal, bus route, etc.)
	Communications (postal service, telephone, wire broadcasting, radio, TV, etc.)
D-2. Basic production facilities	Water utilization facilities (arrangement, contents, etc. of facilities listed in C–2)
	Agricultural facilities (arrangement, contents, etc. of facilities listed in B–2)
	Other industrial facilities (arrangement, contents, etc. of facilities listed in B–3)
D-3. Basic living facilities	Living environment facilities (arrangement, contents, etc. of facilities listed in A–2)
E. Organization and institutional conditions	
E-1. Organization plan	Production circulation dissemination (group, cooperation system, inducing method, administration and financial measure, etc.)
	Social group(residents' organization, residents' movement community activity, etc.)
E-2. Administration and financial plan	Local administration (administrative system, personnel management, desk work improvement, etc.)
	Local finance (account, structure of revenue and expenditure, etc. relevant to development works)

7-4. How to Evaluate the Projects

The figure below shows the items for project evaluation compiled by the Association of Agricultural Engineering and the Research Committee on Overseas Agricultural Development from the Draft Guide of Agricultural Project Analysis: Nov., 1969 prepared by FAO/UN. It gives an outline of the method of evaluating each project.

Fig. II–13 Project Evaluation Items



REPUBLIC OF INDONESIA
MINISTRY OF AGRICULTURE

A Planning Guideline For The Regional Agricultural Development

SUBJECT AND DRILL BOOK FOR THE REGIONAL PLANNER

VOLUME TWO

JUNE 1979
JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN CITY PLANNING

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SUBJECT AND DRILL BOOK FOR THE REGIONAL PLANNER

VOLUME TWO

Chapter III
Planning Techniques

This chapter picks out those of the many planning techniques generally used in master planning that are considered particularly important to the present project with respect to the following points and gives an outline explanation of each:

1) Basic importance to preparation of master plan.

2) Suitability to the planning data to be used in the planning for South Sulawesi.

3) Relevance to the planning methodology set forth in Chapter II.

Each technique is defined, its scope of application in explained, and its procedures are outlined. Furthermore, an example is given of how it can be used, and an exercise is presented for practice in its use.

Since each technique is explained on a separate card, or two or three at the most, they can easily be separated from the report for use.

Actually, the theory and applications of such techniques should be explained more thoroughly for fuller understanding of what they can and cannot be used for and of how they can lead to the use of more advanced techniques, but this has not been possible considering the limited amount of space available. Instead, it was decided to include as many techniques as possible and present them in simple language to afford a rough idea of what they are about for as many of those involved in the planning process as possible.

Needless to say, the techniques to be used in master planning will vary enormously according to the purposes of the planning, the conditions that have been set, and the amount of time, number of personnel, and amount of money available. Nor is the following list a complete one, but merely a reference list to give a basic idea of the possibilities in this respect. In any case, it is important that the aims, applications, and possibilities for development of each be grasped in order for it to be of use in actual planning. In all, 32 techniques are covered.

Technique- 1: Social Survey

This technique involves field surveys of rural communities for identification and analysis of their problems, potentials, and so forth.

Technique- 2: Remote Sensing

This technique involves the use of photographs of the target area taken from above the earth in scientific analysis of its natural phenomena and environmental conditions.

Technique- 3: Economic Base Analysis

This technique uses locational coefficients to analyze what the mainstays of the regional economy are and what kind of specialization regional industry evinces.

Technique- 4: Market and Distribution Analysis

This technique is for the purpose of ensuring that the supply of agricultural produce can be adjusted to the market to prevent imbalance.

Technique- 5: Analysis of Agricultural Operation Type

This technique makes it possible to grasp the structure of standard agricultural operations in the region for the purpose of enhancing farm family income.

Technique- 6: Inter-Industrial Analysis

This technique views the economic activities from production of goods and services to consumption in terms of transactions between different industrial sectors, using the input coefficients derived from such transactions for analysis of the economic structure, forecasting, planning, and assessment of effects.

Technique- 7: Inter/Intra-Region Trade

This technique can be used to analyze how goods and services can be exchanged in an optimum manner from the viewpoint of distance between origin and destination in both geographic and economic terms.

Technique- 8: Mesh Analysis

There is an enormous amount of data concerning the attributes of an area. This technique divides the map of the area up into small meshes which are numbered or otherwise readily identified so that the data can be plotted for easier analysis of such attributes.

Technique- 9: Land-Use Analysis

In regional planning, legal systems, planning apparatus, and other pertinent planning are all of great significance. This is the technique of analyzing them in terms of land use planning.

Technique-10: Land Classification Map

Agriculture is the working of the land by farmers. It is therefore necessary that they be provided with land that is suitable for this purpose, and this is why the land must be properly assessed on the basis of scientific analysis for proper classification.

Technique-11: Potential Map

Agricultural land is of use as capital in as far as it is complemented by roads and irrigation and other facilities. This is the technique of evaluating potential economic, physical, and social conditions that can serve as a basis for more efficient agricultural development.

Technique-12: Land Availability Map

Agricultural development potential is in the final analysis determined by whether or not the agricultural development is economically feasible and whether or not it is socially acceptable. This technique analyzes what it is that determines land use possibilities.

Technique-13: Population Projection

Future population is one of the most important factors in agricultural planning. This technique is for projection of the population of the region by the target year, this population being relevant in terms of both production and consumption.

Technique-14: Social Indicator

In view of the fact that the final contribution of development is improvement of welfare, social indicators are of great importance in development planning. Indicators are also useful for analysis of society as it is now, as it is expected to be in the future, and as it is hoped that it will be after the contemplated development. This technique is for the formulation of such indicators.

Technique-15: Income Distribution

Optimum regional income distribution is one of the socioeconomic goals of regional planning. This technique is for analysis of the problem of how to make income distribution more equitable.

Technique-16: Systems Dynamics Model

In order to be able to get a more accurate picture of the actual social system for planning purposes, it is necessary to analyze it in dynamic terms. This technique, which uses models consisting of the various variables that interact with one another in the social system, is for this purpose.

Technique-17: Econometric Model

This technique, just as that of systems dynamics models, makes planning more realistic by incorporating into it more real phenomena by widening the scope of application of economic principles.

Technique-18: Physical Model

This technique makes use of models of what can be produced most suitably where and models of optimum production-consumption patterns on the basis of analysis of different types of agricultural operations so as to be able to answer the question of what has to be provided in physical terms to make it possible to attain the socio-economic goals of regional planning.

Technique-19: Gravity Model

This technique for analysis of the socioeconomic potential of a region conceives the region in terms of its nuclear structure, expressing the relationships between the nuclei and between regions in quantitative terms.

Technique-20: System Analysis

This technique is that of considering how to make use of a wide variety of other techniques. The key to the success of the analysis is to repeat the same chain of processes over and over again as far as time and money allow or until satisfaction is

obtained. It is, in other words, a set of rules for how to go about thinking out problems.

Technique-21: Time Series Analysis

Statistical data for past years is often expressed in terms of various curves. This method makes it possible to use them to identify trend, cycle, seasonal, and other fluctuation.

Technique-22: Regression Analysis

This technique analyzes whether there are any particular relationships between different variables and, in cases where there are, expresses them in quantitative terms.

Technique-23: Linear Programming

This technique is for solution of problems involving selection of a combination of actions that will maximize the returns from a limited quantity of resources. In this case the problem is that of selection of the combination of production levels of different crops that will bring the greatest return from the given amount of land, labor, and funds.

Technique-24: Decision Analysis

This technique is for judging which of the possible strategies that can be adopted in planning will be the best with the given probabilities or under conditions of uncertainty.

Technique-25: PERT/CPM

This is another technique for optimization, this time for selection of the optimum alternative with respect to the time and cost involved in development programs.

Technique-26: Environment Assessment

This technique is for analysis and assessment in the planning stage of the problem of how to minimize the adverse effect of development on the environment.

Technique-27: Benefit-Cost Analysis/Present Net Value/Internal Rate of Return

This is the technique that is generally used to determine the economic feasibility of projects picked out in the master planning stage, the criteria for such evaluation being the cost-benefit ratio, net present value, and the internal rate of return.

Technique-28: System Flow

One of the most important things in planning is to be able to express in the form of diagrams and figures what you have in mind. This technique shows how to do this in terms of various action sequences and planning procedures.

Technique-29: KJ Method

Imagination and creativity are very important in planning, whether in solving problems, setting goals, considering means of development, making assessments, or any other aspect of planning. This is one of the techniques that can be employed to maximize creative thinking in such situations.

Technique-30: Delphi-Method

In master planning and other long-term master planning, development philosophy, future outlooks from the viewpoint of experts, and diversity of values come into

play. In this respect it is necessary to come up with answers that are universally valid and that are founded on the opinions of scholars and experts. This technique is used here with respect to the problem of measuring and analyzing the quality of life.

Technique-31: Filing System

The success of planning depends to a large extent on the accuracy, reliability, and easy accessibility of the data that is to be used, all of which can be enhanced by adopting suitable filing systems.

Technique-32: Work Sheet Study

One of the aims in planning is to maximize the quantification of the factors being handled. The use of work sheets will make it possible to handle figures with greater ease and to understand the planning processes more readily.

The table given on the next page is a list of 32 techniques to be explained in this chapter.

The vertical axis indicates planning activities, dividing the procedure from survey to evaluation into six stages and indicating, at the same time, whether each technique is most effective ◎ or effective ○ in relation to the activities.

The relation with the basic procedure referred to in Chapter II may be shown as below.

The application of each technique to the particular field of planning is indicated by one of the four marks: △Social planning: ○Economic planning: ◇Physical planning; and □General planning.

Table III– 0–1 List of 32 Techniques

Name of techniques \ Planning activities	Survey/Research	Data Processing	Problem Finding	Forecasting	Model Formulation	Evaluation	General
△ 1. Social Survey	◎	●	●				
◇ 2. Remote Sensing	●	◎	●				
○ 3. Economic Base Analysis		●	◎	●		●	
◇ 4. Market and Distribution Analysis	●		◎				
○ 5. Analysis of Agricultural Operation Type	●	◎		●	●		
○ 6. Inter-Industrial Analysis		●	●	●	●	◎	
○ 7. Inter/Intra-Region Trade		●	●	●	◎	●	
◇ 8. Mesh Analysis		◎	●		●		
◇ 9. Land-Use Analysis	◎						
◇ 10. Land Classification Map		◎	●	●			
◇ 11. Potential Map		●	◎	●			
◇ 12. Land Availability Map		●	●	◎			
△ 13. Population Projection		●		◎	●	●	
△ 14. Social Indicator		●	●	●		◎	
△ 15. Income Distribution		●	◎				
△ 16. System Dynamics Model			●	◎	●	●	
○ 17. Econometric Model		●	●	◎	●	●	
◇ 18. Physical Model				●	◎		
◇ 19. Gravity Model		●			◎		
□ 20. System Analysis			●	●	●	●	◎
□ 21. Time Series Analysis		●	●	◎			
□ 22. Regression Analysis		●		◎			
□ 23. Linear Programming					●	◎	
□ 24. Decision Analysis					●	◎	
□ 25. PERT/CPM					●	◎	
◇ 26. Environment Assessment				●	●	◎	
○ 27. Benefit-Cost Analysis/ Net Present Value/ Internal Rate of Return			●			◎	
□ 28. System Flow							●
□ 29. KJ Method	●		◎				●
□ 30. Delphi-Method			●	◎			●
□ 31. Filing System		●					●
□ 32. Work Sheet Study	●	◎		●		●	●

◎ Most applicable
● Applicable

Planning sectors
△ Social
○ Economy
◇ Physical
□ General

Technique- 1: SOCIAL SURVEY

Definition: A social survey is the process of direct observation, description, and analysis, principally by direct local investigation, of social phenomena occurring within a particular society or social group.

Function: Social surveys are used in planning formulation when the necessary data cannot be directly obtained from statistical books or other literature, when it is necessary to determine causal relationships that have to be known for such purposes as forecasting the effectiveness of planning, when the opinions of residents are to be reflected in the setting of planning targets and evaluation axes (see the section on surveying of the opinions of residents on social indicators* for an example of use for this purpose), and other such cases.

♠ p. 14–1

Method: The following is the procedure followed:

1) Identification of Problems

This is for the purpose of clearly defining the purposes of the survey. It serves to reduce the danger of inclusion of unnecessary survey items and the adoption of unsuitable survey methods.

2) Planning and Preparations

This process consists of a diversity of work items: i. determination of the scope of the survey, ii. determination of methods to be employed in the local investigations, iii. sampling design, iv. determination of survey schedule and budget, v. study of reference literature, vi. preparation survey, vii. preparation of questionnaire forms, and viii. listing of those who are to be surveyd. Although it is possible to conduct the local investigations by means of free interviewing or observation, the most generally employed method is questionnaire forms. Even with questionnaire forms, though, there is some room for choice as to how to conduct the survey. The respondents can be visited separately, they can all meet at a certain place for the purpose of filling in the questionnaire, or they can be sent the forms through the mail.

When it is not possible to poll everyone in the area covered by the survey, sampling can be done (method iii. above). The usual method of sampling is random sampling, in which the probability of being chosen is equally applied in the case of all specimens. The advantage of this method is the fact that it makes it possible, with the known extraction probability to calculate, by means of probability theory, the sampling error of the estimated values for averages, percentages, and so on of all those covered by the survey.

3) Local Investigation

This is all the work done in the project area, including instruction of survey personnel.

4) Processing of Survey Results

This is the process of tabulation of the questionnaires. In this stage it is important to distinguish between quantitative and nonquantitative variables. In the case of nonquantitative variables, there is a distinction made between those that can be grouped in ordered categories such as "very good", "good", "not very good", and "not good" and those that cannot be classed by order, such as "mainly rice paddies", "mainly field crops", etc. with respect to forms of farming.

5) Analysis

The policy and method of analysis will depend on the purpose of the social survey in question. Let us consider here matters to which attention must be given in cases where it is necessary to determine causal relationships. Although the table and graph on the sidenote differ in that the table deals with quantitative variables and the graph with nonquantitative variables, they are both basis methods of expressing the relationship between the two variables x and y. In both cases there is considerable correlation between the two. The causal relationship behind them is one of the following four: X → Y, Y → X X ⇄ Y, or X ← Z → Y. What has to be done is to determine which type of causal relationship it is, the last one being called a quasi-correlation between x and y, which requires the introduction of a third variable Z in order to express the causal relationship and which has to be analyzed by triple cross analysis or other kind of multivariate analysis*.

Fig. III- 1-1

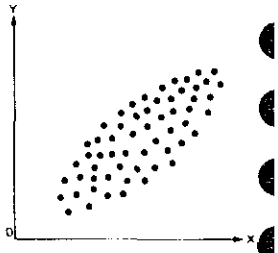


Table III-1-1

Y / X	Y1	Y2	Total
X1	70	5	75
X2	5	20	25
Total	75	25	100

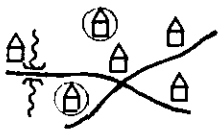
Drill: Identify the State of Consumption by Farm Families for Planning Purposes.

Identification of Problems

1) What are the sources of income of farm families, and for what purposes are their expenditures?

2) How are the prices of consumer goods fluctuating?

Survey Target Area and Sampling Analysis Policy



random sampling

Method of Analysis

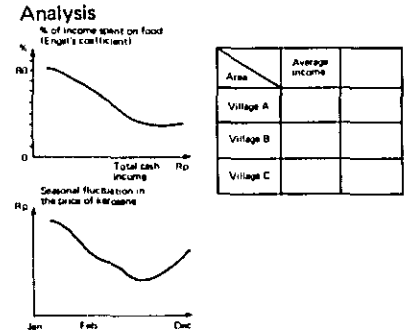
1) Consideration of the different kinds of income and *different kinds of expenditures** by area, type of farming, and total amount of cash income (cross statistics).

2) Time sequence analysis* of consumer prices.

Preparation of Questionnaire Cards (Household)

Name of village ( ) Age of head of household ( ) Number of members of household ( ) Number of members of household engaged in agriculture ( ) Kind of housing ( ) House floor space ( )	Agricultural income Rp. Rice ( ) m^2 ( ) Corn ( ) m^2 ( )
	Nonagricultural income Rp. ( )
Facilities: Running water (Yes/No) Bath (Yes/No) Telephone (Yes/No)	Total ( )

Analysis



(Daily record of family expenditures)

Date

Type of income and expenditure	Cash income	Quantity	Cash expenditure
Rice shipped to cooperative	$2,000	500kg	
Cup noodle			$15
Total			

EXAMPLE

Suggestions for Planning

1) Cash income is greater in the case of [ ].

2) Excessive (inadequate) amount of money spent on [ ] is a problem.

3) Need for production and distribution of consumer goods of [ ] type in the future.

4) Means of reducing fluctuation in the price of [ ] Necessary.

◆ Multi-variable analysis

A method of summarizing and *linking the characteristics of* those data consisting of interrelated variables (characteristic values of various kinds) for the purpose of 1) forecast; 2) discrimination; 3) classification; 4) establishment of interrelations; 5) standardization; 6) partial correlation; and 7) *determination of causation and linking*. Examples: regression analysis, discrimination function, factor analysis, etc.

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◆ Breakdown of expenditures by items.

Example of items

1) Food
   - Main item of food
   - Fish, meat and vegetables
   - Cakes, fruit, alcohol
   - Other food items
2) Housing
3) Clothing
4) Light and heat
5) Other expenditures
   - Health and medical care
   - Transportation and communications
   - Education
   - Amusement
   - Other items

♥ Reference book

- T.W. Anderson Introduction to Multivariate Statistical Analysis, 1958
- W.J. Goode & P.K. Hatt, Methods in Social Research, 1952
- G.A. Lundberg, Social Research, 2nd ed., 1942

Technique- 2: REMOTE SENSING

Definition: Remote sensing is a technique of obtain information about the nature of objects or about natural phenomena or the environment, by means of a remote sensor carried on an aircraft or satellite, and of analyzing such information, by data processing methods such as electromagnetic radiation (ultraviolet, visible, near infrared, thermal infrared, microwaves, etc.) reflected or emitted by a target.

Function-1: Method of Application

Of the different remote sensing systems for observing the surface of the earth, the multispectral MSS data obtained by LANDSAT, the earth resource satellite, is particularly easy to get and can be put to effective use in this project. The MSS sensor on board LANDSAT measures and records four electromagnetic spectrum bands of energy reflected from objects in small areas of 80m x 60m on the surface of the earth, the spectrum length bands being 500–600, 600–700, 700–800, and 800–1,100 nanometers. Furthermore, because of LANDSAT's repetitive observation capacity, it is possible to observe phenomena involving change over a period of time and to survey and assess the natural environment in greater detail.

Since, however, the target area of the survey in the present project is situated in the tropics, it will probably be very difficult to get data for the entire area free of cloud cover. One way of overcoming this problem is by the use of SLAR microwave remote sensing data, which might be available for the target area. If it is, consideration will be given to maximum use of it.

Additionally, if there is even partial availability of existing aerial photographs, they can be effectively used as supplementary data linking the LANDSAT and SLAR remote sensing data and ground surveys.

Besides such data, it will also be necessary to conduct sample surveys on the ground for collection of ground truth.

These kinds of remote sensing data are recorded as images of what can be observed from above the target area. Accordingly, the data on the natural environment needed for the present project can be obtained by processing, analyzing, and evaluating such data and can be used to prepare land use (land cover) maps, geological and soil maps, forest distribution maps, hydrological (water system and river basin) maps, and other topical maps. Furthermore, such data will make it possible to provide information for selection of land suitable for agricultural development and for forecasting and assessing landslides, changes in the natural environment due to development, and other factors standing in the way of development.

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p. 18

Function-2: Characteristics

The following are some of the possible kinds of topical maps on the natural environment that can be obtained by use of remove sensing:

- Maps of present state of land use (land cover maps)
- Topographical classification maps
- Geological and soil maps
- Hydrological (water systems and river basin) maps
- Maps of seasonal variation in water covered areas
- Forest maps
- Maps of seasonal variation of distribution of vegetation
- Landslide distribution maps

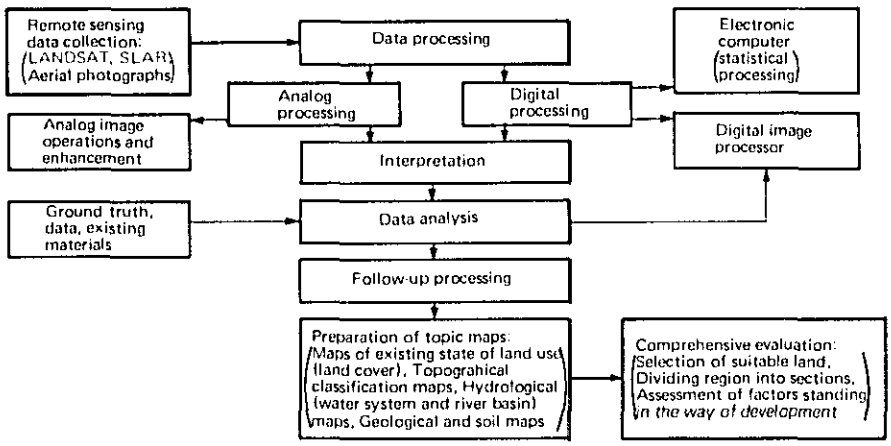
(All on a scale of about 1:250,000)

As for the information that will not be obtainable from the LANDSAT and other such data, such as information regarding road networks, distribution of populated areas, irrigation facilities, etc., it can be supplemented by overlaying topographical and other types of maps. Furthermore, because of the thick cover of vegetation in the target area, ground surveys, aerial photograph analysis and other supplementary methods will have to be used for geological, soil, and similar surveys instead of just relying on LAND SAT data.

Method: Procedure

Fig. III– 2–1 below gives the procedural flow for remote sensing.

Fig. III– 2–1 Remote Sensing System



1) Collection of Remote Sensing Data

It is possible to purchase LANDSAT data from the EROS Data Center in the United States in the form of film and, in the case of some of the information, in the form of magnetic tape for processing by electronic computer.

After examining the available LANDSAT data relating to the target area, that part of it that is of good enough quality and that satisfies cloud coverage and other requirements will be purchased. In this connection, it is desirable to purchase as much of the microwave SLAR remote sensing data available as possible considering the less than favorable climatic conditions (particularly cloud coverage conditions) of the area. It should be possible to purchase the existing SLAR data from the organizations that did the photographing through the Indonesian government, but this possibility will have to be checked out.

A survey will also have to be made of the availability of aerial photographs, as many of which should be collected as possible.

2) Data Processing

Because of the nature of remote sensing data, it is processed by means of analog processing and digital processing. Analog processing consists of image operation by means of photograph processing, image enhancement, image composition, etc. and has the advantage of being economical and allowing for rapid processing. Since digital processing techniques are more suitable for detailed analysis, analog techniques are used for rough analysis and assessment of target areas, analysis of relation patterns of ground objects, and other such purposes. Digital processing consists of processing and analysis of MSS data that has been put into numerical form by use

Fig. III– 2–2 LANDSAT MSS Image (False Color Synthesis)

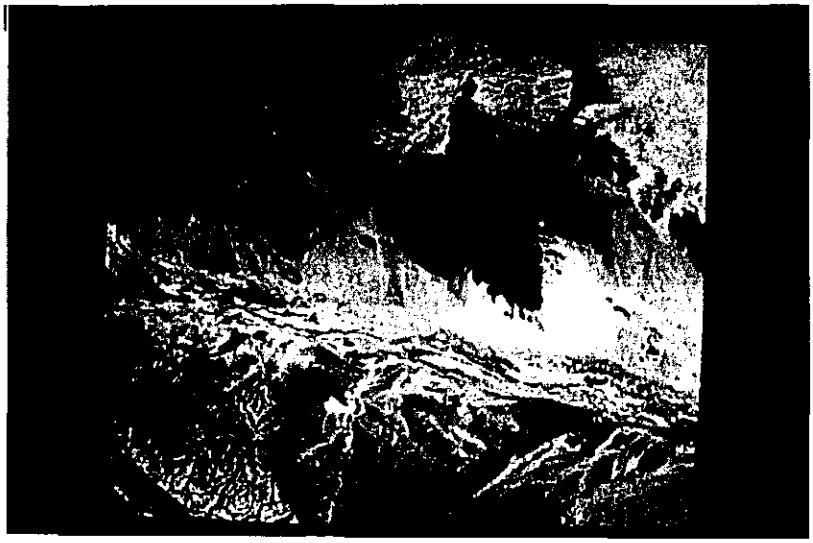


Fig. III– 2–3 Results of Classification by Spectral Features (Digital Image Processing)

Note: These photographs are taken in Yemen Arab Republic

of electronic computers and digital image processor. The processing includes various kinds of data pre-processing, clustering of the target area by means of recognition analysis of spectral patterns of MSS data, various kinds of enhancement, and so on and can be applied in natural environment surveys and surveys of existing state of land use with respect to certain points of the target area that are considered to be of particular importance. In addition, preparation of traditional interpretation keys and the reading of photographs by interpretation engineers are also very effective data processing methods that supplement the physical techniques of analog and digital processing with human perception. Fig. III– 2–2 and –3 are results of processing of LANDSAT data by a digital image processor. Fig. III– 2–2 false color composited image and Fig. III– 2–3 gives the results of classification by spectral features in different colors.

3) Data Analysis

This is process of analyzing the data processing results in each specialized field and classifying and giving meaning to them for the purpose of preparing various topical maps of the natural environment. In the case of analog techniques, the main work is preparation of interpretation keys for the different topical maps and doing the final interpretation, and in the case of digital techniques, automatic pattern recognition by electronic computers using statistical processing techniques is used.

In the final data analysis, data from ground sampling surveys of the target area or field checks are necessary, and collection of ground truth data, which is explained below, is needed in the intermediate analysis stage. It is also possible to use aerial photography data as part of the ground truth data.

4) Collection of Ground Truth Data

This is collection of ground base data for linkage of the remote sensing data obtained from above the target area with ground phenomena. The ground truth data needed varies according to the kind of topical map, the main items being vegetation, forest status, soil, topography, geology, land use, types of crops, hydrology, meteorological features, climatic change patterns and so on at representative points and measurement of the electromagnetic characteristics of the objects composing such elements.

5) Follow-up Processing

This is the work of putting the data for each of the topics as obtained in the data analysis into final form, including topographic contour mapping with automatic plotter, expression on numerical descriminated data in the form of color pictures, and overlaying of information obtained from remote sensing data and other that such as data on social conditions.

6) Comprehensive Evaluation

The basic technique is evaluation of the natural environment in terms of the individual topical maps. It is also effective, however, in analyzing and evaluating the various kinds of remote sensing data from a more comprehensive point of view. Particularly important data can be furnished if LANDSAT photographs happened to catch short-lived phenomena such as floods. Furthermore, it will be useful to overlay the topical maps for setting limiting conditions in the selection of land suitable for development and evaluation of factors standing in the way of development.

♥ Reference book

Manual of Remote Sensing, The American Society of Photogrammetry

- Proceeding of the International Symposium on Remote Sensing on Environment, Environmental Research Institute of Michigan
- Lintz and Simonett, Remote Sensing of Environment, Addison-Wesley Publishing Company Inc.
- Floyd. F. Sabins. Jr., Remote Sensing Principles and Interpretation, WH. Freeman and Company

Technique- 3: ECONOMIC BASE ANALYSIS

Definition: Economic base analysis is based on the idea that the base of regional economic growth is export. In this respect, the industries of a region can be classified as either basic industries, which acquire exchange from outside the region, and nonbasic industries, which service them.

In regional planning it is important that the basic industries of the region be identified because of the great effect their growth or decline has on the regional economy as a whole. In regional agricultural planning as well, plans regarding such basic industries are particularly important among related plans.

♠ p. 6–1

Function: This kind of analysis is more suited to the short run than to long-term forecasting. This is particularly true with respect to application of the economic base multiplier, which will be explained later.

Method: First, let us consider the question of measurement of exports as the determinant of basic industries. Generally, there is no direct data available, and since surveys would be costly, indirect estimate methods are employed, the most widely used method being the locational coefficient based on employment data.

First, a percentage breakdown is made of total national employment by type of industry. Next, a percentage breakdown is made of total regional employment by type of industry. The latter percentage divided by the former is the locational coefficient that we are after as an indicator of regional export and import. If this coefficient is larger than 1 for a particular industry, that industry can be considered an export industry in that region.

For more precise analysis, it is assumed that the percentage of regional employment of each industry in the region is the same as the percentage for the industry nationwide, and the estimate employment of each industry is obtained by multiplying by total regional employment. The difference between this figure and the actual figure (actual figure >estimate) is considered to be the number of people employed in the industry in that region that account for its export. By adding together such employment for export of each industry in the region, we get the total basic industry employment of the region.

Thus, we have divided the total employment of a region into basic employment and nonbasic employment. Assuming that employment is proportionate to income, the percentage of regional income spent within the region will be the same as the percentage of total regional employment represented by nonbasic employment against total regional employment. Here the economic base multiplier is defined as follows:

$$\text{Economic base multiplier} = \frac{1}{1-S}$$

S being nonbasic employment/total employment.
Accordingly,

$$dY = \frac{1}{1-S} dX,$$

dY meaning the change in total employment and dX the change in basic employment. By multiplying the future change in basic employment by the economic base multiplier, we get the future change in total employment.

Example: Calculate the value of the economic base multiplier on the basis of the locational coefficients of each industry and the total export industry employment for S. Sulawesi as derived from the following table III– 3–1.

Table III– 3–1 Number of Employer Persons by Province and Main Industry

Province	Agriculture (Livestock, Fishing etc)	Mining and Quarrying	Manufacturing	Electricity City Gas and Water	Construction	Trade, Restaurant and Hotel	Transport, Storage and Communication	Financing, Insurance, Real Estate and Business Services	Community Social and Personal Services	Activities not Adequately Defined	Total
Daerah Istimewa Aceh	542.486	360	20.784	–	3.438	51.706	7.444	568	56.464	3.164	686.412
Sumatera Utara	1.658.114	1.024	194.568	2.048	26.404	349.272	80.454	8.484	308.244	1.804	2.630.416
Sumatera Barat	681.451	185	33.080	370	8.630	147.803	26.139	2.252	95.969	185	996.064
Riau	393.633	5.913	18.001	172	9.978	74.036	15.862	615	65.960	–	584.170
Jambi	226.099	667	17.560	286	3.092	39.577	11.519	1.615	39.871	–	340.276
Sumatera Selatan	1.202.523	2.743	41.744	468	18.710	139.278	41.099	1.404	120.334	1.838	1.369.947
Bengkulu	180.701	793	1.088	145	1.595	9.756	2.032	–	10.805	–	206.715
Lampung	898.233	6.289	55.942	–	10.447	114.406	17.791	387	69.222	129	1.170.846
D.K.I. Jakarta	19.096	5.518	181.382	6.408	119.082	466.360	150.054	29.726	527.770	3.738	1.509.084
Jawa Barat	4.710.786	27.094	604.694	3.182	190.536	1.355.510	233.326	8.640	880.218	1.642	8.015.728
Jawa Tengah	5.818.594	19.816	1.265.074	6.148	153.002	1.340.416	227.908	18.092	958.832	7.290	9.803.840
D.I. Yogyakarta	904.038	4.032	178.148	410	37.234	148.466	18.152	878	145.222	192	1.436.770
Jawa Timur	7.142.179	24.009	740.360	4.166	131.396	1.741.248	283.412	10.284	1.028.357	3.367	11.108.838
Bali	568.016	3.688	117.216	346	24.072	109.800	13.650	798	98.614	–	936.200
Nusa Tenggara Barat	697.323	1.224	67.881	357	16.932	121.652	16.218	544	78.965	–	1.001.096
Nusa Tenggara Timur[a]	150.392	–	2.980	–	906	9.302	1.909	421	14.302	970	175.182
Kalimantan Barat	689.520	–	57.075	570	9.205	100.215	19.565	570	66.365	555	924.240
Kalimantan Tengah	255.534	62	10.269	99	2.888	26.111	2.949	124	21.382	–	319.418
Kalimantan Selatan	369.118	2.289	84.793	436	3.752	125.568	28.567	872	69.824	–	685.219
Kalimantan Timur	128.585	2.775	20.932	248	7.909	67.129	14.696	669	46.676	347	280.166
Sulawesi Utara	369.784	752	63.094	246	15.732	96.024	15.412	260	88.568	506	610.978
Sulawesi Tengah	278.100	104	5.668	–	3.108	12.859	4.648	208	32.140	–	336.834
Sulawesi Selatan	977.702	1.450	208.770	790	13.570	193.274	42.689	6.246	181.178	158	1.625.777
Sulawesi Tenggara	277.702	2.464	4.611	–	2.032	17.322	5.762	216	22.214	108	332.441
Maluku[b]	680	–	1.300	40	520	7.260	1.700	320	10.540	20	22.880
Irian Jaya[c]	966	28	658	112	1.092	4.398	1.036	252	8.050	112	16.702
INDONESIA	29.117.283	113.365	3.968.272	27.045	815.262	6.813.895	1.283.983	94.433	5.046.784	25.845	47.306.237

a) Hanya Kab. Kupang
b) Hanya Kotamadya Ambon
c) Hanya Jayapura Kota

South Sulawesi agricultural location coefficient =

$$\frac{\text{S. Sulawesi agricultural employment}}{\text{Nationwide agricultural employment}} \Big/ \frac{\text{Total employment in S. Sulawesi}}{\text{Total employment nationwide}}$$

$$= \frac{977{,}702}{29{,}117{,}283} \Big/ \frac{1{,}625{,}777}{47{,}306{,}237} = 0.977$$

The following table gives location coefficients for other industries in South Sulawesi as well as calculated on the same basis as above.

Table III– 3–2 Table of Location Coefficients for Different Industries in South Sulawesi (Based on Employment Figures)

	Agriculture (Livestock, Forestry, Fishing and Hunting)	Mining	Manufacturing industries	Electricity, Gas, Water	Construction	Trade, Restaurants, Hotels	Transportation, Warehousing, Communications	Financing, Insurance, Real estate, Service industries	Social and individual services	Others categories	
Location coefficient	0.977	0.372	1.531	0.850	0.484	0.825	0.967	1.925	1.045	0.177	
Number of employees (A)	977.702	1.450	208.770	790	13.570	193.274	42.689	6.246	181.178	158	1.625.777
% of national total	61.55%	0.24%	8.39%	0.05%	1.72%	14.40%	2.71%	0.20%	10.67%	0.05%	
Theoretical value (B)	1.000.666	3.902	136.403	975	27.963	234.312	44.069	3.252	173.470	813	
Number of employees in base industries (A) – (B)	N/A	N/A	72.367	N/A	N/A	N/A	N/A	2.994	7.708	N/A	Basic Total 83.069

Economic base coefficient $= \frac{1}{1 - S}$

Those of the above industries with a location coefficient greater than 1, i.e. manufacturing industries, financing, insurance, real estate, and service industries and social and individual services, can be considered export industries, as discussed in S. Sulawesi.

The "specialization coefficient" is defined the same as this location coefficient. In some cases comparison is made not only between different regions but also between different counties in the same region or not only between different industries but also between different sections of the same industry, between different crops, for instance, in the case of agriculture, and sometimes gross production figures are used instead of employment figures.

◆ **Locational coefficient**
= Share of i sector in j region ÷ Share of i sector in nation or = Share of i sector in j region against nation ÷ Share of agriculture sector in j region against nation

♠ p. 3

♥ Reference book

- H.O. Nourse, Regional Economics McGrow-Hill, 1968
- W. Isard, Method of Regional Analysis, The MIT Press, 1969
- Charles M. Tiebout, The Urban Economic Base Consider, Urban Economic, 1956

Technique- 4: MARKET AND DISTRIBUTION SURVEY

Definition: This kind of survey is need for planning regarding specifications and quantities, destinations, means, and timing of shipments of agricultural produce as well as the marketing facilities, the organizational improvements, etc. that will be necessary by the target year.

Function: Needless to say, the problem of marketing is one of the major bottlenecks in agricultural development planning in the region in question. In fact, many agricultural experts see solution of this problem as an absolute must if there is to be any development of agriculture at all in the region. Moreover, if it can be solved, they expect agriculture income in the region to increase by 50%.

Method: There are two main reasons why such an important element has not been incorporated in planning. One is the difficulty in acquiring the considerable amount of data needed for this purpose, and the other is the fact that for improvement of planning a great deal of time is required for coordination between all of the levels and existing organization involved.

Market and distribution and surveys are generally conducted by polling of farming cooperatives, shipment organizations (including organizations above them), local government offices, private operational centers, brokers and wholesalers in public and private markets, shop owners and others involved or by collection of national and prefectural agricultural statistics, market statistics and data and statistics in periodical publications of various markets.

1) Production Distribution Surveys
   - i Production quantities and shipment and sales quantities of different items (degree to which different items have become commodities).
   - ii Sales quantities and monetary worth by item, period, and destination (agriculture cooperatives, shipment cooperatives, markets, brokers, retail stores, processers, etc.).
   - iii Shipment quantities and transportation cost by item and means of transportation.
   - iv Prices to producers of main items at main markets during different periods by month, ten-day period, specifications, and product name.
   - v Shipment and sales (distribution) costs of main items for selection, wrapping, crating, shipment, market commissions, etc.
   - vi Local consumption and amount of import from other communities in different seasons of main items.
   - vii Marketing routes (diagrams) of different products.
2) Marketing Facilities
   - i Scale and state of operation of marketing facilities for major types of agricultural produce (collection centers, milk collection centers, fruit selection centers, egg selection centers, warehouses, slaughterhouses, livestock markets, fruit markets, etc.)
   - ii Market conditions (distance to market, transportation conditions and cost, etc.).

3) Marketing Organization (Collection and Shipment Mechanism)

i General conditions and shipment handling records of joint shipment organizations (comprehensive agricultural cooperatives, specialized agricultural cooperatives, voluntary cooperatives, etc.)

ii Collectors and shippers (brokers and wholesalers in production areas) and the amounts of shipments they handle.

iii Conditions and characteristics of individual shippers.

iv State of production and sales by contract (companies placing orders and brokers involved).

v State of provisition of information on market conditions (mechanism of information service concerning production areas and market conditions and use of such information in shipment and sales planning).

4) Processing of Agricultural Products

i State of processing production of different items (primary processing, secondary processing, etc.).

ii Number and processing capacity of processing facilities (scale and state of operation of different kinds of processing plants).

iii Shipment destinations and amounts shipped of different processed goods.

iv Value added and profitability of processing.

5) Storage Facilities

i State of storage warehouses for general agricultural produce.

ii State of joint storage facilities for vegetables and fruits.

iii State of storage facilities for processed agricultural products.

Under conditions of free competition on the free market, producers cannot get high enough prices unless the principles regarding market shipments (quantity, quality, continuity, etc.) are observed in shipment and sales of vegetables, fruits, and livestock products. Among the points that have to be checked for problems are methods of selection, wrapping, and crating, joint shipment organization, market selection, timing of shipments, and method of shipment, possible waste in marketing and sales costs, and whether or not marketability and commodity value have increased in response to market and consumer demand trends.

Accordingly, it is necessary to determine whether steps are being taken to improve market surveys, information service activities, and sales organization as a part of overall marketing efforts and to identify what has to be done for such improvement.

Another problem is the rate of value added in the case of agricultural processed goods, whether such processing be a side business to agriculture or a rural industry in its own right. Evaluation of such agricultural processing industries must be comprehensive so as to be able to gauge all of its merits, including the function of adjusting quantities of shipment of produce and of providing local employment.

Reference book

- Dale C. Dahl and Jerome W. Hammond, Market and Price Analysis: The Agricultural Industries, University of Minnesota, 1977
- K. Wierea and J.C. Abbott, Fertilizer Marketing, FAO Marketing Guide No. 7, 1978

Technique- 5: ANALYSIS OF AGRICULTURAL OPERATION TYPE

Definition: *It is to ascertain the capacity, the system and the form of operations* of farms, their distribution, and also what sort of operations intention exists among the farms or areas.

For these purposes, sample survey and statistical processing are to be carried out to obtain basic data for agricultural operations in future from the following points of view:

♠ p. 10–1
1) Basic conditions of land such as topography, soil, roads, etc.;

♠ p. 18–1
2) Basic components of agricultural management such as size, capital, labor force, etc.;

♠ p. 3–1
3) Maturity of the place of production (stage of development);

♠ p. 13–4
4) Condition of the outflow of labor, diversion of land from agriculture, etc.

Function: This method of analysis is effective not only for agricultural production but also for ascertaining the form of operations for the farm or the place of production to be on its own in agricultural planning aimed at the improvement in income for the area as a whole. In other words, it provides the data necessary for ascertaining what improvement in the operations level is required for securing a certain income under different land conditions in quality and environmental conditions having positions and extension and, further, what priority in investment is to be given to what area.

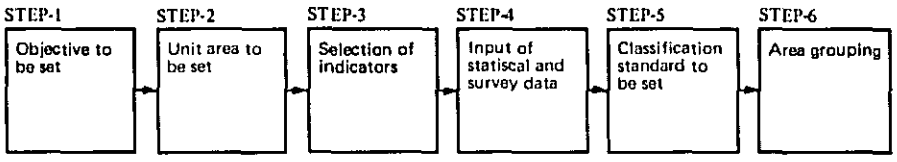
♣ Chap.-2 Macro frame

Method: Indicators and Procedure to Ascertain Characteristics of Farming in the Area Concerned.

1) Study Procedure To Be Set Up

Fig. III– 5–1 shows a general procedure of operations pattern analysis. What is *important here is to ascertain the purpose of the analysis. For instance, classification* unit, selection of indicators, type and contents of data differ according to different objectives such as regional policy aimed at equalization of income, regional distribution plan of labor or *the establishment of the improvement standard for facilities* or basic facilities.

Fig. III– 5–1



♠ p. 14–1
2) Selection of Indicators

The table III– 5–1 is a list of indicators generaly used for studying agricultural operations. Those which meet the objective of analysis may be selected from the list as mentioned under the previous section. However, in reality, it is better to select several farms which may the standard or target from the survey area to conduct detailed survey on operations so that those indicators which may express these characteristics. By using these indicators, it will be possible to evaluate the survey area or set up the standard.

Further, if the standards for comprehensive evaluation are to be given, operations stability (continuity), efficiency (growth) and expansion potential (possibility) may be mentioned.

Table III 5-1

Indicators	Meaning and calculation of indicators	
Net agricultural production	Value added as result of agricultural production (gross agricultural earnings minus material costs (agricultural operational costs exclusive of employee wages and tenant payments))	
Degree of dependence on agriculture	% of total income represented by agricultural income (agricultural income ÷ total income x 100)	♠ p. 32–5
% of coverage of family expenditures by agricultural income	Extent to which family expenses can be covered with agricultural income (agricultural income ÷ family expenditures x 100)	
Agricultural income rate	% of gross agricultural earnings represented by agricultural income as indication of income yield (agricultural income ÷ gross agricultural earnings x 100)	♠ p. 32–5
Capital equipment rate	Amount of capital equipment per worker as indication of level of agricultural production technology, expressed as amount of agricultural fixed capital per 10 hours of agricultural labor (amount of agricultural fixed capital ÷ number of hours of agricultural labor x 10)	
Labor intensity	Expressed as the amount of labor input per unit of cultivated area (1ha) for use as a measure of labor accommodation capacity and labor savings (number of hours of agricultural labor input ÷ cultivated area)	
Capital intensity	Expressed as amount of capital input per unit of cultivated area (1ha) (amount of agricultural fixed capital ÷ cultivated area)	
Land productivity	Expression of the production capacity and economic value of the land in terms of net production per 10a (agricultural net production ÷ cultivated area)	♠ p. 32–13
Labor productivity	Expression of production capacity of labor in terms of net production per 10 hours of input of own agricultural labor (net agricultural production ÷ hours of agricultural labor input x 10)	♠ p. 32–13
Capital productivity	Expression of efficiency of invested capital in terms of net production per ¥1,000 of fixed agricultural capital investment (net agricultural production ÷ fixed agricultural capital x 1,000)	♠ p. 32–13
Rate of marketing of agricultural produce	Indication of degree to which production is marketed as percentage of production sold (sales ÷ production x 100)	
% of gross agricultural income converted into money	Indication of degree of marketing of produce (agricultural cash income ÷ gross agricultural earnings x 100)	
% of family expenditures represented by cash payments	Indication of degree of dependence on cash purchases for consumption (family cash expenditures ÷ total family expenditures x 100)	
Disposable income per family member	Indication of income level (disposable income ÷ number of family members at beginning of year)	
Family expenditures per family member	Indication of level of consumption or standard of living (family expenditures ÷ number of family members at beginning of year)	
Engel's coefficient	Percentage of family expenditures represented by expenditures for food and drink as comparative index indicating standard of living (expenditures for food and drink ÷ total family expenditures x 100)	♠ p. 32–5
Propensity to consume	Percentage of income consumed (family expenditures ÷ disposable income x 100)	
Propensity to save	Percentage of income saved (Farm family economic surplus ÷ disposable income x 100)	

3) Determination of the Standard Operations Pattern in Farming

♠p. 18–1

The flow shown below may decide what type of farm can serve as the standard. In this flow, first of all the target income is to be established. Then, while standardizing the production, production cost consisting of personnel cost and equipment cost and the price of each crop to meet the required income, production per farm is to be determined. Below are the basic items for judgement:

i To what extent production can be expanded.

ii To what extent the distribution mechanism and prices can be stabilized.

iii To what extent agricultural structure can be improved.

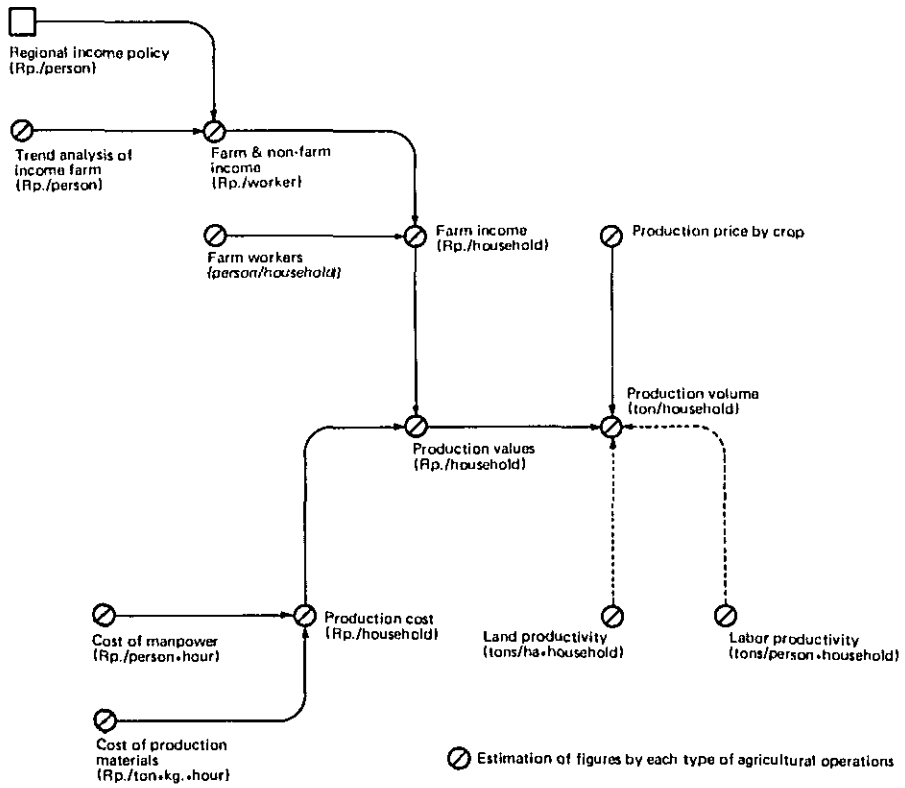
Further, the fact that the agricultural income reaching the target makes independent operations possible for a farm and also that the agricultural income is comparable to the income level in other industries may also serve as the standards.

♠p. 32–9

Table III– 5–2

Type of agri. operations	Size (area) of operations	Compositon of crop mix	Capital equipment	Target income	Remarks

Fig. III–5–2 A Model for a Type of Agricultural Operation



Example: Analysis of Operation Types in Agriculture in the Area Concerned

1) Area Classification by Indicators

Fig. III– 5–3 plots the indicator values for the different villages of K town on the map of the administrative divisions. The purposes of this analysis are to forecast the directions of agricultural development of different zones within the target area in order to be able to provide reference data for investment projects, and this is to be done by relating the features of agricultural markets.

♠ p. 18–1

The target area in this case is one in which there is a mixture of rice paddies and fields and in which there is considerable crop diversity and some livestock raising. Accordingly, it has several types of agricultural operations. The indicators that have been selected are the following five:

i The average total number of productive labor units per household* in each village as an indicator of the scale of operations.

ii The crop yield index* as indicators of production efficiency.

iii The gross production index* as same above indicators

iv Number of cultivators per hectare as an indicator of the degree of intensity.*

v Gross production per adult worker as an indicator of labor efficiency.*

◆ The total number of productive labor units

is one of the indicators of scale of operations. It is obtained by multiplying the amount of labor input and the amount of area for each kind of crop, adding up these products, and dividing the total by the total area or the total number of farm families.

◆ Crop yield index

= Average value (ton/ha) for Y village ÷ Average value for target area x 100

◆ Gross production index

Same as above, except that ton/ha is replaced by yen/ha.

◆ Degree of intensity

= Labor (materials, capital) input ÷ Operational area (cultivated area)

◆ Labor efficiency

Efficiency per unit of labor input.

Fig. III– 5–3 Indicator Values for Some of the Villages in K Town (Partial)

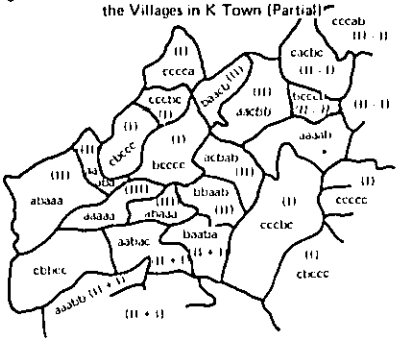


Table III– 5–3 Different Categories for Five Indicators (Village Averages)

2) Comparison with Land and Base Conditions

Here we lay maps of the same scale as Fig. III– 5–3 and expressing land conditions (topography, soil, rivers, etc.) and base conditions (roads, irrigation facilities, etc.) on top of it in order to get an idea of the causal relationships between the above-mentioned indicators and these two categories of conditions. If, for instance, the indicator values for a particular village are mostly in the class "a" in spite of poor road, topographical, and soil conditions, the validity of such values should be questioned. The same can be said for the opposite case. In either case, it will be necessary to reconsider such possibility as mistaken data, mistaken entry of indicator values, incomplete description of road conditions, the possibility of the village having some special conditions or other that are not reflected in the indicators, and so on. The principles for classification of the zones within the area are as follows:

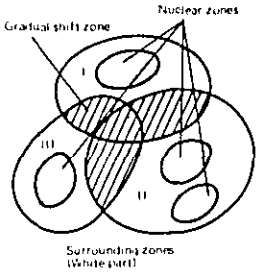
♠ p. 20–2

i Grouping together of at least three villages.

ii No grouping together of villages not linked with each other by roads even if they are contiguous.

iii Attention is to be paid to formation of nuclear zones, surrounding zones, and gradual shift zones.

Fig. III– 5–4



*The terms "nuclear zones", "surrounding zones", and "gradual shift zones" are explained in *Fig. III– 5–4. In the formation of zones, there are villages that have features of the operational* indices in classical form, and these are collected together to form nuclear zones. Outside them, however, such features gradually fade, and there are zones which are formed by the overlapping of surrounding zones of nuclear zones with different features. These overlap zones, known as "gradual shift" zones, do not easily lend themselves to grouping as to the future direction of their development. To make things easier to understand, let us assume that the zones in the diagram represent different types of agricultural operations, which will be explained later on, Zone–1 being of the sericulture type, Zone–2 of the tobacco type, and Zone–3 of the dairy farming type. In the nuclear zones most of the agricultural operations are larger scale operations of the type that characterizes the zone. In surrounding zones, however, there are more and more operations of other types, and in the gradual shift zones it is hard to tell what type of agricultural operation is the most characteristic. Nor can one tell whether they will take a certain direction in the future or continue to be mixed zones. In view of the fact that in reality there is a complex intermixture of villages with different characteristics, in grouping villages attention must be paid to the above points, with judgment based on experience.

3) Preparation of Area Classification Maps

♠ p. 11–1

Fig. III– 5–5 was produced by overlaying Fig. III– 5–3 with maps depicting topography, soil, and road conditions and grouping the villages on the basis of checking and revision, taking into account such conditions. In this figure Zone–III is a zone with outstanding agricultural productivity, Zone–I is a backward zone with low agricultural productivity, the *pluses and minuses indicating relative superiority and* inferiority within that range. As for the areas indicated by the slanted lines, they represent village groupings with a second type sideline farm family rate of more than 70%. They will be of great importance in terms of consideration of future directions, income formation, and area problems.

♠ p. 18–1

4) Formulation of Types of Agricultural Operations

What has been explained above is of relevance to determination of present levels of productivity and future directions. Let us now consider the way in which the direc*tions of production of agricultural operational entities will differentiate or the* extent to which they have been integrated in terms of individual villages, first classifying such entities into various operational types on the basis of certain criteria.

Table III– 5–4 classifies scales of operation with respect to different crops and other agricultural operations on the basis of the following criteria:

i Those that are only one sector of agricultural as a profession.

ii Those that are only supplementary or complementary sectors of the basic sector characterizing the area.

iii Those that are one of the sectors of complex agricultural operations.

iv Those that are specialized basic sectors.

Fig. III– 5–5 Preliminary Area Classification Map in K Town (Partial)

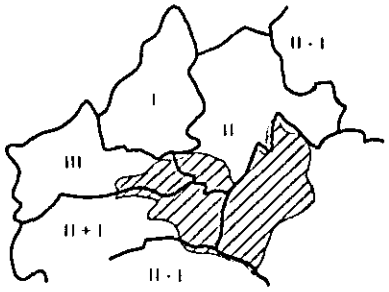


Fig. III– 5–6 Distribution of Farm Families in Different Villages of K Town Engaged in Cultivation of Tabacco by Scale of Operations

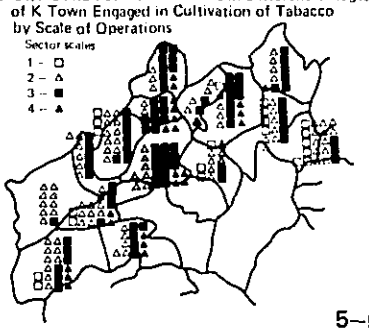


Table III-- 5--4 Classification Indicators for Scale of Different Sectors

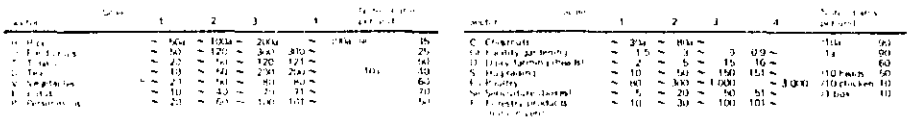


Table III— 5—5 shows the number of farm families in each village engaged in the cultivation of different crops or other agricultural activities, and Table III— 5—6 gives the totals for the whole target area.

Fig. III— 5—6 takes up a particular sector of those covered in Table III— 5—5, showing what the distribution of the scales of operation in that sector is among the different villages. As many more maps of this kind can be drawn as needed.

♠ p. 18—1

Table III— 5—5 No. of Farm Families in Different Villages of K Town Agricultural Operation Type

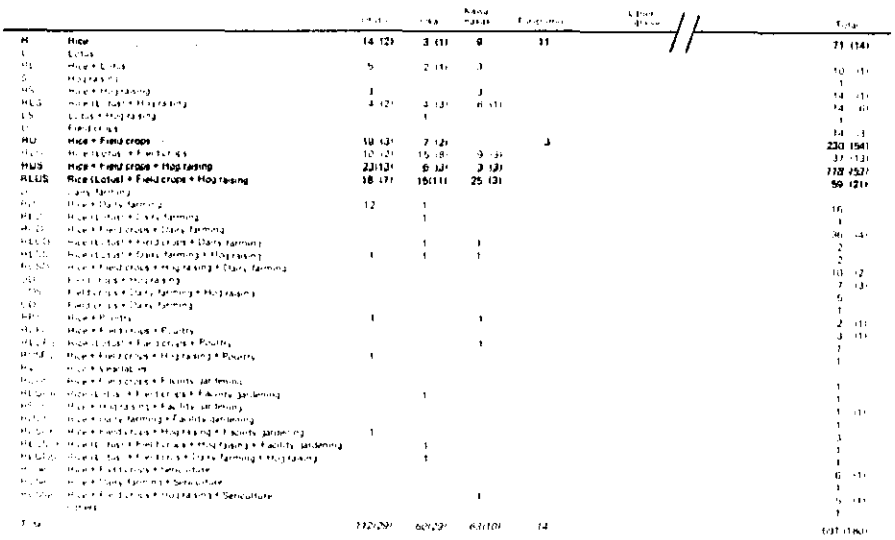
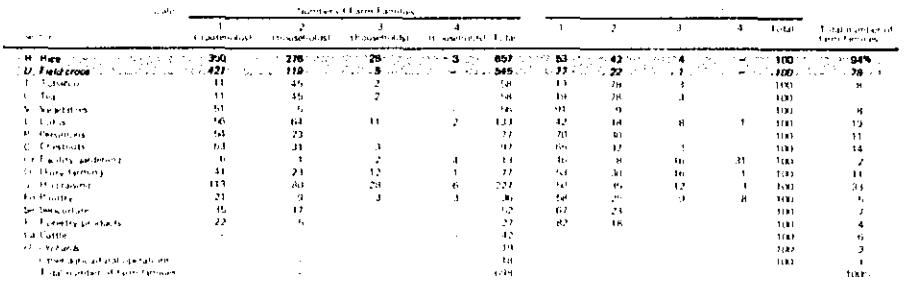


Table III— 5—6 No. of Farm Families and Those Ratio by Different Sectors and Scales



5) Secondary Classification of Area Agricultural Features from the Viewpoint of Formation of Production Areas

From Table III– 5–5 one can see that there is a considerable number of types of agricultural operations in the area as a whole, the main ones being "rice + field crops", "rice + field crops + hog raising", "rice alone", "rice (lotus) + field crops + Hog raising", "rice + field crops + dairy farming", and "rice (lotus) + hog raising", all of which are rather simple patterns. In this area a large percentage of the agricultural operations consist of rice and ordinary field crop cultivation plus hog raising, with some dairy farming as well.

♠ p. 3–2

Similarly, Table III– 5–6 tells us which production sectors are engaged in most by farm familieis in the area. Almost all of them (94%) cultivate rice, and a high percentage (78%) of them also cultivate field crops. In the case of both of these sectors, however, the scale of operations is for the most part no greater than the second category (supplementary or complementary), with only a very few operations belonging to the third category. In the field crops sector in particular the percentage of operations in the first category (self-sufficiency) is very high. This is an indication that many farm families in the area still cultivate wheat, sweet potatoes, peanuts, soybeans, and various grains.

These types of agricultural operations and distribution of scale of operations in the area as a whole must be kept in mind in studying the village distribution, paying attention to the following general points.

i Checking, by comparison with the primary area classification map, of which sectors have particularly large scale of operations in each type of agricultural operations in the villages in each area.

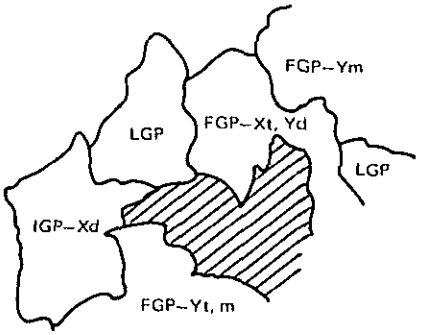
ii Checking of what type of agricultural operations is most prevalent in the villages of each area and of the category of scale of operations that it belongs to.

iii Checking of whether the major types of agricultural operations with large sector scales are concentrated in particular villages of the area or fairly evenly spread out among all of the villages.

iv Checking of how many farm families in what areas have independent operations with respect to the operations of such scale.

After checking out these points, the primary area classification map is revised as per Fig. III– 5–7. While there are no strict criteria for such revision, it is desirable that the following procedure be followed (see Fig. III– 5–8).

Fig. III– 5–7 Secondary Area Classification Map in K Town (Partial)

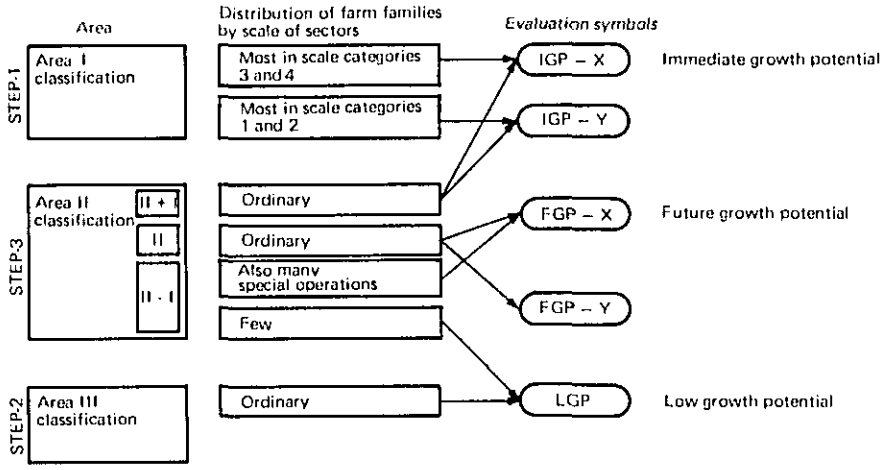


* As an example, the revision has been done in such a way as to make it easy to understand.

** *IGP: High growth potential*
FGP: Considerable growth potential over the long run
LGP: Low growth potential
X: Large, stable sector scales
Y: Increasing sector scales, but not yet stable

The sub-letters indicate the particular crop or other agricultural activity: d (dairy farming), t (tobacco), u (usual field crops), m (mixed crops), etc.

Fig. III - 5 8 Procedure of Secondary Area Classification



Classification such as the above should be supplemented and revised on the basis of information such as the following, which will be helpful in making improvements.

i In what percentage of the farm families in each village can sons be expected to take over their fathers' agricultural operations?

ii Are the products of the main sectors in each area sufficiently oriented toward *markets?*

♠ p. 4--1

iii Where are the existing modernization facilities (milk plants, joint selection facilities, storage facilities, etc.) located, and are they adequate for marketing purposes?

iv Checking of data on population decrease and outflow of labor in the case of LPG areas.

♠ p. 11–3

v Use of data from questionnaires of farmer opinions and attitudes, if available.

♠ p. 1–2

Also checks, on the basis of the village cards, of the cooperatives or other production organizations in each village or area and of any agricultural improvement programs that may have been implemented.

Needless to say, it is very important in the preparation of such secondary area classification maps that there be feedback from local administrative offices, extension center, agricultural cooperatives, and farm families, for such feed back will be the decisive factor determining whether such classification maps will be no more than reference material for "desk plans" as background research for analysis of agricultural operation in the target area as an area problem or serve as reference material for actual steps to be taken for solution of real problems.

6) How to Read and Use Secondary Area Classification Maps

It should be emphasized that whereas classification maps prepared according to the above procedure may not seem to be very much out of the ordinary they are in fact of *quite different significance from the usual kinds of area classificiation maps, which* classify different types in order to grasp various phenomena or represent macro-structural classifications. In the case of these maps, classification is made from the viewpoint of how the agricultural structure can be improved (modernized) in terms

♠ p. 18–1

of the agricultural operational entities themselves. As can be seen from the procedure followed, these maps are carefully prepared in a number of steps, beginning with examination of the basic conditions of the agricultural operations and the infrastructural conditions (base conditions for the operational environment) having a bearing on them. Furthermore, the posture assumed and approach taken in putting together the procedure for application of the relevant data always reflect the main viewpoint of what agriculture should be like in the future in each area within the target area. While the procedure is a very careful one, it is by no means complicated or highly technical. Furthermore census data suffices.

♠ p. 18–1

Such classification maps, the maps of distribution of agricultural operational types prepared as a basis for them, and even the basic data used in the process will of course all be of use for the research purpose of analysis of agricultural operations. They will also, however, be of considerable value as reference materials for agricultural and forestry administrative offices, improvement extension centers, and other entities on the local level. Furthermore, instead of preparing such maps themselves, local statistical and information offices can enlist the cooperation of such entities in making them available for their use as well.

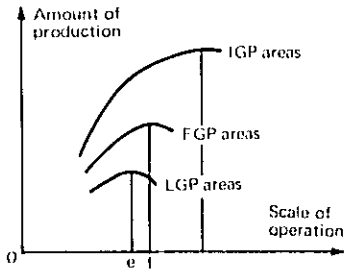
In conclusion, let us briefly consider the basic differences between the IGP, FGP, and LGP areas in the secondary area classification map with respect to their future agricultural development and why sub-letters representing the different crops and other agricultural activities were used.

i The aim of analysis of agricultural operations as a regional problem as well as what matters in future administrative consideration of provision of agricultural and other rural facilities is improvement of the structure of agriculture and not the formulation of production policy for different agricultural products. Here, too, the presentation of methods and procedures for handling the statistical data has been geared to this aim in recognition of the fact that in the past agricultural production policies have not taken into consideration the operational entities themselves. This does not, however, deny the fact that projects for structural improvement in actuality have to be geared to different agricultural products. It is only natural that projects should be implemented in a comprehensive fashion, with organization of the functional groups along different product lines, and that is why individual sectors have been indicated on the map as sub-letters.

ii In the case of IGP areas it would be effect to introduce modernization facilities and machinery as investment projects for expansion of operational scale, but in FGP areas, and even more so in LGP areas, provision of infrastructure is much more important and will be more effective, at least for the time being, than introduction of such facilities and machinery, and this is one of the main implications of this classification map. In LGP areas and areas excluded in the primary classification there are cases where it is more important to take steps to improve the welfare of the residents from other angles than steps to improve the structure of agriculture.

*The weighting of the measures for expansion of operational scale in IGP, FGP, and LGP areas has already been accomplished with the basic data for the classification and in the classification process. Fig. III– 5–9 gives an idea how amount of production will change with additional capital investment for expansion of operational scale. As one can see, investment for expansion of scale of operations is not very effective in LGP and FGP areas in increasing the amount of production, the reason being that relative inferiority of basic conditions. Since area classification in the past often did not show this to be the case, it was not possible to get a realistic idea of what the effectiveness of operational investments would be in different areas.

Fig. III 5-9



Technique- 6: INTER-INDUSTRIAL ANALYSIS

Definition: Inter-industrial analysis, also known as input-output analysis, expresses in matrix form the distribution in various production sectors and the final demand sector of the products and services produced by each industrial sector during a certain period, normally one year. This quantitative technique for economic planning and forecasting analyzes the changes that will be brought about in production in different industrial sectors by an increase, for instance, in final demand and the way different industries are linked to and influence one another in terms of production.

Method: Inter-industrial analysis involves the preparation of the following three kinds of tables:

1) Table of transactions

2) Input coefficients table

3) Inverse matrix table

Since the table of transactions expresses the whole chain of economic activities from production of goods and services to consumption as transactions between the large number of industrial sectors that make up the economy, it is possible to get an idea of the industrial structure for the year the table was made just by reading off the figures given in it, but the main purpose of making such a table is to use the input coefficients obtained from it for inter-industrial analysis for such purposes as analysis of the present state of the economic structure, economic planning and forecasting, measurement of the economic effect of particular measures, and so on.

♠ p. 3–1

1) Table of Transactions

Let us consider a closed national economy without imports or exports and consisting of only an agricultural and an industrial sector. Table III– 6–1 below is its inter-industrial table of transactions for a particular year. The figures across show how much of the output of each sector was sold to the other sector or went to final demand, and the figures in the columns indicate how much of the production of the other sector each sector bought and the value added (wages, profits, etc.) it produced, all of which is known as input. The figures across and the figures in each column come to the same amount: the amount of production of that industrial sector in that year. In Table III– 6–1, for instance, the cross total and the column total are both 100 for agriculture and both 200 for industry.

Table III– 6–1 Table of Transaction (Assumed Case)

Output / Input		Intermediate Demand: Agriculture	Intermediate Demand: Industry	Final Demand	Amount of Production
Intermediate input	Agriculture	10	20	70	100
	Industry	20	100	80	200
Gross value added		70	80		
Amount of production		100	200		

2) Input Coefficients Table

Table III– 6–2 is a table of input coefficients, which are obtained by dividing the worth of the raw materials bought by an industrial sector by the worth of the production of that industrial sector. These coefficients are basic to inter-industrial analysis as indicating the necessary amount of raw materials for unit of production in each industrial sector.

If final demand is given at the outstart, each industry must produce enought to satisfy that final demand. In order to be able to produce that amount, it is necessary to purchase raw materials as intermediate demand, the amount being calculated as

the product of the input coefficient, which is already technically determined, and the given final demand. This intermediate demand gives rise to a second intermediate demand for raw materials and so on and so forth as an endless process of inducing intermediate demand. This "multiplied effect" gradually approaches zero, however, and the cumulative sum of all of these intermediate demands represents the amount of production required of that particular industry.

Table III– 6–2 Input Coefficients Table (Assumed Case)

	Agriculture	Industry
Agriculture	0.1 (15/100)	0.1 (20/200)
Industry	0.2 (20/100)	0.5 (100/200)
Gross value added	0.7 (70/100)	0.4 (80/200)
Total input	1.0 (100/100)	1.0 (200/200)

3) Inverse Matrix Coefficients Table

Table III– 6–3 gives inverse matrix coefficients, which indicate the combined direct and indirect "multiplied effect'. on production in each industry when the final demand is given. The accumulated "multiplied effect" explained in 2) above is obtained by first obtaining such inverse matrix coefficients. In this example, directly and indirectly, 1.1628 units of agricultural production and 0.4651 units of industrial production are required in order to meet one unit of final demand for agricultural products.

Inter-industrial analysis can be called analysis using inverse matrix coefficients. The relationships between final demand and production, imports and value-added can be analyzed by linking the inverse matrix coefficients with the figures for percentage breakdown of final demand components.

Table III– 6–3 Inverse Matrix Coefficients Table (Assumed Case)

	Agriculture	Industry	Totals
Agriculture	1.1628	0.2325	1.2953
Industry	0.4651	2.0930	2.5581
Total	1.6279	2.3255	

The following table is a part of the two-volume input-output table for Indonesia in 1971 as compiled in 1977 as a cooperation effort between the Indonesian Central Statistics Bureau, the Bank of Indonesia, and Japan's Institute of Developing Economies and the Southeast Asia Research Center of Kyoto University. The portion relating to agriculture has been party reproduced here as reference material in terms of the three kinds of tables mentioned above.

Table III– 6–4 Transaction Table at Producer's Prices (19 Sector Classification)

Row Sector		Column Sector 01	02	03	04	05	06	07	
01	Paddy	4 88	291 50	–	0 71	–	–	–	01
02	Other farm food crops	–	24 51	0 05	0 97	–	0 28	–	02
03	Other agricultural crops	–	0 18	130 73	0 66	–	–	–	03
04	Livestock and products	0 66	1 99	0 81	39 07	–	–	–	04
05	Forestry	–	1 29	2 28	–	16 71	0 45	0 14	05
06	Fisheries	–	–	–	0 03	–	41 22	–	06
07	Mining & quarrying	–	–	1 58	–	–	0 55	1 58	07
08	Food, beverages & tobacco industries	–	0 72	–	0 63	–	0 34	–	08
09	Other manufacturing industries	16 51	10 37	17 02	0 64	5 88	4 07	3 79	09
10	Petroleum refining	0 02	0 23	2 86	0 05	3 75	1 50	4 24	10
11	Electricity, gas & water supplies	–	0 35	1 18	0 05	1 28	0 10	8 16	11
12	Construction	2 44	0 64	3 51	0 82	2 40	0 02	0 58	12
13	Trade	3 67	9 15	21 08	4 05	6 21	6 59	1 84	13
14	Restaurants & hotels	–	0 74	2 78	0 04	1 22	1 83	1 55	14
15	Transport & communication	1 84	6 44	14 87	2 29	4 79	4 01	2 88	15
16	Financing, real estate & business services	2 14	0 48	5 57	0 27	1 51	0 99	3 48	16
17	Public administration & defence	–	–	–	–	–	–	–	17
18	Other services	–	0 21	0 46	–	0 14	0 09	0 50	18
19	Unspecified & provisional sector	0 02	1 00	2 05	0 05	0 63	0 95	1 03	19
190	Total intermediate input	32 20	349 86	200 81	50 13	44 52	82 90	29 75	190
201	Wages & salaries	112 94	107 92	90 92	18 56	24 69	16 70	25 66	201
202	Operating surplus	310 65	264 74	176 03	92 05	87 34	133 47	250 14	202
203	Depreciation	5 57	5 00	8 82	1 35	10 54	6 44	6 91	203
204	Indirect taxes	2 44	4 13	5 19	3 91	3 85	3 28	27 52	204
209	Gross value added	431 60	381 79	280 96	113 87	126 42	159 89	310 24	209
210	Total input	463 80	731 65	487 77	164 00	170 94	222 79	339 99	210

Table III– 6–5 Input Coefficient Table at Purchaser's Prices and at Producer's Prices (19 Sector Classification)

Row Sector	Column Sector	01		02		03		04		05		
		Purchaser's Prices	Producer's Prices	Purchaser's Prices	Producer's Prices	Purchaser's Prices	Producer's Prices	Purchaser's Prices	Producer's Prices	Purchaser's Prices	Producer's Prices	
01		010805	.010526	.400002	.396415	–	–	004465	004350	–	–	01
02		–	–	037148	.033508	.000135	000103	005498	005029	–	–	02
03		–	–	000319	.000243	.316871	268016	005094	003998	–	–	03
04		001877	001434	003079	.002724	001893	001680	272857	238205	–	–	04
05		–	–	002219	001762	006355	004634	000006	000004	138293	097749	05
06		–	–	–	–	–	–	000240	000208	–	–	06
07		–	–	–	–	000238	003235	000000	000000	–	–	07
08		–	–	001097	.000991	000001	000001	004485	003823	–	–	08
09		046903	035602	018558	.014179	043564	034887	004646	003880	039793	034411	09
10		000098	000044	000422	.000309	008007	005812	000443	000335	029317	021940	10
11		–	–	000478	.000478	002418	002418	000320	000320	007474	007474	11
12		005268	005268	000878	.000878	007200	007200	003757	003757	014014	014014	12
13		–	007920	–	.012505	–	043218	–	024899	–	036347	13
14		–	–	001009	.001009	005693	005693	000223	000223	007120	007120	14
15		000047	000970	001482	008803	011938	030484	000641	013984	010216	028040	15
16		004811	004811	000651	000651	011415	011415	001858	001858	006852	006852	16
17		–	–	–	–	–	–	–	–	–	–	17
18		000005	000005	000283	.000283	000950	000950	000028	000028	000830	000830	18
19		000045	000042	001560	001455	004512	004207	000303	000282	003960	003683	19
190		069420	069420	478182	.478182	.423991	423991	305672	305672	260459	260459	190
201		243520	.243520	147497	.147497	186403	186403	100867	100867	144443	144443	201
202		669799	669799	361844	.361844	360881	360881	561302	561302	510025	510025	202
203		012005	012005	006827	.006827	018087	018087	008222	008222	061632	061632	203
204		005257	005257	005649	.005649	010638	010638	023837	023837	022541	022541	204
209		930580	930580	521818	521818	576009	576009	694328	694328	739541	739541	209
210		1 000000	1 000000	1 000000	1 000000	1 000000	1 000000	1 000000	1 000000	1 000000	1 000000	210

Table III– 6–6 Inverse Matrix at Producer's Prices, (I–A) (19 Sector Classification)

Row Sector	Column Sector 01	02	03	04	05	06	07	08	09	10	11	
01	1 011119	0 417698	0 002567	0 011058	0 002180	0 003250	0 001185	0 328606	0 010081	0 002318	0 005618	01
02	0 000252	1 035225	0 002160	0 008531	0 001806	0 003446	0 001038	0 047717	0 004843	0 001977	0 004526	02
03	0 002390	0 003158	1 372328	0 004636	0 005213	0 004508	0 002351	0 281276	0 059356	0 005631	0 011004	03
04	0 002218	0 004992	0 005036	1 313009	0 001915	0 001890	0 001005	0 005373	0 005559	0 002074	0 003764	04
05	0 002194	0 003789	0 011166	0 001320	1 112688	0 004249	0 001823	0 007893	0 037230	0 003738	0 004714	05
06	0 000168	0 000425	0 001668	0 000589	0 001705	1 278800	0 001027	0 008709	0 003237	0 001863	0 004556	06
07	0 002837	0 003289	0 017316	0 002948	0 021158	0 011970	1 017331	0 019794	0 054816	0 550470	0 162826	07
08	0 001122	0 002724	0 005405	0 005089	0 004614	0 008150	0 002501	1 037403	0 025253	0 004870	0 012435	08
09	0 059961	0 052416	0 100276	0 019568	0 083756	0 046373	0 027874	0 114331	1 540734	0 092539	0 112047	09
10	0 002566	0 003870	0 019420	0 004289	0 035387	0 014840	0 022383	0 029080	0 043751	1 043115	0 291437	10
11	0 001547	0 002006	0 007494	0 001557	0 012186	0 002918	0 026375	0 026910	0 034955	0 025793	1 039991	11
12	0 006336	0 004052	0 013159	0 005841	0 018103	0 001661	0 003475	0 008478	0 012325	0 009680	0 013455	12
13	0 015055	0 023205	0 075791	0 037382	0 055631	0 044582	0 012607	0 085048	0 148733	0 034155	0 103079	13
14	0 000736	0 001922	0 010346	0 001036	0 010172	0 010510	0 005945	0 013077	0 013860	0 011441	0 020893	14
15	0 007736	0 014824	0 052800	0 022165	0 040995	0 028016	0 013518	0 066623	0 068717	0 029405	0 078585	15
16	0 006750	0 004916	0 022548	0 004504	0 015793	0 009330	0 043182	0 022093	0 035891	0 032042	0 028872	16
17	0 000000	0 000000	0 000000	0 000000	0 000000	0 000000	0 000000	0 000000	0 000000	0 000000	0 000000	17
18	0 000339	0 000763	0 002857	0 000365	0 002290	0 001522	0 002346	0 004777	0 005878	0 008838	0 006956	18
19	0 001103	0 002795	0 009103	0 001290	0 006955	0 007251	0 004823	0 013635	0 023466	0 007019	0 032733	19
Total	1 124429	1 582158	1 731641	1 451299	1 432557	1 433474	1 160570	2 119801	2 129085	1 866761	1 937490	Total

Sector number in each column corresponds to that of row sectors

The three tables in previous page is based on 19 Sector Classification. In the study, however, other two classification methods are also used (66 and 175 Sectors). The following list is that of 66 Sector Classification (see Table III– 6–7) and the Agricultural sectors in 175 Sector Classification are identified in the paragraphs following it.

Table III– 6–7 List of 66 Sector Classification

Code	Sectors	Code	Sectors	Code	Sectors
01	[illegible]	24	[illegible]	45	[illegible]
02	[illegible]	25	[illegible]	46	[illegible]
03	[illegible]	26	[illegible]	47	[illegible]
04	[illegible]	27	[illegible]	48	[illegible]
05	[illegible]	28	[illegible]	49	[illegible]
06	[illegible]	29	[illegible]	50	[illegible]
07	[illegible]	30	[illegible]	51	[illegible]
08	[illegible]	31	[illegible]	52	[illegible]
09	[illegible]	32	[illegible]	53	[illegible]
10	[illegible]	33	[illegible]	54	[illegible]
11	[illegible]	34	[illegible]	55	[illegible]
12	[illegible]	35	[illegible]	56	[illegible]
13	[illegible]	36	[illegible]	57	[illegible]
14	[illegible]	37	[illegible]	58	[illegible]
15	[illegible]	38	[illegible]	59	[illegible]
16	[illegible]	39	[illegible]	60	[illegible]
17	[illegible]	40	[illegible]	61	[illegible]
18	[illegible]	41	[illegible]	62	[illegible]
19	[illegible]	42	[illegible]	63	[illegible]
20	[illegible]	43	[illegible]	64	[illegible]
21	[illegible]	44	[illegible]	65	[illegible]
22	[illegible]	45	[illegible]	66	[illegible]

Agriculture, Livestock, Forestry and Fisheries
(175 Sector Classification, Input-Output Code: 1-001 to 1-042)

The agricultural division is divided into 29 sectors which cover the cultivation of field crops, fruits, nuts, seeds, trees (with the exception of forest trees), bulbs, vegetables, flowers (both in the open and under glass), tea, coffee, cocoa and rubber. Also included are the processing of agricultural products on farms and estates. But, when this processing can be separated from farms and estates, it is defined as a manufacturing sector. For example, rice milling, sugar refining, coconut oil extraction in factories, etc., are classified in the manufacturing sector.

The livestock division is divided into 6 sectors which cover the raising of livestock, poultry, and furbearing or other animals and the production of milk, wool, fur and eggs.

The forestry division is divided into 4 sectors which cover the operation of timber tracts and forest tree nurseries, the planting, replanting and conservation of forests, the gathering of uncultivated materials, charcoal burning, timber cutting, and the production of rough, round, hewn or riven forest wood. Also included are saw mills located in forests.

The fisheries division is divided into 3 sectors which cover commercial fishing in ocean, coastal, off-shore, estuary and inland waters. Also included are fishery services.

♥ Reference book

- Input-Output Table Indonesia, I.D.E. Statistical Data Series No. 22, 1971
- H.W. Richardson, Regional Economics, A Reader, Macmillian Student Edition, 1970
- W. W. Leontief and A. Strout, Multi-Regional Input-Output Analysis, The Review of Economics and Statistics, 1961
- H.B. Chenery, Inter-Industry Economic, 1959
- H. Isard, Inter-Regional and Regional Input Output Analysis, Review of Economics and Statistics, 1951

Technique- 7: INTER/INTRA-REGION TRADE

♠ p. 3–1 and 5–1

Definition: Each region or area has some degree of production specialization, which is based on the exchange of goods and services.

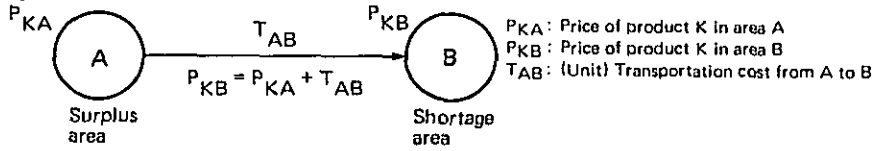
In the model described below the effect of distance has been partially incorporated, but there has been considerable simplification. No attempt has been made to account for all the factors determining the flow of goods and services (not just agricultural planning for this region but also manpower).

Method: Flow Plan

The basic principle behind trade in a product is that the product is produced in greater quantities in a certain area than there is demand for it and in less quantities in another area than there is demand for it. If there is no other supplier, the chances are that the first area will supply the second with that product.

In reality, however, such trade would entail physical distribution and transportation costs. Simply speaking, the retail price of the product in the second are will be its retail price in the first area plus the cost of transportation between them.

Fig. III– 7–1



Social benefit will be created by a flow plan that minimizes total transportation cost, for, as can be seen from the above formula, this will minimize the increase in the price over the price in the suplus area due to the cost of transportation.

♠ p. 23–1~2

The technique known as linear programming provides an important frame for determining a flow that will minimize total transportation cost.

◆ cwt = Hundred weight

For example, suppose there are four production surplus areas, a1, a2, a3, and a4, and four shortage areas, b1, b2, b3, and b4. Suppose also that the total demand in the shortage areas must be satisfied regardless of the price and that the total amount of shortage for the four shortage areas is exactly equal to the total amount of surplus for the four surplus areas.

Table III– 7–1

Area	Amount of Surplus Production of Product K
a1	3,000
a2	1,500
a3	3,000
a4	3,500
Total amount of surplus production	11,000

Table III– 7–2

Area	Amount of Production Shortage of Product K
b1	2,500
b2	3,000
b3	3,500
b4	2,000
Total amount of production shortage	11,000

Table III– 7–3 Transportation Costs between Surplus and Shortage Areas

	b1	b2	b3	b4
a1	12	33	24	2
a2	16	9	15	8
a3	12	20	8	5
a4	4	12	10	18

Table III– 7–1 left gives the amount of surplus supply for each production surplus area, Table III– 7–2 gives the amount of production shortage for each *short shortage area, and Table III– 7–3 the transportation cost per cwt* between* the respective surplus areas and the respective shortage areas.

There are 16 possible supply routes between the four surplus areas and the four shortage areas. The problem boils down to which routes to use in satisfying all of the shortages of the shortage areas and what the transportation cost will be for each route.

Determination of Amounts to Be Shipped Between Different Areas

In this case the purpose is to distribute all of the surplus production of product K to all of the shortage areas in the amounts that will exactly satisfy their individual shortages and with such routing that the overall transportation cost will be minimized.

$$\sum_{i=1}^{4}\sum_{j=1}^{4} X_{ij} C_{ij} = \min \quad \cdots \quad ①$$

X_{ij} Quantity of shipment from supply area i to demand area j

C_{ij} Unit cost of transportation from supply area i to demand area j

X_{ij} Represents the amounts of flow between the different areas that are to be determined. Needless to say, negative values are not relevant

The limitations on the above equation are as follows

$$\sum_{j=1}^{4} X_{ij} = A_i \qquad i = 1, 2, 3, 4 \quad \cdots \quad ②$$

$$\sum_{i=1}^{4} X_{ij} = B_j \qquad j = 1, 2, 3, 4 \quad \cdots \quad ③$$

$$\sum_{i=1}^{4} A_i = \sum_{j=1}^{4} B_j \quad \cdots \quad ④$$

$X_{ij} \geq 0 \quad \cdots \quad ⑤$

Formula ② means that the amount shipped from each surplus area must be the same as the amount of its surplus. Formula③ means that the amount shipped into each shortage area must be the same as the amount of its shortage. Formula ④ means that the total amount shipped out of the surplus areas must be equal to the total shortage of the shortage areas. Formula⑤ means that there can be no negative values of sipments from surplus areas.

While there are several possible solutions to this problem there is only one solution that minimizes the overall transportation cost (see Table III– 7–5).

The way of solving such a linear programming problem is explained in Chapter III–23.

♠ p. 23–1~2

Table III– 7–4

Origin	Destination	Amount of Shipment (kg)	Unit Transportation Cost	Cost
a1	b2	1,500	33	49,500
a1	b4	1,500	2	3,000
a2	b2	1,500	9	13,500
a3	b2	2,500	6	17,500
a3	b4	500	5	2,500
a4	b1	2,500	4	10,000
a4	b3	1,000	10	10,000
Total transportation cost (assumed)				106,000

Table III– 7–5

Origin	Destination	Amount of Shipment (kg)	Unit Transportation Cost	Cost
a1	b1	1,000	15	15,000
a1	b4	2,000	2	4,000
a2	b2	1,500	9	13,500
a3	b2	3,000	6	18,000
a3	b1	1,500	4	6,000
a4	b2	1,500	12	18,000
a4	b3	500	10	5,000
Total transportation cost (optimum)				79,500

In the above model it has been assumed i. that the total surplus and the total shortage are the same, ii. that the amount of supply is given, iii. that there is zero price elasticity of supply, and iv. that transportation rates do not vary with quantity. These assumptions can also be expressed as functions in the model.

Fig. III– 7–2 Possible Combinations of Surplus Areas and Shortage Areas

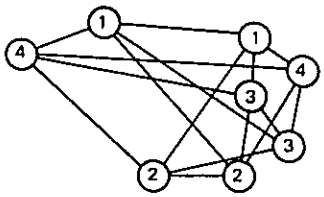
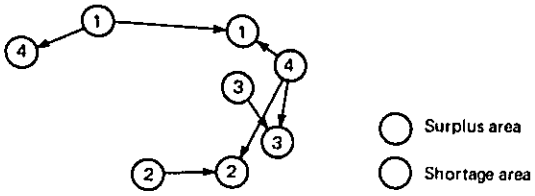


Fig. III– 7–3 Minimal Cost Solution for Shipments from Surplus Areas to Shortage Areas



In conclusion, the significance of such a model technique in transportation planning in the context of regional agricultural development planning can be stated as follows.

Firstly, it can be used to consider the inter and intraregional movement of goods and services involved in agricultural development, assuming that the transportation plan is given as an exogenous variable, and what kind of plan will be suitable for attainment of development goals under such limitations. What this means is determination of the location, scale, timing, etc. of land use and facilities as variable planning factors, given the transportation planning system.

Secondly, the results obtained can be used as persuasive grounds for requests to planning authorities regarding new transportation network capabilities for future regional agricultural development.

Technique- 8: MESH ANALYSIS

Definition: When a map of an area is divided up into small squares or near squares as units for display of information on it, this is called an area mesh. Mesh analysis is the scientific analysis of the area with various statistical data input into the individual meshes, the word "mesh" referring either to the whole collection of such units or to each unit itself.

Function: This technique has come into considerable use in recent years in planning areas such as regional planning, city planning, and civil engineering planning, where a great deal of information regarding the target areas is used. This is because the need has been recognized for planning based on quantitative processing for greater accuracy, homogeneity, and rationality in view of the fact that in the past planning has often been based on one-sided specialized experience, policy overemphasizing a single aspect, or unbalanced political judgement.

♠ p. 18–1

Many different kinds of methods have been developed for the automatic quantification, processing, graphing, and calculation of enormous amounts of data by means of electronic computers on the basis of this technique.

♠ p. 2–1

In addition to this technique there is also the overlay method, which consists of placing on top of one another a number of sheets of tracing or other transparent paper, each with a certain type of information on it in a certain color so as to be able to tell *where the different kinds of information overlap with respect to the target area.*

The advantages and disadvantages of the mesh technique and the overlay technique are listed below:

Advantages of the Mesh Technique	Advantages of the Overlay Technique
a. Making a complex object easier to handle by breaking it down into simple components.	a. It makes it possible for direct overlay of existing data by merely plotting it on maps.
b. Because the units are all of the same size, it is possible to make easy quantitative comparison.	b. As a result, data accuracy is very high.
c. The target area can be divided up in any way that is convenient.	
d. It makes possible the processing of a large amount of data by computer.	
e. It can be used in factor analysis, quantification theory, linear programming and other planning techniques.	

Disadvantages of the Mesh Technique	Disadvantages of the Overlay Technique
a. The conversion of existing data into mesh form take a great deal of time and effort.	a. In practical terms, it is only possible to lay about three sheets on top of one another and still be able to see through them all.
b. Naturally, *the data does not correspond to administrative* divisions, and it is not possible to give adequate expression to rivers, lakes and marshes, valley, and other natural topographical features.	b. It is all work by hand since no system has been established for computer or other automatic processing.
c. Accuracy is also a problem, although this will depend on the size of the meshes.	c. Since the units are not equivalent, it is not possible to compare different regional phenomena, particularly social conditions.

From the above, the general conclusion can be drawn that the mesh technique is better suited for wider areas such as whole countries or provinces and that the mesh technique is better suited for smaller areas.

Method-1: Selection of the Mesh in Question Through Comparison

Since mesh data is collected for partitions of practically the same area and the same shape, comparison between different meshes is possible. In order to get an overall idea of the general situation of the area with respect to a certain factor it is often useful to set a standard value for it and classify all of the meshes as being either above or below that standard. This is probably the simplest way of using mesh data *to make a particular judgement about an area.*

♠ p. 19–1

Fig. III– 8–1, for instance, is an example of use of mesh data to divide an urbanly developed area into two population density categories, one above the average and the other below it.

Fig. III– 8–1 Example of Classification of Meshes As Being above or below and Average Value

In selection of suitable sites for development or other purposes, it is useful to consider several conditions. For instance, some such conditions that should be considered for selection of a suitable housing area are the following:

1) Maximum distance from the center of the city or town.

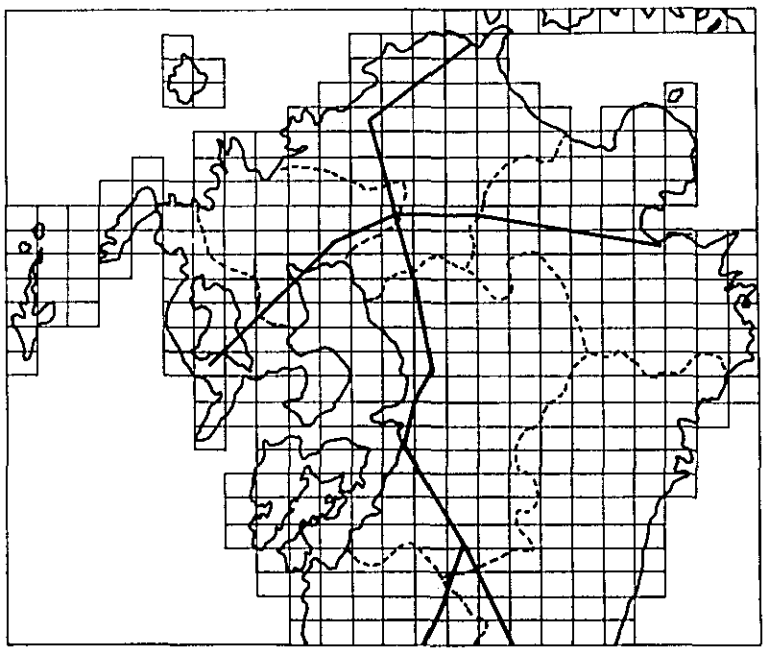
2) Maximum population density.

3) Maximum average slope.

All of these conditions can be rather easily applied for selection of the most suitable meshes.

It is also possible to use meshes to identify areas that will be affected by a new highway, for instance, as in Fig. III– 8–2 below.

Fig. III– 8–2 Mesh Affected by Highway



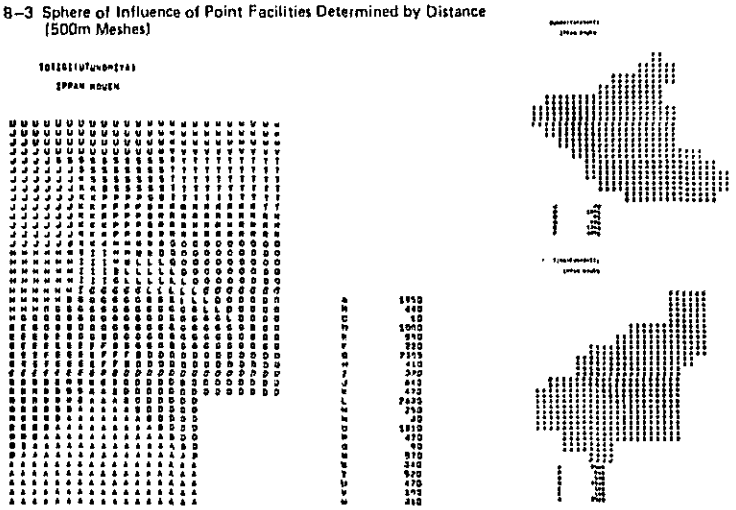
♠ p. 18—1

Method-2: Use of Mesh Analysis in the Setting of Spheres

1) Identification of Spheres of Influence of Points

In some cases it is necessary to assign all points in an area to one or another of several dominant points located here and there in it. In such a case no point can be assigned to more than one dominant point. In the case of an elementary school district, for example, the dominant points are the elementary schools, and the other points are the homes of the children. The points can also be areas represented by meshes, each mesh being assigned to a particular dominant point. The simplest criterion for determining which dominant point each mesh should be assigned to is distance; that is to say, each mesh can be assigned to the dominant point nearest to it. The points and meshes belonging to a particular dominant point collectively constitute its sphere of influence. Fig. III— 8—3 is an example of how 500m meshes have been assigned to their respective nearest dominant points. In this case a point equidistant from two or more dominant points has been allowed to belong to more than one.

Fig. III— 8—3 Sphere of Influence of Point Facilities Determined by Distance (500m Meshes)



Geometrically, a sphere of influence determined by distance alone is a polygon the sides of which are the lines perpendicular to the lines joining the dominant point in question with other dominant points and cutting them in half, the boundary sometimes being included. The job of making such polygons is no easy matter, and when the number of dominant points is rather large, the calculations can get out of hand. If the original size of the meshes is too large to allow for fine distinctions, some of the meshes can be divided into equal parts, different ones be assigned to different territories. Even at that, however, the meshes cannot be divided up too finely. Needless to say, it is not necessary to divide a mesh if all of it clearly belongs in the territory of a particular dominant point. The only meshes that will have to be divided, therefore, are those on the boundaries of different territories. The specific procedure is as follows:

i Determination of the distance of each point and mesh from the dominant point.

ii Selection of the dominant point with the smallest distance (s) as a candidate.

iii Making other points with a distance of $s + \sqrt{2}\ell$ or less candidate points, ℓ being the length of one side of the original mesh.

Candidate points are then selected from this subdivided mesh and assigned to different dominant points. The territories or spheres of influence of the dominant points will not necessarily be determined by distance alone. In the gravity model, for instance, a particular, mesh belongs to the point j for which the value of $aij = \frac{Mj}{dij\lambda}$ is maximum. In this case the value of aij is sought for each mesh in exactly the same way, and all that has to be done then is decide which dominant point each mesh belongs to on the basis of the values obtained.

2) How to Obtain Branch Territories

There can also be spheres of influence of branches of networks. The thinking is the same as in the case of spheres of influence or territories of dominant points. In other words, the territory of a particular branch consists of all of the points that are closer to it than to any other branch. Geometrically, as shown in Fig. III– 8–5, the first step is to identify the intersections of the straight line that includes the branch in question with all the straight lines that include other branches not parallel to it and then draw the lines dividing in two each of the angles made by such intersections. (If the branches are parallel, a straight line is drawn half way between them and also parallel to them.) If, however, one of the angles is greater than 180°, instead of the line bisecting the angle, the locus of points (parabola) equidistant between the apex of the angle and the branch in question will be used. Of the closed figures obtained by these straight lines, curved lines, and territorial boundaries, that encloses the branch in question and has the smallest area is the territory of the branch in question.

Since it would take a considerable effort to determine the territory of each branch in geometrically strict terms, the same method can be used as in the case of determining the territory of a dominant point. That is to say, one side of a mesh can be subdivided, assigning the smaller meshes obtained thereby to the different branches. Of course, not all of the meshes have to be subdivided like this.

Let us see what this means in terms of a concrete figure. In determining the territories of points P and Q in Fig. III– 8–5, if the center of mesh m is closer to P than Q, the whole mesh will belong to the territory of point P. If, however, we want to determine the boundary more precisely, the mesh will have to be divided into equal parts, four in this case. Once this is done, the distances from the center of each of the smaller meshes to P and Q are compared, and each smaller mesh will be assigned to the territory of the point the distance to which is less than the distance to the other. In the figure the range of $s + \sqrt{2}\ell$ has been hatched. In fact, however, the territory of point P is only where there is double hatching. In this example 13/16 of mesh m belongs to the territory of point P.

Fig. III– 8–4 Setting of Territory by Subdivision of Meshes

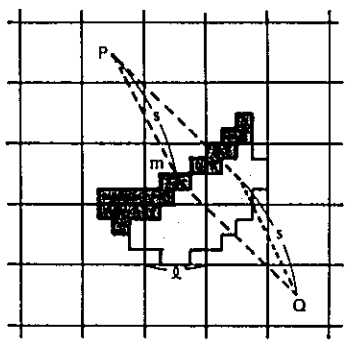
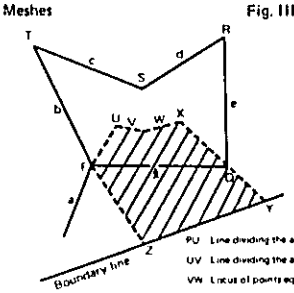


Fig. III– 8–5 Territories of Branches



♥ Reference book

- W. Isard et al., Methods of Regional Analysis, John Wiley and Sons Inc., 1960
- G.A.P. Carrothers, The Gravity and Potential Concepts Human Interaction, Journal of the American Institute of Planners vol. 22, 1956

Technique 9: LAND USE SURVEY

Definition: Since land use planning if for the purpose of realizing the optimum pattern of use of the land of a particular area by means of guidance and controls for systematic conversion of the existing pattern in order to meet new land use requirements while at the same time maintaining the natural and socioeconomic balance of the land, the studies involved in such planning must be comprehensive.

Furthermore, land use planning varies greatly depending on its particular aims, stage, and relation to other related planning.

In terms of content, land use planning consists of the following three main categories:

1) Land Use Planning as Area Zoning

Designation of zones within the area on the basis of law for the purpose of achieving the desired land use pattern and the desired environment.

2) Land Use Planning as Master Planning

Land use planning for the purpose of setting a framework within which individual specific plans and facilities can be harmonized and made more effective.

3) Land Use Planning as Programming

Generally it is necessary to take into account the process of change in land use planning for areas such as towns and industrial area where the land use pattern changes quickedly and markedly so as to be able to guide such change in the desired direction with a specific program for bridging the gap between reality and goals.

It is important to identify which of the above purposes the land use planning is for and to carry out the particular studies required for that purpose.

In land use planning the three following categories must be studied.

i Land Use Potential

Consideration of possibilities with respect to natural and socioeconomic factors of the land having a bearing on land use and to conditions relating to development and use.

ii Layout Goals

Orientation of land use, policy for improvement of physical regional structure, etc. for satisfaction of socioeconomic goals set as the macroframe in accordance with the development goals.

iii Coordination and Adjustment with Various Development Plans

Guidelines for adjusting conflicting use demands on the basis of the principles set for the various land uses, plans of various public entities for development, preservation, and improvements, and so on.

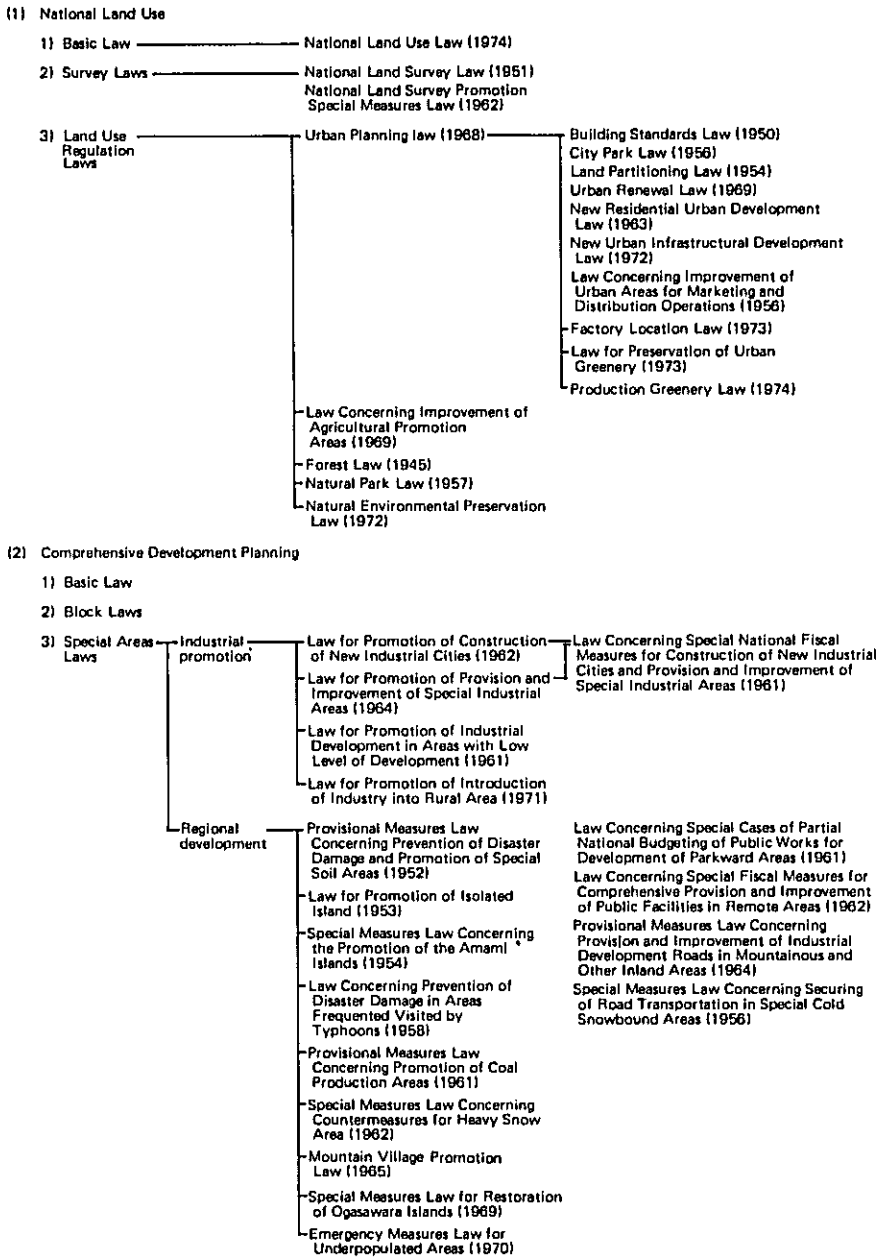
The study frame must adequately cover these three land use planning categories.

Method: The following is a rough explanation of the kinds of studies that land use planning as master planning involves, reference being made to the situation in Japan.

1) Legal Study

Systems of laws regarding land use are usually very diverse and of course differ considerably from country to country. Fig. III– 9–1 shows a part of the Japanese system of laws regarding land use and comprehensive development. One of the basic studies in land use planning is that for the purpose of determining what bearing, if any, each of these laws has on the particular project.

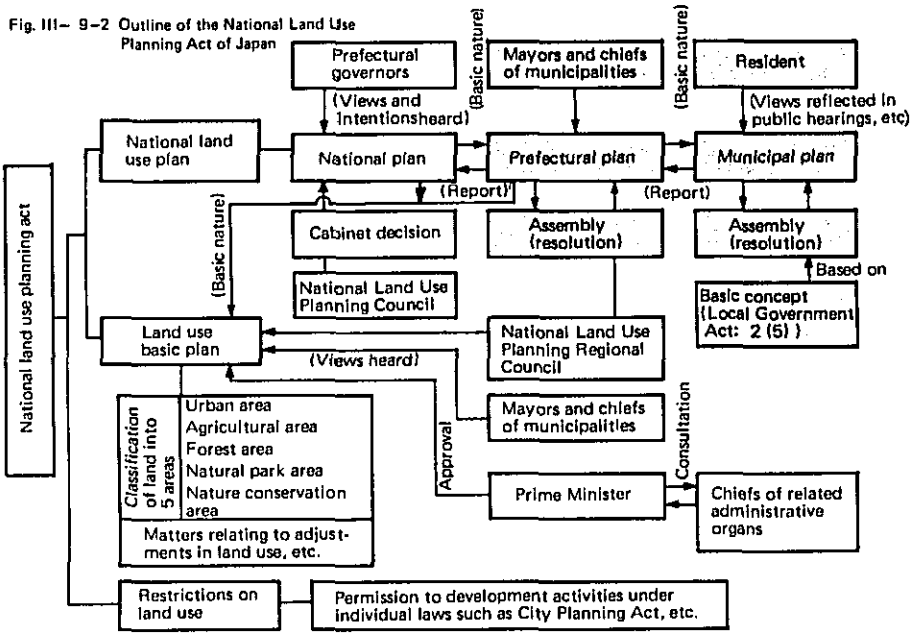
Fig. III– 9–1 System Chart of National Land Use and Comprehensive Development Planning Act



2) Study of Planning Entities

This study is just as based to land use planning as the legal study. Fig. III– 9–2 gives a partial picture of how different government agencies relate to land use planning data is available, what entities have what kind of decision making authority, what agencies are to be reported to for approval, and what kind of coordination is necessary between different entities.

Fig. III– 9–2 Outline of the National Land Use Planning Act of Japan



3) Study of Existing Plans

♣ Chap.-II Problems finding

It is important in land use planning to make a survey of existing plans that might have a bearing on the present planning so as to be able to determine what that bearing might be, including possible need for adjustment or recommendations.

4) Study of Existing Land Use Conditions

i Various kinds of control zones in the project area, including the areas covered and the kinds of controls involved.

ii Agricultural land distribution by type (area and extent of improvement for agricultural use).

iii Change in recent years (extension of cultivated area, conversion to other uses, etc.)

iv Land use features (analysis in relation to natural and socioeconomic conditions for identification of possibilities).

See Techniques 10, 11, and 12 in Chapter III regarding the analytical techniques for iv) above.

As indicated in Table III– 9–3, a good number of methods have been developed for the evaluation of land use potential from the viewpoint of natural conditions and particularly slope.

5) Landownership and Land Prices

It is important to study landownership, land price, and land transaction conditions so as to be able to get a better picture of land use conditions from the viewpoint of development and use and devise systematic policies and means of guiding development.

It is very important that the findings of all of these studies be plotted on maps of a certain scale so that all of those involved in the planning can get a more accurate idea in visual terms of individual points and how they fit into the overall picture.

♠ p. 12–2

Table III– 9–1 Slope Degree and Possibilities in Land Use

Reference book

Report of the Committee on Land Utilization in Rural Areas, Scott Report, Ministry of Works and Planning, 1942

Davis, T.L., & Soreson, D.M. Land Use Planning Handbook, Fort Collines, Colorado State University, 1973

National Land Use Policy Legislation, 93rd Congress, Committee on Interior and Insular Affairs, Washington, D.C., U.S. Government Printing Office, 1973

Dolliver J., Land Use Issues at the State Level, In James C. Barron (Ed.), Land Use Policy, Pullman, Washington State University, Cooperative Extension Service, 1974

Land Use Planning Assistance, United States Department Agriculture, Washington, D.C., U.S. Government Printing Office, 1974

Technique-10: LAND CLASSIFICATION MAP

Definition: The land classification map is to ascertain and analyze the distribution of natural resources to determine what crop is suitable for the land in question with the suitability expressed in a mapping.

The term, natural resources, in relation to crops, is used here to mean : 1) climate and water; 2) terrain features and topography; 3) geology and subsurface soil; and 4) existing vegetation. By ascertaining the causal relations between the four major resources and, at the same time, by analyzing them qualitatively and quantitatively for their classification into three to six types from the viewpoint of agricultural utilization, classification maps of resources may be prepared for each type.

Further, the standard for suitable land for each crop is to be determined from the technical point of view in respect of the four major resources (combination resources and crops).

The classification map of the four major resources is to be evaluated according to the above-mentioned standard to be classified into 5 rankings in land suitability ranging from most suitable to unsuitable so that a land classification map may be prepared for each crop.

♣ Chap.-I Ploblems finding

Function: This method is recognized as an almost established method and is applied to various projects. Since it is relatively easy to obtain pertinent data compared with other methods and it is one of the basic items to be examined in agricultural development planning, it is necessary to select and employ a method which fits the area concerned.

♣ Chap.-IV Data List

As for those areas for which the pertinent data are insufficient, good results may be expected in future by adopting new techniques such as remote sensing.

Method: The Fig. III–10–1 below shows the process of preparing a land classification map, consisting of five operational steps.

Of these steps, the elucidation of causal relations with natural resources seen from the viewpoint of agricultural land use conducted under Step–1 and the method of evaluation to be made under Step–4 and –5 seem to be particularly important.

♠ p.2–1

In order to elucidate the causal relations between various natural resources, it is important to refer to those generally and scientifically developed material and to examine them from technical and empirical judgments including many years' experience in the area concerned and intuition. Through these judgments does it become possible to extract the natural resources which are particularly necessary for analysis and evaluation.

♠ p. 9–1

Similarly, it is important for evaluation to consider as many methods as possible suitable for the area concerned by combining the adoption of general scientific methods and empirical methods for better results.

Fig. III–10–1 Process of Preparing the Land Classification Maps

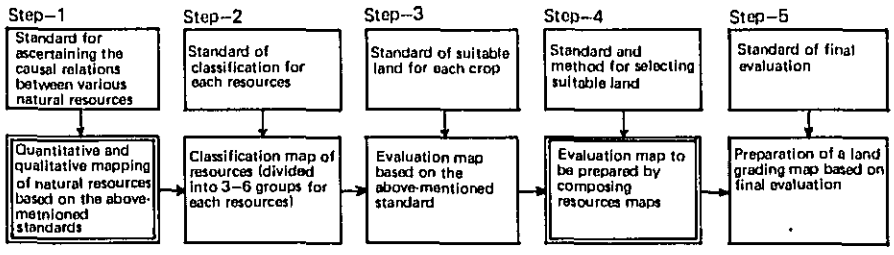
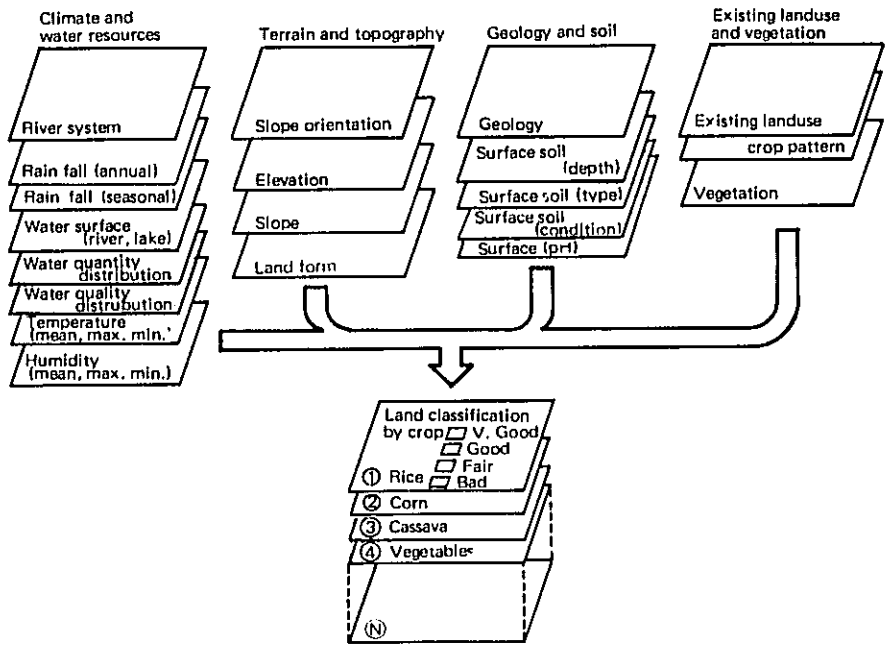


Fig. III–10–2 How to make the land classification map



♠ p. 9–1

♣ Chap.-IV Data List

♣ Chap.–IV Map List

Example: The Land Classification Method in the Master Planning

As an example, the method of land classification employed in the South Sulawesi Regional Agricultural Development Planning implemented under the JICA assistance may be mentioned here.

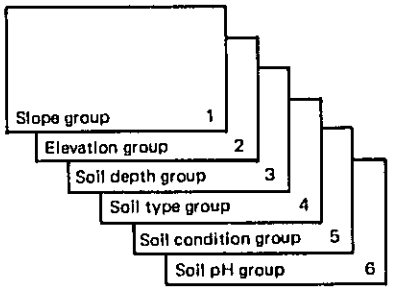
♣ Chap.-IV Data List

In this method, elevation and slope were used for topographical analysis and the thickness of subsurface soil, type, condition and acid base for the analysis of the subsurface soil so that the distribution map of each type of natural resources could be prepared.

This method was formulated under the guidance of JICA specialists. For furture, land classification with improved basic data, which also takes into consideration the above factors such as climate, water resources and land form, may be recommended.

Step 1: Natural resources map

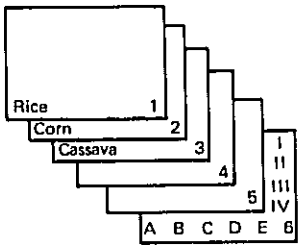
♣ Chap.-IV Map List



Legend from 1 to 6

1	2	3	4	5	6
0–3	0–500	1m–	≡	Medium	Medium
3–15	500–1,000	0.5–1.0	≡	Loamy	Lacidic
>15	>1,000m	<0.5	≡	Sandy	Alcaline

Step 2: Distribution of suitable land



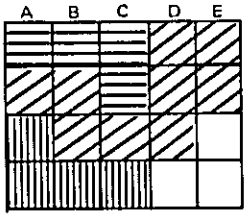
Evatuation criteria from 1 to 6

Criteria \ Resources		1	2	3	4	5	6
Good	3	0–3					
Fair	2	3–15					
Poor	1	15–					

Evaluation Table

Code No	A				B				C				D				E			
Resources	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
	3	3	3	2	3	2	3	3	3	2	2	1	2	2	1	1	2	2	1	1
	3	3	2	2	3	3	3	3	3	3	3	3	2	2	2	1	1	2	1	1
	3	2	2	2	3	3	2	3	3	3	3	1	3	2	2	3	3	1	2	2
	3	2	2	2	3	3	2	1	3	3	3	3	3	3	3	2	3	3	3	1
	2	3	2	2	3	2	1	1	3	3	2	2	3	3	3	2	2	3	2	2
	2	1	1	1	2	2	3	1	3	3	2	2	2	2	2	2	2	2	2	1
Total points	16	14	12	11	17	15	14	12	18	17	15	12	15	14	13	11	13	13	11	8

Step 3: Distribution of suitable land based on total points

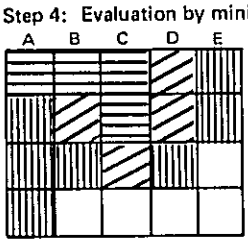


Overall evaluation of location according to natural resources is to be made based on the total of those points given to each of six resources in respect to each crop in Step 2.

Evaluation standard based on total points (applicable to all crops)

Evaluation	Total points by mesh
Most suitable	16–18
Suitable	13–15
Fair	11–12
Un-suitable	

Step 4: Evaluation by minimum point standard

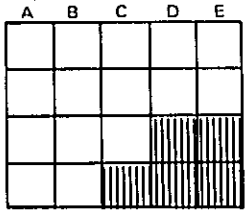


Modified overall evaluation according to the minimum-points standard for the evaluation of suitability based on inter-resources differentials and reduced resources which may not be evaluated adequately by the overall points evaluation method in Step 3.

Minimum points standard for overall evaluation (applicable to all crops)

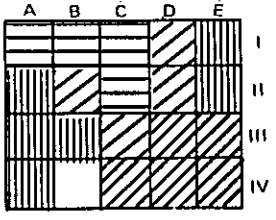
Evaluation	
Most suitable	2
Suitable	2
Fair	Below 1 point
Un-suitable	

Step 5: Distribution of unsuitable land



If location is impossible unless conditions of natural resources are under a certain standard for each crop, it is to be regarded as unsuitable. (For instance, the lack of water resources when suitable land is to be selected for paddy planting) Here the land of over 15° of inclination is to be regarded as unsuitable.

Step 6: Overall evaluation (Land classification map by crop)

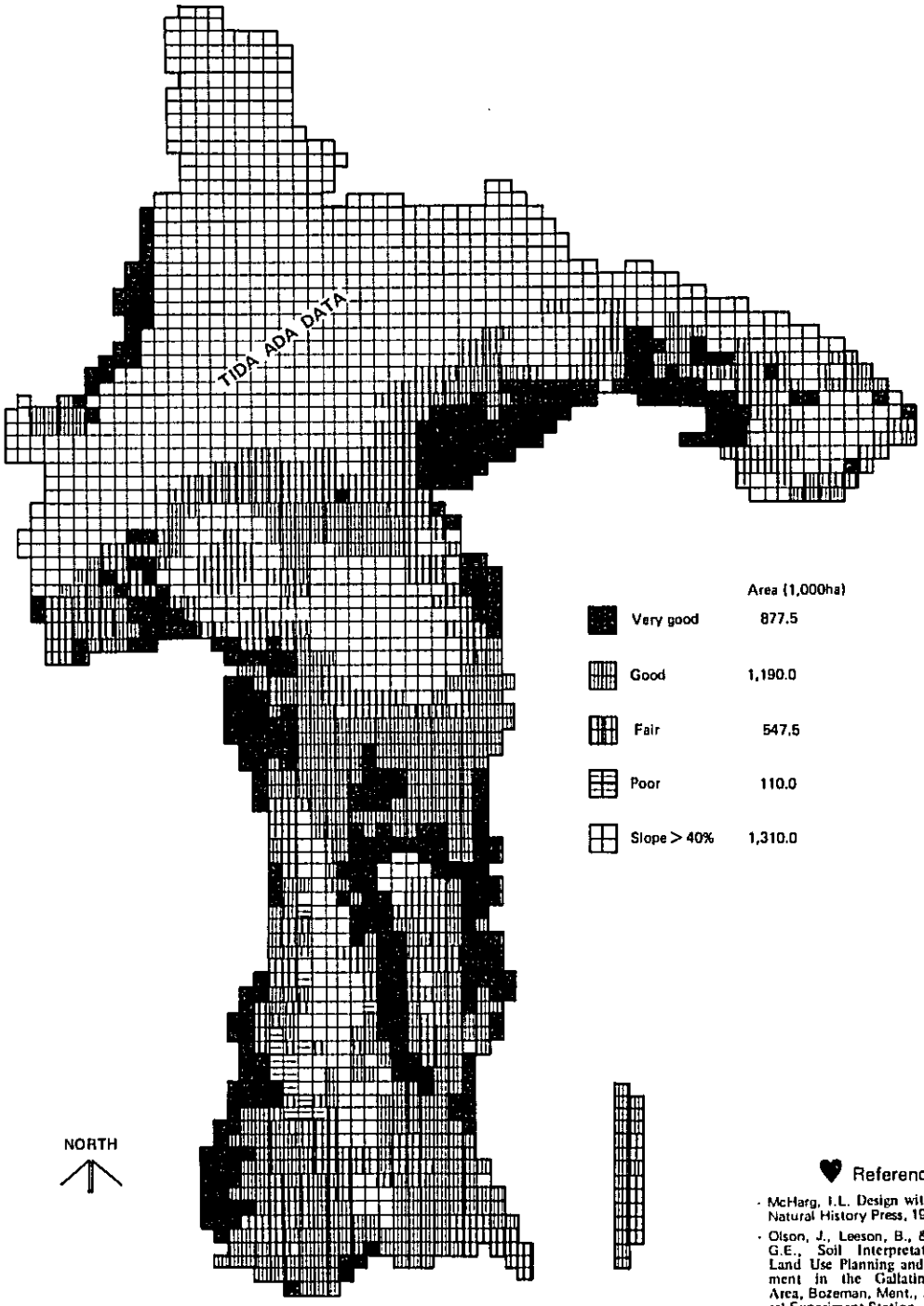


Here the lowest evaluation in Steps 3–5 is to be selected as final unsuitable.

Legend (Rice)

- Most suitable
- Suitable
- Fair
- Unsuitable
- Poor

Fig. III-10-3 Land Classification for Paddy Field Area



♥ Reference book

- McHarg, I.L. Design with Nature, Natural History Press, 1969
- Olson, J., Leeson, B., & Nielson, G.E., Soil Interpretations for Land Use Planning and Development in the Gallatin Canyon Area, Bozeman, Mont., Agricultural Experiment Station, 1973

Source: South Sulawesi Regional Agricultural Development Planning/ ATA-140 Project, Final Report on Phase 1, vol. 5, p. 14

Technique-11: POTENTIAL MAP

Definition: In order to select suitable land for each type of agricultural operations analysis and evaluation of not only location based on natural resources but also social resources accumulated and distributed in the region concerned to prepare a distribution map of suitable map of a highest level for each type of agricultural operations. At the same time, selection of suitable land for each type of agricultural operations by adopting the analysis of social resources results in the optimum use of existing social resources.

The analysis of social resources for the preparation of the potential map is to cover potential agricultural labor force*, agricultural and other related facilities and infrastructure, and social facilities and infrastructure. For the analysis and evaluation of these social resources, the mesh analysis method* is to be used as in the case of land classification map*.

♠ p. 13–4

♠ p. 8–1, 10–1

By combining evaluations of various sources, a social resources accumulation classification map is to be prepared. Further, by combining it with the suitable location map for different type of agricultural operations, a minute and realistic suitable map for each type of agricultural operations is to be prepared.

Function: As for the method of analyzing social, there are threshold analysis, gravity model*, etc., but they are still at the stage of development. For those areas which are behind other areas in the provision and accumulation of social capital, this method is not necessarily effective. In applying this method, it is necessary to bear the above-mentioned point in mind.

♠ p. 19–1

Method-1: How to Make a Social Resource Distribution Map

Classification and mapping of distribution of labor, facilities, and infrastructure according to quality and service level as resource.

1) Potential Agricultural Labor Force

The present potential agricultural labor force* can be obtained from the past and the present numbers of agricultural households, agrarian population and the agricultural labor force (attention to be paid to seasonal migration and social movements of population).

♠ p. 13–4

2) Agricultural Capital

Classification and mapping of distribution of agricultural facilities (educational, research, training, union, warehouse, marketing, et.) at national province, country, group, and WILUD level and preparation of distribution map.

- Classification and mapping of areas as having agricultural machinery (rice-cleaning, spray, etc.) by wilud unit.
- Classification and mapping of areas as having publically managed village managed, or no agricultural water channels.

♣ Chap.-IV Data list

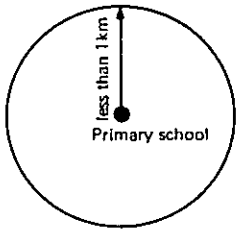
3) Social Facilities and Infrastructure

- Classification and mapping of distribution of educational facilities of different levels (elementary, middle, high, university).
- Classification and mapping of distribution of medical facilities (general hospitals-pharmacies).
- Classification and mapping of transportation and communications facilities in the same way.
  In the case of the road network, classification by management level (national, provincial, country, village, etc.) and by paving (asphalt, stone, unpaved).

4) Evaluation Map of each Social Resource above Mentioned

Setting of service spheres and influence spheres for each of the classifications of facilities and infrastructure in 1), 2), 3). Evaluation of each type of social resource by mapping service spheres of facilities and infrastructure with respect to the maps prepared in 1), 2), 3) on the basis of such sphere standards.

Service area:
Primary school zone



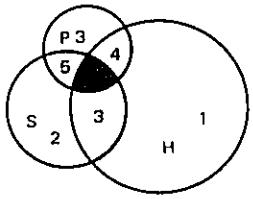
Method-2: Evaluation of Degree of Accumulation of Social Capital

1) Map of Future Distribution of Potential Agricultural Labor Force Density

The distribution under Method-1-1) may be multiplied by the growth rate of future agricultural labor force to prepare a density distribution map of future potential agricultural labor force.

2) For Evaluation of the Degree of Accumulation of Agricultural Capital

The facility, machinery, and infrastructure evaluation maps of Method-1-2) are synthesized, with weighting. The total number of points in each mesh indicates the degree of accumulation. Dividing these total points into 3–4 stages, maps for evaluation of degree of accumulation of capital within each mesh are drawn.



3) Evaluation of Social Facilities and Infrastructure

By the same technique as for evaluation of accumulation of social facilities and in frastructure.

Degree of accumulation of capital Weighting

P. Primary sch.	3
S. Secondary sch.	2
H. High sch.	1

Method-3: Selection of Appropriate Locations for Different Types of Agricultural Operations on Basis of Evaluation of Degree of Accumulation of Social Capital

The area most suitable to the target type of agricultural operations established by the macro frame and Strategy is to be selected according to the degree of accumulation of social capital. By combining the above selection of suitable land and the suitable layout plan of agricultural operation type based on the analysis of natural resources conducted in Strategy, the layout plan of each agricultural operation type aiming at more intensified and efficient land use is to be prepared.

♣ Chap.-II Macro frame Strategy
♠ p. 18–1
♠ p. 5–1

Example: Social Infrastructure Diagnosis

Below is an outline of the analysis of the social infrastructure under the Kilimanjaro Region Integrated Development Planning in Tanzania (JICA assistance project 1977).

1) Purpose of the Study

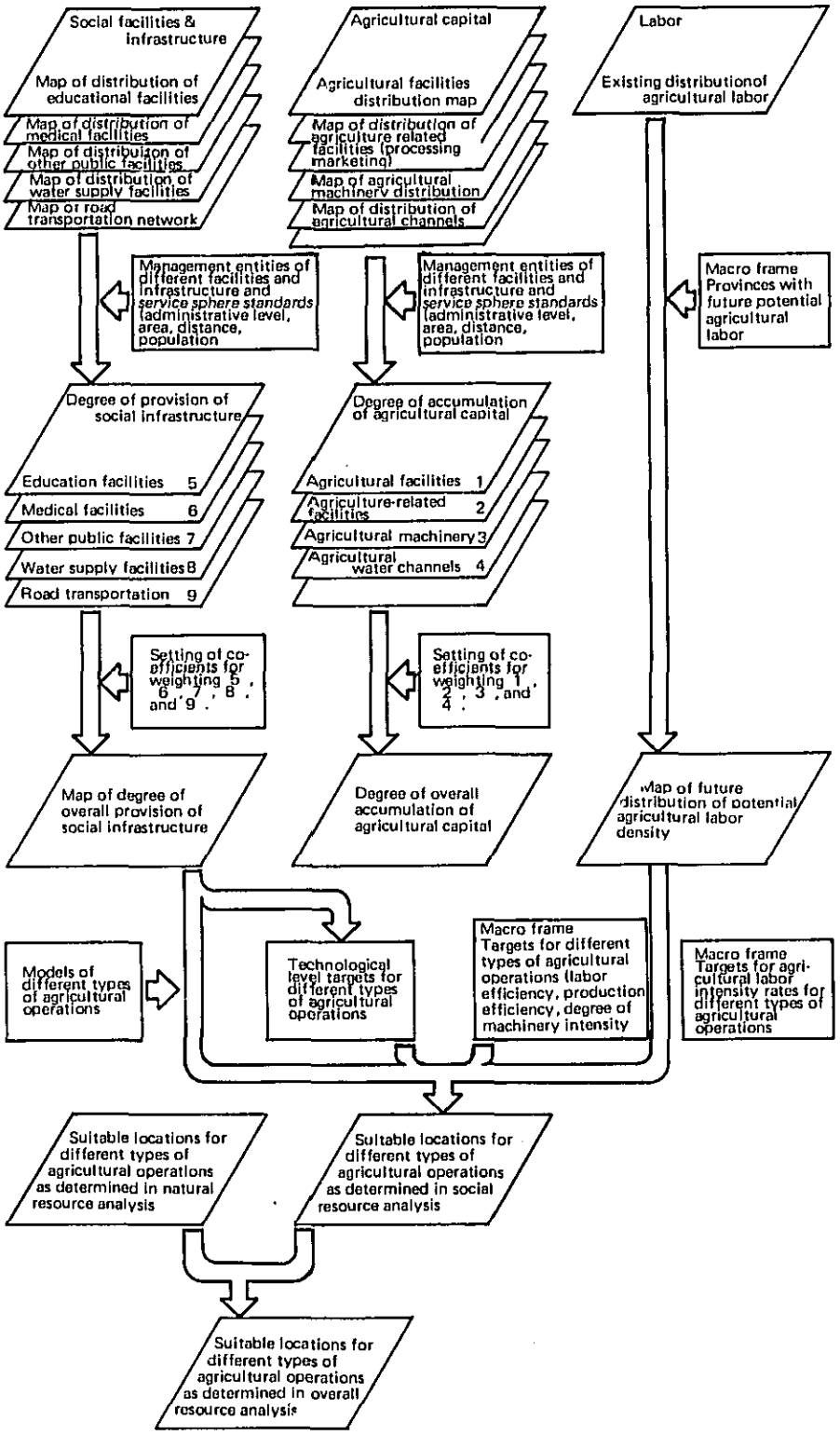
The area of the region must be classified into different categories for social infrastructure purposes on the basis of the land-use plan and the population distribution plan in order to make it possible to ensure a standard of living in the region that is adequate culturally and in terms of health as well as an adequate degree of functionalness of regional activities, and each category of area must be provided the kinds of public facilities that it needs.

This diagnosis, which also takes into account population distribution, makes it possible to identify problems and consider how they should be dealt with.

2) Evaluation Method

Diagnosis of the state of social infrastructure in the Kilimanjaro Region has been based on the following criteria.

Fig. III-11-1 Map Study Flow



Primary:

i Good road accessibility – within 1km of trunk road or 500m of feeder road

ii Water supply areas – city water supply areas and areas within 500m of *domestic water pipeline*

iii Medical care service areas – within a radius of 4km of hospital or health center and villages with dispensary

iv Education service areas – villages with primary school

Secondary:

v Commercial service areas – within a radius of 4km of open-air market or other commercial facility

vi Electricity supply areas – covered areas

vii Telephone service areas – covered areas

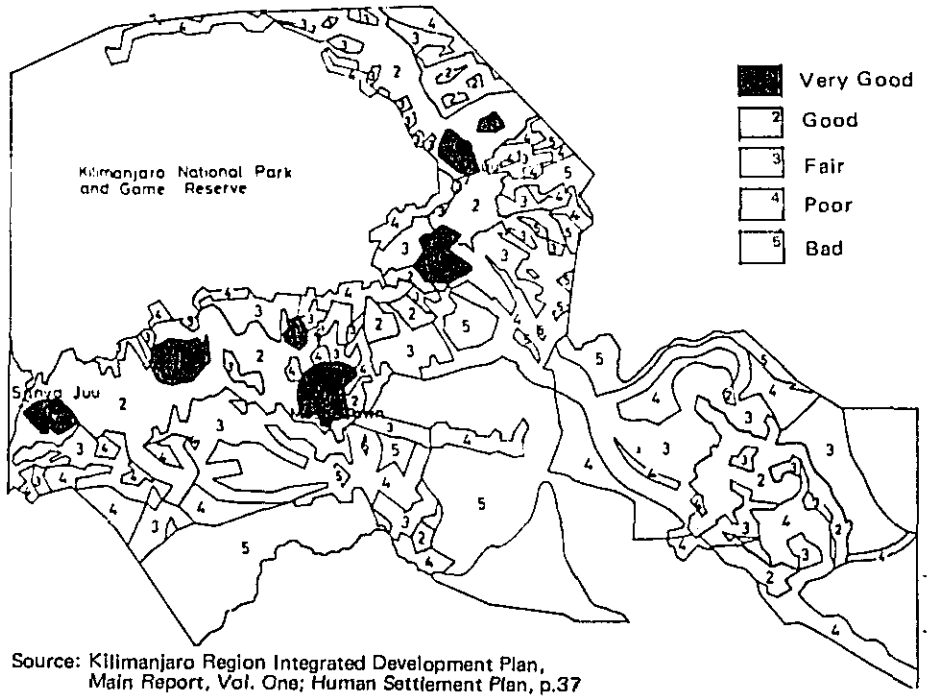
viii Postal service areas – within a radius of 4km of post office

ix Bus service areas – within 2km of a bus route

The areas have been ranked as follows according to which of the above criteria are satisfied in them.

Ranking	Primary criteria				Secondary criteria				
	i	ii	iii	iv	v	vi	vii	viii	ix
Very good	●	●	●	●	●	●	●	●	●
Good	●	●	●	●					
Fair	●	●	Which one				Any 2–4		
Poor	●	Anyone			×	×	×	×	×
Bad	×	×	×	×	×	×	×	×	×

Fig. III–11–2 Social Infrastructure Diagnosis Map



Source: Kilimanjaro Region Integrated Development Plan, Main Report, Vol. One; Human Settlement Plan, p.37

♥ Reference book

- Lewis, P.H., Jr. Regional Design for Human Impact, Springfield, Thomas Publications, 1969
- Lassey, W.R. (Ed.), Human Resources Planning, Pullman, Washington State University, 1974

Technique-12: LAND AVAILABILITY MAP

Definition: The purpose of availability analysis is to analyze the adequacy and the permissibility of the area concerned in respect of the development method, scale and time in agricultural development so that the possibility of development in that area may be positioned.

In order to ascertain the adequacy and the permissibility of development in the area concerned, the following examinations are to be made:

♠ p.1–1

1) Community assessment (through the survey of the response of local residents and learned men)

♠ p.26–1

2) Ecological assessment (the method and the scale of development are to be examined for the conservation of the present ecology of the region)

3) Analysis of the expected bottlenecks in construction and operation

4) Wide-ranging and comprehensive adjustments such as those with related administrative adjustments such as those with related administrative organs regarding preceding plans and projects and those regarding the target for the improvement in the future agrarian living standards are to be made to set the direction of development.

Based on the above examinations and adjustments, the following three maps are to be prepared in order to position the possibility of development in the area concerned:

1) Distribution map of unsuitable land for development

2) Distribution map of development priority

3) Distribution map of special development areas

Function: Various items of examination for availability analysis have not yet been established. However, whatever the development program may be, it is necessary to position development opportunities and possibilities from various related elements of the present condition and the surrounding virons. Accordingly, the method of more wide-ranging and comprehensive examination has to be devised.

Method: Map Making System

1) Bottlenecks in Construction and Management

Inventory is to be made of unfavorable factors in the form of a chart as to whether major problems occur with manpower, supply capacity and the method of transporting materials during both construction and management.

2) Ecological Assessment

In order to preserve the present ecological position to protect the natural and social environment of the area concerned, it will be necessary to place ecological assessment as part of land use control planning so that the multiplying effects of the accumulation of projects on the environment may be assessed not as a local problem but from a regional point of view.

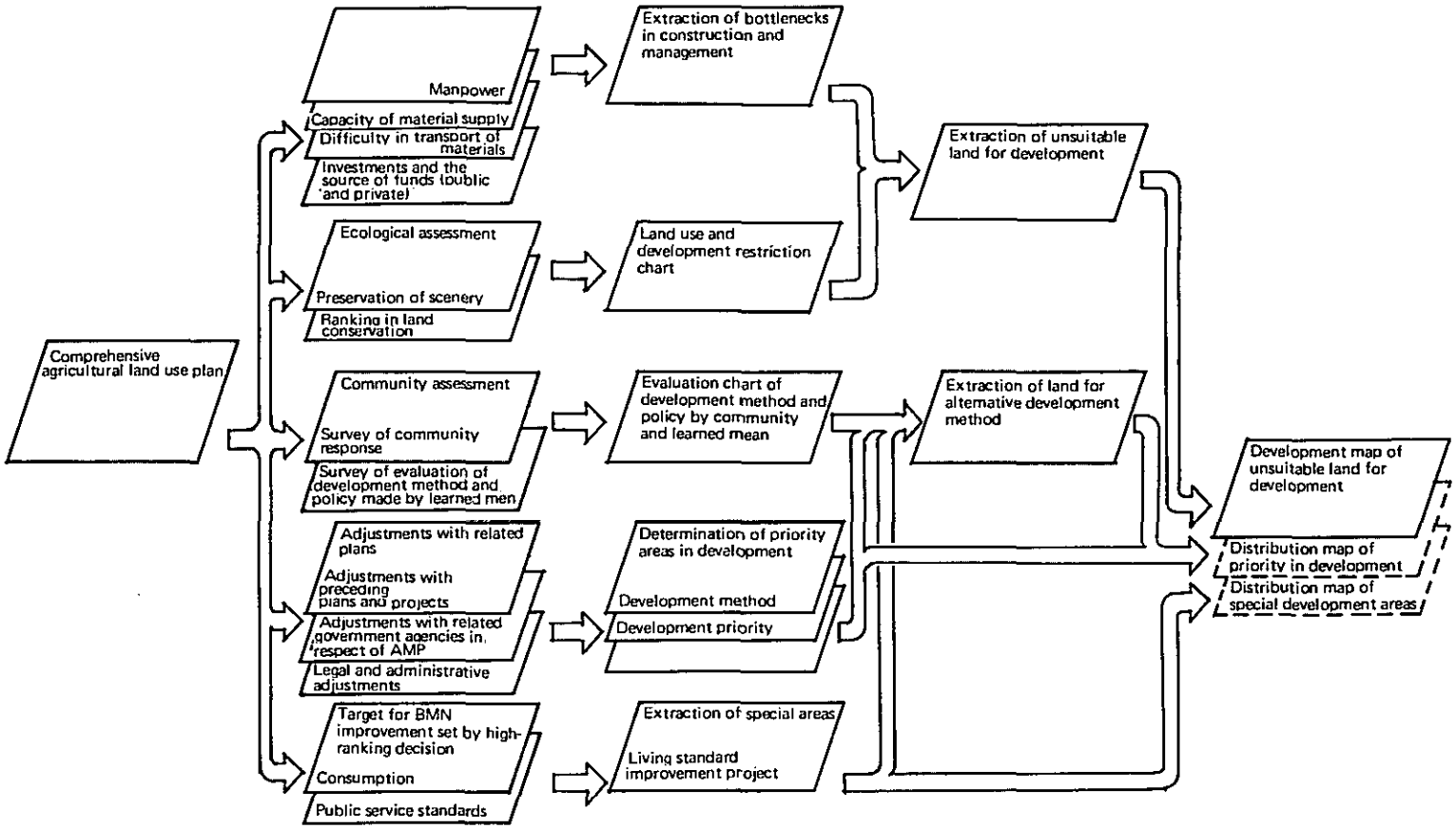
♠ p. 26–1

3) Community Assessment

For the determination of the development method and policy for each area, an important condition for the promotion of the project and the achievement of its goal will be that the consciousness of the residents participating in the project is reflected in it. It is important that evaluation and judgement of learned men in agriculture and related fields (foresight supported by research and experience) are

♠ p. 30–1

Fig. III-12-1 Map Study Flow



reflected in the project for adding validity and concreteness to long-term agricultural development planning.

4) Adjustments with Related Plans and Projects

♣ Chap.-II Strategy

By increasing the comprehensive nature of the project and by making adjustments with those plans and projects preceding agricultural development, validity and concreteness of the development method and policy for each area are to be increased so that the degree of achieving the target value may be raised. Further, by reconciling the development policies of various administrative organs, better multiplying effects of projects may be obtained by linking them rather than by implementing them separately. Accordingly, here the adjustments are to be made with all planning and operating bodies concerning agricultural facilities, infrastructure and social infrastructure.

5) Improvement in the Standard of Living through the Introduction of Basic Human Needs

♠ p. 14–1

The level of consumption and the service standard for public services (education, medical service, etc.) are to be established on the basis of high-ranking decision-making and adjustments made with related administrative bodies so that a long-term outlook may be ascertained to improve the existing standard.

Example: ***Land Evaluation and Measures for the Conservation of Natural Environment.***

Below is an outline of the Natural Resources Conservation Project under the Kilimanjaro Region Integrated Development Planning in Tanzania (JICA assistance project 1977).

The method adopted is the analysis of the present condition and the selection of conservation areas based on the analysis. The conservation areas have finally been selected on nine items to serve as a guide line for drawing in afforestation, forest reserve and natural environment conservation programs under other chapters.

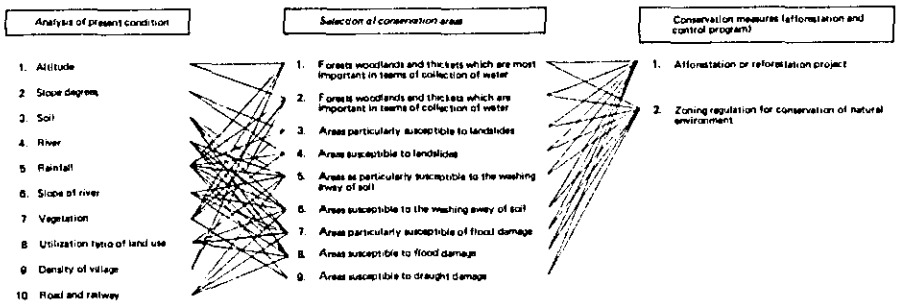
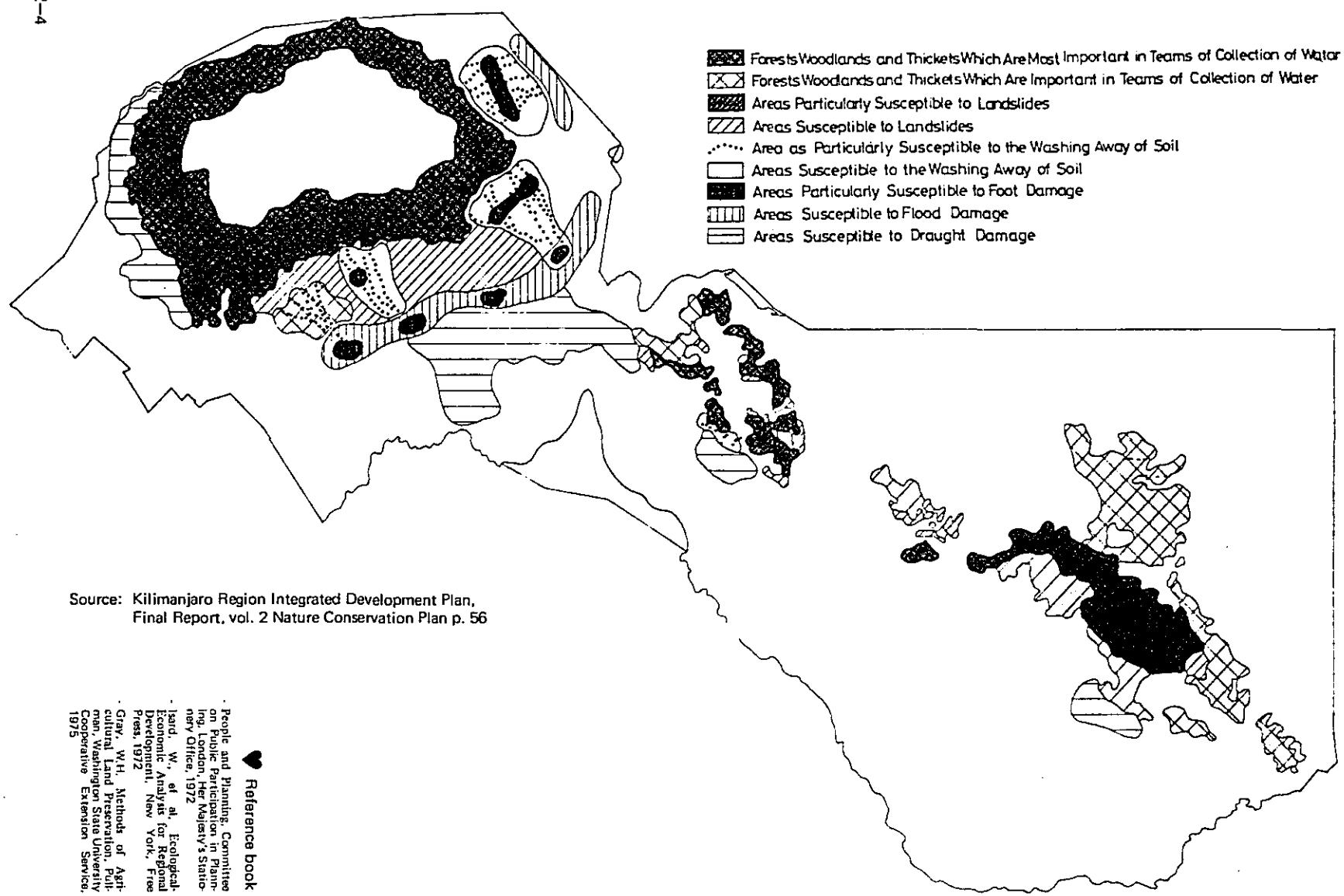


Fig. III–12–2 Analysis Map of the Conservation Values



Source: Kilimanjaro Region Integrated Development Plan, Final Report, vol. 2 Nature Conservation Plan p. 56

Reference book

- People and Planning, Committee on Public Participation in Planning, London, Her Majesty's Stationery Office, 1972
- Isard, W., et al. Ecological-Economic Analysis for Regional Development, New York, Free Press, 1972
- Gray, W.H. Methods of Agricultural Land Preservation, Pullman, Washington State University Cooperative Extension Service, 1975

Technique-13: POPULATION PROJECTION

Definition: Population assumes importance in two respects in the formulation of regional planning. First, population serves as a given condition for planning concerning the demand for consolidation of facilities, demand for food production, etc. In this case, population serves as Input for planning, and, therefore, accurate population forecast is the key to successful planning. (Forcasted population.)

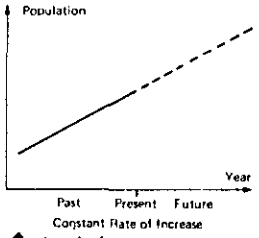
♠ p. 32

Secondly, population, when industrial location planning creates employment which in turn starts off social movement of population, the population is already the object of planning, not to speak of family planning and colonization planning which directly causes a change in population. (Planned population.)

Having made clear that population has the two aspects of forecasting and planning, we will now turn to some of the methods of forecasting.

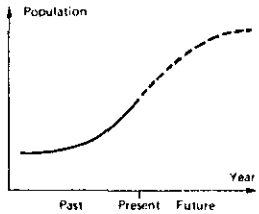
Method-1: Simple Extention Method.

◆ Constant rate of increase



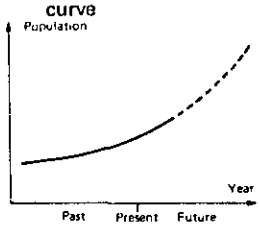
Constant Rate of Increase

◆ Logistic curve



Logistic Curve

◆ Secondary parabola curve

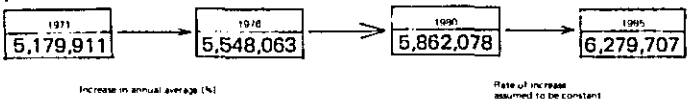


Secondary Parabola Curve

1) The Method Based on a Constant Rate of Population Increase (or Decrease).

Assuming from the secular trend of population in the past that population increases by geometrical progression, the average rate of increase is obtained, which is expected to continue in future.

Table III–13–1



2) Regression by the Trend Line

Judging from the past secular trend that population increase may be expressed by a secondary parabola, logistic curve , etc., the population increase is estimated from the trend line.

Method-2: Balanced Population Dynamics Method

Under this method variable factors of population are classified in detail, and the post secular trend is extended into future for each factor.

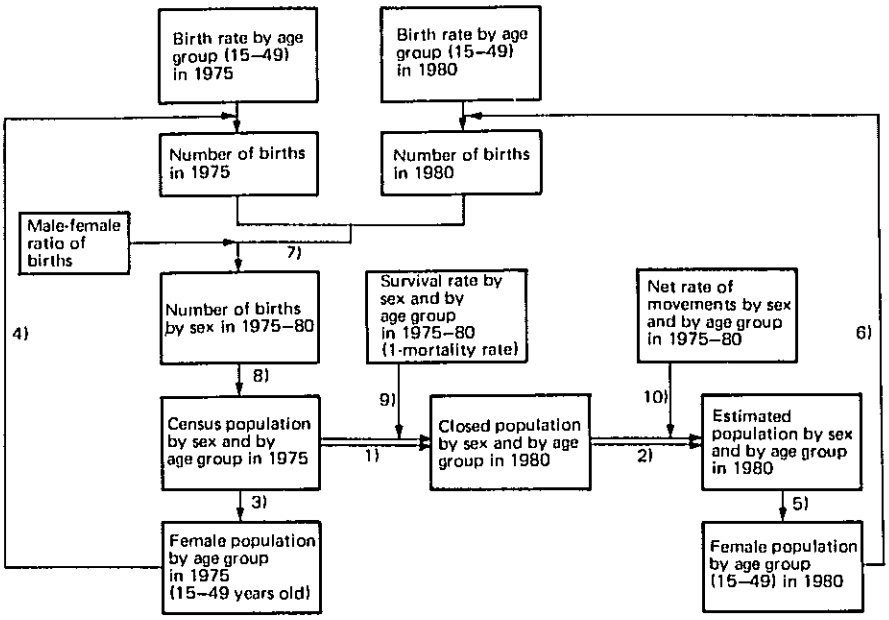
$$\text{Future population} = \text{present population} + \underset{\text{natural increase or decrease .....}}{\text{(births during the period} - \text{deaths during the period)}} + \underset{\text{social}}{\text{(inflow during the period} - \text{outflow during the period)}}$$

The above equation is called the "Population equation". Estimation of each variable factor requires time series data on births, death, moving-in and moving-out in the area, showing dynamic changes in population. Further, even with the data secured, the rate of moving-in and that of moving-out are to a great extent subjected to prevailing social and economic conditions, and estimation regarding future changes *is a difficult task.*

Method-3: Cohort Method

As a method of estimating the structure of regional population by sex and by age, the cohort method is useful. The actual procedure of the cohort method is as below (see Fig. III–13–1)

Fig. III–13–1 Flowchart of the Estimation of Population by the Cohort Method



The census population of 1975 by sex and by age is to be the basic population which will be used to estimate the population of 1980 by sex and by age. The estimation of future population at a more distant time such as 1985, 1990, etc., will be clearly possible by piling up the 5-year periods.

1) The cohort of 0–4 years of age will be that of 5–9 five years later in 1980. Accordingly, if we multiply the census population of 1975 by sex and by age group (grouping by five years) by the survival rate by sex and by age, assuming that the social increase (or decrease) is nil, we may obtain the estimated population of 1980 by sex and by age group (grouping by five years). (Closed population.)

However, it should be remembered that the cohort grouped by five years will be up each by one rank in 1980, leaving the cohort of 0–4 still unfilled.

2) If we multiply the closed population of 1980 by sex and by age group (grouping by five years) by the net rate of operation by sex and by age group, we may obtain the net total of movements by sex and by age group corresponding to the social increase (or decrease). By adding this to the closed population of 1980 by sex and by age group, we may estimate the population of 1980 by sex and by age group (grouping by five years). However, as in the case of 1), the cohort of 0–4 years will, in this case, be unfilled.

3) We extract from the census population by sex and by age group in 1975 the female population of the reproductive age (grouping by five years) – from 15 to 49 years old – which is the main factor in births.

4) This may then be multiplied by the fertility rate by female age group in 1975 for each conort (grouping by five years) to be added up to obtain the number of births in 1975.

5) As in the case of 3), we extract the female population of the reproductive age (15–49 years old) grouped by five years from the estimated population of 1980 by sex and by age group computed in 2).

6) This is then multiplied by the fertility rate of the female population of 1980 by age group for each cohort (grouping by five years) to be added up to obtain the number of births in 1980.

7) We then take the average of births in 1975 and those in 1980 computed under 4) and 6) and multiply it by five to obtain the estimated number of births in 1975–1980.

This is then allocated to male and female by the male-female ratio to obtain the number of births by sex.

8) The task left now is to use the above as the basic data to estimate the population of the age group 0–4 by sex in 1975 which was left unfilled under 1) and 2).

9) If the number of births by sex in 1975–1980 is multiplied by the survival rate of the age group 0–4 by sex, the population of the age group 0–4 by sex will be obtained, which was lacking from the closed population of 1980 by sex and by age group.

10) The above may then by multiplied by the net rate of movements of the age group 0–4 by sex to obtain the net number of movements of the age group 0–4 by sex to complete finally the estimation of the population in 1980 by sex and by age group.

◆ Participation rate

Participation rate = workers population ÷ population (more than 15-years old)

◆ Dependent population index

Dependent population index = $(0-15)^{pop.} + (\text{more than } 65)^{pop.} \div (15-65)^{pop.}$

The structure of the regional population thus obtained has a significant meaning for planning. For instance, in manpower planning, the participation rate* and the dependent population index* computed by using the population classified by age group serve as important indicators to ascertain the condition of the labour force.

Drill: Given the population data of A province in 1975, forecast the population in 1980 using the cohort method.

Table III–13–2 Computation of Births (1975)

Age	1975 Female Population (a)	Birth Rate (b)	Number of Births (a) × (b)
15–19	197,200	0.00330	651
20–24	299,400	0.10206	29,236
25–29	284,500	0.19714	56,096
30–34	254,100	0.08319	21,139
35–39	220,100	0.01862	4,098
40–44	173,500	0.00323	560
45–49	138,000	0.00018	25
Total	1,553,800	0.40774	111,795

Table III–13–3 Computation of Births (1980)

	Female Population (a)	Birth Rate (b)	Number of Births (a) × (b)
15–19	195,110	0.00330	644
20–24	239,152	0.10278	24,580
25–29	338,824	0.19856	67,277
30–34	317,177	0.08365	26,532
35–39	274,410	0.01862	5,110
40–44	230,139	0.00323	743
45–49	178,799	0.00018	32
Total	1,773,611	0.41032	124,918

Average 118,356.5 × 5.0 → 591,783
Male 51.41% → 304,236
Female 48.59% → 287,547

Table III–13–4 Estimation of Male Population by Age Group

Age	1975 Census Population (a)	1975–80 Survival Rate (b)		1980 Closed Population (c) = (a) × (b)	1975–80 Rate of Movements (d)	Total Movements (e) = (c) × (d)	1980 Estimated Population (f) = (c) + (e)
Total	2,814,600		Total	3,039,816		301,435	3,341,251
Births	(304,236)	(0.984371)	0–4	299,481	0.0500	14,974	314,455
0–4	276,200	0.99572	5–9	275,018	0.0500	13,751	288,769
5–9	220,200	0.99328	10–14	219,707	0.0500	10,985	230,692
10–14	173,800	0.99709	15–19	173,294	0.3119	54,050	227,344
15–19	248,700	0.99498	20–24	247,651	0.2613	64,711	312,362
20–24	367,100	0.99436	25–29	364,897	0.1285	46,867	411,564
25–29	309,000	0.99293	30–34	306,815	0.1192	36,572	343,387
30–34	275,700	0.99117	35–39	273,268	0.0854	23,337	296,503
35–39	243,800	0.98755	40–44	240,765	0.0537	12,929	253,694
40–44	192,900	0.98123	45–49	189,279	0.0427	8,082	197,361
45–49	135,300	0.97133	50–54	131,428	0.0416	5,467	136,895
50–54	96,200	0.95395	55–59	91,770	0.0400	3,670	95,440
55–59	90,800	0.92573	60–64	84,056	0.0303	2,547	86,603
60–64	70,500	0.87895	65–69	61,962	0.0266	1,648	63,614
65–69	53,000	0.81193	70–74	43,034	0.0260	1,119	44,151
70–74	34,100	0.71391	75–79	24,349	0.0167	407	24,751
75–79	15,900	0.58041	80–84	9,226	0.0241	222	9,451
80–	11,400	0.35243	85–	4,018	0.0241	97	4,115

Before we begin our computation, we have to collect input data which are indicated by the green mark on the table. Of these, the survival rate (b) applies to those who live through the period of five years. Since the rate is not expected to change so much for five years, it may be computed by using the mortality rate by age group in 1975 as below.

Survival rate of Group i = (1 − mortality rate of group i in 1975)[5]

Though it is difficult to estimate the rate of movements (d), it is assumed in this case that there is an inflow of mainly the young group during the period from 1975 to 1980 to obtain the figures.

The fertility rate on Table III–13–2 is computed from the statistical data. However, the fertility rate on Table III–13–3 has to be estimated by taking account of social and economic conditions. The assumption here is that the birth rate of the age group 25–34 somewhat increases.

With regard to the male-female ratio of births, as it is extremely stable, no problem will arise in future from the use of the figure.

Let us now proceed with our computation:

1) (c) = (a) x (b)

With this equation those columns below 5–9 years under (c) on Table III–12–4 will be filled. Table III–12–4 is for the computation of male population by age group; but computation is to be made similarly for the table for female population (not given here).

2) (e) = (c) x (d), (f) = (c) + (e)

Similar to the above, those columns below 5–9 years will be filled.

3) The data for 15–49 in 1975 are to be extracted from the table for female population to be used on Table III–13–2

4) (a) x (b)

By totalling the number of births of each age group in 1975, the total of 111,795 may be obtained.

5) The data for 15–49 in 1980 computed from the table for female population are to be used on Table III–13–3

6) (a) x (b)

Thus we obtain the number of births 124,918 in 1980.

7) (111,795 + 124,918) x ½ = 118,356.5

118,356.5 x 5 = 591,783

The total number of births in the five-years period obtained by averaging and multiplying by five is to be allocated using the male-female ratio.

$$591{,}783 \times \frac{51.41}{100} = 304{,}236$$

$$591{,}783 \times \frac{48.59}{100} = 287{,}547$$

8) The figure is now entered under Births in the column (a) on Table III–13–4 for male population. Similar operation is to be carried out for female population.

9) 304,236 x 0.98437 = 299,481

10) 299,481 x 0.0500 = 14,974
299,481 + 14,974 = 314,455

We have thus obtained the population of each age group on the column (f) and the aggregate may now be obtained.

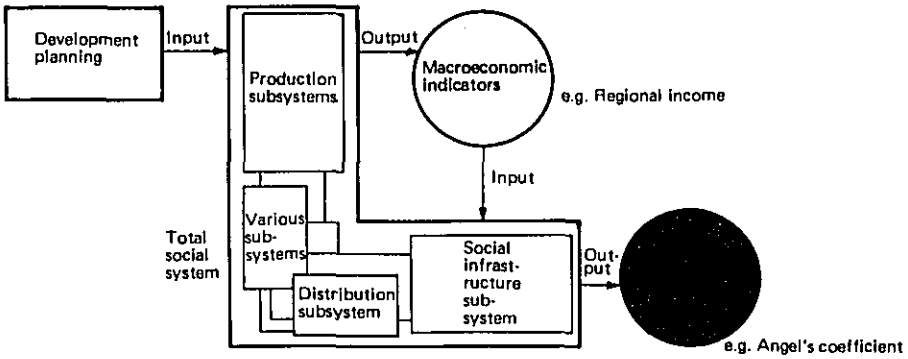
♥ Reference book

- JICA, Kilimanjaro Region I.D.P., 1977
- G.W. Barclay, *Techniques of Population Analysis*, 1958
- N. Keyfitz, Introduction to the Mathematics of Population, 1968

Technique 14: SOCIAL INDICATOR

Definition: Needless to say, the ultimate goal of regional development planning, including agricultural planning, is that of increasing the welfare of the residents of the region. Accordingly, evaluation of the planning should be from the viewpoint of the extent to which a contribution is made to such welfare. However, since welfare is a subjective concept which is difficult to quantify, planning has usually been evaluated by means of macroeconomic indicators, particularly GNP. Although macroeconomic indicators in themselves are still of significance, nowadays it is considered necessary to evaluate planning in terms of its final output, the quality of life of the residents of the region, and it is for this purpose that social indicators, as a system for expression of the quality of life, have been developed.

Fig. III–14–1



Method-1: How Can Social Indicators be Used in the Planning Process?

First of all, they can be used as a means of evaluating existing conditions. Through comparison of different countries, different provinces, different kabupaten, and so on, it is possible to identify problems of each. Secondly, it is possible to targets. In selection of the indicators and setting of such residents.

Framework for Surveys of Opinions of Residents

i How satisfied are you with your living conditions and the environment in which you are living?

ii What elements in the circumstances of your everyday life do you consider most important in terms of the quality of life?

iii What would you like to see done about public facilities that have a large bearing on the quality of life?

The goals set serve as important criteria for prior evaluation of whether or not development plans will be able to attain such goals and for follow-up assessments of whether or not they have in fact attained them. For prior evaluation, however, it is necessary to forecast the impact of development factors (primarily economic variables) on the quality of life, and for this purpose use is made of mutual independence tables*, systems dynamics*, and other techniques.

◆ Interdependence table
The interdependence table developed by Dr. Jan Drewnowski is to ascertain the direction of interdependence between social variables. It is similar in form to the input-output table employed in the analysis of inter-industry relations.

♠ p. 16–1

In the selection of indicators there are two basic approaches. One is the deductive approach of first considering what welfare is, then setting large and medium targets, and then setting subtargets under them, and the other is the inductive approach of arranging actually available statistics into systems. In order to express accurately the quality of life, social change, structure of needs, and so on of the region in question, it is necessary to build up systems on a trial-and-error basis with both the deductive and inductive approaches.

Example: System of Social Indicators of Different Entities

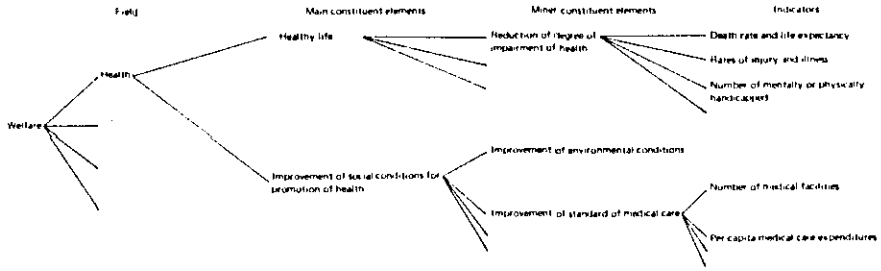
Table III--14--1

Area of life \ Entity	OECD	U.N. (Drewnowski)	U.S. (for social report)	Welfare indicators of Tokyo Metropolitan Government
Basic needs	1) Income & consumption	Control of goods and services	Nutrition	Income & poverty	Income & consumption
	2) Security & stability	Public security and justice	Security	Public order & security	Security
	3) Health	Health	Health	Health & disease	Health
Environmental needs	4) Preservation of nature (Harmony with nature)	Physical environment	Environment	Physical environment	Natural environment
	5) Living environment	Work and employment	Housing		Transportation and communications
	6) Work environment				Work
Higher needs	7) Education & culture	Learning and culture	Education	Learning, science, & art	Education
	8) Leisure	Leisure and time	Leisure	Social mobility	Leisure
	9) Participation & belonging	Quality of community life		Participation and estrangement	Solidarity

The systems of social indicators that have been formulated to date have a great deal in common in terms of major categories, which is an indication of the fact that there is to a large extent a consensus with respect to them. What is necessary now is to set medium and smaller goals to make them systems that have good balance of overall expression.

Drill: Ordering of System of Indicators in Field of Health

Fig. III--14--2 Format of Ordering System of Indicators in Field of Health



Each person should complete the system according to the above format.

Method-2: Social Indicators - Area Unit Measured and Method of Indication

1) Area Unit Measured

This means the size of the area for which values of social indicators are to be sought. There are four work sheets below. Which one to select will depend on how the social indicators are to be used. Type II would be useful for identifying the characteristics of provinces, and Type III will be necessary in considering how to remedy gaps between different areas in the same province. In the case of many indicators, however, data concerning provinces is available, but not statistical data concerning kabupaten and villages, which means that it is often necessary to carry out sample surveys. The Type III and IV work sheets can be considered to be a part of the community record , it being advisable that the information be kept on a daily basis so as to eventually serve as basic planning data.

Table III–14–2 Work Sheet

I	Caloric intake
Indonesia	
Philippines	
Japan	

II	Infant fatality rate
Province	
S.Sulawesi	
E.Sulawesi	

III	No. of beds per 10,000 population
Kabupaten	
U. Pandung	
Maros	

IV	% of elementary school attendance
Desa	
Maloku	
Baru	

2) Method of Indication

Because of variation in measure which the indicators concern, it is hard to compare them with one another. Hence the need for methods of standardizing the measure, the following being a few such methods:

i Index Method

Making of indices as percentages of the points in time or areas taken as standards.

$$Iij = \frac{Xij}{Xj} \times 100$$

Iij = The index of indicator j at point (area) i
Xij = Value of indicator j at point (area) i
Xj = Value of indicator j at standard point (area)

ii Standard Score Method

This method makes it possible to place the level of a particular area within the overall area distribution, there being various possibilities with respect to how the average value and the standard deviation are determined.

a) $Iij = \frac{Xij - Xi}{\sigma j}$

b) $Iij = \frac{10\,(Xij - Xj)}{\sigma j} + 50$

Iij = The index of indicator j at point (area) i
Xij = Value of indicator j at point (area) i
Xj = Average value of indicator j
σj = Standard deviation of indicator j

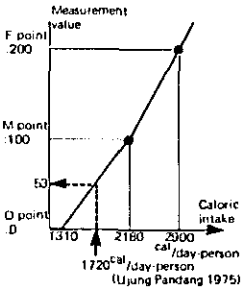
iii Standard Point Method

This method measures the level of attainment of welfare goals as an index of the degree of deviation from some standard points set. The following three standard points are set for each indicator: 0 point (production point) ..... measurement value of 0; M point (minimum necessary point) ..... measurement value of 100; and F point (perfect satisfaction point) ..... measurement value of 200. After determination of the standard points by the experts, the indices are placed, relatively, the distance between points M and 0 being equivalent to 100.

$$Iij = \frac{Xij - Xjo}{Xjm - Xjo} \times 100$$

Iij = The index of indicator j at point (area) i
Xij = Value of indicator j at point (area) i
Xjo = Point of survival of indicator j
Xjm = Minimum necessary quantity of indicator j

Fig. III–14–3



Drill: Some social indicators are given below. Index them by means of the standard score method and place South. Sulawesi Province with respect to them.

Table III–14–3

Province	Estimates of Infant Mortality Rates (Deaths 0–1 Year per 1,000 Born)*1	Beds per 10,000 Population*2	Rations of Pupil to Teacher*3	Cinema's Seats per 1,000 Population*4	Estimates of Infant Mortality Rates (Deaths 0–1 Year per 1,000 Born)*1	Beds per 10,000 Population*2	Rations of Pupil to Teacher*3	Cinema's Seats per 1,000 Population*4
1. Daerah Istimewa Aceh	119.5	4.16	28.8	4.7	48.1	48.2		
2. Sumatera Utara	103.0	13.28	26.8	9.9	44.4	56.2		
3. Sumatera Barat	130.3	5.25	28.3	4.7	50.5	49.2		
4. Riau	108.2	4.44	30.5	9.9	45.2	48.5		
5. Jambi	144.6	3.68	24.9	5.3	53.8	47.6		
6. Sumatera Selatan	140.3	7.86	32.8	10.7	52.8	51.4		
7. Bengkulu	135.9	2.53	32.3	3.6	51.8	46.8		
8. Lampung	133.1	2.27	33.8	3.9	51.2	46.6		
9. DKI Jaserta	114.7	11.51	36.2	18.9	47.0	54.6		
10. Jawa Barat	146.1	2.99	36.9	3.9	54.1	47.2		
11. Jawa Tengah	134.5	4.25	28.2	2.9	51.5	48.3		
12. D.I. Yogyakarta	134.5	8.09	21.7	2.1	51.5	51.7		
13. Jawa Timur	122.1	3.79	31.1	2.9	48.7	47.9		
14. Bali	120.8	5.16	31.4	3.7	48.4	49.1		
15. Nusa Tenggara Barat	156.7	2.12	30.3	3.4	56.5	46.4		
16. Nusa Tenggara Timur	124.8	4.63	29.0	1.4	49.3	46.6		
17. Kalimantan Barat	128.2	5.70	34.8	8.2	49.8	49.8		
18. Kalimantan Tengah	118.3	2.96	21.6	5.6	47.8	47.2		
19. Kalimantan Selatan	130.3	4.82	21.7	6.7	50.5	48.9		
20. Kalimantan Timur	108.0	13.22	31.8	12.3	45.5	56.1		
21. Sulawesi Utara	103.0	13.34	23.2	4.1	44.4	56.2		
22. Sulawesi Tengah	124.8	4.60	29.8	6.9	49.3	48.6		
23. Sulawesi Selatan	141.2	5.38	30.0	3.0	53.1	49.3		
24. Sulawesi Tenggara	147.6	4.48	29.2	5.9	54.5	48.5		
25. Maluku	128.9	7.08	27.5	4.1	50.2	50.8		
26. Irian Jaya	Not available	13.53	30.6	2.7	Not available	56.4		
INDONESIA	127.9	6.2	29.3	5.8	50	50	50	50

*1 Source Central Bureau of Statistics 1971
*2 Source Department of Health 1976
*3 Source Department of Education and Culture 1976
*4 Source Central Bureau of Statistics 1977

Fill the figures

♥ Reference book

- Social Statistics-Social Indicators Central Bureau of Statistics, 1977
- On Measuring and Planning the Quality of Life Jan Drewnowski, 1976
- Toward a Social Report U.S. PHEW, 1969
- Report on Social Indicators for Namgang Areas Development Project in Korea Y. Kumata, 1976

Technique 15: INCOME DISTRIBUTION

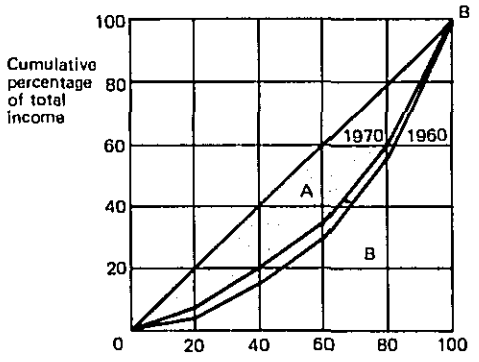
Definition: The productive income produced by economic and other activities during a particular period is ultimately distributed among the constituent members of society, whether individual persons or corporations, and to see it that such income distribution is fair is one of the economic goals of society.

Function: It is important in terms of regional diagnosis to know how regional income or regional agricultural income is distributed and whether such distribution is getting fairer or increasingly less fair. The Lorenz curves answers these question visually.

One of the policy goals of Pelita III as well is a fairer income distribution, and in regional agricultural planning it is necessary tostudy trends in this respect with regard to the nation as a whole (comparison with other countries and change over time), trends in comparison with other regions and, if data is available, trends within the region in terms of urban areas and rural areas separately in order to devise guidelines for improvement over both the short and the long run.

Method: It is obtained by dividing the object into several stages and calculating the percentages of the whole for each and then totalling up the data from the lowest percentage up to the highest. In this graph the horizontal axis represents the cumulative percentage of the total number of people, and the vertical axis the cumulative percentage of total income. If income were divided equally among all the people, the Lorenz curve would be the straight line OB' which forms a 45 degree angle with both axes. With the actual income distribution, however, the Lorenz curve sags downward to the right of this line, and the greater the area between it and this line (marked with oblique lines in the graph), the greater the inequality of income distribution. Observation of the movement of this curve over time is useful in planning as a means of determining whether income distribution is becoming fairer or less equitable with the passing years.

Fig. III–15–1 Lorenz Curve



The ratio of the area between the Lorenz curve and the straight line OB to the area between the horizontal axis and the straight line OB is known as the Gini coefficient. The closer its value gets to zero, the greater the equality of income distribution.

$$\text{Gini coefficient} = \frac{A}{A + B}$$

Example: The figures in the following table concern the Philippines and Thailand. With them, plot the Lorenz curve for each and calculate the Gini coefficient for each. It is also possible with these figures to compare the two countries with respect to income gap between urban and nonurban areas and time sequence change.

Table III–15–1 Income Distribution in Philippines and Thailand

i Philippines	Per cent of Income					
	Total		Rural		Urban	
	1961	1971	1961	1971	1961	1971
Lowest 20 per cent of population	4.2	3.8	5.9	4.4	3.8	4.6
Next 20 per cent of population	7.9	8.1	11.8	8.9	7.5	9.4
Next 20 per cent of population	12.1	13.2	13.5	13.9	12.6	13.4
Next 20 per cent of population	19.3	21.1	21.9	21.8	19.5	21.9
Highest 20 per cent of population	56.4	53.9	46.9	51.0	57.1	50.7
Gini coefficient	0.50	0.49	0.40	0.46	0.52	0.45

ii Thailand	Per cent of Income			
	Rural		Urban	
	1962	1970	1962	1970
Lowest 20 per cent of population	6.0	5.5	3.5	6.5
Next 20 per cent of population	9.0	8.5	9.5	10.5
Next 20 per cent of population	13.5	14.0	14.5	15.0
Next 20 per cent of population	20.5	21.0	22.5	22.5
Highest 20 per cent of population	51.0	51.0	50.0	45.5
Gini coefficient	0.50[a/]			

Sources: Economic Development Policies: Case Study of Thailand (Rotterdam: Rotterdam University Press, 1972); ILO, Sharing in Development.

a/ Harry T. Oshima, "Income Inequality and Economic Growth: The Postwar Experience of Asian Countries", Malaysian Economic Review, October, 1970

Fig. III–15–2 Philippines

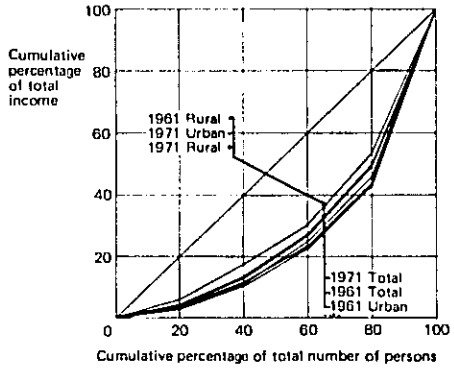
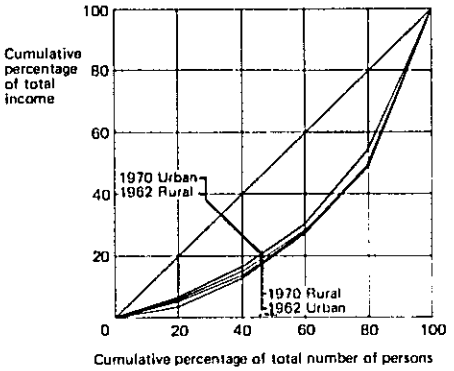


Fig. III–15–3 Thailand



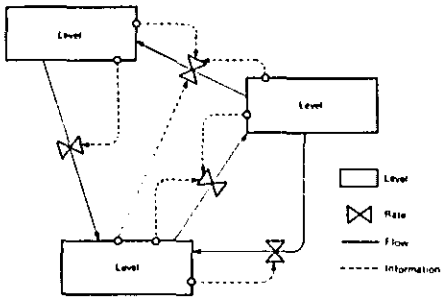
Reference book

- Maurice H. Yeats, An Introduction to Quantitative Analysis in Economic Geography, McGrow Hill, 1968
- Hendra Esmara, Regional Income Disparities, Bulletin of Indonesian Economic Studies vol. 11, 1975

Technique 16: SYSTEM DYNAMICS

Definition: For the sake of accurate forecasting of the effects of planning, it is necessary to have a model that can express the dynamic movement of the social system. Furthermore, the dynamic model for this purpose should not be one that merely has the superficial character, in terms of output, of being able to express the time sequences of variables, but rather one that can incorporate time elements into the causal relationship as features of its structure, including, as in the case of the actual system, change in the factors influencing each variable and the existence of time lag and distortion in the conveyance of such change. One of the representative types of models with such features is the technique known as systems dynamics (SD). *Models of this type require, however, the use of computers* because of the large amounts of data that must be handled at once.

Fig. III–16–1 System Dynamics Model



Method: Since the meaning of experimentation with models has already been explained in the section on systems analysis, let us proceed directly to an explanation of the basic structure of SD. As indicated in the figure, the SD model consists of many combinations of variables and their relationships, the four elements involved being levels, flows, rates, and information.

1) Levels are of such things in the system that represent accumulations as farmland, population, and so on. Even if the activity of the system comes to a halt, the variables representing levels still have values, which is a characteristic that can be used in contradistinction to flows.

2) Flows are of people, things, money, etc. from one level to another. Whereas levels are expressions of states in systems brought about by certain activities, flows correspond to the activities themselves.

3) Rates, which are also referred to as decision making mechanisms, have the function of determining the quantity of flows. There is a distinction, however, between rates that can be influenced by policy considerations and those that are automatically determined.

4) Information is the input from levels to rates. It has the function of determining the function (rate equation) of the rate at each point in time.

Even a model of seemingly complex industrial and population movement can be expressed rather simply (regardless of the large number of variables) with these four elements through use of causal flow charts and other analytical techniques. The next task is that of rearranging such elements into systems that allow for simulation with computers, i.e. systems of equations. Levels and rates are rearranged into level equations and rate equations. In addition, there are supplementary equations, special functions, etc. as means of arriving at operational systems and supplement equations and other means of expression of simulation results. Each equation can be considered to express on hypothesis regarding change or activity in the social system in the form of parameters and table functions*

Since explanation of how specifically to make such systems of equations would require detailed consideration in terms of actual systems, which would involve a great deal of technical details, we will leave that task up to the reference literature.

♠ p. 20–1

◆ Table function
A method in system dynamics to express the relationship between two variables directly in graph form without using an algebraical equation.
1) Workers' housing land multiplier.
2) Ratio of land in use.

Example: System Dynamics Model of Pasturage System of Intensive Pasture Land

When a stock farmer does not have much pasturage, he has to make the most of it by maximizing its capacity to support his stock. In such a case, he will not only make rational use of fertilizers and irrigation but also divide the pasturage into sections and rotate the stock from one to the other according to the state of growth of the grass in each. This is because rotational pasturage makes it possible to prevent overthickness of the growth of the grass and underthickness due to falling down, and it also minimizes loss of grass due to trampling and coverage by animal excrements.

Fig. III–16–2 Flow chart of Rotational Pasturage System

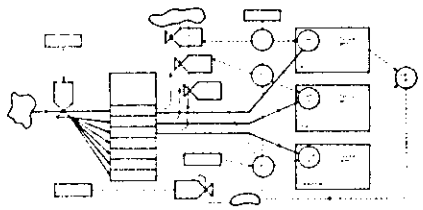
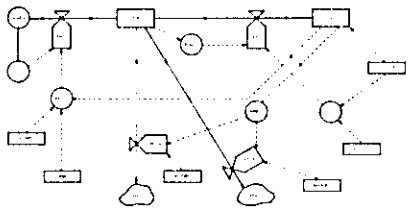


Fig. III–16–3 Flowchart of Rotational Pasturage System – Subroutine of Lamb Growth



The flow charts in Figs. III–16–2 and –3 are models devised by Jones & Brockington in 1971 on the basis of the pasturage system thought up by Spedding and others in 1966 at the British Pasturage Research Institute.

Fig. III–16–2 first gives the growth features of various kinds of pasturage grass in table form (TOHG), on the basis of which the amount of production of pasturage grass is determined. This amount of production is distributed among the different sections (HAPP) to be eaten by the lambs in succession according to the above-mentioned pasturage method (CYCLIC BOXCAR, 1–7). The amount of grass is expressed in terms of digestible organic matter, and the increase in weight of the lambs in each group is calculated from the herbage intake (LW 1–3). The elements indicated in the rectangular boxes are the existing quantities of herbage and weight, that is to say, they represent level. The bulb shaped HRG and HRW 1–7 give quantitative change per unit of time or area, that is to say, the elements in them represent rates. In the small squares are indicated constants and other data incorporated in the table of values from the outstart.

Fig. III–16–3 is a detailed model of the process of increase in lamb weight as a subroutine.

Table III–16–1 Explanation of Symbols Used in Flow Chart of Rotational Pasturage System

AHRI	Actual rate of herbage intake
ALFWD	Activity level per unit metabolic body size per day
ARG	Actual rate of growth
ASI	Activity sink
BST	Boxcar shifting time
DOM	Digestible organic matter
FA	Feed in animal
FAFG	Feed available for growth
GP 1	Number of lambs in Pilot group
GP 2	Number of lambs in Main group
GP 3	Number of lambs in Scavenger group
HAPA	Herbage available per lamb
HAPA 1	Herbage available per lamb in Pilot group
HAPA 2	Herbage available per lamb in Main
HAPA 3	Herbage available per lamb in
HAPD	Herbage available per
HAPP	Herbage available
HIME	Herbage in
HIPWD	Herb
HRG	

Table III–16–2 Influences of Grazing Density and Number of Days Grazed

	Grazing (lambs/ha)	Grazing Sections	Number of Days in Each Section	Increase in Weight (g/lamb/day)	Increase in Weight (kg/ha)
Experiment I	49	7	3	226	1,111
	54	"	"	226	1,220
	59	"	"	222	1,312
	64	"	"	195	1,257
	69	"	"	173	1,200
	74	"	"	155	1,151
Experiment II	59	6	3	222	1,310
	"	7	"	222	1,313
	"	8	"	216	1,272
	"	10	"	208	1,213
	64	6	3	211	1,303
	"	7	"	208	1,287
	"	8	"	210	1,298
Experiment III	59	7	2	224	
	"	"	3	222	
	"	"	4	"	
	"	"	5		
	64	7	2		
	"	"	"		
	"	"	"		

After completion of the model, a test run is made to check its validity, and then the experiments proper begin, with various changes in the parameters and simulation. These are computerized pasturage experiments. Table III–16–2 indicates different combinations of grazing density, number of grazing sections, number of days in each section, and other factors that are considered to be particularly practical and representative on the basis of the calculations.

Example: Namgan Social Indicator Model

This model was developed by Prof. Yoshinobu Kumata in 1974 as a tool in preliminary evaluation of a comprehensive development project for the Namgan River basin in the southern part of Korea. It was an attempt to measure the effects of the comprehensive development in terms of the degree of its contribution to the improvement in the quality of the life of the residents.

Accordingly, the model contains many social variables such as the level of medical service, illiteracy ratio, information diffusion ratio, etc., and is capable structurally of expressing causal relations of these with economic variables. Advancement of the social standard is a major development objective in preparing the macroframe described in Chapter II, and it is necessary to attach importance to social factors.

♥ Reference book

- Report on Social Indicators for Namgang Areas Development Project in Korea, Sanyu Consultants Inc.
- J. Foresster, Urban Dynamics, MIT Press, 1969
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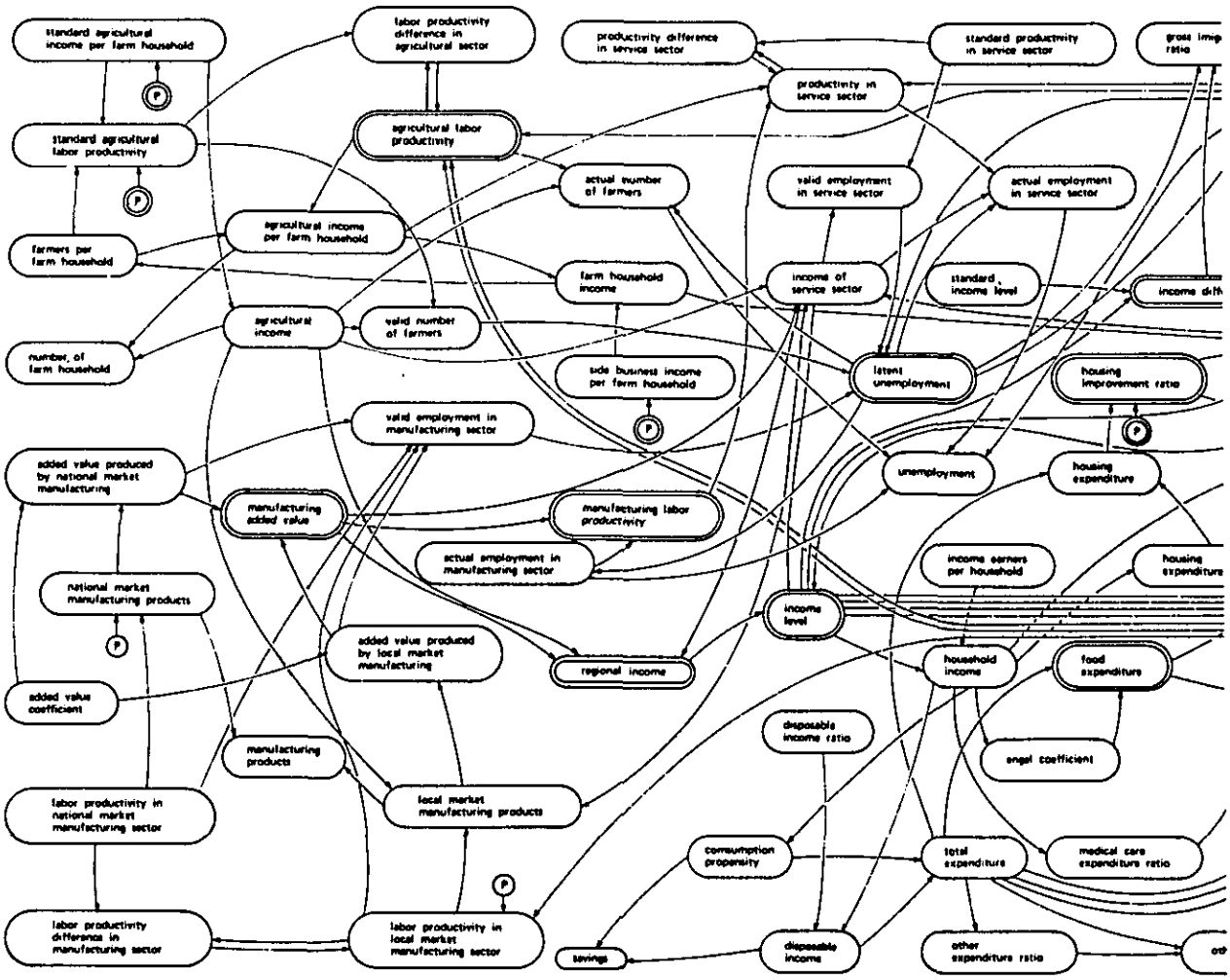
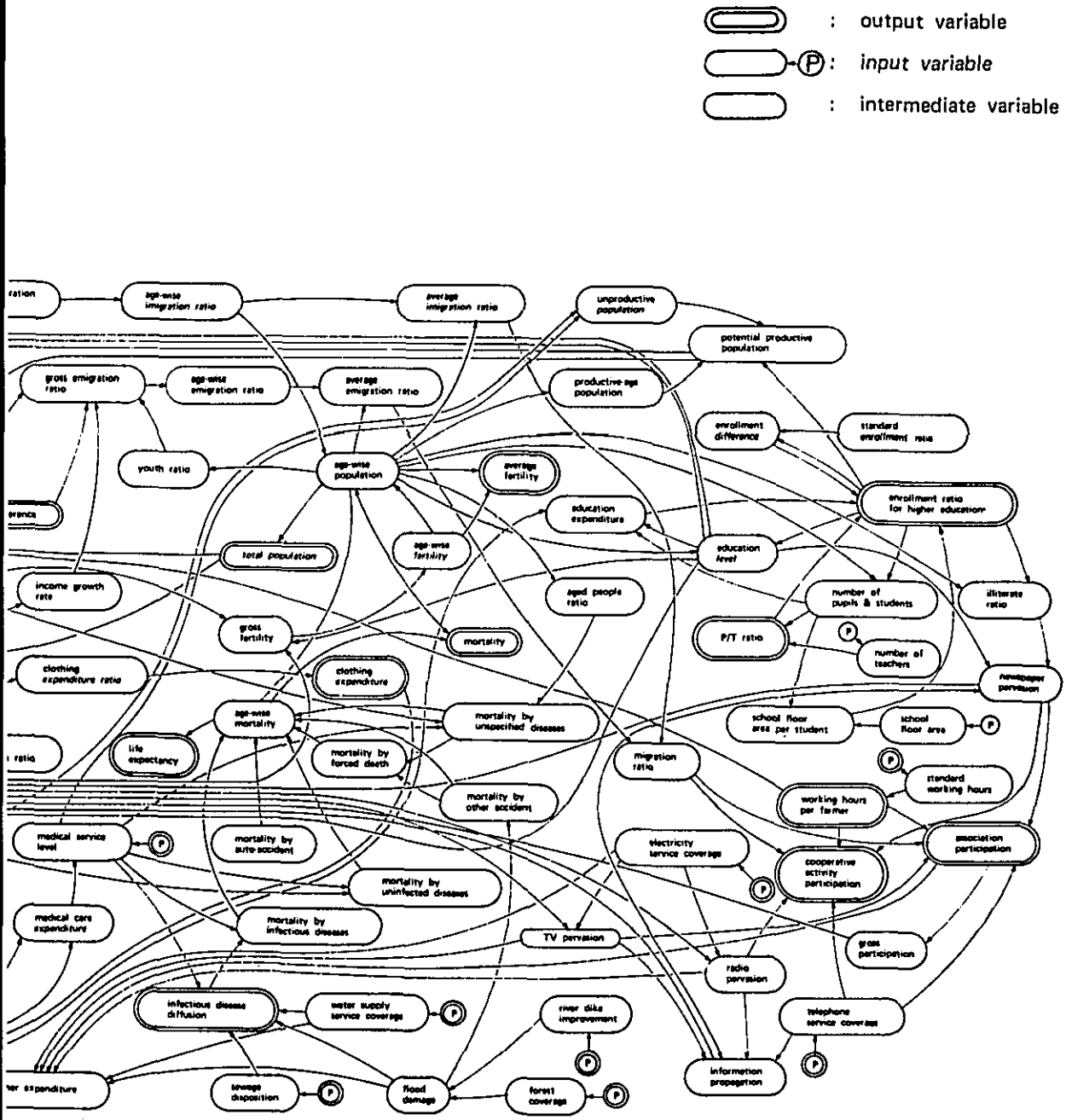



: output variable
: input variable
: intermediate variable
age-wise immigration ratio
average immigration ratio
unproductive population
potential productive population
gross emigration ratio
age-wise emigration ratio
average emigration ratio
productive-age population
enrollment difference
standard enrollment ratio
youth ratio
age-wise population
average fertility
education expenditure
enrollment ratio for higher education
total population
age-wise fertility
education level
income growth rate
aged people ratio
number of pupils & students
illiterate ratio
gross fertility
mortality
P/T ratio
number of teachers
clothing expenditure ratio
clothing expenditure
newspaper pervasion
age-wise mortality
mortality by unspecified diseases
school floor area per student
school floor area
life expectancy
mortality by forced death
migration ratio
standard working hours
mortality by other accident
working hours per farmer
medical service level
mortality by auto-accident
electricity service coverage
association participation
cooperative activity participation
mortality by uninfected diseases
medical care expenditure
mortality by infectious diseases
TV pervasion
green participation
radio pervasion
infectious disease diffusion
water supply service coverage
river dike improvement
telephone service coverage
information propagation
drainage disposition
flood damage
forest coverage

Technique 17: ECONOMETRIC MODEL

Definition: Econometrics is the science of dealing with economic problems in quantitative terms. Because of its practical importance, it has come into the spotlight in recent years, and it is now possible to express complicated economic phenomena rather accurately with econometric models.

Function: Kinds of Econometric Models

There are three basic types of econometric models, more than one type often being used concurrently: 1) time series models, 2) regression models (single equation models), and 3) simultaneous equation models.

♠ p. 21–1

1) Time series models* focus attention on change of economic phenomena over time. That is to say, they express economic phenomena as functions of time. Accordingly, they are inadequate for the purpose of expressing economic phenomena dependent on one another. Because of their simplicity and convenience of calculation, however, they have many applications.

♠ p. 22–1

2) Regression models* (single equation models) explain an economic phenomenon (variable) in relation to other variables representing not only economic phenomena but also time, natural phenomena, etc. The technique applied is the least square method*, for which computerized programmes have been developed.

◆ Least squares method

This method is for determination of an expression (theoretical expression) that best fits the measured statistical values in question. It is often used in calculating the regression line and is also applied in measurement of time sequence trends.

3) In a single equation model one economic phenomenon (variable) is explained in terms of another or other related variables in a single equation. Generally, however, economic phenomena are interdependent, and in many cases such relationships cannot be fully expressed by a single equation model. Simultaneous equation models are, however, capable of expressing such inter-relations.

There are many different kinds of econometric models, each with different kinds of variables and analytical goals, including econometric models for companies, econometric models for industries, econometric models for regions and macro econometric models for the entire economy of a country. Here we are most concerned with regional econometric models, which chiefly analyze regional economies in terms of forecasting for regional development planning and general forecasting of the regional economic environment, the main variables being regional production income, population movement, and other items concerning the regional economy.

Method: Structure of Econometric Analysis

Econometric analysis can be divided into the following steps from a methodological point of view.

1) Formulation of Models

Since econometric analysis consists of expression of economic phenomena in model form and then calculating values with respect to them on the basis of input data, the first step that it involves is the preparation of appropriate models. In the formulation of such models, the causal relationships of the economic factors behind the economic phenomena in question are clearly identified on the basis of economic theory.

2) The Identification Problem

In the case of single equation models it suffices to formulate a theoretical model and estimate the coefficients of the equation by the least square and other methods on the basis of past data. In the case of a simultaneous equation model, however, the "the identification problem", which is peculiar to econometrics, arises. What this

problem amounts to is the possibility of arriving at an entirely different model than the one intended by the formulator. Hence a check is necessary to confirm the relevance of the model that has been formulated.

3) Equation Estimation

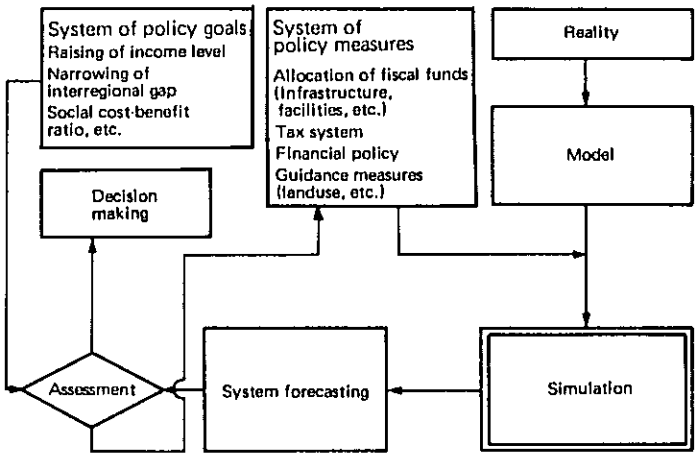
In the case of single equation models traditional statistical methods suffice, but in the case of simultaneous equation models such improved versions of the least square method as the generalized least square method, the two-step least square method and other multiple-step least square methods and the limited-information and full-information maximum liklihood methods and other techniques.

4) Forecast

After arriving at what is considered to be a miniature of the actual economic structure, forecasting and analysis is undertaken on the basis of that economic structure. What are forecasted are the relatively stable interdependent economic variables (exogenous variables).

This is generally known as simulation. The figure below shows what simulation analysis on the basis of econometric models aim at as a part of the government decision making process.

Fig. III-17-1 Decision Making Process by the Government



Example: Because of space limitations we can only go so far here as to give a general example, instead of an illustration with real data input, as a means of pointing out the way econometric analysis is done and important points regarding it. This example is of econometric analysis of supply and demand with respect to agricultural produce.

1) Model Formulation

For the sake of simplicity, we will assume that the supply of agricultural produce (S) is determined by the price (P), and the demand (D) by the price (P), consumer income (Y), and the total population (N) and that demand is equal to supply. These relationships can be expressed as follows in the form of structural equations:

$S = a1 + b1P$ ..... ①
$D = a2 + b2P + c2Y + d2N$ ..... ②
$S = D$ ..... ③

2) The Identification Problem

This is a problem peculiar to simultaneous equation models. In a case where an equation in a simultaneous equation model can be joined in a linear combination with another equation in the model to form an equation of the same type as the original equation, one cannot tell which equation the coefficients calculated on the basis of past data belong to. In such a case the equation is not identifiable and has to be revised. Equation ② in the above example is such an equation. Therefore it is necessary to revise equation ③ to S + I = D (I, an exogenous variable, represents the amount of imports) or make some other revision.

3) Method of Estimation

Once the model is formulated and the identification problem is checked, past data is collected for all of the variables, and the coefficients of the equations are estimated by means of one of the least square or maximum liklihood methods mentioned above.

4) Model Tests

i Partial Test

This test, which is carried out for each of the structural equations, consists of substituting realized values for the explanatory variables in order to obtain the estimated values of the explained variables for comparison with the realized values.

ii Comprehensive Test

This test consists of substitution of realized values in those of the explanatory variables that are to be decided first (exogenous variables and lagged endogenous variables) to obtain endogenous variables (without lag) for comparison with the realized values. (Lagged variables are those whose values lag by one or more period.)

iii Final Test

This test consists of substituting realized values for exogenous variables and preliminary lagged endogenous variables to obtain a series of estimated values of endogenous variables for comparison with the realized values.

Points to Which Attention Should Be Given

i Distinction Between Exogenous and Endogenous Variables.

In our example we treated Y in equation 2 as an exogenous variable, but it is also possible to treat it as an endogenous variable by introduction of an explanatory equation. The distinction between exogenous and endogenous variables has to be judged by the model formulator on the basis of the purposes of the model.

ii The Identification Problem Check Conditions (Order Conditions)

If $A^{**} > G-1$, over identification adequately identifiable

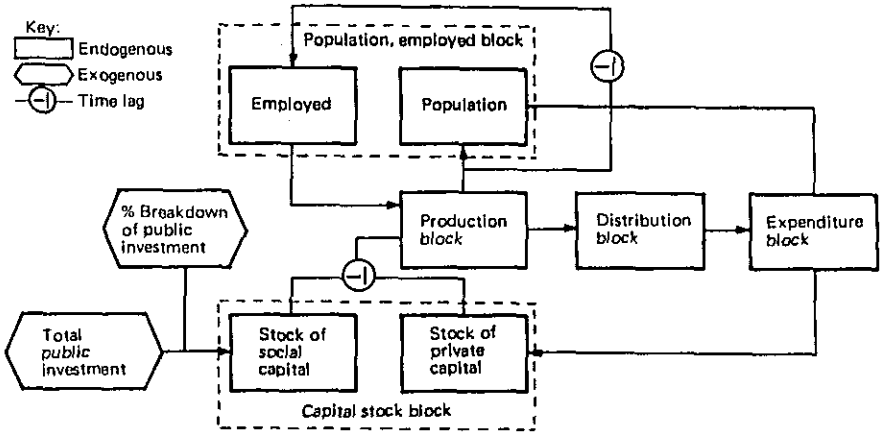
If $A^{**} = G-1$, adequate confirmation

If $A^{**} < G-1$, not identifiable

A^{**}: Total number of variables (endogenous and exogenous) included in the simultaneous equations but not in the equation in question.

G: Number of equations in the set of simultaneous equations.

Fig. III–17–2 Block Flowchart of Socioeconomic Model (Econometric Model)



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- H.T. Davis, Theory of Econometrics, Princitia Press, 1971
- J. Kmenta, Elements of Econometrics, Macmillian, 1971

Technique-18.1: LAND-USE MODEL OF AGRICULTURAL OPERATION TYPE (Physical Model-1)

Definition: Several type of agricultural operations are to be set for the selection of the target of regional development and the following items are to be set as standards:

1) Crop mixture. 2) Family composition; number of household workers. 3) Size (area). 4) Income (per household; per worker). 5) Production of each crop (ton).
♠ p. 5–1
6) Land productivity of each crop (ton/ha). 7) Number of machinery owned.

According to the above standards for each agricultural operation type, the standard land-use model is to be prepared for each type.

Function: Appropriate allocation of land is to be made for type of agricultural operations, using the above model, on a land classification map by crop. By this study, the number of farming households falling under the target type of agricultural operations may be ascertained for the entire province.

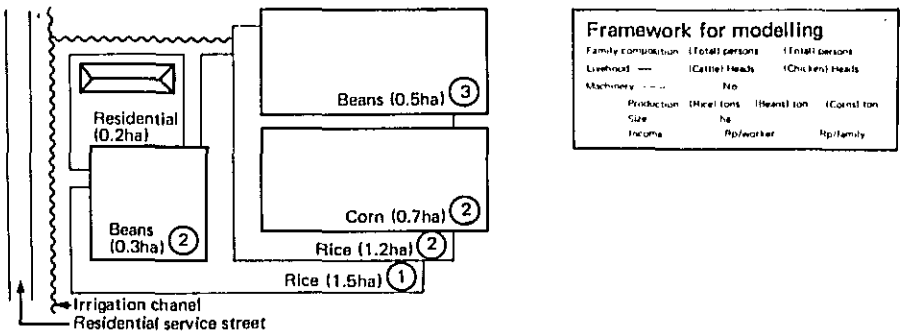
♠ p.18–1
Further, by ascertaining the total number of households, the supply-demand balance between the production demand (by crop) of the entire province and the supply of labor may be examined.

Method:

1) How to Prepare A Model of A Agricultural Operation Type

By using those target standards for each agricultural operation type which are closely related to land-use, a land-use model is to be set. At that time, necessary infrastructure and facilities are to be incorporated in the model.

Fig. III–18–1 Example of Type of Agricultural Operation
(Type A: Food Crop Type)



2) Distribution Map of Suitable Land by Different Type of Agricultural Operation

In order to elucidate the distribution of suitable land by different type of agricultural operation based on the mixture of crops of different type of agricultural operation A–G (effective use of family labor is to be planned by eliminating the reinforcement of land productivity and seasonal changes by appropriately mixing crops), distribution of suitable land by different type of agricultural operation by combining land classification maps by crop according to the mixture of most suitable crops by different type of agricultural operation. On evaluating, the elimination method based on the overall points method and the minimum points method regarding land classification maps, and the elimination method based on the main crop are all to be used to prepare a distribution map of suitable land.

Fig. III–18–2

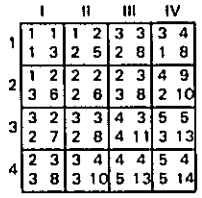
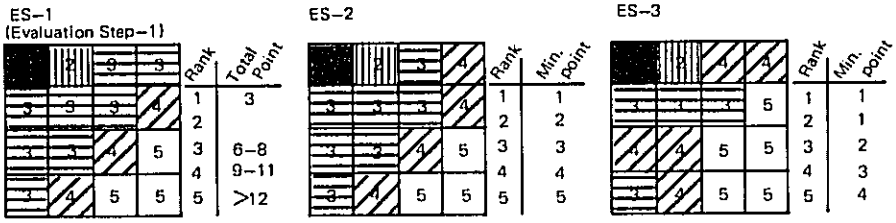


Table III–18–1 Food Crop Type

Code No.	I				II				III				IV			
Crops	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Rice (2 ?ha) (Main)	1	2	3	2	1	2	3	3	3	2	4	4	3	4	5	5
Bean (0.8ha)	1	2	2	3	2	2	3	4	3	3	3	4	3	5	5	4
Corn (0.7ha)	1	1	3	3	2	2	2	3	2	3	4	5	1	2	3	5
Total (4.2ha)	3	5	8	8	5	6	8	10	8	8	11	13	7	11	13	14

Rank 1
" 2
" 3
" 4
" 5

Fig. III–18–3



3) Allocation Map of Different Type of Agricultural Operation

By combining distribution maps of suitable land by different type of agricultural operation A–G, allocation of suitable land by different type of agricultural operation is to be made by the natural location type of effective use of natural resources. In allocation, by placing all distribution maps of suitable land by different type of agricultural operation together, the highest ranking agricultural operation type in each mesh is to be selected as the most suitable type. However, if there are more than two types of the same ranking, the type of agricultural operation having the highest production per unit area is to be selected as the most suitable type.

Fig. III–18–4

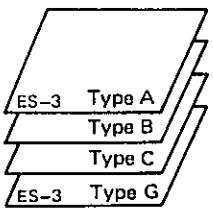


Table III–18–2

Code No.	I				II				III				IV			
Type of Operation	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A Type	1	2	3	5	2	2	3	5	3	3	5	5	4	4	5	5
B Type	2	2	2	4	1	1	2	4	2	2	2	3	2	3	4	5
C Type	4	3	3	3	3	2	2	3	3	2	1	2	2	1	1	2
D Type	1	1	1	2	1	1	1	2	2	2	2	3	3	3	3	4
E Type	2	2	2	2	3	2	1	1	3	2	1	1	5	4	2	2
F Type	5	5	5	5	3	3	3	5	1	1	2	3	1	1	2	3

Table III–18–3

Type of Operation	Rank 1	2	3	4	5
A Type	15	17			
B Type	12	12			
C Type	10	9			
D Type	8	6			
E Type	6	5			
F Type	9	8			

Fig. III–18–5 Distribution Map of Suitable Land by Different Type of Agricultural Operation

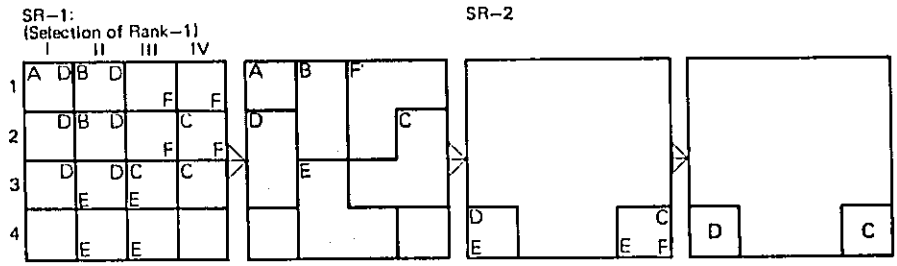
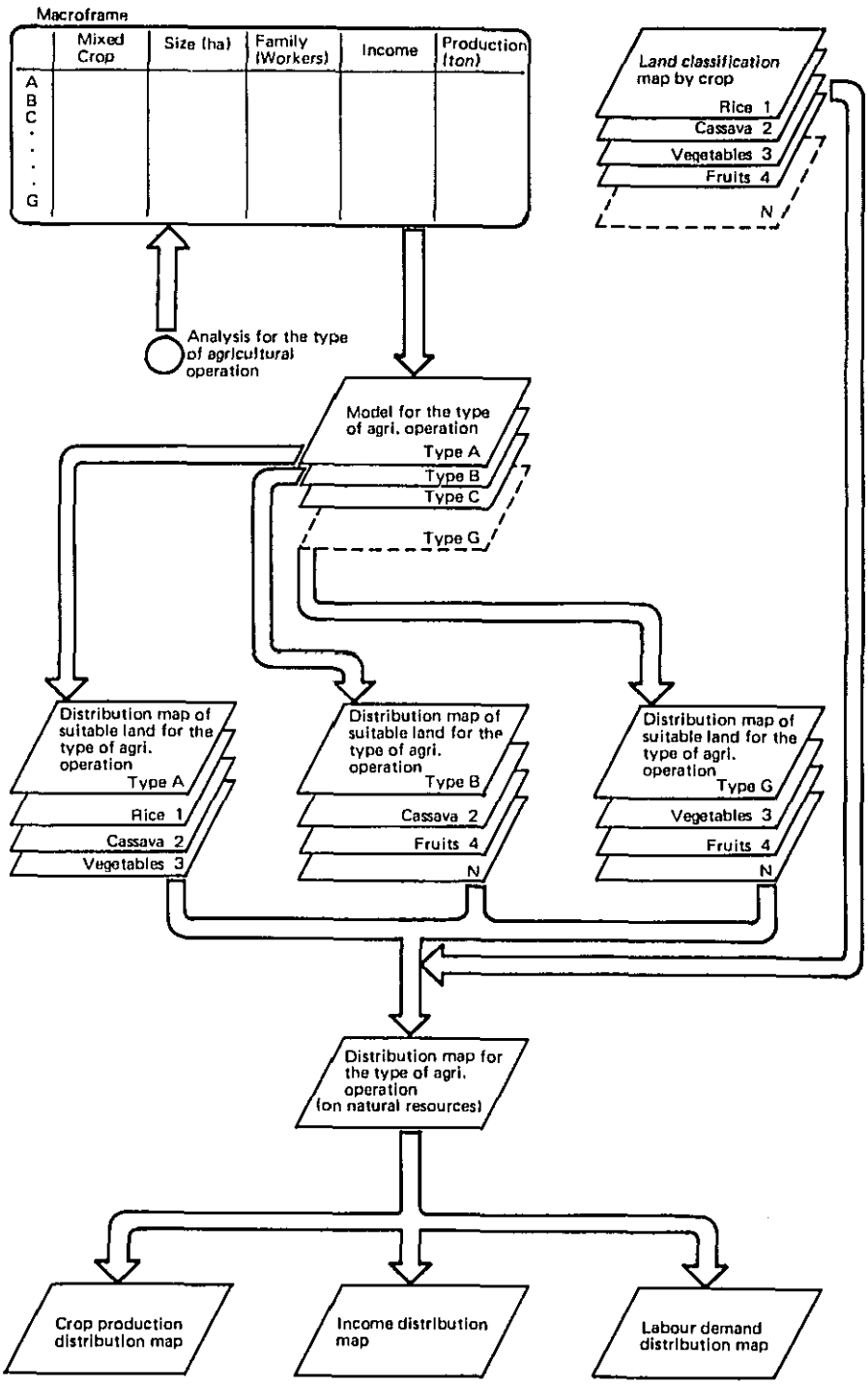


Fig. III-18-6 Map Study Flow



4) Production Distribution Map

Distribution map for each mesh is to be prepared according to the allocation map by different type of agricultural operation and land production by different type of agricultural operation and by rank. At the same time, the total production of each crop in the province is to be computed for comparison with the macro frame*

♣ Chap.-II Macroframe

5) Income Distribution Map

By the same method as the above, production per worker and per family is to be computed. Production costs are then to be deducted from the above to be compared with the macro frame*

♣ Chap.-II Macroframe

6) Demand of Labor Force Distribution Map

The size per family (ha) on the type of agricultural operation model and the demand for labor force may be put in the allocation map of agricultural operation type to prepare a distribution map of labor demand according to the type of agricultural operation of each mesh. Then the aggregate demand for labor force in the province may be obtained, which is then to be compared with labor supply in the macro frame*

♣ Chap.-II Macroframe

Drill: Select four districts from the project area and carry out the operation as described in the text in respect of each item given below :

1) The target types of agricultural operation is to be selected and a land use model of the agricultural operation type is to be prepared based on the text.

2) Suitable land for each agricultural operation type is to be selected and layout on the land classification map by each crop.

3) Examination is to be made as to whether the total production of each crop and the demand for labor force correspond to the target and the permissible level of the district.

♥ Reference book

- V.A. Anuchin, On the Subject of Economic Geography, Soviet Geography, Review and Translation, 1961
- H.H. McCarty & J.B. Lindberg, A Preface to Economic Geography Prentice Hall, 1966

Green, B.J., Country Planning, the Future of Rural Regions, Manchester, United Kingdom, Manchester University, 1971

Technique-18.2: ZONING MODEL OF OPTIMUM SUPPLY-DEMAND (Physical Model-2)

Definition: A supply-demand zone is the zone which primarily satisfy the supply of products and the consumer demand. The optimum model introduced here is to be a regional supply-demand zone which satisfy regional supply and demand of agricultural products, forestry products and fishery catches.

♠ Chap.-II Strategy

In setting the regional supply-demand zone, it is to be in two steps: 1) the supply-demand zone to be set for each product; and 2) the optimum regional supply-demand zone to be set including all products.

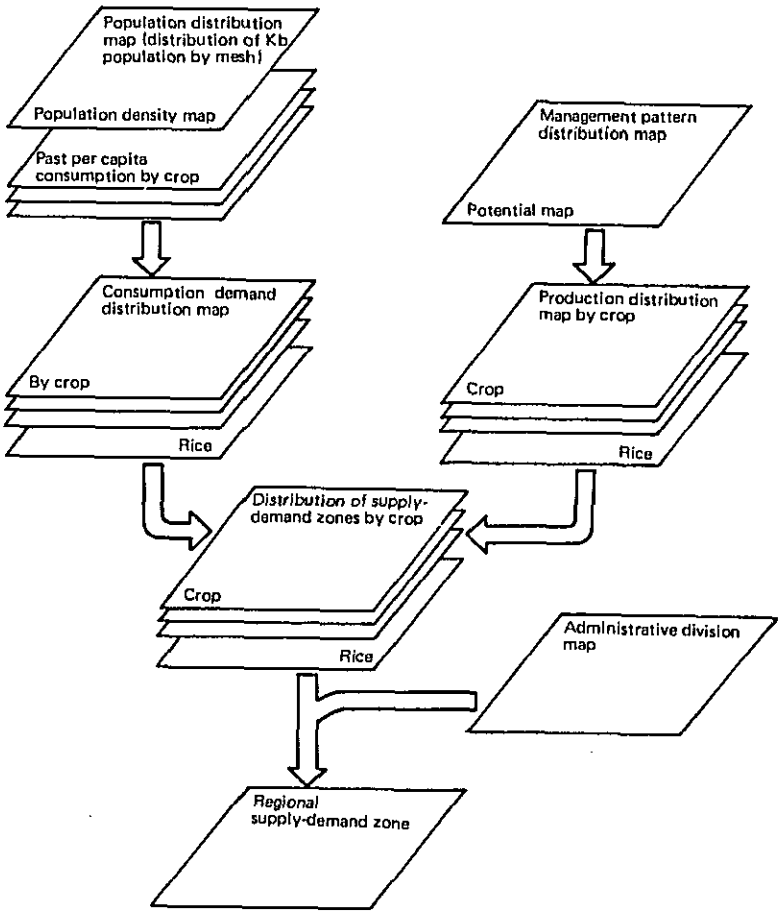
Function: The regional supply-demand zone model may be adapted as a strategy *not only for agricultural development but also for regional integrated development.*

♠ p. 18-1

It is also possible to place it as a method of setting a regional community zone* in integrated development planning.

By setting an appropriate supply-demand zone will it be easy to transport and allocate regional production and crops, thus reducing the transport loss. At the same time, it will be possible to satisfy the regional consumer demand in all items and reduce the loss due to congestion and putrefaction. Activation of these flows of goods and people lead to the improvement in the income, culture and living of the region concerned and also to the correction of regional and industrial differentials.

Fig. III-18-7 Map Study Flow



Method: Map Making System

1) Population Density Map

Based on the future population of the province determined by the macro frame* and the placement of agricultural population ascertained from the present distribution and the potential map, future population density at Kabupaten or each 5km mesh is to be determined and a distribution map is to be prepared.

♣ Chap.-I Macro frame
♠ p. 11–1
♠ p. 8–1

2) Past Consumption by Crop

Past per capita consumption by crop is to be obtained. By using the past data or by conducting a sample survey, past movements at Kabupaten or, if possible, at each mesh, are to be ascertained on a chart.

3) Distribution Map of Consumption Demand

Based on per capita consumption target by crop ascertained by the macro frame*, per capita consumption by crop is to be obtained for each Kabupaten or mesh. By multiplying it by population density, consumption demand (ton) is obtained for each mesh.

♣ Chap.-I Macro frame

4) Distribution of Production by Crop

Production by crop is to be obtained for each mesh. Based on the agricultural operation type distribution map based on potential analysis (analysis of social resources), production of each crop is to be obtained for each mesh.

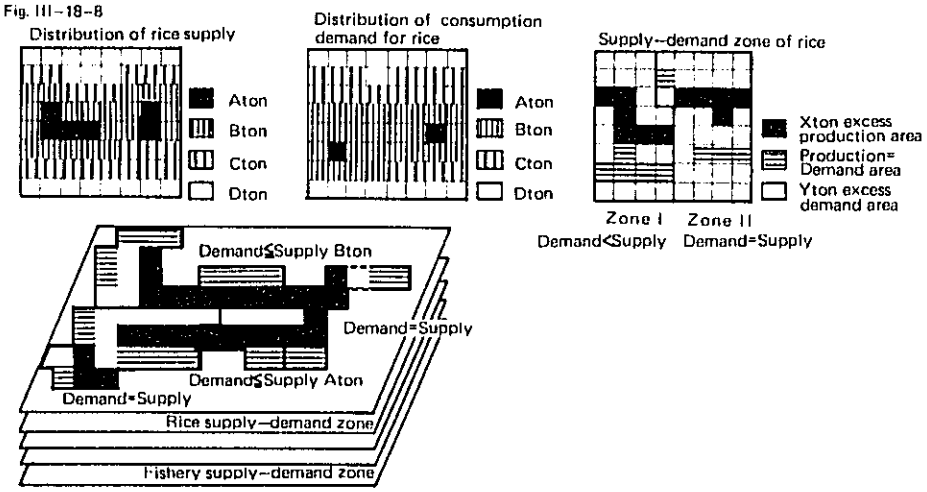
♠ p. 11–1

5) Supply-demand Zone by Crop

By combining the distribution of production by crop and the distribution of consumption demand by crop, the supply-demand zone by crop is to be established. Further, by combining the distribution of production and that of consumption demand for each crop, the difference between production and demand is to be obtained for each mesh. Then three types of distribution are to be obtained: meshes where production exceeds consumption; meshes where production and consumption demand are balanced; and meshes where consumption demand exceeds production.

Those smallest areas where production and consumption demand are balanced (production ≧ consumption demand) on the above distribution map are to be supply-demand zones by crop.

Fig. III–18–8



6) Establishment of Optimum Supply-demand Zone

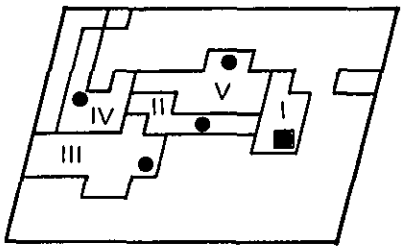
By setting up the optimum regional supply-demand zone, a development strategic zone may be ascertained to achieve such objectives as: "Promotion of consumption of products", "Elimination of loss in distribution", "All residents in the zone may purchase all primary products at low prices", "Circulation of both materials and population is activated contributing to the improvement in the culture and living of the regional community zone", etc.

As for the method to be adopted, the smallest area which is in the zone containing all supply-demand zones by crop (previous section) and fisheries, forestry, etc. Production of each crop is also to be in excess of the regional demand.

From the viewpoint of the management of the plan, the zone is to be set up as a well-contained area by giving consideration to the administrative boundary.

Further, since it is to be a regional community zone, it is necessary to contain a city which may serve as the center of distribution and culture. At the same time, all regional supply-demand zones are to be of the same size (population and area).

Fig. III-18-9



Drill: Carry out the operation as described in the text in respect of each item given below :

1) Crops which should maintain the supply-demand balance are to be selected for an area of the future. Then the production and the consumer demand are to be computed in respect of each crop and the distribution map is to be prepared.

2) Surplus production and supply shortage are to be computed by overlaying these distribution maps to prepare a new set of distribution maps.

3) Carry out supply-demand zoning for each crop under the crop transfer conditions given below so that supply and consumer demand of each crop may be balanced for each district, i.e., all residents of the area can consume the crop in a fair manner.

i Transfer is to be conducted between the geographically nearest districts.

ii Transfer is to be conducted between the nearest districts in terms of road distance.

♠ p.6-2

iii Transfer is to be conducted between the nearest districts in terms of transfer time by road.

4) Optimum comprehensive supply-demand zoning is to be carried out by overlaying the supply-demand zoning maps by crop. In drawing, out of the items below those deemed necessary for optimization are to be selected as conditions.

i From the viewpoint of operating the plan, attention is to be paid to provincial, regional boundaries, etc.

ii Attention is to be paid to the existing relations between the districts, e.g., living, etc., which cannot be ascertained from the distance alone.

iii Depopulated and overpopulated districts are to be combined as one supply-demand zone.

iv Fishery and forestry districts, and secondary and tertiary industries are also to be components.

v The supply-demand zone is to have a city as the core.

vi The supply-demand zones are to be of the same size in terms of population, area and distance.

♥ Reference book

· Weller, J., Modern Agriculture & Rural Planning, London, Architectural Press, 1967

Technique-18.3: STRUCTURAL MODEL OF REGIONAL PRODUCTION AND COMMUNITY ZONES (Physical Model-3)

♠ p. 18–1

Definition: The method of setting a multi-dimensional model of the zonal structure of production and living of a region corresponding to the regional supply-demand zone* and the method of formulating a long-term development and improvement plan with the establishment of the zone as the regional target are to be shown here.

Analysis and determination of the existing regional structure from the viewpoints of administration, production and living are to be made in respect of agriculture and public facilities forming the structural core and the zonal character of the core of each level. Based on the analysis and determination thus made, the present standard model is to be prepared.

Further, from the viewpoint of improving agricultural production and living in future the target for improving service standards such as agricultural, public facilities and social infrastructure by coordinating the demand of the residents and related administrative organs is to be set so that a zonal structural model as a future image of the region while maintaining consistency with the present standard model.

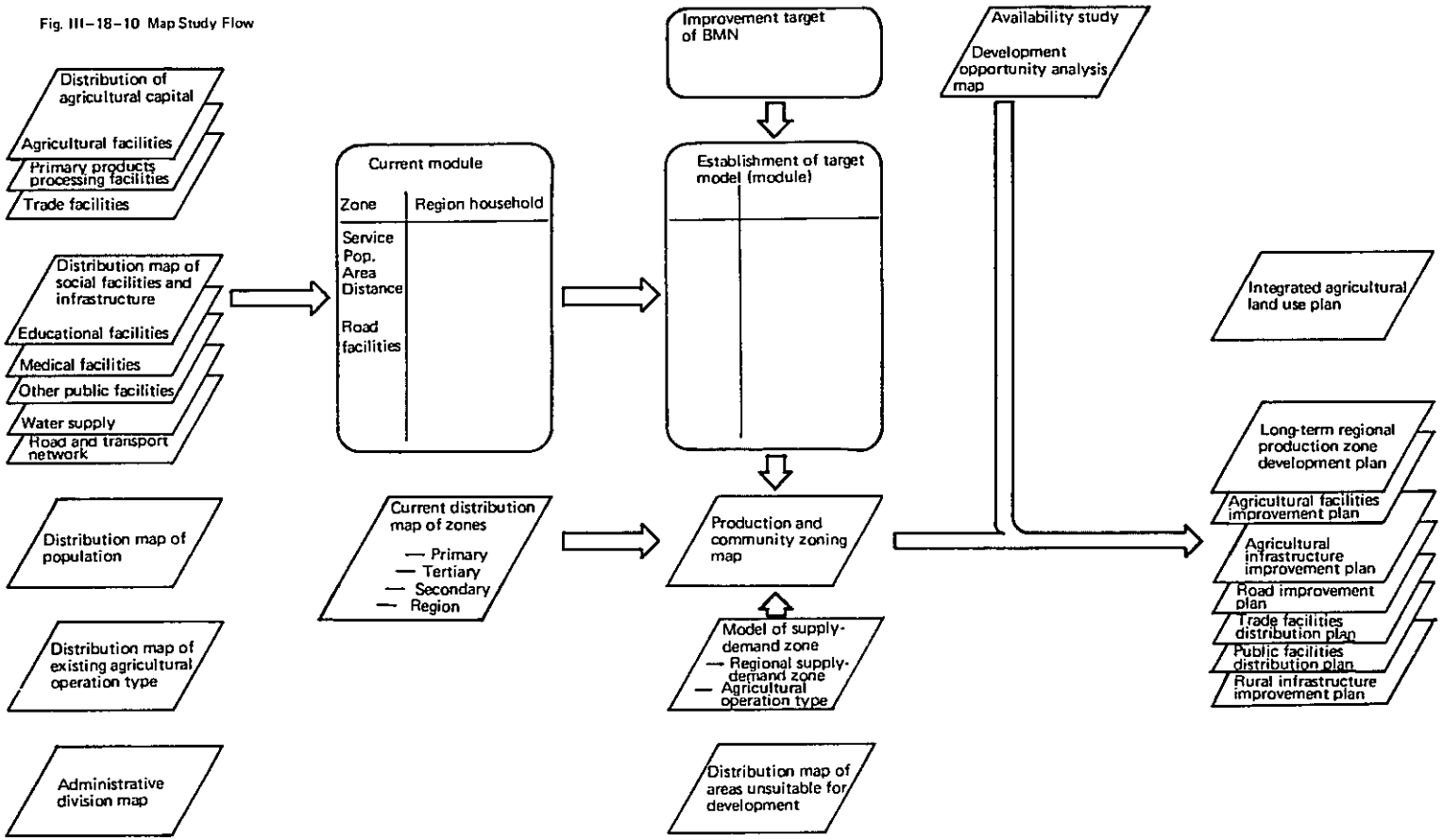
The difference between the future image and the present condition is to be the target for long-term development and improvement, and short, medium and long-term development and improvement plans are to be formulated to achieve the target. In order to conceive the development strategy divided into three phases, development opportunities in various places are to be given wide ranging and comprehensive consideration.

As for plans, those for agricultural comprehensive land-use, long-term regional production zone development, and the development of agricultural and public facilities and infrastructure.

Function: The structural model of a regional production zone is set as a model suitable for regional integrated development planning containing not only agriculture but also comprehensive analysis and examination. This is because regional agricultural integrated development planning requires intensified and integrated planning without excluding the improvement in rural life.

The development and improvement plan divided into three phases will not serve as the final plan unless consistency is maintained in planning appropriate allocation of investments to three phases.

Fig. III-18-10 Map Study Flow



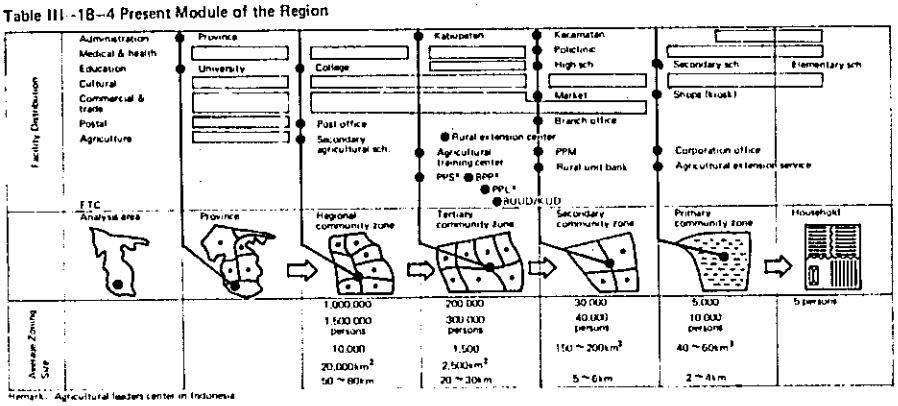
Method: Process of Model Study

1) Present Structural Model

♠ p. 11–1

What is to be done here is to re-ascertain of Potential Analysis Study* regionally and structurally. Analysis of the service level of facilities, infrastructure, etc. is to be made to ascertain the level of the zone structure of the area concerned. Then the average scale of each zone level is to be analyzed in respect of the zone area and population. Further, analysis of the system of allocation of agricultural and social structure and infrastructure corresponding to the analyzed and ascertained level of each zone is to be made so that the present module of the area may be elucidated.

Table III -18–4 Present Module of the Region



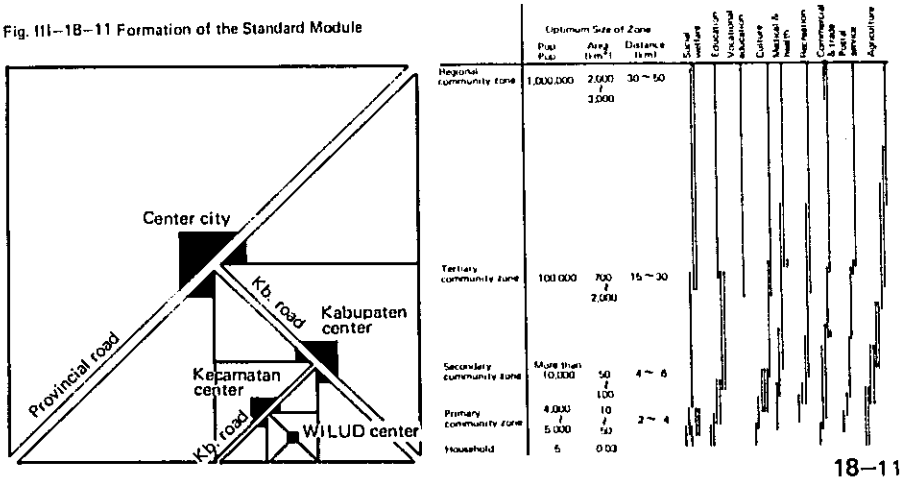
2) Future Model

Here a module of production and community life in the future regional area (supply-demand zone to be assumed) reflecting high-ranking decision-making and plans under related administration is to be set up and zoning of future zones is to be conducted according to the module. At the same time, service centers are to be established for various zones and various networks between them are to be planned. Further, according to the module, agricultural and social facilities are to be placed for the service centers.

♠ p. 12–1

It is to be borne in mind that the improvement in living set in the availability study* is to be fed into the module and that those areas forming bottlenecks in environmental conservation, construction and management are to be excluded from development or alternatively, the development method is to be changed for these areas.

Fig. III–18–11 Formation of the Standard Module



3) Long-term Production and Community Zoning

Based on the long-term future outlook formed under 2) long-term development and improvement planning is to be made in the light of the present situation. Then each plan is to be divided into short-, medium- and long-term projects to be fed into the pre-feasibility study for the 1st five-year program (short-term project).

The long-term development and improvement plan is to be the difference between the production and community zoning as the long-term future outlook under 2) and the potential study which has ascertained the present condition of agriculture, public and social facilities, and infrastructure. However, those areas unsuitable for development designated under the availability study are to be excluded from development and improvement.

Allocation of various development and improvement projects to three terms is to be made according to the allocation of investments in the macro frame and the evaluation of development opportunities through the comprehensive examination of the availability study*, giving weight in terms of development and improvement method and volume.

♠ p. 12–1

The plans to be prepared are: long-term regional production zone development and improvement plan, integrated agricultural land use plan, agricultural facilities improvement plan, agricultural infrastructure improvement plan, road improvement plan, trade facilities improvement plan, public facilities distribution plan and rural infrastructure improvement plan.

Drill: Prepare a model (module) of regional production and community zoning which fits the projected area.

"The Planning Standards for Rural Community Zoning : Division and Facilities layout" below are in current use as guideline for regional community zoning by the Ministry of Home Affairs in Japan.

Prepare two tables for the present condition and future objectives of the projected area based on Table III–18–5 and the text.

Table III–18–5

		Village	Village group (village community zone)	Primary community zone (Agricultural community)	Secondary community zone	Tertiary community zone (local metropolitan area)
Special extent		Native hamlet –	max. 1km radius opt. 500m radius	max. 4km radius opt. 2km radius	max. 8km radius opt. 4km radius	15–30km radius
Criteria of limited time distance			Walkable distance of children or old men 15–30 minutes walk	Walkable distance of school children (about 1 hour) 20 minutes by schoolbus and within 8km radius	Walkable distance of secondary school children (about 1 hour) 20–30 minutes on bycicle 10km by bus	1 hour by bus
Population and No. of households			100–300 households 500–1,500 persons	800 – 1,000 household 4,000 – 8,000 persons	More than 2,000 household More than 10,000 persons	About 100,000 persons Central DID more than 30,000 persons
Allocation of public service facilities	Social welfare		Play lot Nurture area	Children's hall Public nursery Nurture		Children's welfare facilities Old people's home welfare facilities
	School education	Complex of facilities	Kindergarten	Kindergarten Primary school (Secondary school)	Secondary or special school Library	Educational center of some facilities High school (College)
	Adult education		Meeting room	Public meeting hall (Library)	Central public hall Local history hall	City hall Library (Mobile) Museum and/or art hall Young men's hall
	Health and hospital			Health center	Clinic	Hospital Public health center Ambulance
	Recreation		Children playground	Children's park Neighbourhood park	Young men's park Public park Public ground	Natural park Central park Sports center Recreational park
	Shopping		Everyday shop	District shopping center (Drug stores, restaurants)	Shopping center	Department store Special store
	Supply and disposal		Community plant Waste disposal (Primary water supply system)	Primary water supply system	Public water supply	Sewage plant Refuse burner Cremation
	Security	Small power pump	Small fire car	Fire service station Police station	Fire sub-office	Fire office Police office
	Public administration	Post		Post station	Post sub-office Town and village office Municipality sub-office	Post office Municipality office Sub-station of upper body
	Agriculture		Agricultural machine warehouse	Production facilities (Repair shop, rice center)	Cooperative office	Extension service office

♥ Reference book

- Sismondo, S., Measurement Instruments for Community Structure Research in Kent County, New Brunswick, Canada, 1972
- Sismondo, S., Applications of Structural Indicators for the Measurement of Development; Selected Findings for Rural Communities in Kent Country, New Brunswick Inc., 1973
- Groot, J.P., & Van Dusseldorp, D.B.W.M., The Guiding Image and Rural Physical Planning, Wageningen, The Netherlands, The Agricultural University, 1970
- Lassey, W.R., Combining Methods of Social Research in Underdeveloped Areas, Rocky Mountain Social Science Jornal, 1968

Gessaman, P.H., A Conceptual Framework for Rural Development, Paper Presented at the 1974 Seminar of the Great Plains Resources Economics Committee, Lincoln; University of Nebraska, 1974

Technique 19: GRAVITY MODEL

Definition: The gravity model originates from the law of gravity in physics: the gravity which works between two objects is proportionate to the product of the two masses and is in inverse proportion to the distance between the two. This law is applied to geography to express the structural interrelations between two cities or areas.

Function: Many analyzes concerning spatial distribution tend, whether they are qualitative or quantative, to stress in some form the interrelations between two places or points. The interrelations here may be conceived as a flow of goods, services, ideas, etc. between points. This model is simpler to compute than other methods of analysis and may be useful in determining the optimum interrelations between places under several rigid preconditions. Further, the result of the model may be compared with actual conditions to ascertain to what extent it is practical.

♠ p. 7–1

♠ p. 18–1

Method-1: Flow of Population Between Two Points

As an example, the flow of population between two points (i and j) may be estimated. In the case, as the operational definition regarding mass, the population (p) at each point may be adopted. Let us assume that the population at the two points has the same propensity to move and the moving is possible. Since the restriction by distance may be expressed in this case by moving expenses between the two points, it may be replaced by travelling expenses. Alternatively, measurement concerning the distance may be amended to show the travelling expenses by using some kind of index. If we assume that as the effects of the distance weaken the size of the index gets smaller, the model in the case of two points may be expressed as below.

$$Iij = \frac{PiPj}{dijb}$$

If, at this point, the case is extended to determine the flow of population between the one point (i) and all other points (n), the flow of population may be expressed as below.

$$\frac{PiPj}{dijb} + \frac{PiP2}{dijb} + \cdots\cdots\cdots\cdots\cdots + \frac{PiPn}{dijb} = \sum_{j=1}^{n} \frac{PiPj}{dijb}$$

Since Pi is the same for each member (dividing each member by Pi), if

$$\sum_{j=1}^{n} \frac{Pj}{dijb} = Vi$$

This value shows per capita flow in respect of the population at the point i to all other points, which is called the potential at i. If the potential at each of n points is to be computed, the volume below has to be computed n times.

$$Vi = \sum_{j=1}^{n} \frac{Pj}{dijb}$$

Method-2: Computation of the Potential Curve

Fig. III–19–1 shows the distribution of data on a fictitious case. The points indicate towns located in fretwork, giving the population of each town in the unit of 1,000 persons. The problem is to determine the theoretical value of the flow of population between points within the boundary; it is, in other words, to obtain the potential at each point.

Let us assume that the potential model has been adopted as a dynamic expression of reality and that empirical analysis has revealed that travelling expenses are related to the distance over the entire area in a linear form. Then the index may be determined as b = 1.

As a result, the potential concerning the first town may be computed as below.

$$\frac{P2}{d1,2}+\frac{P3}{d1,3}+\frac{P4}{d1,4}+\frac{P5}{d1,5}+\cdots\cdots\cdots+\frac{P24}{d1,24}+\frac{P1}{0.5(d1,2)}=V1$$

The last number of the above equation expresses the impact of the flow of the first town's population, using a point for the center of the town; but it takes account of the distribution of the population in the surrounding area.

Fig. III–19–2 shows the potential led from the computation concerning each point and other points, and each isopleth shows the ratio to the highest potential.

In a potential model, the impact of either position or location may be replaced by the distance, and this impact may be detected very clearly by studying the potential chart (Fig. III–19–2). The highest potential may be seen in the shape surrounding the town with more or less the largest population (p. 3, 11, 15, 17). Though one medium-sized town (p. 9) is located within the area of the highest potential, this is simply because the town is situated between the two towns of the largest population.

On the other hand, small-sized towns have in general low potentials except those (p. 4 and 10) surrounded by the largest and medium-sized towns.

The importance of location in relation to the flow potential can be detected clearly even in this simple case.

Fig. III–19–1 Data Map for Population Potential Model (Bigger Number Shows a Number of Population)

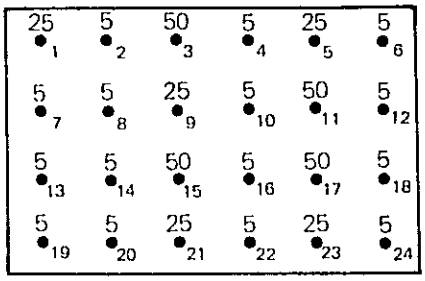
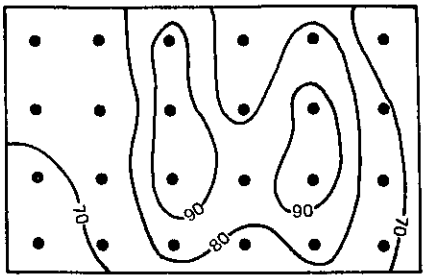


Fig. III–19–2 Map on Population Potential Curve (Isopleth Shows 10% Interval)



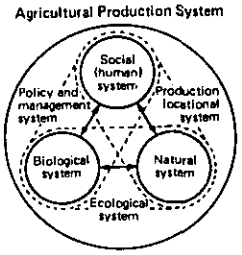
♥ Reference book

- G.A.P. Carrothers, A Historical Review of the Gravity and Potential Concept of Human Interaction, Jurnal of American Institute of Planners vol. 22, 1956
- Regional Population Projection via Income Potential Models, Papers and Proceedings of the Regional Science Association Vol. 4, 1958
- Maurice H. Yeats, An Introduction to Quantitative Analysis in Economic Geography, International Student Edition, McGrow-Hill, 1972

Technique 20: SYSTEM ANALYSIS

Definition: Agricultural production can be considered to be a system in which man uses the natural system of sunlight, air, water, and soil in raising and controlling the biological system of plants and animals so as to be able to acquire the harvests needed to meet human needs. In other words, it is a large system connecting three other systems, including the human social system. When the elements comprised in a system are systems themselves, they are called subsystems. The biological system, for instance, is a subsystem of the agricultural production system, but it is also a huge system in its own right consisting in turn of a host of subsystems, including material metabolism and hereditary control mechanisms. Up to now we have used the concept of "system" without defining it. From the above, however, it is clear that a "system" is a "meaningful whole resulting from the linkage of a plurality of elements".

Fig. III–20–1 The Process of Agriculture Production



♠ p. 23–1

Society consists of a large number of elements the interrelations between which are extremely ramified, and this is what makes planning evaluation so difficult. Hence the need to develop a systematic method of selection of optimum alternatives after making society manageable by conceiving it in terms of a "system" or "systems". This is what is known as "systems analysis".

Function: It should be noted, however, that systems analysis is not technique in the usual sense of the word, but rather a way of thinking. In the course of systems analysis use is made of linear programming*, multivariate analysis, cybernetics, information theory, queuing theory and other techniques development in various fields of science, systems analysis being the attitude assumed in making use of them.

System analysis, as we have already noted, is a way of thinking. Let us list the guiding principles in such analysis. Principles identified by E.S. Quade of the Rand Corporation who has had a great deal of experience in systems analysis:

i Direct main attention to formulation of problem
ii Constant systems orientation of analysis.
iii Never eliminate alternatives arbitrarily or without analysis.
iv Make early hypotheses.
v Look at problems and not just phenomena in making models.
vi Stress problems, not models.
vii Do not put too much emphasis on mathematics and calculations.
viii Analyze enemy strategy and tactics.
ix Handle uncertainty manifestly.
x Leave details till later.
xi Be careful in partial optimization.
xii Do what can be done.

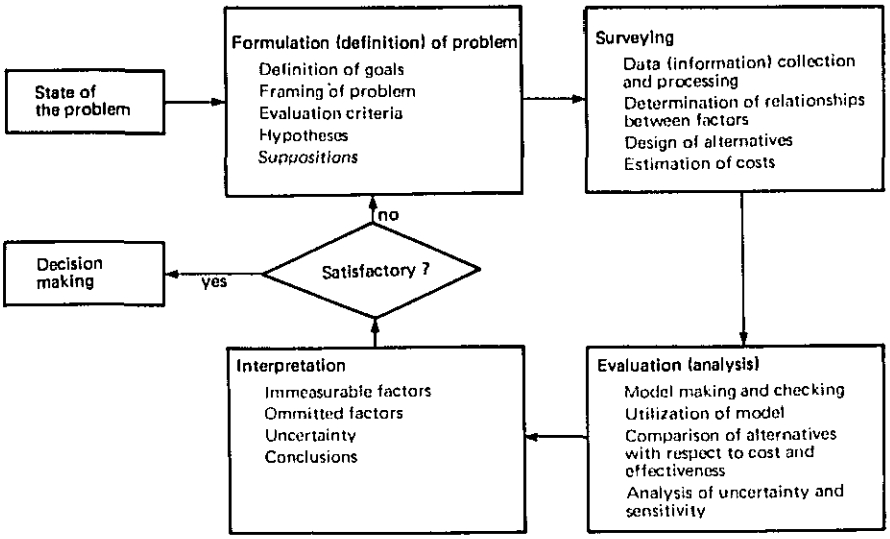
Method: The analytical process is as indicated in Fig. III–20–2. In the "evaluation" box one sees the item "model making and verification". What is meant here by "model" is expression in some abstract form or other of essential relationships considered to be dominant with respect to the operation of the system. How the model is used will depend on the type of model it is. Systems dynamics models*, and regression analysis*, for instance, are used mainly for forecasting, and linear programming models* and decision analysis* for calculation of optimum alternatives.

♠ p. 16–1
♠ p. 22–1
♠ p. 23–1
♠ p. 24–1

The key to success in such analysis is repetition of a series of processes up to the point where satisfaction is reached or it becomes necessary to stop because either time or money or both have been exhausted. Through a process of reassessment of goals, development of new alternatives, improvement of the model, etc., the problem

is given greater definition, and progress is made in the direction of being able to make a rational decision.

Fig. III–20–2 The Process of Systems Analysis

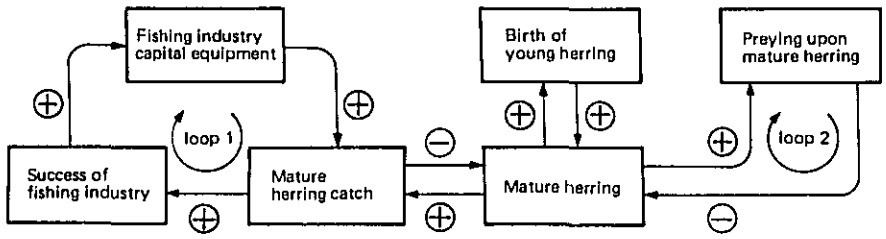


Example: Causal Signed Structure Flow Chart

This has been developed for definition of problems in systems analysis as a way of indicating the structure of the system from the viewpoint of the causal relationships between the factors comprising it.

The following example concerns the fishing industry:

Fig. III–20–3 Causal Signed Structure Flow Chart



$A \xrightarrow{\oplus} B$ means that an increase (decrease) in A causes an increase (decrease) in B, and $A \xrightarrow{\ominus} B$ means that an increase (decrease) in A causes a decrease (increase) in B. In this example, such symbols are used to indicate, for instance, that an increase in fishing industry capital will result in an increase in the catch of mature herring.

Let us now consider the feed-back loops comprised of such individual chains. Loop-1, called a positive feed-back loop, is marked by constant divergency. What this means is that increase of fishing industry capital brings about an increase in the herring catch, this leads to the success of the industry, and this in turn brings about an increase in its capital investment. If, however, one of the variables begins to decrease instead of increasing, there will be accelerating decrease of all of the elements of the loop. Loop-2, called a negative feed-back loop, has a self-adjustment mechanism. Such analysis enables the discovery of feed-back loops that are causing problems so as to be able to proceed on to the next stage of analysis.

♥ Reference book

- Thomas A. Goldman, Cost-Effectiveness Analysis: New Approaches in Decision-Making, Frederick A. Praeger, 1967
- E.S. Quade and W.I. Boucher, Systems Analysis and Policy Planning: Applications in Defense The RAND Corporation, 1968
- B.H. Rudwick, Systems Analysis for Effective Planning: Principles and Cases, John Wiley & Sons, Inc., 1969
- Clay Thomas Whitehead, Uses and Limitations of Systems Analysis The RAND Corporation, P–4683, 1967

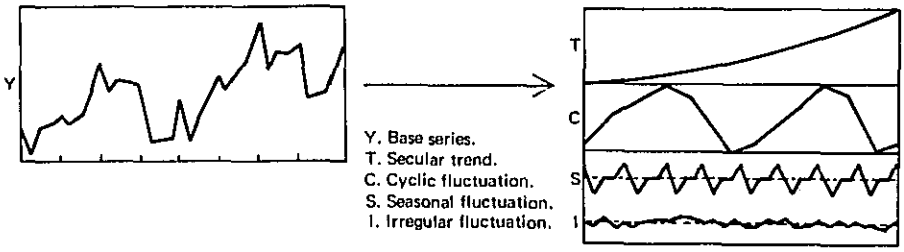
Technique 21: TIME SERIES ANALYSIS

Definition: It is important for agricultural policy planning to ascertain price fluctuations of agricultural products and the trend in yield. Time series analysis is a method of analysing fluctuations in time series such as prices and yield of agricultural products.

Method: Elements of Fluctuations in a Time Series

In analysing time series, it is important to draw a graph first. In many cases, it is possible to ascertain a trend in fluctuation by observing the graph. For instance, a time series of rice price may be shown by the Fig. III–21–1 as below.

Fig. III–21–1 Analysis of a Time Series



As can be seen from the time series shown by the graph, it is clear that the price of rice was inclined to increase throughout the period. Such a continuous and regular change over a long period is called a trend, and Graph T shows only the trend.

Table III–21–1 shows that the price of rice repeated such a cycle as shown by the graph. This fluctuation showing a cycle of a few years without a specific period of lapse are called cyclic fluctuation.

However, when we examine short-term fluctuation, we find that it repeated a regular 1-year cycle which is called seasonal fluctuation, as shown by Graph S. (Fig. III–21–1)

Table III–21–1 Production of Rice

Year	Production 1,000 ton	5-Year Moving Average 1,000 ton
1946	9,209	–
47	9,798	–
48	9,966	9,401
49	9,383	9,368
50	9,651	9,593
1951	9,042	9,248
52	9,923	9,194
53	8,239	9,740
54	9,113	10,112
55	12,385	10,420
1956	10,899	11,171
57	11,464	11,848
58	11,993	11,943
59	12,501	12,247
60	12,858	12,556
1961	12,419	12,720
62	13,009	12,736
63	12,812	12,647
64	12,584	12,712
65	12,409	13,001
1966	12,745	13,328
67	14,453	13,612
68	14,449	13,668
69	14,003	13,296
70	12,689	12,785
1971	10,887	
72	11,897	

Further, we also find that there are irregular fluctuations without showing clear reasons as show by Graph I. Thus, fluctuation in a time series seem to combine these four elements of fluctuations. Various methods have thus been formulated according to which element is to be extracted or eliminated.

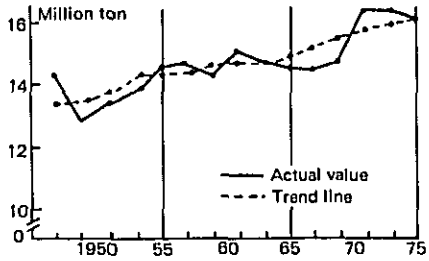
Example-1: How to Compute a Trend (Method of Moving Average to Obtain a Trend).

Table III–21–1 shows the results of computation of the trend in Japanese rice production since 1946 by the method of 5-year moving average. The figures were obtained by computing the average of each 5-year period while moving down by the month. Thus, the figure for the trend line in 1948 is the average of the 1946–50 period having 1948 at the center, the figure for 1949 the average of the 1947–51 period, and so on.

Fig. III–21–2 is a graph showing the time series of rice production and the 5-year moving average. As can be seen from the graph, by using the 5-year moving average, it is possible to ascertain a secular trend while eliminating short-term fluctuation in a secular change. The length of the period for moving average does not necessarily have to be five years.

Further, as a method of ascertaining a secular trend, there is one of obtaining the regression line while using time as the explanatory variable. For the use of the regression line, please refer to the section on regression analysis.

Fig. III–21–2 Moving Average of Rice Production



♠ p. 22–1

Example-2: How to Handle the Seasonal Trend (Index of Seasonal Fluctuations)

Fig. III–21–3 shows monthly retail sales during the 1975–76 period, and seems to show a 1-year cycle. This index for capturing the seasonal trend is called the seasonal trend index, and may be computed as below.

Fig. III–21–3 Monthly Retail Sales During the 1975–1976 Period

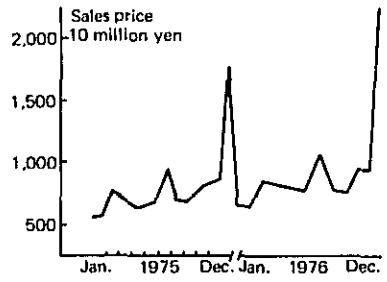
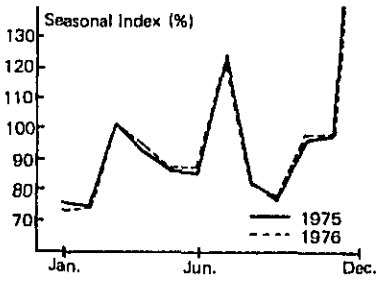


Fig. III–21–4 Seasonal Trend Index of Monthly Retail Sales



1) Compute the 12-month moving average.

2) Total of 12-month moving averages is to be obtained. Then, the ratio of the moving average to the total is to be computed, which is the seasonal trend index.

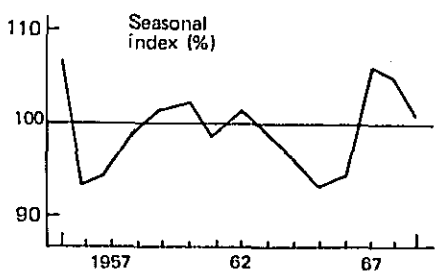
Example-3: How to Handle Cyclic Fluctuation

Table III–21–2 shows the annual yield of rice during the 1955–69 period and the values of the trend computed from the regression line. To separate cyclic fluctuation, trend fluctuation may be separated from all fluctuations. Accordingly, cyclical fluctuation may be separated by dividing the time series by the trend fluctuation. In some cases, computation may be made by deducting the trend fluctuation. Graph Fig. III–21–5 shows that the production fluctuated at a cyclic of about eight years registering two peaks in 1959 and 1967.

Table III–21–2

F.Y.	Yield (Y) 10,000 ton	Trend Line (T) 10,000 ton	Cyclic Trend Y/T	Cyclic Trend Index Y/T x 100 (%)
1955	1,239	1,148	1.0792	107.92
56	1,090	1,166	0.9348	93.48
57	1,148	1,184	0.9679	96.79
58	1,199	1,202	0.9975	99.75
59	1,250	1,219	1.0254	102.54
60	1,286	1,237	1.0398	103.98
61	1,242	1,255	0.9898	98.98
62	1,301	1,273	1.0219	102.19
63	1,281	1,291	0.9922	99.22
64	1,258	1,309	0.9610	96.10
65	1,241	1,327	0.9351	93.51
66	1,275	1,345	0.9479	94.79
67	1,445	1,363	1.0601	106.01
68	1,445	1,381	1.0463	104.63
69	1,400	1,398	1.0014	100.14

Fig. III–21–5 Cyclic Trend Index



♥ *Reference book*

- Frederic E. Croxton and Dudley Cowden, Practical Business Statistics, Prentice-Hall
- Jutius Shiskin, Electric Computers and Business Indicators, National Bureau of Economic *Research, Occasional Paper 57*

Technique 22: REGRESSION ANALYSIS

◆ Relative price

Relative prices may be obtained by dividing prices of various items by the price index so that time series prices may be compared in *real terms.*

Definition; If one considers the relationship between the amount of supply and the relative price* of agricultural products, it would seem that an increase in the amount of supply has the effect of lowering prices. Regression analysis is a technique for analyzing whether or not there really is a relationship between two factors the value of one of which seems to affect the value of the other and for determining what the relationship is if there is one.

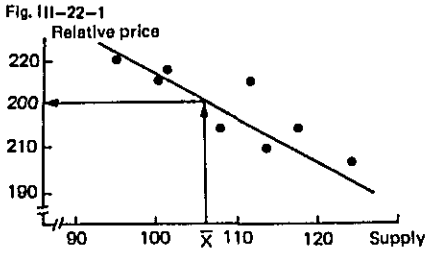
Method-1: Relationships Between Variables

One can get an intuitive idea of the relationships between variables by drawing graphs of them. Table III–22–1 shows the relationship between the amount of supply of agricultual product A and the relative price. Let us look at this relationship in graph form, with supply on the horizontal axis and relative price on the vertical axis. Fig. III–22–1 is such a graph. From the graph one can readily see that an increase in the supply tends to lower the prices.

Table III–22–1

	Per Capita Supply	Price	General Price Index	Relative Price
1967	117.5	27.9	136	205
1968	160.4	29.5	137	215
1969	108.4	29.9	146	205
1970	124.1	29.4	149	197
1971	95.2	33.5	152	220
1972	101.5	34.7	159	218
1973	110.7	37.5	174	216
1974	112.8	39.9	200	200

Fig. III–22–1



Next, let us go a step further and consider by what degree an increase of one unit in the amount of supply will reduce the price. For this purpose, we will draw a straight line through the cluster of points in such a way as to place it as near to all of the points as possible. Although not all of the points are exactly on this straight line, it can still be considered to represent the relationship between the amount of supply and the relative price of agricultural product A. In this case, the slope of the straight line indicates the rate by which the price is lowered by a unit increase in the amount of supply. Furthermore, one can use the value on the Y axis corresponding to the planned amount of future production x to forecast the price that can be expected with that amount of production.

Method–2: Simple Regression Analysis and Method of Calculation

In the above example the straight line drawn through the cluster of points as close to all of them as possible was drawn intuitively. Actually, however, there is a way of determining the straight line that would best represent the distribution of the points, this method of calculation being called the "the method of least squares". As for the straight line determined by this method, it is called a regression line. The purpose of regression analysis is to investigate the slope of the regression line, consider the extent to which it approximates the distribution of the points, and make forecasts such as the above.

Let us briefly consider how a regression line can be determined. Let us assume that change in a variable x causes change in another variable y. In the above example, x stood for the amount of supply of agricultural product A and y for its relative price. Here we will assume that the direct line

$y = a + bx$

indicates the relationship between y and x. On the basis of observed values of x and y, we can calculate the values of the coefficients a and b. Suppose that n observed values of both x and y are given as follows:

Table III–22–2 Observed Valves of X and Y

X	X1	X2	X3	. . . . .	Xn
Y	Y1	Y2	Y3	. . . . .	Yn

With these values, the coefficients a and b can be calculated as follows:

$\bar{X}$ and $\bar{Y}$ being the averages, respectively, of the n observed values of X and the n observed values of Y, and

$$b = \frac{\sum_{i=1}^{n} (Xi - \bar{X})(Yi - \bar{Y})}{\sum_{i=1}^{n} (Xi - \bar{X})^2} \quad \text{and} \quad a = \bar{Y} - b\bar{X}$$

meaning the following:

In the above example, the values of n, the averages, and so on and the regression line are as follows:

$$\sum_{i=1}^{n} (Xi - \bar{X})^2 = (X1 - \bar{X})^2 + (X2 - \bar{X})^2 + (X3 - \bar{X})^2 + \ldots\ldots\ldots + (Nn - \bar{X})^2$$

$$\sum_{i=1}^{n} (Xi - \bar{X})(Yi - \bar{Y}) = (X1 - \bar{X})(Y1 - \bar{Y}) + (X2 - \bar{X})(Y2 - \bar{Y}) + (X3 - \bar{X})(Y3 - \bar{Y}) + \ldots\ldots\ldots\ldots\ldots + (Xn - \bar{X})(Yn - \bar{Y})$$

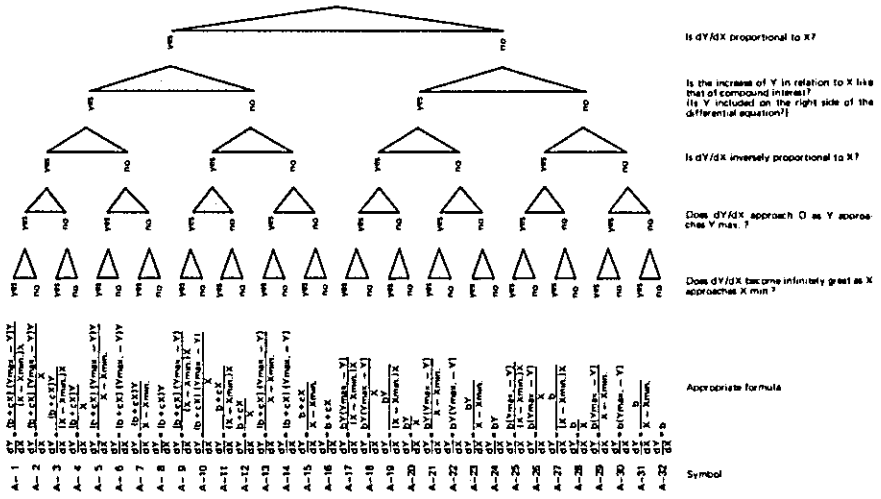
n = 8, X = 108.8, Y = 209.5
i $(Xi - X)^2$ = 638.4, i (Xi – X) (Yi – Y) = –505.3
b = –0.792, a = 296 and
∴Y = 296 – 0.792X

Method-3: Further Development of Simple Regression Analysis

So far we have considered cases in which only one variable X causes a change in Y. Such problems can be handled with simple recurrence analysis, but there is more than one such variable, it is necessary to use multi-regression analysis.

Furthermore, there are cases when the line represent the distribution of the points on a graph ought to be a curved line rather than a straight line. Watt has systematically indicated how to determine the kind of curve that is most appropriate for different kinds of point distributions. (see Fig. III–22–2).

Fig. III–22–2 Logical System Tree for Deviation of Differential Equation Suitable for Discription of Data (Watt, 1961)



Reference book

- DRCROOME & J.N. Robinson, Understanding the Economy, Weidenfeld & Nicolson, 1972
- N.R. Drager and H. Smith, Applied Regression Analysis, John Wiley & Sons, Inc.
- Johnston J., Econometric Method McGraw-Hill

Technique-23: LINEAR PROGRAMMING

Definition: The knowledge of the method of allocating resources to obtain the maximum results with limited resources of land, labor, capital, etc. is extremely important in decision making. Linear programming is the method of optimum allocation of resources when restricted resources can be expressed in the form of simple inequality and when the target can also be expressed in a simple eqation.

For instance, let us assume that a certain area of land and a certain amount of labor are given to produce several crops. If the labor per unit area required for each crop, the yield per unit area and the price of the crop are constant, the planted area of each crop which produces the maximum yield may be obtained. This is the problem of linear programming. Problem of transportation may also be given as another typical problem.

Method-1: Formulation of A Linear Programming Problem

For simplifying the explanation, the problem below may be conceived as a linear programming problem of two variables.

Let us assume that crops A and B are to be grown in a limited area of land (10ha). The yields of A and B per unit area are, say, 8 tons and 10 tons espectively, and labor 150 and 50 persons. The labor force available for plowing the land is 1,000. If the prices of A and B are 3 units and 1 unit respectively, obtain the optimum planted areas of A and B X1 and X2(ha) for maximum yields.

The yield is affected greatly by the weather. The yield per unit area here is based on the mean weather. Thus it is possible to formulate the problem of production as a linear programming problem. Let us first express restrictive conditions of land in a simple inequality. Since the total of planting areas A and B does not exceed 10ha,

$X1 + X2 \leqq 10$ ..... ①

As for the restrictive conditions of labor, the labor force required for the production of A is 150X1 persons and that for B is 50X2 persons. Since the total of these does not exceed 1,000 persons,

$150X1 + 50X2 \leqq 1{,}000$ ..... ②

Next, with regard to the total earnings, the target, it may similarly be expressed in a simple equation. The yields per unit area of A and B are 8 tons and 10 tons respectively. Accordingly, the production of A will be 8X1 tons and that of B 10X2 tons. *Therefore, the total earnings Z will be:*

$Z = 8X1 \times 3 + 10X2 \times 1$

$= 24X1 + 10X2$ ..... ③

This problem of production has been formulated as a linear programming problem. That is, it shows that the problem of production is a liner programming problem of two variables to obtain the combination of X1 and X2 which produces the maximum Z under the conditions ① and ② .

Method 2: Solution of the Problem

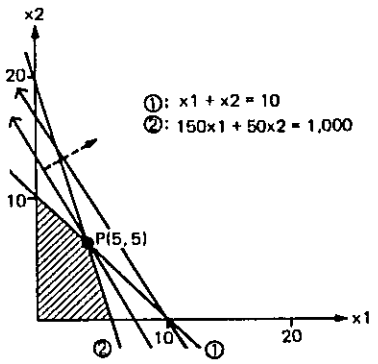
If the number of variables contained in the formulae of restrictive conditions and in the objective functions is two, the solution by graph solution by graph is intuitive and easy to understand. *Let us try to solve the problem given above by using a graph.*

On Fig. III–23–1, the formulae of restrictive conditions ① and ② correspond to the area of oblique lines. Since the combination (X1, X2) within the area satisfy the formulae of restrictive conditions ① and ② , it is the allocation which makes the production possible. Thus the values of objective variables shown by ③ are determined corresponding to a combination (X1, X2) in allocation. The problem now is to discover the combination which gives the maximum earnings from those in the area of oblique lines.

If Z is constant in ③ , the inclination of the straight line is –2.4, which is half-way between –1, the inclination of ① , and –3, that of ② . Accordingly, as can be seen by changing the value of Z, if Z is smaller than 0, 3 never crosses the area of oblique lines. On the other hand, if Z increases from 0, ③ crosses the area of oblique lines until the line ③ passes the intersection P of ① and ② . If the value increases further, the straight line ③ no longer crosses the area of oblique lines. Accordingly, Z can take only those values from 0 to the point P (5, 5); hence the combination (X1, X2) which gives the maximum Z is (5, 5). Then the value of the total earnings will be:

$Z = 24 \times 5 + 10 \times 5 = 170$(units)

Fig. III–23–1 Graph Solution



Method-3: Variations in Linear Programming Problems

The problems have so far been confined to those planted areas with two crops. In reality, however, more than two crops may be involved in the problem. In such a case, the linear programming problem may be formulated as the problem of obtaining the maximum value for the object given in a simple equation under the restrictive conditions given as simple inequalities as in the case of the problem having two variables. In this case, however, solution by graph is extremely difficult and, therefore, the simplex method is normally used.

Other variations in linear programming include the integer programming method for such cases as facilities projects in which the solution can only be given in whole integers and parametric programming to ascertain what effects the change in objective functions has on the optimum solution when the objective functions contain some doubt though the restrictive conditions are certain. Further, there is non-linear programming as the method of solution when either restrictive conditions or objective functions can not be expressed in simple equation.

♥ Reference book

- Gass, S.I. Linear Programing, Method and Application, McGraw-Hill
- Garvin, W.W. Introduction to Linear Programing, McGraw-Hill

Technique 24: DECISION ANALYSIS

Definition: Decision analysis offers techniques whereby we can go about making rational choices regarding courses of action.

Function: Let us consider here a situation that can materialize irrespective of our course of action, that is to say, a future situation that we cannot control. Let us call *such a situation a "natural state". Suppose there are N such "natural states"*, designated as follows: θ1, θ2, θ3, ...θj .....θn. Next, let us suppose that there are M courses of action that we can take: A1, A2 .....Aj .....Am. Let us designate the result of the realization of the natural state θj when we have taken the course of action Ai as being Cij. By the same token the results of any combination of natural states and courses of action can be designated as per the table III–24–1.

Table III–24–1 Pay off Table

Course of Action \ Natural State	θ_1	θ_2	θ_j	θ_n
A_1	C_{11}	C_{12}	C_{1j}	C_{1n}
A_2	C_{21}	C_{21}	C_{2j}	C_{2n}
A_3	C_{i1}	C_{i2}	C_{ij}	C_{in}
A_m	C_{m1}	C_{m2}	C_{mj}	C_{mn}

On the basis of this table, known as the payoff table, decision-making problems can be classified into the following three types:

1) *decision-making under certainty*
2) decision-making under risk
3) decision-making under uncertainty.

The first type is one in which one natural state θ and one alone is certain to occur. This type can be handled with a number of different analytical techniques, including linear programming. The second type is one in which the natural state that can arise in the future and the probability of its occurrence are known, and the third type is one in which the probability of occurrence of the natural state is not known. Linear programming and other analytical methods for dealing with the first type of decision-making problem will be discussed elesewhere whereas the analytical techniques *employed in handling the second and third type will be explained here.*

♠ p. 23–1

Table III–24–2

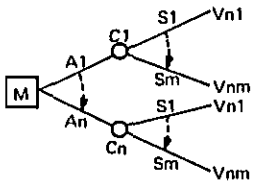
	S1 ..... Sm
	(P1) ..... (Pm)
A1	V1 ..... V1m
An	Vn1 ..... Vnm

Ai Strategy which can be adopted.
Sj Possible natural situation.
Pj Probability of occurring
Vij Benefits from selecting the strategy Ai when the natural situation is Sj.

Mehotd-1: Analysis of Decision Making Under Risk

The "decision tree" is often used in handling decision-making problems involving risk. What this technique attempts to do is to make an optimum strategic choice on the basis of consideration of benefit and its probability of occurring. In this case the expected benefit, which is the weighted average benefit, the weight being the probability of the natural state, is used at the criterion for the decision making. In employing this method the biggest problem is the measurement which expresses the utility of the person making the decision. If this is given appropriately, this is *the most rational decision making method.*

Fig. III–24–1



The left is an explanation of the procedure of the analytical technique using the decision tree. First let us consider a pay-off matrix such as the following. This benefit table can also be expressed in terms of the following decision tree. M is called the decision point, and from it the decision maker must adopt a strategy, A1 Ci is called a chance event. Let us suppose that the natural state Sj occurs there with a probability of Pj. Finally, there is a benefit Vij at a terminal point. In this decision

tree, the optimum strategy is that where the expected value, (Ai) = P1 x Vi1 + ... + Pm x Vim, is maximized.

Example: An Analysis Using the Decision Tree

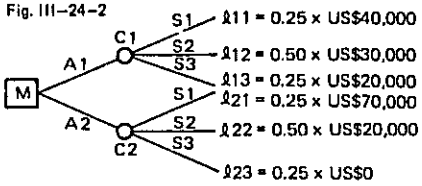
Let us consider a problem of deciding what kind of crop to grow in a certain area, given the pay-off matrix table regarding crops A and B and the weather.

The problem can be expressed in the form of a decision tree as per the Fig. III–24–2:

Table III–24–3

Natural State / Strategy	S1 Good Weather	S2 Changeable Weather	S3 Poor Weather
Occurrence	0.25	0.50	0.25
A1 = Crop A	US$40,000	US$30,000	US$20,000
A2 = Crop B	US$70,000	US$20,000	US$0

Fig. III–24–2



From this figure the expected values of two strategies can be calculated as follows:

ℓ(A1) = 0.25 x 40,000 + 0.5 x 30,000 + 0.25 x 20,000 = US$30,000
ℓ(A2) = 0.25 x 70,000 + 0.5 x 20,000 + 0.25 x 0 = US$27,000

Accordingly, strategy A1, that of planting crop A, should be adopted.

Method-2: An Analysis of Decision Making Under Uncertainty

In handling decision making problems under uncertainty, use is often made of the max-min principle, which is that of attempting to maximize benefit under the supposition that the natural state that will arise will constantly minimize it. With this principle, however, no matter how great a benefit can be expected from a certain strategy, a decision will be made to give up that benefit if it is less than the minimum benefit of some other strategy.

The right is a simple explanation of the procedure for strategy selection on the basis of the max-min principle. Let us assume the right pay-off matrix (see Table III–24–4) as given. In this case on the basis of the max-min principle we will first select the minimum benefit (the lowest value in each row) for each strategy A1, and then we will select the strategy with the greatest value corresponding to the benefits selected.

Table III–24–4

	S1 ..... Sm
A1	V1 ..... V1m
An	Vn1 ..... Vnm

Ai : Strategy which can be adopted
Sj : Possible natural situation
Vij : Benefits from selecting the strategy Ai when the natural situation is Sj

Example: A Selection of Course of Action on the Basis of the Max-Min Principle

Let us assume the following pay-off matrix as given. In this case, the worst benefit from the strategy at selected (ℓ worst (Ai)) is as follows:

ℓ worst (A1) = 20,000US$
ℓ worst (A2) = 5,000US$

Table III–24–5

Natural Situation / Strategy	Outbreak of Harmful Insect A	Outbreak of Harmful Insect B	Outbreak of Harmful Insect C
Agricultural chemicals X prepared (A1)	US$50,000	US$40,000	US$20,000
Agricultural chemicals Y prepared (A2)	US$70,000	US$10,000	US$5,000

Accordingly, strategy A1, that of using insecticide or fungicide x, ought to be adopted.

♥ Reference book

- Miller D.W. & M.K. Star, The Structure of Human Decision, Prentice-Hall
- H. Raiffa, Decision Analysis, Addison-Wesley Publishing Co., Inc.
- Schlaifer, R.O., Analysis of Decisions under Uncertainty, McGraw-Hill
- Luce, R.D. and H. Raiffa, Games and Decisions, John Wiley & Sons

Technique 25: PERT/CPM

Definition: In the construction of complicated, large-scale system the question of what arrangements to make in order that none of the work done will have been in vain and in order to shorten the period of construction is always an important one.

◆ Network technique
The method of finding the most suitable route in the light of a standard such as the minimum cost, based on individual operations necessary for the implementation of the project and their interrelations indicated on a network.

◆ Network
The network may be defined by points linked by a straight line or an arrow, or by pairs of joints. The way from a joint (starting point) to another joint (destination or terminal) is called "route". The arrow on the network indicates either one-way traffic (either direction) or two-way traffic. These are normally characterized by the time required, cost and the distance.

PERT (Program Evaluation and Review Technique) is a network technique* that has been developed for the purpose of optimizing time and cost in situations where this kind of planning management is necessary.

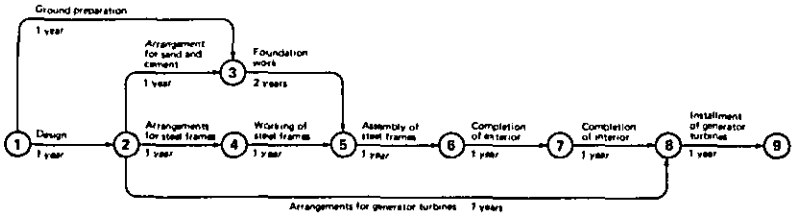
Function: PERT diagrams, the network of interrelationships of the complex of work elements in the execution of a project, makes it possible to discover "critical paths", i.e. courses with no time slack and which require the most time, on the basis of which the overall management of the project can be accomplished. The difference between PERT and CPM (Critical Path Method), developed by DuPont in 1957, being that CPM uses a single estimated value for the required time whereas PERT deals as well with the problem of uncertainty of the required time and that CPM dealt with the problem of completion of the project at the lowest cost from the outset whereas PERT did not deal with cost until development of the PERT/COST method.

Method-1: Simple PERT

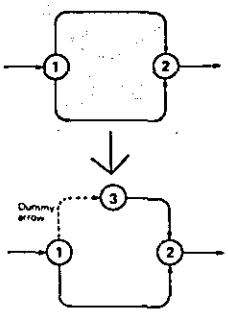
The following example will serve as an explanation of the simplest form of PERT, one using a single estimated value for the required time and dealing only with the construction period.

PERT begins by depicting the work procedure as a network. The figure III–25–1 shows such a network in the case of a dam construction project. The network consists of chains of events represented by circles and activities represented by arrows. Event 1 is commencement, and Event 2 is completion of the design work. The activities, of course, represent spans of time.

Fig. III–25–1



The rules to be followed in depicting the network are as follows:

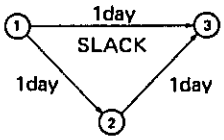


1) An arrow leaving a circle must represent an activity that cannot be started until all of the activities represented by arrows leading to the circle have been completed.

2) If an activity can be started after an event, the arrow representing that activity must depart from that event.

3) There can only be one arrow between two events. If there are two activities that start at the same time and both must be completed before another activity can be started, a dummy event is added to the scheme as indicated below and a dotted-line dummy arrow is drawn from the commencement of the two activities in question to the dummy event.

The relationship between events①②and③is as per the right diagram.



There is a one-day leeway between①——→③and①——→②——→③and this leeway is called slack. The critical path for the plan as a whole is that which links all of the activities without any such slack. In this example, the critical path is①——→②——→⑧——→⑨and the required time is 9 years. If it takes longer to cover this critical path, the construction period will be lengthened, and if the critical path is covered in less time than this, the construction period will be shorter. Accordingly, the program management emphasis should be placed in this case on the critical path activity of arranging for the generator turbines.

Method-2: Complete PERT, CPM, and PERT/COST

In the above example, each activity has been given a definite required time, but in reality it is often difficult to determine the amount of time that will be required. Although it is supposed to take 7 years to arrange for the generator turbines, it might take only 6 years or as much as 10 years. This is where the complete PERT method comes in. It makes it possible to calculate the expected time within which the project will be completed on the basis of the probability with respect to the various time requirements.

Furthermore, the amount of time required for each activity can be considered to depend to some extent on the cost. If, for instance, double the amount of money is spent on arrainging for generator turbines, it would probably be possible to complete this activity in less than 7 years. CPM therefore incorporates the relationship between the cost and the required time for each activity in order to consider the relationship between the total cost and the required time for completion of the project, and what PERT/COST is a combination of CPM and complete PERT

♥ Reference book
R.L. Ackoff and M.W. Sasieni
Fundamentals of Operations Research, John Wiley & Sons, Inc.

Technique 26: ENVIRONMENT ASSESSMENT

Definition: *In assessing development and development planning, it is not only the effectiveness of the development and the development planning that must be human environment, and if such adverse effects are considerable, comprehensive measures must be taken to prevent or at least mitigate them, including conservation measures and even, if necessary, abandonment of the development itself.*

♣ Chap.-II Strategy

♣ Chap.-II *Project finding*

In undertaking environmental assessment it is necessary to have a new set of values regarding the environment and an awareness of the existing situation in advanced industrial countries. Furthermore, it is necessary that new planning technique be introduced to be able to reflect the "necessary standards regarding the quality of *the environment" and "everyday wisdom based on participation of residents"*

♠ p. 12–1

Function: The object of environmental assessment can range from a project for construction of a single facility to a comprehensive development plan for a whole region, there being different methods of surveying, forecasting, and evaluating for *different levels. The problem has been, however, that quantitative assessment has* been too expensive or that it has not been possible to establish a clear system of causal relationships between different kinds of development impact and the effects thereof.

History of Environmental *Assessment*:

♠ p. 2–1

1969 Enactment of National Environmental Act (USA)
1970 Implementation of *National Environmental Act*
1972 Adoption of Declaration on Human Environment at Human Environment Conference in Stockholm
Enactment of Technology Assessment Act (USA)
1973 Enactment of Natural Environmental Preservation Law (Japan)

Method: Procedure of Assessment

1) Clarification of Development and Development Plans

Clear grasping of the development and development planning in question and analysis of their characteristics.

2) Setting of Scope

Setting of spatial, time, social, ecological and other scopes of the environment surrounding the development and development planning in question.

3) Identification of Different Kinds of Impact

Identification of impacts expected to arise from the development and development planning.

4) Background Survey

Grasping of present state of environment by means of various kinds of surveys.

5) *Impact Forecasting*

Forecasting of impact of development and development planning on the environment by *means of simulation, models, etc.*

6) Impact Assessment

Assessment of the forecasted impact from various angles

7) Indication of Preservation Countermeasures and Alternatives

Indication of preservation countermeasures and alternatives with respect to anticipated problems

Fig. III–26–1 Environmental Assessment Procedure

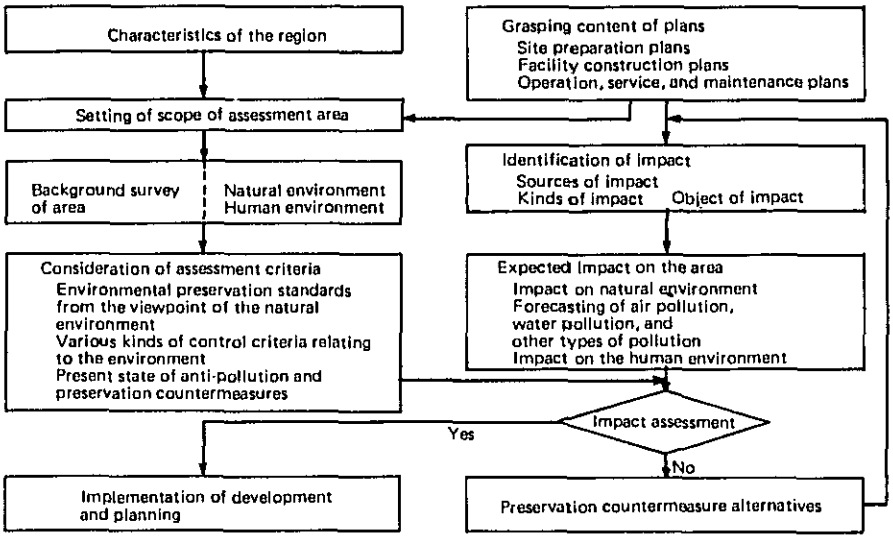
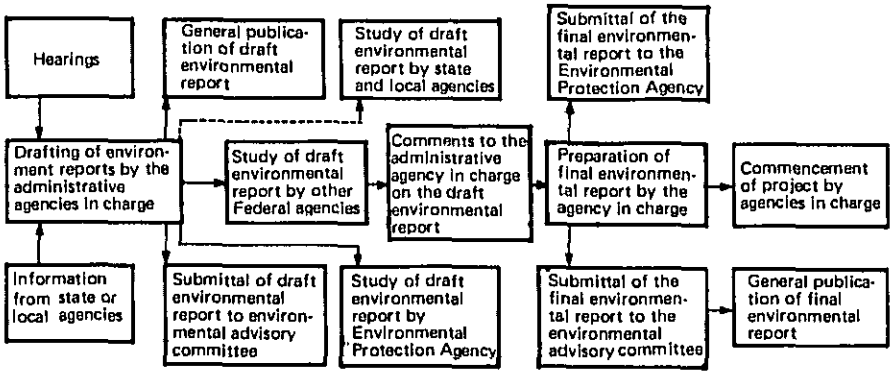


Table III–26–1

Type of development	Facility construction	Dam or other infrastructural development	Agricultural land development	Block development	Preservation of scenic areas
Map scale used Those affected	1/1,000 Farmers in service sphere	1/2,500 ~ 1/5,000 Farmers in river basin or infrastructural service sphere	1/5,000 ~ 1/10,000 Settlers	1/50,000 All residents of whole block	1/250,000 ~ 1/500,000 Those covered by provincial plan
Survey techniques	Field surveys All environmental impact categories Collection of existing data	Sample survey (Remote sensing)			
Kind of environmental impact	Direct affect on human life	Impact on wide area throughout basin	Effect on water quality and vegetation, particularly during agricultural operation	Accumulative effect greater than sum of individual effects	Deterioration of the ecological system
Impact assessment techniques	Quantitative assessment				Qualitative assessment

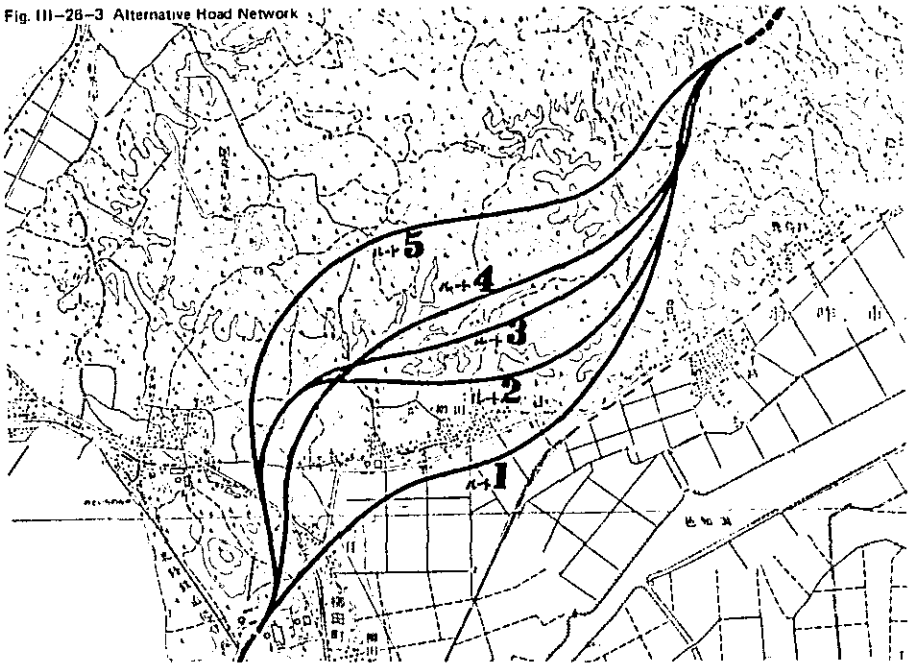
Fig. III–26–2 Environmental Reporting by Federal Agencies



Example: Environmental Assessment of Noto Shoreline Road in Japan (2nd Stage)

The figure below shows the five proposed routes for the Noto Coastal Road planned in the north of Hakui City, Ishikawa Prefecture (length approximately 5km). The environmental assessment method described below was used to obtain the optimum solution to the problem of selection.

Fig. III–26–3 Alternative Road Network



1) In this case the assessment procedure was as follows:

Fig. III–26–4

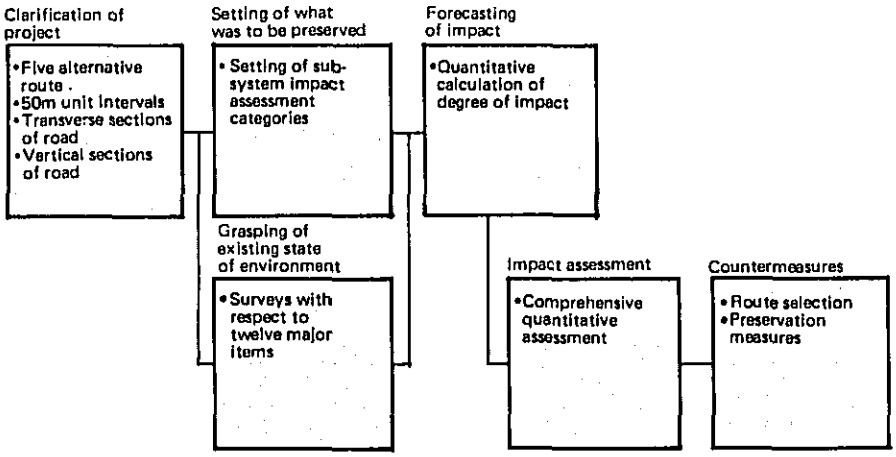
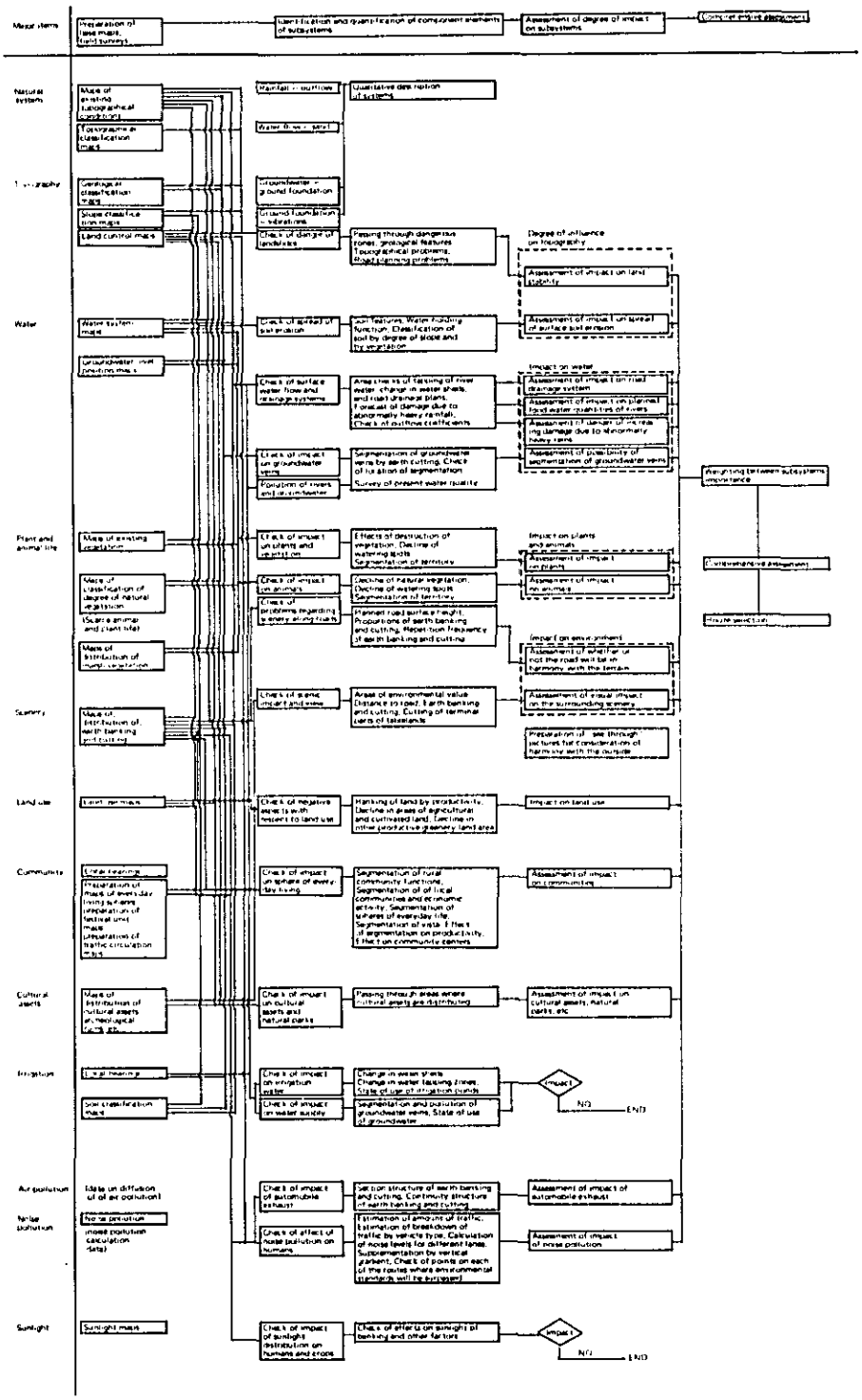


Fig. III–26–5 Planning Flow



2) Policy and Range

The flow of this survey is indicated on Fig. III–26–1. The "major items" are those with respect to which forecasts were made. The qualitative description of the systems explain the standpoints from which the impact assessments were made. Furthermore, measures were introduced for quantification of such assessment. Next, each of the five routes under consideration was divided into 50m stretches, and the impact of each of the items was calculated for each.

The figures assessing each of the stretches were then tabulated to serve as basic data for comprehensive evaluation of each of the routes after proper weighting and ranking with respect to each item. Two comprehensive assessments were made, one by weighting the basic data and one by weighting each item of assessment.

♠ p. 26–6

i Forecasting of impact – Quantitative calculation of degree of impact (see Table III–26–2)

♠ p. 26–6

ii Comprehensive Assessment – A: (Ranking)

This ranking is based on the number of times each routes was given a certain ranking with respect to the assessments for each 50m stretch thereof in terms of each of the items of assessment.

From a civil minimum point of view, R–1 and R–2 were eliminated as being unsatisfactory, leaving R–3, R–4, and R–5 for consideration. (see Table III–26–3)

♠ p. 26–6

iii Comprehensive Assessment – B: (Weighting)

With the basic data the relative importance of the impact of the different subsystems and the intensity of impact on the whole system and parts of it are not indicated. The following three criteria have been introduced in an attempt for and oveall evaluation.

Criterion I In determining the weightings, it has been considered on the basis of the results of the surveys regarding the impacts of the various items that the most practical assessment will be assessment on the basis of the Delphi method, with experts in various fields and other personnel as the mother groups. Furthermore, the weighting has been done in such a way as to obtain a general model that does not take into account the features of particular areas since each of the items is essentially an independent variable with absolute values on the basis of introduction of criteria M and K.

Criterion M This criterion takes into account regional features, etc., the ranking points being as follows:
10: Very big problem 9–7 Considerable problem 6–4 Some problem
3–1 Hardly any problem

Criterion K Since overlapping of the factors constituting the individual items of this criterion will mean overlapping of the items themselves, in cases where the same content is obtained from the base map n times, the degree of independence of the factor is considered to be 1/n, and the degree of independence of the subsystem (item) itself is calculated on the basis of the above principle since the subsystems (items) constituted by these factors are considered to be variables independent of each other.

With introduction of these three criteria, the comprehensive evaluation is as given in Table III–26–5. The overall impact is calculated as $\sum_{i=1}^{15} Ii \times Mi \times Ki \times Di$ (Di: basic data). (see Table III–26–4)

iv In the case of R–1, the impact on the community is extremely large. This route is also a bigger problem than the other routes with respect to land use, harmony with surrounding scenery, and noise pollution. Since it would have such a great impact on people's lives and there would not seem to be technical solutions of the problems involved, it is not a very acceptable route.

As for the other four routes, although they are rather close to one another in terms of thier overall degrees of impact, they differ substantially in terms of the makeup of such overall impact. The main contrast is the large overall impact of R–2, R–3, and R–4 versus the large impace of R–5 on natural vegetation. R–5 is the best, however, with respect to other items, particularly impact on human, which will make it the most balanced of the five routes, provided the impact on vegetation can be reduced. (see Table III–26–5)

v Route Selection and Preservation Measures

Selection of routes 5, which runs through the mountains. In mountain areas road building involves much more alteration of the natural topography by cutting and banking than elsewhere, and this has a considerable effect on natural vegetation and scenery. The course of this route, its vertical section design, and so on will therefore have to be restudied from the angle of minimizing the amount of cutting for greater harmony with nature.

Table III–26–2 Impact in Case of Each Route

Items \ Route	R-1	R-2	R-3	R-4	R-5
1 Topographical stability	11	12	15	16	8
2 Soil erosion	32	42	41	44	41
3 Road drainage system	6	5	2	1	11
4 River water flow quantity	1	0	0	0	2
5 Augmentation of damage	1	3	2	0	0
6 Groundwater	1	1	1	0	1
7 Plants	1	1	1	1	8
8 Animals	0	0	0	6	3
9 Harmony with terrain	9	11	12	10	8
10 Harmony with scenery	29	7	6	5	8
11 Land use	3	0	0	1	0
12 Communities	4	1	0	3	0
13 Cultural assets	0	8	4	5	0
14 Air pollution	16	17	26	16	32
15 Noise pollution	35	7	0	0	0
Totals	129	115	110	108	122

Table III–26–3 Comprehensive Assessment-A (Ranking)

	R-1	R-2	R-3	R-4	R-5
1st place					
2nd place					
3rd place					
4th place					
5th place					

Table III–26–4 Weighting Coefficient for Weighting of Each Impact

Items \ Coefficient	I	M	K
1 Topographical stability	0.08	5	0.75
2 Soil erosion	0.05	3	0.44
3 Road drainage system	0.02	1	0.33
4 River water flow quantity	0.05	5	0.29
5 Augmentation of damage	0.08	8	0.70
6 Groundwater	0.08	1	0.64
7 Plants	0.08	10	0.78
8 Animals	0.08	6	0.67
9 Harmony with terrain	0.05	2	0.36
10 Harmony with scenery	0.05	7	0.72
11 Land use	0.08	5	0.47
12 Communities	0.08	10	0.97
13 Cultural assets	0.08	10	0.96
14 Air pollution	0.08	3	0.5
15 Noise pollution	0.08	6	0.5

Table III–26–5 Comprehensive Assessment-B (Weighting)

Items \ Route	R-1	R-2	R-3	R-4	R-5
1 Topographical stability	44.32	45.32	44.44	46.18	41.22
2 Soil erosion	7.60	10.53	9.67	9.70	9.95
3 Road drainage system	0.67	0.87	0.64	0.45	0.72
4 River water flow quantity	0.80	0.88	0.84	0.70	1.13
5 Augmentation of damage	4.64	7.44	5.69	7.00	5.04
6 Groundwater	0.60	0.70	0.35	0.22	0.60
7 Plants	22.45	28.55	26.86	25.77	39.01
8 Animals	8.85	15.42	19.71	23.28	23.09
9 Harmony with terrain	4.21	4.02	4.07	3.52	4.01
10 Harmony with scenery	30.08	18.03	17.18	15.16	19.32
11 Land use	21.03	18.45	16.18	15.41	17.23
12 Communities	38.67	18.21	13.81	17.02	11.85
13 Cultural assets	3.64	18.43	12.60	15.78	8.72
14 Air pollution	8.22	7.73	10.06	7.05	11.82
15 Noise pollution	2.80	2.07	0.62	0.79	1.17
Totals	196.57	193.15	182.62	188.03	192.90

Reference book

- Tubbs, C.R., & Blackwood, J.W. Ecological Evaluation of Land for Planning Purpose, Bilogical Conservation, 1971
- Odum, E.P. Fundamentals of Ecology (3rd ed), Philadelphia, Saunders, 1971

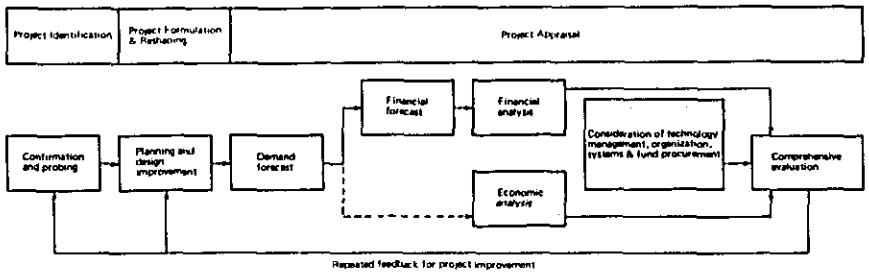
Technique 27: BENEFIT-COST ANALYSIS/NET PRESENT VALUE/ INTERNAL RATE OF RETURN

Definition: In the master planning stage, identified projects must be analyzed and evaluated to determine whether or not they should be implemented. Among the criteria for such evaluation are the benefit-cost ratio, net present value, and the internal rate of return.

Function: Originally they were used for the purpose of deciding whether or not particular projects should be funded, but recently such economic evaluation has also been used to provide feedback for improvement of project design.

This feedback process is illustrated in the following diagram (Fig. III–27–1).

Fig. III–27–1 Procedure of Project Evaluation



Source: Research on Economic Analysis and Evaluation of Projects, 1977, JICA

The stage in which the project is assessed on the basis of only a rough idea of what it will involve is known as the pre-feasibility study phase, and only after considerable feedback that gives increasing shape to the project is the feasibility study phase reached.

Method-1: Benefit-Cost Ratio

The benefit-cost ratio, expressed as follows, is used to obtain the ratio between the present value of cost and the present value of benefit:

$$\text{Benefit-cost ratio} = \frac{\text{Present value of benefit}}{\text{Present value of cost}}$$

To obtain the benefit-cost ratio, one must first decide on a discount rate. In the case of a private project, the market interest rate can be used for this purpose, and in the case of a project the costs of which are to be covered with borrowed money, the interest rate at which the money is borrowed can be used. Once the discount rate is decided upon in some way or other, one has to calculate the present values of the benefit and cost flows of the project and the ratio of the one to the other. If this ratio is greater than 1.0, the project will be worth undertaking, and if not, it will probably not be considered feasible. Needless to say, the higher the value of this ratio, the better.

Method-2: Net Present Value

The net present value is the difference between the present value of benefit and the present value of cost:

Net present value = Present value of benefit – Present value of cost
= Present value of net benefit

If the net present value is plus, this means that the discounted benefit of the project is greater than the discounted cost, and the greater the net present value, the greater

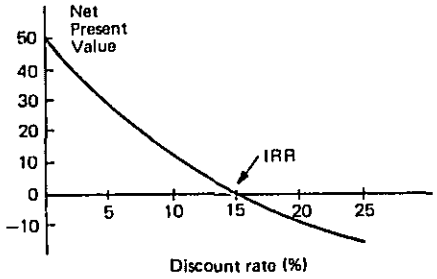
the return of the project will be. As in the case of obtaining the benefit-cost ratio, the discount rate must be decided beforehand.

Method-3: Internal Rate of Return (IRR)

The internal rate of return is the discount rate that makes the net present value of the project zero. In the usual project, in which benefit does not accrue until after initial investment, net present value declines as the discount rate increases. The discount rate at which net present value reaches zero is called the internal rate of return (IRR).

Fig. III–27–2 gives a visual illustration of internal rate of return, which is 15% in this case.

Fig. III–27–2



The internal rate of return is a very good measure of the economic feasibility of the project. One of its advantages is that it is not necessary to know in advance the correct discount rate as in the case of the benefit-cost ratio or net present value, and another is the fact that its value does not vary according to the discount rate. In this sense, it is an excellent indicator for ranking a number of projects. Since a higher internal rate of return means higher economic feasibility, those projects with the highest internal rates of return will normally be ranked highest in terms of priority.

Table III–27–1 Comparison of Project Selection Criteria

	Benefit-cost Ratio	Net Present Value	Internal Rate of Return
Selection criteria	When discounted with a discount rate that indicates correctly the opportunity cost of capital, all projects with a rate of over 1 are approved	When discounted with a discount rate that indicates correctly the opportunity cost of capital, all projects with a net present value greater than zero are approved	All projects with an internal rate of return greater than the opportunity cost of capital are approved, and they will be started in the order of the largest internal rate of return
Ranking	Since the rate will vary according to gross profit or net profit, there is a risk of mistaken rankings	There is no indication of what the order of implementation should be	Reliable ranking is given, which is invaluable when two or more projects are incompatible with one another
Comparison of incompatible alternatives	Risk of mistaken selection	If projects with the highest net present value as determined on the basis of correct discount rates are selected, such selection will normally be correct.	Since it often happens that small-scale projects have higher internal rates of return than large-scale projects that are able to achieve benefit considerably greater than the capital opportunity cost involved, there is the risk of mistaken selection. This is why it is necessary to discount the cash flows of the two alternatives
Selection of discount rate	In the case of each project an appropriate discount rate must be used. If the capital opportunity cost is used, it will be necessary to determine it	The capital opportunity cost must be determined	The discount rate is automatically determined, but in order to determine the cut-off line for project selection with respect to the discount rate, it will be necessary to take into consideration capital opportunity cost

Drill: The following table gives figures for different years for investment, maintenance and operational costs, and production for a fictitious project as calculated on the basis of demand, financial, and other forecasts.

Table III–27–2 Cash Flow (10 million of Rp)

	Costs			Benefits
Year	Capital Investment	Maintenance and Operation Costs	Production Costs	Sales Income
1	20			
2	30			
3		4	70	100
4		4	70	100
5		4	70	100
6		4	70	100

This table can be used as follows to calculate the benefit-cost ratio. The first table compares gross profit with costs, and the second compares net profit with costs, the discount rate in both cases being 15%.

Table III–27–3 Gross Profit and Cost (10 millions of Rp)

	Costs						Benefit		
Year	Capital Investment	Maintenance and Operation Costs	Production Cost	Total	Discount (15%)	Present Value	Sales Income	Discount (15%)	Present Value
1	20			20	0.870	17.40		0.870	
2	30			30	0.756	22.68		0.756	
3		4	70	74	0.658	48.69	100	0.658	65.8
4		4	70	74	0.572	42.33	100	0.572	57.2
5		4	70	74	0.497	36.78	100	0.497	49.7
6		4	70	74	0.432	31.97	100	0.432	43.2
						199.85			215.9

Benefit-cost ratio = 215.9 – 199.85 = 1.08

Table III–27–4 Net Profit and Cost (10 millions of Rp)

	Costs					Benefits				
Year	Capital Investment	Maintenance and Operation Cost	Total	Discount (15%)	Present Value	Sales Income	Production Cost	Net Profit	Discount (15%)	Present Value
1	20		20	0.870	17.40				0.870	
2	30		30	0.756	22.68				0.756	
3		4	4	0.658	2.63	100	70	30	0.658	19.74
4		4	4	0.572	2.29	100	70	30	0.572	17.16
5		4	4	0.497	1.99	100	70	30	0.497	14.91
6		4	4	0.432	1.73	100	70	30	0.432	12.96
					48.72					64.77

Benefit-cost ratio = 64.77 – 48.72 = 1.33

Since the benefit-cost ratio will vary according to whether it is gross profits or net profits that are being considered, care must be taken in this respect.

The net present value, however, is the same no matter whether gross or net profits are considered:

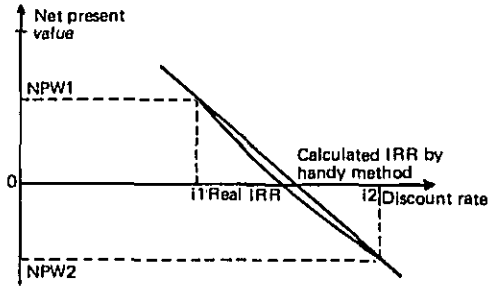
215.9 – 199.85 = 16.05 (Table III–27–3)

64.77 – 48.72 = 16.05 (Table III–27–4)

Finally, let us consider the internal rate of return. This is the discount rate that will make the net present value zero, and it can be obtained by trial and error.

There is also a convenient way of obtaining the internal rate of return from a graph or calculate as below:

Fig. III–27–3



$$IRR = i1 + (i2 - i1) \times \frac{\text{absolute value of net present value at } i1}{\text{absolute value of net present value at } i1 + i2}$$

The internal rate of return for the project can be obtained as follows on the basis of this convenient method.

Table III–27–5

(10 millions of Rp.)

Year	Costs			Total Costs	Benefit (Sales Income)	Net Cash Flow	Discount Rate (i1) 30%	Present Value	Discount Rate (i2) 35%	Present Value
	Capital Investment	Maintenance and Operation Costs	Production Costs							
1	20			20		−20	0.769	−15.38	0.741	14.82
2	30			30		−30	0.592	−17.76	0.549	−16.47
3		4	70	74	100	26	0.455	11.83	0.406	10.56
4		4	70	74	100	26	0.350	9.10	0.301	7.83
5		4	70	74	100	26	0.269	6.99	0.223	5.80
6		4	70	74	100	26	0.207	5.38	0.165	4.29
Net present value								0.16		−2.81

$$IRR = 30 + (35 - 30) \times \frac{0.16}{0.16 + 2.81} = 30.1\%$$

What is considered as costs (expenditures) and what is considered as benefit (income) will depend on whether the analysis is a financial analysis or an economic analysis, the purpose of the former being assessment of the profits of project implementation entity in terms of market prices and the purpose of the latter being assessment of the net benefit received by society from the project. Generally, costs are measured in terms of potential (calculated) prices.

Technique-28: SYSTEM FLOW CHART

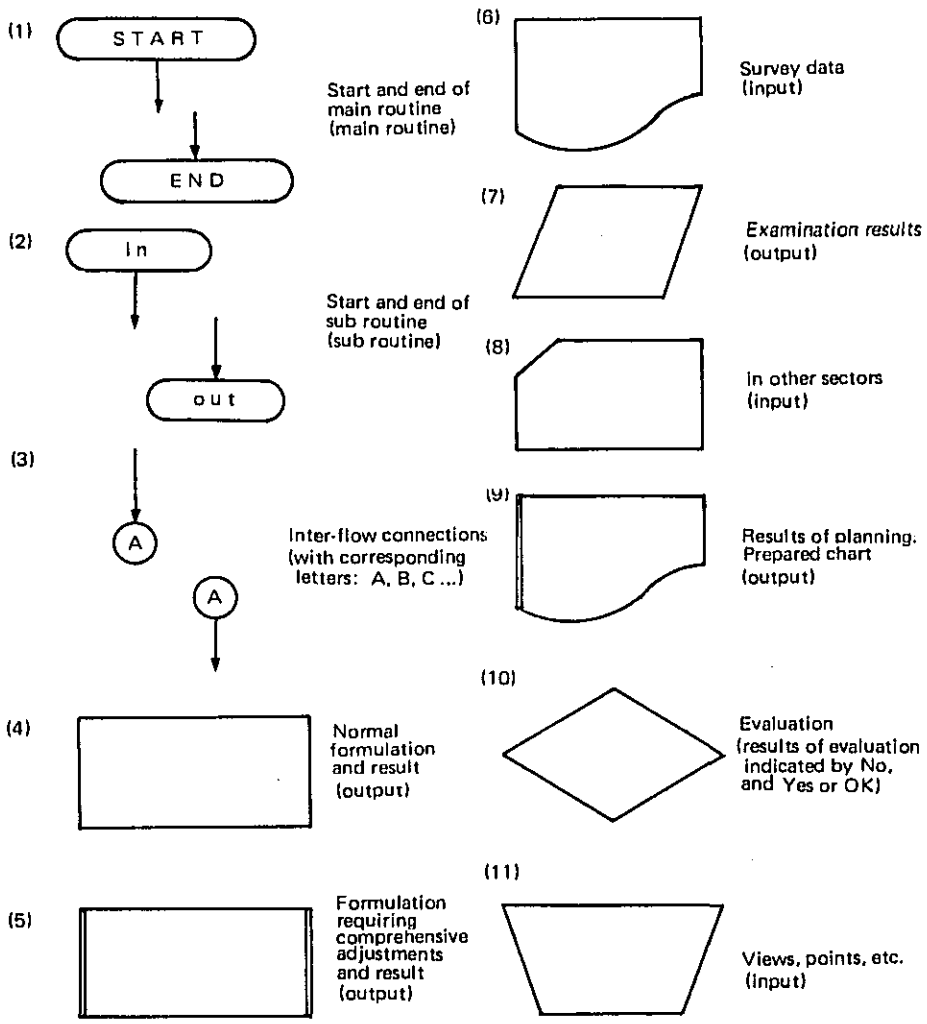
♠ p. 20–1
♠ p. 16–1

Definition: Behavior of a system* may be expressed normally in a flow of goods, persons and their actions, information and time*. A flow chart is a method of ascertaining and expressing objectively these systems and flows which are interwound in a complicated way. The flow chart can describe these systems in one glance, which may not be possible by everyday language. When one shows the way to others, it is clear that drawing a map is far superior in terms of accuracy and time required to verbal explanations. The merits of the flow chart correspond to those of the map.

Function: Those marks and symbols used for the flow chart may be selected freely each time according to the type of the flow in question and the difference in purpose. Here, marks and symbols concerning the flow of operation and information, the most important factors in the formulation of a plan, are proposed with examples.

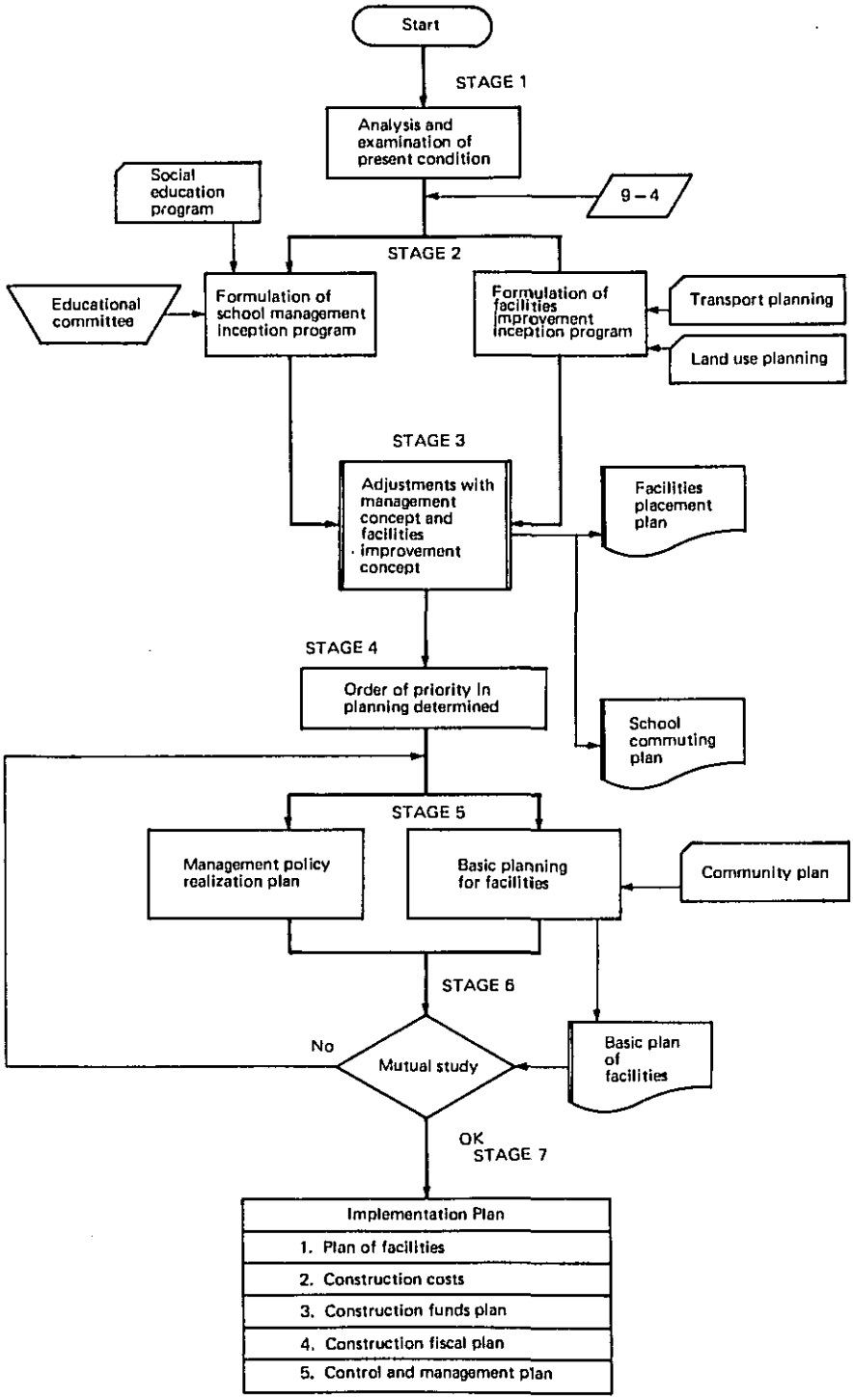
Method: Marks to Be Used in the Flow of Operation and Information

Fig. III–28–1



Example: Flow Chart of School Facilities Plan

Fig. III–28–2



Technique 29: KJ METHOD

◆ KJ Method
This method was developed by Jiro Kawakita in the 60's. He defines the method as "a method of conception to compile illuminatingly those complex and varied data obtained out of doors by letting them speak for themselves."

Definition: The KJ* method is a technique for handling the structure of the most basic problems in the planning process. It aims at making a basis of solution of such problems by means of team discussion in which the most is made of individual creativity.

What is needed is about 100 cards and several sheets for display use.

Method: Step 1

1) Restating of Problem in Simple Terms

First of all, in order to eliminate divergence in how different members of the team see the problem, it is necessary to reconsider it in easily understandable terms. For instance, if the theme is "new town planning in such and such an area", it might be reformulated in terms such as "What kind of community would we want to live in if we were the residents of that area?"

2) Data Collection (Brain Storming)

This is a way of drawing forth creative thinking and ideas. The following rules must be observed in order for this important step to be able to make the KJ method creative:

i One should refrain from criticizing the opinions of other participants.

ii One should feel free to say whatever might come to mind. The odder the idea, the better.

iii As many ideas as possible should be registered, as many as 100, if possible.

iv An effort should be made to develop on ideas already set forth by others.

v Opinions should be expressed as concretely as possible since too much abstraction will make them hard to handle.

Besides these rules, it is a good idea to appoint a chairman and a person responsible for keeping a record of the ideas expressed. The chairman will have the responsibility of seeing to it that the ball keeps rolling, and the recorder will have to be able to summarize concisely.

Once enough ideas have been collected, those presented during about the first half of the session can be discarded since they tend to be too unimaginative.

Next, the members confirm among themselves the meaning of the data. This is to avoid waste of time in later discussion due to misinterpretations. Finally, the data is registered on the cards, and the cards are dealt out to the members as if they were playing cards.

Step 2

1) Primary Classification

One of the members puts out one of his cards, and other cards that appear to be related to it somewhat in terms of thinking or technique are arranged alongside it, the criterion of judgment being the base card. If, however, there is disagreement as to its usefulness, it can be withdrawn, a basic aim beings full consensus. Each person can put out as many cards as he wants to. When all related cards have been exhausted, the same process is repeated with another base card, and in this way a number of sets of cards are formed.

2) Naming of Sets of Cards

Each set of cards is then given an appropriate heading in as specific terms as possible and avoiding invalidation of any of the cards in the set because of the heading selected.

3) Intermediate Classification

Next the headings are grouped and regrouped in a process that gradually reduces the number of sets to seven or fewer.

4) Final Stage

Finally, some expression is arrived at that is capable of representing all of the headings.

5) Display

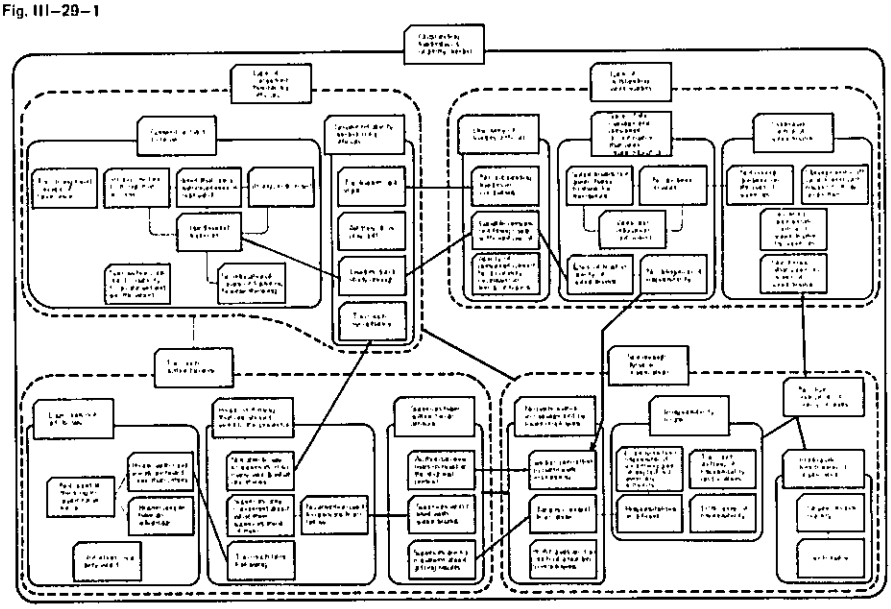
The cards are pasted on the pasteboard in such an order as to give a good idea of the course that the discussion has taken, circling the primary, intermediate, and final classifications so as to clearly indicated how they relate to one another.

This KJ method usually takes quite a lot of time, but no attempt should be made to shorten the process by majority voting or other means since that would reduce the chances of maximizing the creative results.

Although other methods of making use of creative thinking have also be developed, the KJ method is particularly effective in that it couples brain storming with concentrated logical classification.

Example: In the Formulation and Implementation of Administrative Planning Outstanding Leadership Is Needed within Administrative Organization.

Fig. III–29–1



Technique-30: DELPHI-METHOD

Definition: This method was developed for the purpose of making up for the defects of the panel or committee method. It avoids face-to-face confrontation of participants and protects the anonymity of opinions by indirectly providing participants with the opinions of other participants in an effort to bring opinions as close together as possible for the purpose of forecasting and evaluation.

Function: Initially the Delphi method was used for the purpose of getting consensuses regarding time factors involved in development of new technology, and much is expected of it in the future in terms of application to such important tasks as setting of higher targets and goals, including social goals, national goals, and companywide goals.

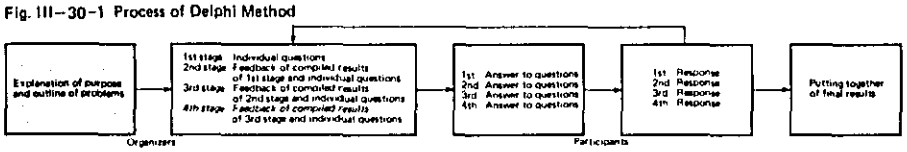
Method: The Delphi method usually follows the process depicted in Fig. III–30–1. First of all, some information needed for the first response as a summary of the problem, including background and implementation goals, is furnished in written form. With it, the participants answer questions in writing as the first response. Then the answers are sorted and compiled as preparation for the second stage.

In the second stage the participants are first provided with these processed answers and asked to revise their earlier opinions on the basis of such new information if they want. If a particular participant submits an extreme answer, he is asked to give his reasons for doing so. Then the organizers classify and sort the new answers as preparation for the next stage.

The same process is repeated in the third stage as in the second, with those that have again submitted extreme opinions again being asked to give the reasons why they cannot accept the views contrary to their own.

In the fourth stage the reasons indicated by such participants in the third stage are returned to them with critical remarks, and they are given their last chance to revise their views as already expressed. When the factors involved are quantitative ones, the median of all of the responses in the fourth stage is taken to be the unanimous view of all the participants, and in the case of qualitative factors, the opinion expressed with the greatest frequency is adopted.

Fig. III–30–1 Process of Delphi Method



In applying this method, particular care must be taken in i. selection of the experts who are to participate, including determination of their number, ii. the kind of information that should be provided, and iii. the way the questions are put.

Possible criteria for selection of the participants include their professional experience in particular fields, their forecasting record (degree of success in forecasting), the number of years of experience they have had in the particular field, the number of works they have published on the subject, and their academic standing.

As for the content of the information furnished, it is possible that there will be cases of failure to lead the participants to a definite conclusion or failure to achieve a consensus because of inability to understand the problem appropriately. Particularly when the problem is one of forecasting the future, it is advisable that several scenarios be prepared regarding it.

As for the questions that are to be put, they must not be vague. Rather, they should make it clear what they are driving at with respect to a specific problem.

Example: Let us consider in this connection the RAND work **Measurement and Analysis of the Quality of Life**, which set as its purpose the clarification of human values by means of the Delphi method.

1) In this study there were 24 participants and 4 feedback stages.

2) 1st Stage Instructions

i Make a list of 5–10 features which you consider on the basis of your own experience or the experience of others to have the strongest influence on the quality of life of adult Americans, giving brief definitions of terms or synonyms.

ii Indicate whether each feature has a positive effect, negative effect, or both positive and negative effects.

In response, about 125 features were cited. Since many of these meant just about the same thing, the organizers grouped them into 38 items, including "love", "recreation", "intimacy", and "aesthetic environment".

3) 2nd Stage

In the 2nd stage the participants were fed back these 38 items and asked to relate them to each other in terms of points for degree of relation on a matrix. Fig. III–30–2 was obtained from the results. In it the 38 features are arranged in 12 groups.

4) 3rd and 4th Stages

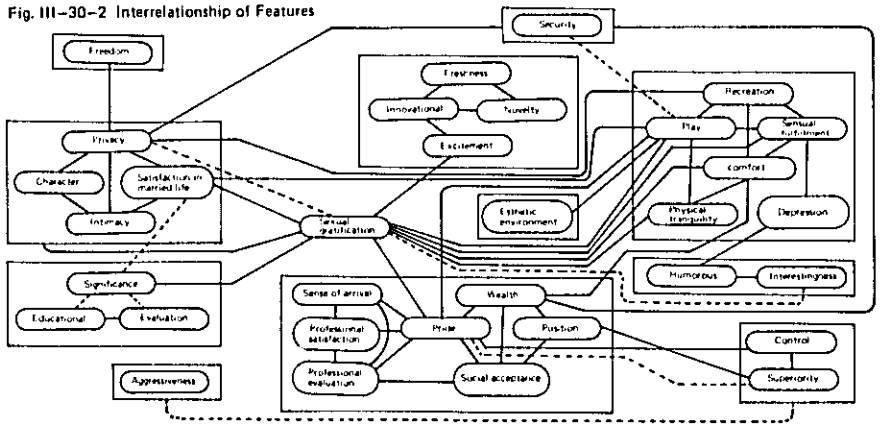
In the 3rd and 4th stages the participants were fed back the table of 12 features and asked to weight them with a total of 100 points to be distributed among them. Table III–30–1 gives the results.

Table III–30–1 Weighting of Features

Feature	1st Weighting			2nd Weighting		
	1st Q	2nd Q	3rd Q	1st Q	2nd Q	3rd Q
Sense of beauty	3	4	10	3	4	7
Freedom	6	9	15	6	10	14
Pleasure	8	10	15	10	10	10
Significance	5	10	12	7	10	12
Newness	5	6	10	5	6	9
Aggressiveness	0	2	5	0	2	4
Sexual gratification	5	10	13	6	10	13
Security	5	9	11	5	10	11
Superiority	1	4	6	1	4	5
Love	7	10	18	9	11	15
Interestingness	2	5	8	3	5	6
Position	5	12	20	6	14	55

Q Quartile

Fig. III–30–2 Interrelationship of Features



Technique 31: FILING SYSTEM

Definition: Data banks are places for sorting and storing all sorts of information, including information that accumulates in the process of everyday business activities and information that is used in planning. For the purpose of such sorting and storage it is necessary to use some kind of filing system for greater efficiency.

A filing system is a means of management and custody of a variety of information. What is meant here by information management is principally the maintenance of a smooth system of lending out and returning the information being stored in order to prevent it from becoming public or being lost, and what is meant here by information custody is storing the information in an appropriate place under good conditions in such a way that it can be readily referred to when needed.

Fuction: In planning, whether policy planning, master planning, project planning, implementation planning, or any other kind of planning, it is necessary to have timely access to a diversity of pertinent information. It is advisable, therefore, that a filing system such as that described below be introduced by those responsible for keeping such information. The main requirements of such a system are 1) simplicity and speed of access to and return of the information, 2) flexibility with respect to acquisition of additional information, and 3) ease of reference.

Furthermore, for a smoother filing system it is necessary to prepare accurate index notes on the basis of good documentation techniques.

Besides keeping track of the inventory of the filing system itself, contact should be maintained with a number of other information sources to keep abreast of what information is being kept by whom, where, and in what form or condition so as be *able to judge the adequacy of the information presently in the filing system in terms* of both quality and quantity. This will also make it possible to provide advice on how to obtain information not presently available in the filing system.

Method: The following is a simple description of how to file information with the use of filing cabinets.

First the information should be classified into such categories as "books", "reports", "documents", "drawings", "maps", "photographs and film", "catalogs", "clippings", "newspapers and magazines", and so forth. Each will have to be kept and made available in a different way because of difference in size, weight, effective life, and so on. *Before actual filing it will be necessary to sort out the materials by type,* content, characteristics, and so forth for arrangement by topics. Furthermore, effective useful lifetime will have to be determined in order to get rid of materials that are no longer of any value.

1) *Filing Methods*

Since the methods of filing described below will influence the ease with which the information can be found and used, those keeping the information must have a good idea of such factors as how it is obtained and how it is being used.

i Filing by Source

If the sources of all of the information are known, this is the simplest and most convenient method of filing.

ii Filing by Topic or Theme

iii Filing by Title

The title itself is used as the reference key.

iv Filing by Project or Case

For instance, all of the documents concerning a particular action from application to receipt of permission can be kept together.

v Filing by Format

"Notification", "awards", and so on being some of the formats under which information can be filed.

Of these five filing methods, the most convenient and effective ones should be selected for each particular purpose, including everyday operational backup, planning and analysis, and policy making.

2) Arrangement of Files

The following are different way of arranging the files based on the above methods in such a way as to find the information that is needed.

i Alphabetical Order

This order of arrangement is convenient when frequency of use is just about even.

ii Order by Area

This order of arrangement is convenient when particular information comes from the most part from particular areas.

iii Organizational Arrangement

This order of arrangement is convenient when the sources of information are different organizational sections.

iv Numerical Arrangement

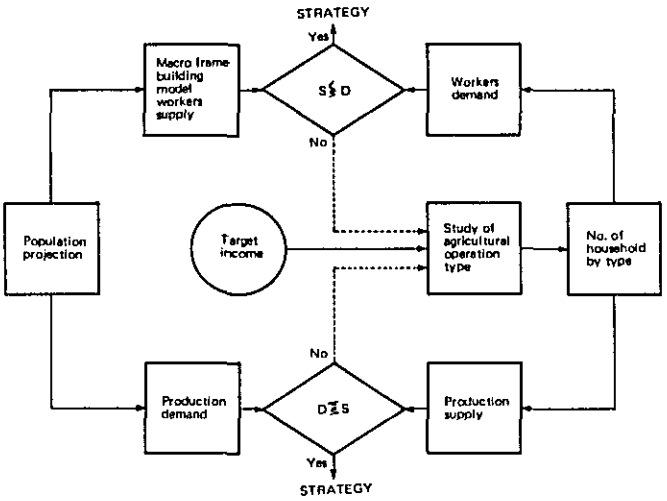
This method makes use of index notes and cards.

Each of these methods makes use of banking files, folders, card guides, and so forth, with the materials being put in drawers or boxes. Furthermore, when an effort is made to improve the particular filing system being used, the two most important aims to keep in mind are compatibility with the particular circumstances and purposes for which the information is to be used and ease of reference and use.

Reference book

- Buggest, Earnest, D. etc., Business Filing and Records Control, South-Western Publish
- Heicher, Nerlo. K., Ministers Simplified Filing System, Baker Book House
- Kahn Girbird, etc., Progressive Filing and Record Management, McGrow-Hill Book Company
- Place, Irene. etc., Foundamental Filing Practice, Prentice-Hall
- Turner, David. R., File Clerk, Arco Publishing
- Wood Merle, W., Number Filing on the Job, South-Western Press

Technique-32: WORK SHEET STUDY



Let Us Use Work Sheets to Prepare the Macroframe

The figure above shows the basic thinking involved in making a macroframe with five work sheet studies.

In Work Sheet Study 1 there are two drill work sheets, one for determining the amount of food production demand on the basis of the population of the area in in the target year and the target per-capita calorie intake criteria and the other for determining the total production demand of the area as the sum of this figure and based in turn on the import and export projections for the same years.

Work Sheet 2 consists of drills for determining the supply of agricultural workers on the basis of estimation of such factors as the number of workers there will be in the target year and the present rate of increase in the number of those engaged in agriculture.

Work Sheet Study 3 consists of two drill work sheets, one for determining the target production figures for different crops in the case of each type of agricultural operation on the basis of income goals and the other for determining the income scale of the target area, the required area of cultivated land, the number of people that will have to be engaged in agriculture, and production figures for different crops, all on the basis of the number of farm families of each agricultural operational type.

Work Sheet Study 4 consists of drills for comparison of the figures for demand for agricultural workers based on the target production figures for different crops in each agricultural operational type as determined in Work Sheet Study 3 with the figures for the supply of agricultural workers determined in Work Sheet Study 2.

Work Sheet Study 5 consists of drills for comparison of the figures for production supply of different crops in each agricultural operational type as determined in Work Sheet Study 3 with the figures for production demand for different crops as determined in Work Sheet Study 1.

The answers for each of these work sheet studies can be obtained by first understanding what they are driving at and how they are to be handled and then preparing a planning flow chart and using the various planning data available.

Question / Work Sheet	1	2	3	4
Study-1a	2 5 4 3 1	1. This method is to estimate the future population of the area concerned by dividing factors of population changes and by extending the past secular trend into the future for each factor., population in future = present population + natural increase + social increase. (demographical equation), 2. This method is to estimate the population structure of the area concerned by sex and age bracket by taking account of all factors of population changes such as mortality of the cohort by sex and age, net migration rate by sex and age, birth rate by female age bracket, sex ratio in births, etc., 3. This method is to estimate the future population of the area concerned by using only static population statistics and by extending the past secular trend into the future. Actually there are three methods under this category: 1) method of assuming the population increase (or decrease) as constant; 2) method of assuming the rate of population increase (or the rate of population decrease) as constant; and 3) method of using the trend curve.	1. Population projection method, 2. Survey of calorie by commodity, 3. Standard for different categorie of calorie intake, 4. Survey of storage quantities by commodity, 5. Demand of consumption volume and storage quantities by commodity	a. 30, b. 3, c. 6, d. 5, e. 12, f. 4, g. 10, h. 40, i. 90, j. 420, k. 120, l. 300
Study--1b	2 5 1 4 3	1. % of total income represented by agricultural income (agricultural income – total income x 100), 2. Percentage of family expenditures represented by expenditures for food and drink as comparative index indicating standard of living (expenditures for food and drink – Total family expenditures x 100) 3. % of gross agricultural earnings represented by agricultural income as indication of income yield (agricultural income – gross agricultural earnings x 100)	1. Survey of exports volume by commodity for each market in the area, 2. Exports volume by commodity for each market in thearea	a. 360, b. 138, c. 385, d. 332
Study -2	4 5 2 1	1. This is an indicator to show how much the total population of the region decreased (or died) in one year. As for the method of computation, one is to take the total population and the other is to take the age group of five years. Deaths/total population (crude death rate) or 1 – death rate, 2. This is an indicator to show the number of births in one year against the total population. *Total births/total population*, 3. *Incoming migration* and outgoing migration are computed and the ratio of the difference to the total population of the area concerned to indicate a social increase/decrease. (input population – output population)/total population	1. Setting the social increase and decrease, 2. Estimate of the population volume in the area in the target year, 3. Estimate of the agricultural worker engagement rates.	a. 41, b. 44, c. 35, d. 39, e. 80, f. 81, g. 92, h. 84, i. 92, j. 86, k. 88, l. 33, m. 30, n. 33, o. 36, p. 39
Study–3a	4 4 1 5 2	1. Setting the target income per farm worker, 2. Family income, 3. Total operational expenses, 4 Price of production by commodity	a. 2,400, b. 9,600, c. 3,200, d. 780, e 610, f. 810, g. 5,580, h. 3,090, i. 3,930, j. 75, k. 168, l. 60, m. 50, n. 24, o. 60, p. 68, q. 43, r. 27	
Study–3b	5 3 1 4 2	1. Survey of family income, 2. Survey of cultivated area for each crop, 3. Survey of production volume for each crop, 4. Survey of amount of imput materials, 5. Marketing conditions in future	a. 30, b. 16, c. 560, d. 9, e. 5, f. 5, g. 330, h. 64, i. 1300, j. 640, k. 700, l. 500, m. 240, n. 600, o. 680, p. 340, q. 440, r. 10.8, s. 16.0, t. 10.0, u. 10.4, v. 10.9, w 9.2, x. 13.0, y. 12.1, z. 11.0, a'. 144.4, b'. 128, c'. 140, d'. 45.5, e'. 48.0, f'. 120.0, g'. 75.6, h'. 68.0, i'. 88.0	
Study--4	2 1 5 4 3	1. Expression of production capacity of labor in terms of net production per 10 hours of input of own agricultural labor (net agricultural production – hours of agricultural labor input x 10), 2. Expression of the production capacity and economic value of the land in terms of net production per 10a (agricultural net production – cultivated area), 3. Expression of efficiency of invested capital in terms of net production per Y1,000 of fixed agricultural capital investment (net agricultural production – fixed agricultural capital x 1,000)	1. Criteria of land productivity for each crop by operation type, 2. Toal demand of production volume by commodities	a. 1680, b. 600, c. 600, d. 410, e. 270, f. 301, g. 301, h. 445
Study–5	4 3 2 1 5	1. This is an indicator to show the ratio of the employed to the total labor force. Number of the employed/working population, 2. The ratio of the unemployed, the aggregate of the totally unemployed and the temporary unemployed, to the total labor force., 3. This is to show the ratio of the labor force to the total working population. Labor force/total working population	1. Criteria of labor productivity for each crop by operation type, 2. Total supply of agricultural workers volume by operation type	a. 145, b. 35, c. 65, d. 30, e. 20, f. 10.0, g. 9.2, h. 11.0, i. 1680, j. 700, k. 600, l. 640, m. 600, n. 320, o 410, p. 440, q. 270

Work Sheet Study 1a: Calculation of Total Food Demand in the Area in Terms of Different Crops

Question-1: The following is an example of how to calculate the total food demand in the area. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

By studying the population breakdown by age and sex in the past several years one can calculate the total population in the area in the target year by a population projection method, among which there are ( ), the population dynamic balance method, ( ), the age brackets method, and so on. Which method to choose will depend on ( ), survey possibilities, etc.

Next, one studies the state of food consumption in the area in terms of different crops and which items the residents favor for the purpose of setting standards for different categories of calorie intake and determining per-capita food demand in the target year in terms of different items. By multiplying these figures by those for population in ( ), one can obtain figures for total food demand in the area for different items.

It is further necessary to study and analyze the food processing industry in dynamic terms, make ( ) in the target year, and estimate the demand for different items. It is also necessary tostudy and analyze existing storage quantities for different items and estimate what the same figures will be by the target year. By adding the demand figures for different items based on these two kinds of demand projections, we get figures for the total food demand within the area.

1. an interim forecast of demand
2. the simple extrapolation method
3. the target year
4. the present state of data availability
5. the regional population balance method

Question-2 The following indices and criteria are study materials for the planning. Explain them simply, using quantitative expressions.

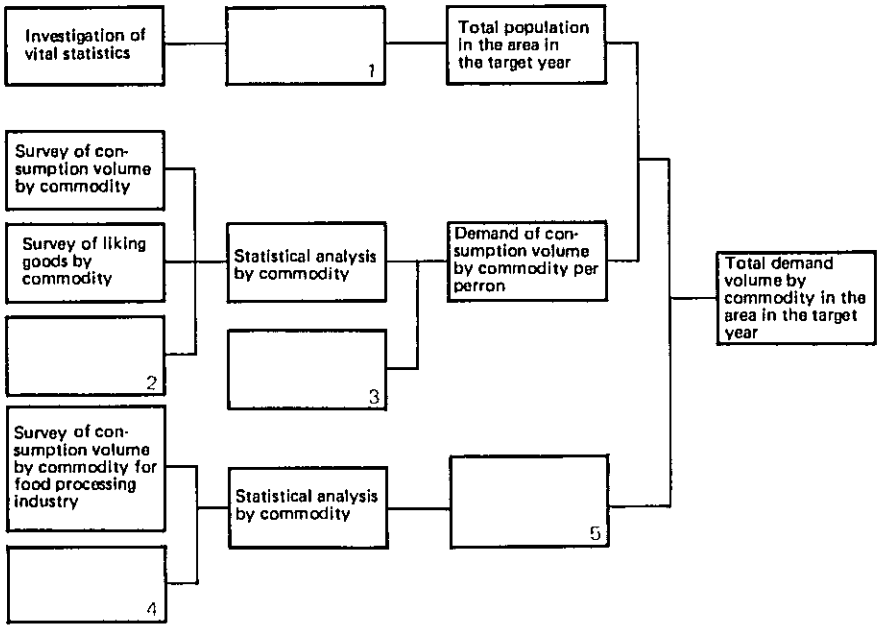
1. Population dynamic balance method

2. Age brackets method

3. Simple extrapolation method

Question-3 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III–32–1 Planning Flow Chart for Estimation of Food Demand



Question-4 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III–32–1 Work Sheet-1a: Estimation of Food Demand in the Region

Population (Present)	Total population in the region at target year: Increase ratio (%)	Total population in the region at target year: Population	Consumption volume by commodities (ton/person): 1 P	1 T	2 P	2 T	3 P	3 T
20	1.5	30	2	4	d	e	6	10
15	2.0	a	b	c	6	14	f	g
Total								

Population (Present)	Total demand volume by commodities (ton): 1 P	1 T	2 P	2 T	3 P	3 T
20	h	120	100	360	k	l
15	45	180	i	j	60	300
Total						

 The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

Work Sheet Study 1b: Calculation of Food Demand for Different Items Outside the Area and of Total Production Demand Quantities for Different Crops in the Area

Question-1: The following is an example of how to calculate production demand quantities of different crops in the area. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

After studying and analyzing the total quantities of imports and exports of different items for each market in the area, one forecasts the demand and supply quantities of the different items in the target year for ( ). Since, however, in some cases figures for particular markets have already been determined in ( ), these figures forecasting ( ), should not be simple extrapolations of demand to date.

The figures for total food production quantities in the area in terms of different crops can be obtained by adding the production demand corresponding to the ( ) for the different items and then subtracting the figures for supply to the area of the different items.

1. supply and demand
2. each market
3. total demand
4. population
5. national planning

Question-2 The following indices and criteria are study materials for the planning. Explain them simply, using quantitative expressions.

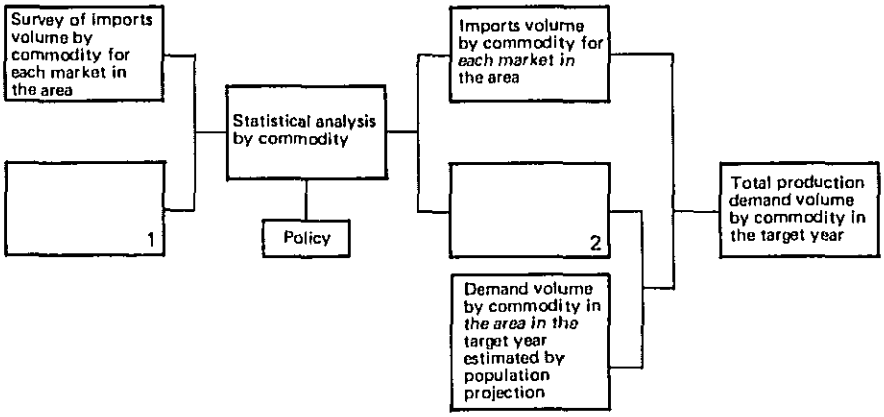
1. Degree of dependence on agriculture

2. Engel's coefficient

3. Agricultural income rate

Question-3 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III–32–2 Planning Flow Chart for Estimation of Total Demand



Question-4 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III–32–2 Work Sheet-1b: Estimation of Total Food Demand

Market name / Commodities	Import and shipment volume from other regions of each market by commodities (ton)							
	1		2		3		4	
	P	T	P	T	P	T	P	T
1	6	5	2	1	1	1	3	2
2	4	3	3	2	2	3	8	6
3	7	4	4	4	5	2	6	4

Market name / Commodities	Export and shipment volume to other regions of each market by commodities								Estimated food demand in the region (ton)	Total production demand in the region (ton)
	A		B		C		D			
	P	T	P	T	P	T	P	T		
1	3	8	1	5	2	4	6	10	120	b
2	8	12	2	7	3	8	4	12	a	c
3	6	10	5	10	4	6	7	20	300	d

The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

Work Sheet Study 2: Calculation of Supply of Agricultural Workers in the Area

Question-1: The following is an example of how to calculate the supply of agricultural workers in the area. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

( ) in the area is calculated by studying the population figures for the past several years by age and sex, setting the birth rate, ( ) for different age groups, and rates of population ( ) from the area, forecasting the total population in the area by the target year, and then revising these figures along the lines of national policy for holding down population.

Next, the present breakdown of worker population by industry is studied, and ( ) are calculated by dividing the total number of workers in each industry by the figure for the present work force.

Next, the future population percentage breakdown is forecasted and the agricultural employment rate estimated by studying and analyzing the employment breakdown by ( ) in the past several years.

Finally, the supply of agricultural workers in the target year is obtained by multiplying the figure for the total population of the area by that year by the percentage of all workers that will be employed in agriculture.

1. worker engagement rates
2. inflow to and outflow
3. different industries
4. the total population
5. survival rates

Question-2 The following indices and criteria are study materials for the planning. Explain them simply, using quantitative expressions.

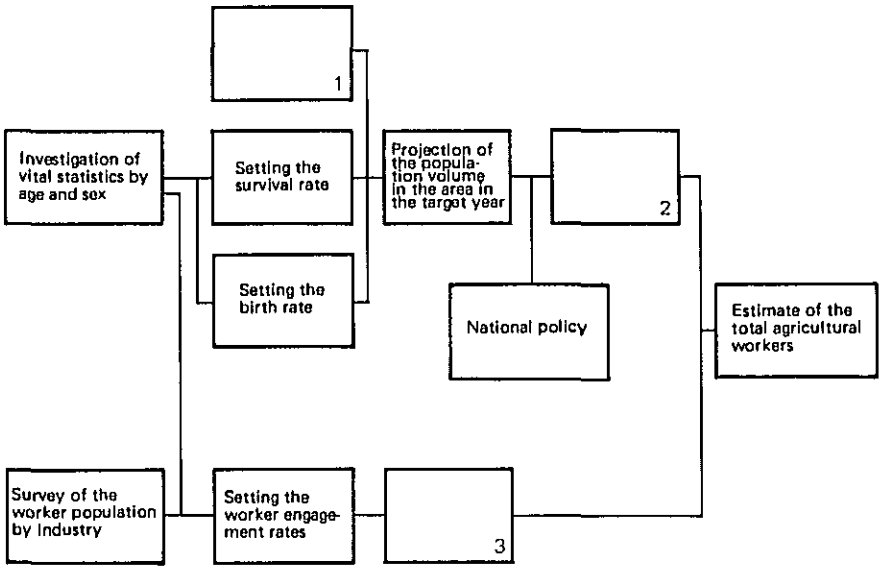
1. Mortality

2. Birth rate

3. Social increase/decrease ratio

Question-3 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III–32–3 Planning Flow Chart for Estimation of Total Agricultural Workers



Question-4 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III–32–3 Work Sheet-2: Estimation of Agricultural Worker Supply

Age group	Increase of survival rate to next generation	Social increase and decrease	Population		Percentage of workers index by industry						No. of Agricultural workers		Remarks
					Agriculture		Industry		Service				
			P	T	P	T	P	T	P	T	P	T	
Male													
0– 5	0.9	0	40		–	–	–	–	–	–	–	–	
6–10	1.0	0	38	36	–	–	–	–	–	–	–	–	
11–15	1.0	1.1	35	42	–	–	–	–	–	–	–	–	
16–20	0.9	1.1	35	39	e	85	19	13	1	2	28	n	
21–25	1.0	1.3	34	a	82	h	16	13	2	3	k	34	
26–30	1.0	1.3	32	b	f	82	15	12	4	6	26	o	
⋮													
Female													
0– 5	0.9	0	40		–	–	–	–	–	–	–	–	
6–10	1.0	0	39	c	–	–	–	–	–	–	–	–	
11–15	1.0	0	37	d	–	–	–	–	–	–	–	–	
16–20	1.0	0	37	37	90	i	9	6	1	2	l	34	
21–25	1.0	1.1	36	41	g	94	6	3	2	3	33	p	
26–30	1.0	1.2	34	43	88	j	8	10	2	2	m	37	
⋮													
Total													

The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

Work Sheet Study 3a: Calculation of Farm Family Production for Each Operational Type on the Basis of Income Goals

Question-1: The following is an example of how to calculate farm family production for each operational type on the basis of income goals. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

There are two ways of setting per-capita income goals for agricultural workers. One is simply to extrapolate the income figures for recent years, and the other is to adopt ( ).

Next, one calculates the ( ) by multiplying the target income figures mentioned above by the number of agricultural workers in each farm family in the case of each agricultural operational type. Nonagricultural income should not be included, however.

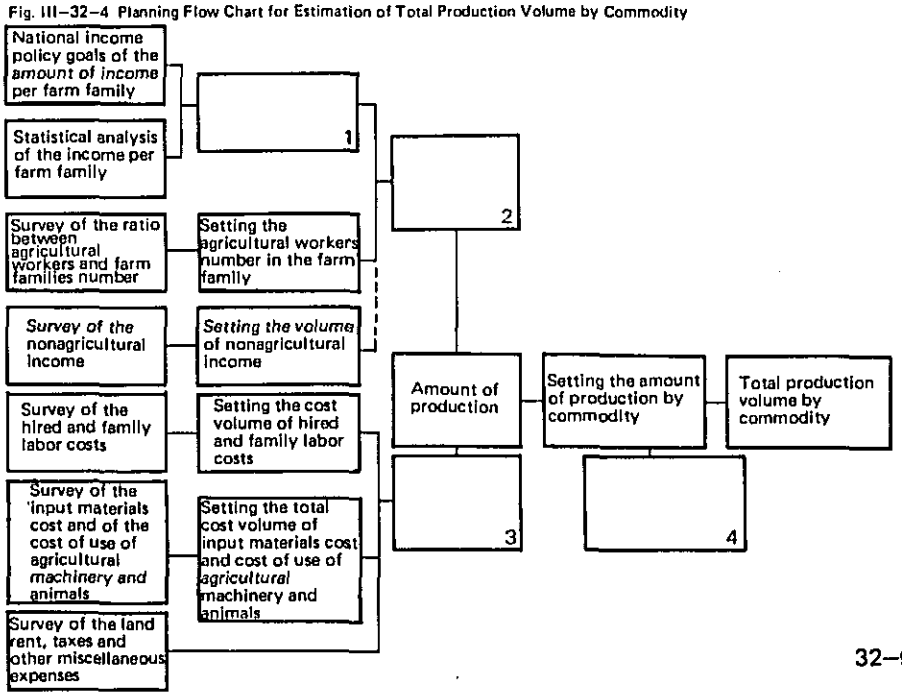
Then the worth of production per farm family is calculated as the sum of total operational expenses, including hired and family labor costs, cost of purchase of input materials, cost of use of agricultural machinery and animals, and land rent, taxes, and other miscellaneous expenses, and the farm family income as calculated above.

The amount of production of each crop is obtained by dividing the monetary production goal for it by the figure for worth of its production. Next, one must consider whether or not such amounts of production will be feasible in terms of ( ) and ( ), if any of the figures turn out to be unfeasible, it will be necessary either to percentage breakdown of ( ) by the different crops or to manipulate the production prices of the different crops. The latter step, however, should be left to price policy.

1. labor productivity
2. production
3. amount of income per farm family
4. the national income policy goals
5. land productivity

Question-2 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III–32–4 Planning Flow Chart for Estimation of Total Production Volume by Commodity



Question-3 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III–32–4 Work Sheet-3 a: Estimation for Setting of Farm Management Type in a Target Year

Type of agricultural operation	No. of families		No. of agricultural workers		No. of nonagricultural workers		Income/worker (Rp.)		Family income (Rp.)	
	P	T	P	T	P	T	P	TP	P	TP
A	8	10	5	6	1	2	800	1200	4800	b
B	6	7	3	4	1	1	600	900	a	4500
C	5	6	3	3	1	1	500	800	2000	c
G										

Type of agricultural operation	Labor cost (Rp.)		Input materials cost (Rp.)		Others (Rp.)		Total operational expenses (Rp.)	
	P	TP	P	TP	P	TP	P	TP
A	500	600	200	250	80	100	d	950
B	450	500	180	230	60	80	690	f
C	400	450	150	200	60	80	e	730
G								

Type of agricultural operation	Amount of production		Composition of amount of production by commodities (Rp.)					
			1		2		3	
	PP	TP	P	T	P	T	P	T
A	g	10550	3900	8400	1000	1400	680	750
B	h	5310	2100	3400	600	1200	390	710
C	2610	i	1800	2800	500	700	310	430
G								

Type of agricultural operation	Price of production by commodities (Rp./ton)						Production volume by commodities (ton)					
	1		2		3		1		2		3	
	P	T	P	T	P	T	P	T	P	T	P	T
A	30	50	20	22	10	18	130	k	m	64	p	41
B	28	48	19	20	9	16		70	32	o	q	44
C	28	46	21	22	9	16	64	l	n	32	34	r
G												

The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

P: Present
T: Target year
TP: Target price

Work Sheet Study 3b: Setting of Future Figures for Number of Farm Families of Each Agricultural Operational Type

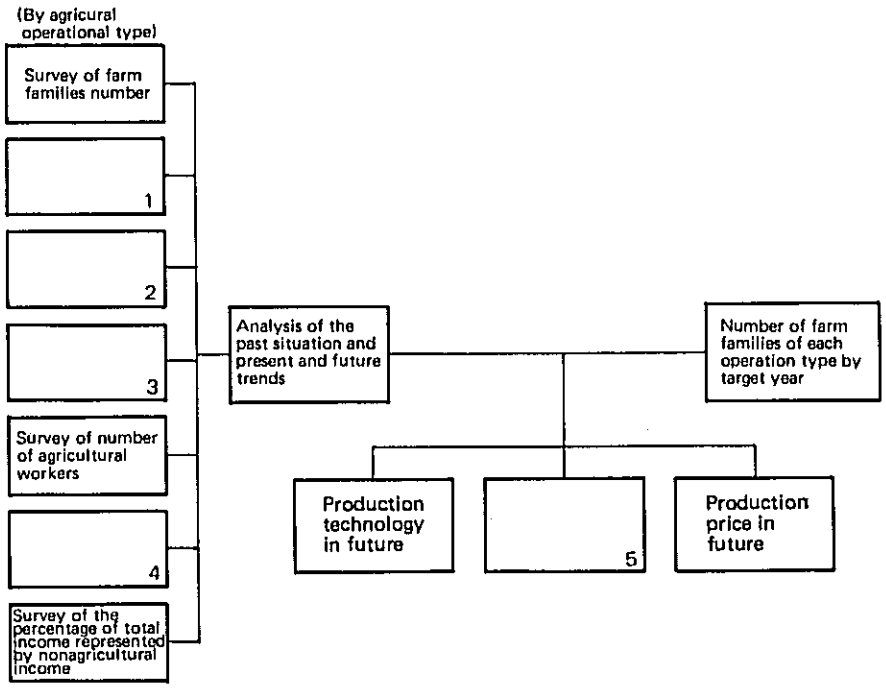
Question-1: The following is an example of how to calculate the future number of farm families of Each Agricultural Operational Type. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

The number of farm families of each operation type by the target year is to be forecasted on the basis of study and analysis of the ( ) and present and ( ) with respect to the breakdown of the total number of farm families by type, farm family income, cultivated area for each crop, number of agricultural workers, amount of input of materials, and the percentage of total income represented by ( ). Forecasted figures based on simple extrapolation should be revised to take into account improvement in ( ), improvement in marketing conditions, and change ( ) for different crops, and other future change.

1. nonagricultural income
2. production prices
3. future trends
4. production technology
5. past situation

Question-2 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III-32-5 Planning Flow Chart for Estimation of Number of Farm Families of Each Operation Type



Question-3 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III-32-5 Work Sheet-3b:Estimation for No. of Agricultural Household by Farm Management Type in the Region

Type of agricultural operation	No. of household				Family Income			Actual farm land by commodities (Gross) (ha)					
	Present							1		2		3	
	A	B	Total	T	P	T	Total	P	T	P	T	P	T
A	12	4	16	a	20	30	900	120	145	48	55	52	30
B	10	2	12	20	18	28	c	80	70	36	65	44	40
C	8	2	10	b	16	25	400	40	35	22	28	28	20
G													

Type of agricultural operation	Crop field (ha)				Paddy field (ha)			
	Total area of farm land		Planted area		Total area		Planted area	
	P	T	P	T	P	T	P	T
A	100	120	80	60	80	120	80	100
B	80	100	60	50	60	100	50	80
C	60	60	40	30	50	80	40	60
G								

Type of agricultural operation	Costs of input materials (Rp./ha)						No. of agricultural workers						
	1		2		3		Family workers		Employ-ment workers		Total		No. of workers in target year
	P	T	P	T	P	T	P	T	P	T	P	T	
A	50	60	30	35	8	10	5	6	4	5	d	11	g
B	40	50	20	25	6	8	3	4	2	1	5	f	100
C	30	40	10	15	4	6	3	3	2	1	e	4	h
G													

Type of agricultural operation	Production volume by commodities (ton/unit)						Land productivity by commodities (ton/ha)					
	1		2		3		1		2		3	
	P	T	P	T	P	T	P	T	P	T	P	T
A	i	1680	l	640	o	410	r	11.6	u	11.6	x	13.7
B	750	k	320	n	430	q	9.4	t	8.9	w	9.8	z
C	j	600	m	320	p	270	s	17.0	v	11.4	y	13.5
G												

Type of agricultural operation	Worker productivity by commodities (ton/person)					
	1		2		3	
	P	T	P	T	P	T
A	a'	152.7	d'	58.2	g'	37.3
B	150.0	c'	64.0	f'	86.0	i'
C	b'	150.0	e'	80.0	h'	67.5
G						

A. No. of households which were already reached to the planned type of agricultural operations.

B. No. of households which were not reached yet, but, will be reach to the planned type of agricultural operations in target year.

The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

Work Sheet Study 4: Calculation of Number of Agricultural Workers on the Basis of the Number of Farm Families of Each Operational Type by the Target Year

Question-1: The following is an example of how to calculate on the basis of the number of farm families of each operation type the number of agricultural workers that will be needed by the target year and of how to deal with the situation if there is an imbalance between demand and supply. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

The number of agricultural workers that will be needed by the target year can be calculated by dividing the amount of ( ) in each operational type by ( ) for that crop in that operational type.

If comparison of the number of agricultural workers that will be needed with the number of agricultural workers that will be available as calculated on the basis of one of ( ) reveals a difference between the number needed and the number that will be available, it will be necessary to change the breakdown of ( ) in the different operational types, change the percentage of ( ) that will be represented by agricultural employment, or make some other planning adjustment.

1. the labor productivity
2. production of each crop
3. total employment
4. the number of farm families
5. the population forecasting methods

Question-2 The following indices and criteria are study materials for the planning. Explain them simply, using quantitative expressions.

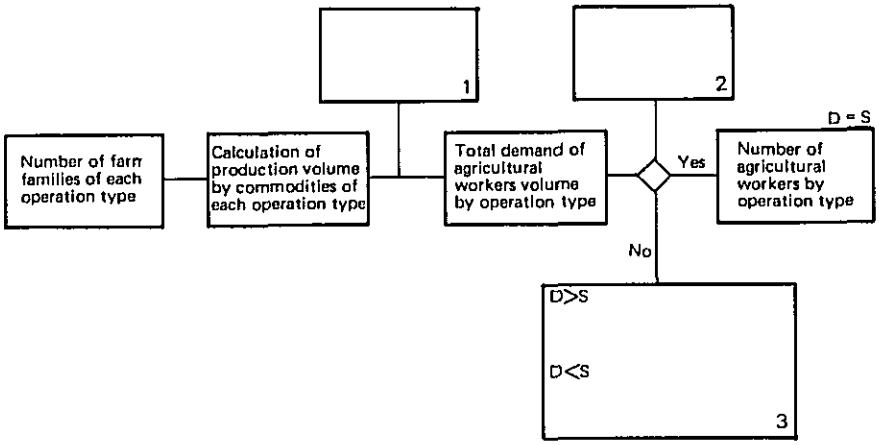
1. Labor productivity

2. Land productivity

3. Capital productivity

Question-3 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III-33-6 Planning Flow Chart for Estimation of Number of Agricultural Workers by Operation Type



Question-4 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III-32-6 Work Sheet-4: Estimation for Demand and Supply of Agricultural Workers

Type of agricultural operation	No. of household in target year	Production volume by commodities (ton)			Criteria of labor productivity for each crop			Demand of agri. workers	Supply of agri. workers	Remarks
		1	2	3	1	2	3	(D)	(S)	
A	30	a	640	d	11	8	6	f	300	D = S:
B	20	700	c	440	5	5	4	g	600	D<S:
C	16	b	320	e	4	2	2	h	320	D>S:
G										

The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

Work Sheet Study 5: Calculation of Production Quantities for Different Crops on the Basis of the Number of Farm Families of Each Operational Type by the Target Year

Question-1: The following is an example of how to calculate the amount of production of different crops on the basis of the number of farm families of each operational type and what to do about the situation if there is an imbalance between supply and demand. Fill in the spaces in the parentheses with the numbers of the phrases below that seem to be most suitable.

The amount of production supply of each crop by the target year can be calculated by dividing the amount of ( ) for each operational type by the productivity set for it for that operational type.

If comparison of these ( ) figures for the different crops with the amounts of each crop that will be required as calculated by one of the population forecast methods reveals that there is a difference between the amount of supply and the amount of demand, it will be necessary to alter the breakdown of the number of ( ) by operational type, ( ) the deficient amounts of the different crops, increase the amount of production by exapnding the rate of ( ), or adjust the plans in some other way.

1. import
2. farm families
3. production supply
4. production of each crop
5. land use

Question-2 The following indices and criteria are study materials for the planning. Explain them simply, using quantitative expressions.

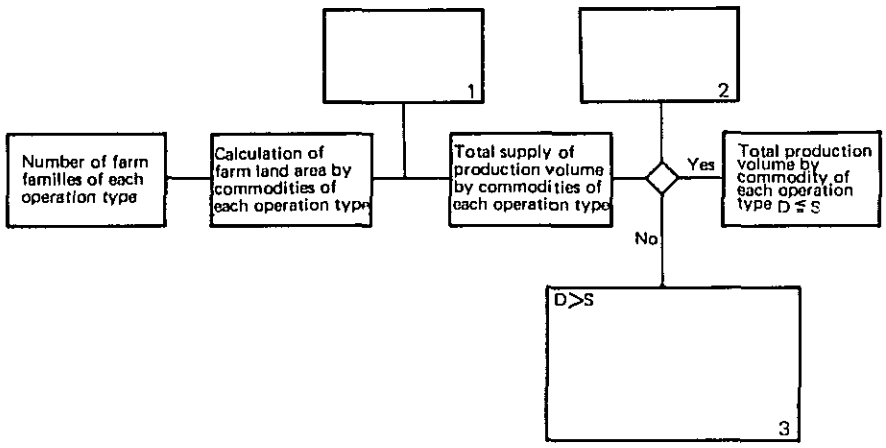
1. Employment ratio

2. Unemployment ratio

3. Labor force ratio

Question-3 The following planning flow chart has been prepared on the basis of the thinking of the preceding question. Complete the chart by filling in the blank spaces with appropriate words or phrases.

Fig. III-33-7 Planning Flow Chart for Estimation of Total Production Volume by Commodity of Each Operation Type



Question-4 The following work sheet has been prepared on the basis of the thinking of the preceding question. Complete it by calculating the values.

Table III-32-7 Work Sheet-5: Estimation for Demand and Supply of Food Production

Type of agricultural operation	No. of household in taget	Farm land area by commodities (ha)			Criteria for acreage commodities (ton/ha)			Supply of commodities (S) (ton)		
		1	2	3	1	2	3	1	2	3
A	30	a	55	d	11.6	11.6	13.7	i	l	o
B	20	70	c	40	f	g	h	j	m	p
C	16	b	28	e	17.0	11.4	13.5	k	n	q
G										

Type of agricultural operation	Demand of commodities (D) (ton)			Remarks
	1	2	3	
A				D = S :
B				D<S :
C	6000	4000	3000	D>S :
G				

The figures in the table are arranged in such a way that computation may be carried out easily and are, therefore, different from actual figures.

Technique-33: NEW ONE

Definition:

♠ Refer to p.

Function:

Method:

♣ Refer to the other Chapter

◆ Terminology

Example:

Drill:

 Reference book

REPUBLIC OF INDONESIA
MINISTRY OF AGRICULTURE

A Planning Guideline For The Regional Agricultural Development

SUBJECT AND DRILL BOOK FOR THE REGIONAL PLANNER

VOLUME THREE

JUNE 1979
JAPAN INTERNATIONAL COOPERATION AGENCY

JAPAN CITY PLANNING

A Planning Guideline For
The Regional Agricultural Development

SUBJECT AND DRILL BOOK FOR THE REGIONAL PLANNER

VOLUME THREE

Chapter IV
Planning Information and Data

This Chapter is intended to arrange those Input information and data obtainable in South Sulawesi which are necessary for actual application of the basic concept for planning, method and techniques described in Chapters I—III.

Those information and data may be classified into four categories as below.

1) Various surveys, studies and statistics published by government agencies relating to regional agricultural development planning.

2) Current maps of topography, land use, rivers and roads, etc.

3) Major existing survey plans under foreign and state aid.

4) Contents of the projects implemented during the REPELITA II phase.

1. Planning Data Published by Government Agencies Concerned

These are those planning data obtained during the field survey which seem necessary for regional agricultural development planning.

They have been arranged as a table with survey items for Input data for the system of problems finding in Chapter II on the vertical axis and obtainable items of planning data on the horizontal axis.

They have also been arranged in such a way that whether the necessary data for planning are obtainable currently, whether they cover National, Province, Kabupaten, Kecamatan or Desa, or to what extent they are detailed in terms of secular coverage and contents may be shown at a glance.

The table IV–1 on next page may be used in the following way:

For instance, if the information wanted concerns the population of the Desa unit, see under Population B–1–1 on the vertical axis, and if the item is marked with Z, look for the title of the planning data on the horizontal axis. Conversely, one can work from obtain information on its contents.

The table uses the following marks:

V: National
W: Province
X: Kabupaten or Kotamadya
Y: Kecamatan or Kota
Z: Desa

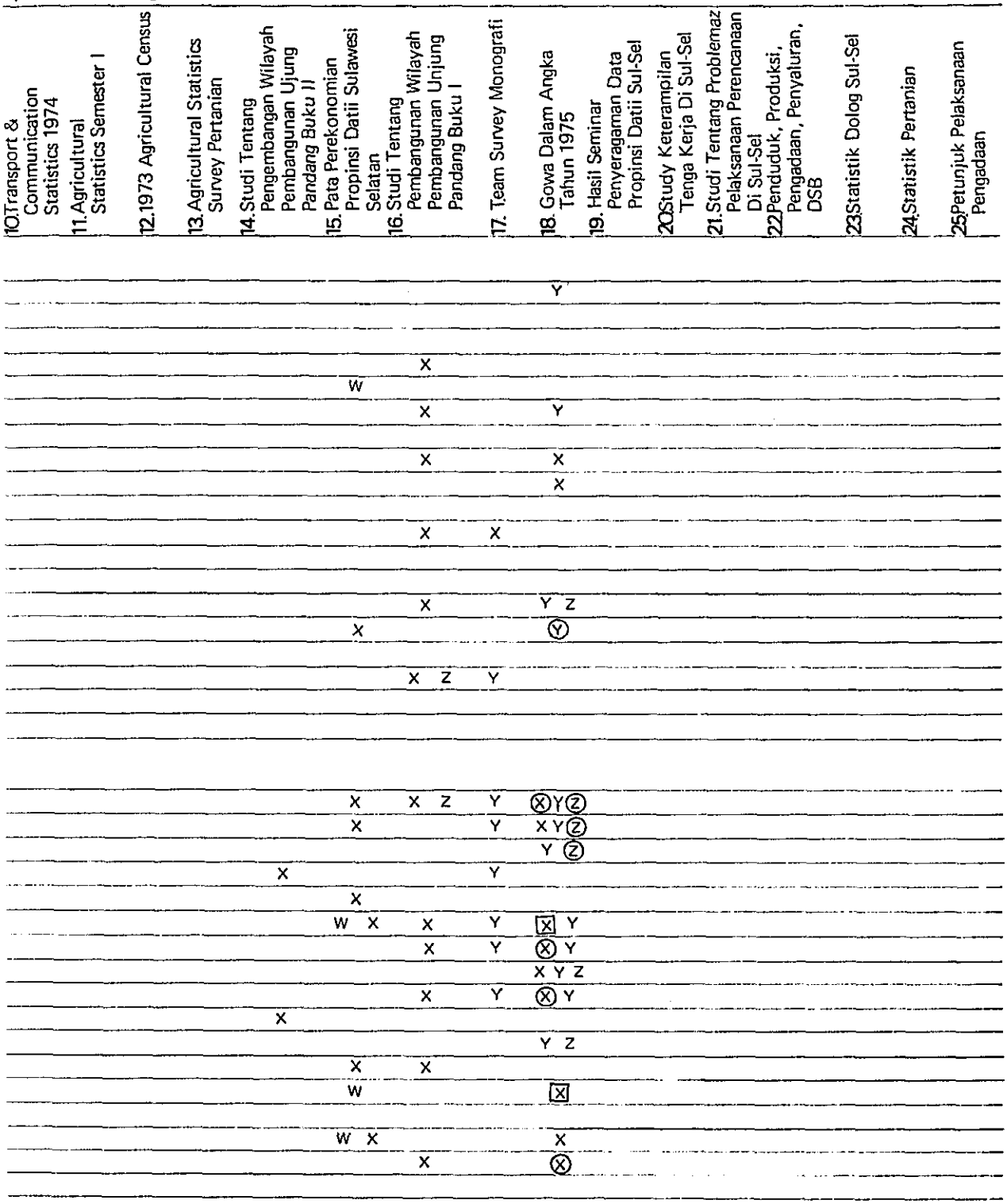
Note: Please note that some of the planning data obtained include those in Indonesian without translation and those which we could not understand completely.

Based on the instructions given above, make an attempt to use the table regarding Nos. 19–25 of planning data.

Table IV–1 Existing Planning Data List

Items (contents)		Planning data published								
Categories	Survey Items	1. National Socio Economic Survey	2. National Income Statistics	3. Industrial Statistics Volume I	4. Industrial Statistics Volume II	5. Wilayah Pembangunan Utama–D	6. Monthly Statistical Bulletin	7. 1974/1975 Industrial Census	8. Daftar Tipe Dan Klasifi Kasi	9. Transport & Communication Statistics 1977
A. Natural and land conditions										
A-1. Land	•Topography									
	•Aerial photograph									
	•Slope									
	•Geology									
A-2. Climate and hydrology	•Air temperature									
	•Precipitation									
	•Wind direction									
	•Rivers									
A-3. Environment	•Disasters									
	•Pollution									
A-4. Landscape	•Vegetation									
	•Animals and plants									
	•Cultural properties									
A-5. Land use	•Division of use									
	•Landownership									
	•Land prices									
A-6. Water use	•Irrigation water									
	•Groundwater									
	•Drainage									
B. Society and living conditons										
B-1. Social basis and population	•Total population					W				
	•Populationstrucure					W	W			
	•Number of households									
	•Migration									
	•Employment structure					W				
	•Living zone					W		W		
B-2. Living environment	•School education					Ⓦ			W	
	•Social education									
	•Medical and health									
	•Consumption					W				
	•Social welfare									
	•Recreation									
	•Public safety, fire prevention									
	•Supply and processing									
	•Transportation									Ⓦ
	•Communications									
	•Housing									

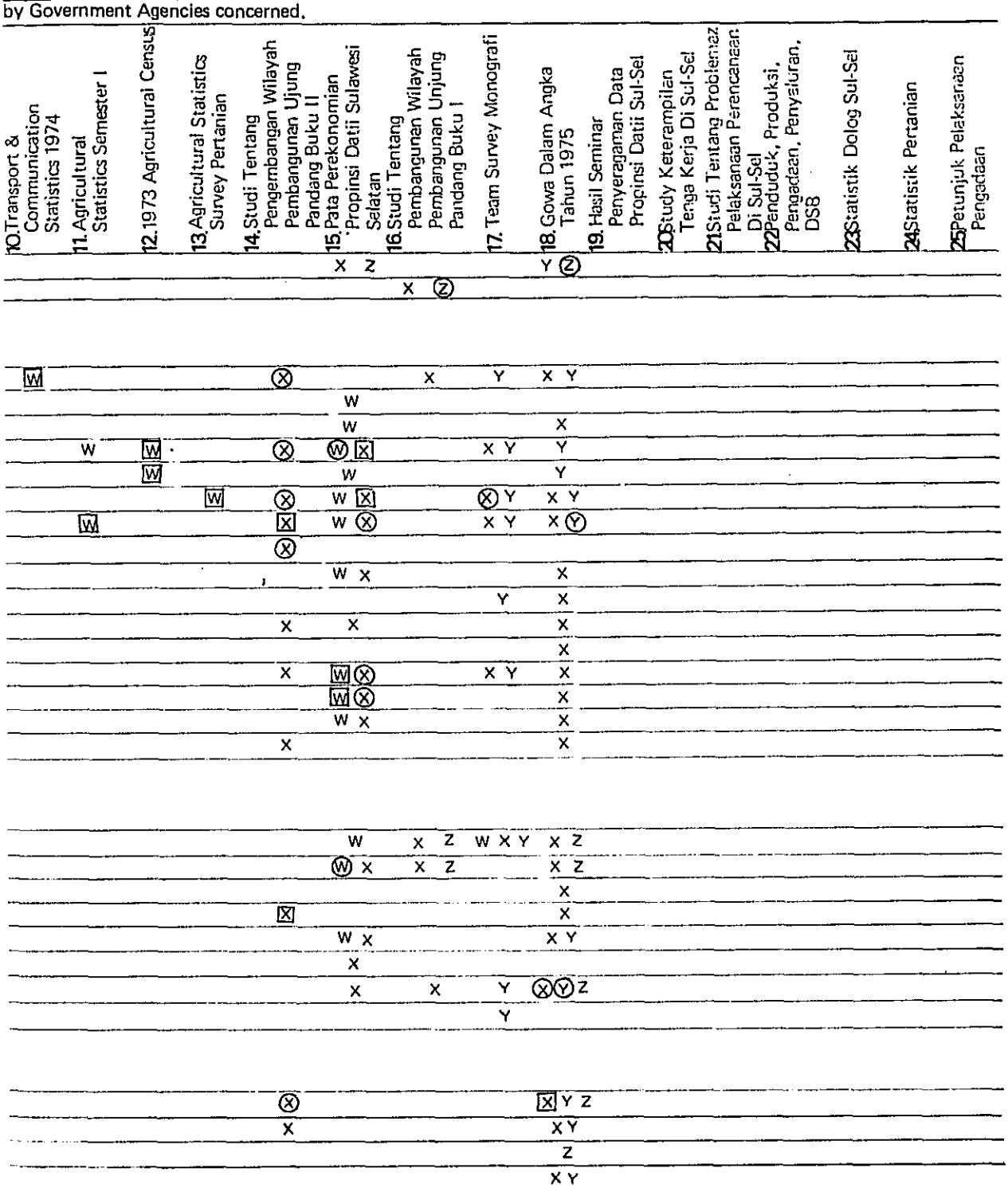
by Government Agencies concerned.



Items (contents)		Planning data published									
Categories	Survey Items	1.National Socio Economic Survey	2.National Income Statistics	3.*Industrial Statistics* Volume I	4.Industrial Statistics Volume II	5.Wilayah Pembangunan Utama—D	6.Monthly Statistical Bulletin	7.1974/1975 *Industrial* Census	8.Daftar Tipe Dan Klasifi Kasi	9.Transport & Communication Statistics 1977
B-3. Village	• Location									
	• Land use								W	
C. Economy and industrial conditions										
C-1. Economic basis and income	• Economic zone	V				W	W		W	
	• Income	V	V			W				
	• Employment and wage level									
C-2. Agriculture (Applies to forestry, livestock and fisheries)	• Farm land					W				
	• Farming household					Ⓦ				
	• Operation									
	• Production and distribution			V		W	W			
	• Machinery									
	• Facilities					W				
	• Organization									
C-3. Other industries	• Mining							W X		
	• *Construction*			V						
	• Manufacturing			V	V			W X		
	• *Wholesale and retail*									
	• Services									
	• *Other industries*									
D. Infrastrucre and facilities conditions										
D-1. Transport and communications	• Transport network									W
	• Transport means									
	• Communications means									
D-2. Basic production facilities	• Water utilization									
	• Agricultural facilities									
	• Other industrial facilities									
D-3. Basic living facilities	• Living environment facilties									
E. Organization and institutional conditions										
E-1. Administration and finance	• Local administration									
	• Local finance								W	
E-2. Related program	• Upper ranking program									
	• Related program									

Note: ☐ Mark means in detail information

by Government Agencies concerned.



and data available, ○ mark means some information and data available and no mark means only just little.

Table IV–2 reference books used in Table IV–1 are as follows:

1. National Socio-Economic Survey
   Indonesia,
   Survey Sosial Ekonomi Nasional, Tahap Ke-Lima
   September – Desember 1976
   Pengeluaran Untuk Konsumsi Penduduk
   Jawa-Madura, Luar Jawa, Indonesia
   Source: Biro Pusat Statistik Jakarta-Indonesia
2. National Income Statistics
   Main Tables of The National Income of Indonesia
   1971 – 1977
   31, August 1978
   Source: Biro Pusat Statik Jakarta-Indonesia
3. Industrial Statistics 1977
   Survey of Manufacturing Industries
   Volume I
   Source: Biro Pusat StatistiK Jakarta-Indonesia
4. Industrial Statistics 1977
   Survey of Manufacturing Industries
   Volume II
   Source: Biro Pusat Statistik Jakarta-Indonesia
5. Wilayah Pembangunan Utama-D
   Team Purvey Proyek Pembangunan Pertanian
   Regional/Wilayah
   Buku Di
   1976
   Source: Kerja Sama Antara Biro Perencanaan
   Departmen Pertanian Pengan Survey
   Agro Economi.
6. Monthly Statistical Bulletin
   Indikator Economi
   Nopember 1978
   Source: Biro Posat Statistik Jakarta-Indonesia
7. 1974/1975 Industrial Census
   Small Manufacturing establishments in South
   Sulawesi
   Volume X
   Pebruari 1978
   Source: Biro Pusat Statistik Jakarta-Indonesia
8. Daftar Tipe Dan Klasifikasi
   Tingkat Perkembangan Desa
   Tahun 1977/1978
   Source: Direktorat Pembanguman Desa Propinsi
   Sulawesi Selatan
9. Transport & Communication Statistics 1977
   Vehicles and Length of Road Statistics
   1977
   Source: Biro Pusat Statistik Jakarta-Indonesia
10. Transport & Communication Statistic 1974
    Manurt
    Golongan Barang, Daerah Asal Dan Tujuan Inter
    Insulair Traffic by Commodity Group, Region of
    Origin and Region of Destination
    1974
    Source: Biro Pusat Statistik Jakarta-Indonesia
11. Agricultural Statistics
    Planted Area, Production and Stocks of Principle
    Estate Crops
    Semester I
    1978
    Source: Biro Pusat Statistik Jakarta-Indonesia
12. 1973 Agricultural Census
    Number and Area of Crops by Type of Crops
    Untuk Daerah for Sulawesi
    Oktober 1976
    Source: Buro Pusat Statistik Jakarta-Indonesia
13. Agricultural Statistics
    Survey Pertanian
    Januari-April 1977
    Source: Biro Pusat Statistik Jakarta-Indonesia
14. Studi Tentang Pengembangan Wilayah
    Pembangunan Ujung Pandang
    Buku II
    Tahun 1975/1976
    Source: Bappeda Prop, Sul-Sel
15. Data Perekonomian Propinsi Dati I Sulawesi
    Selatan
    Tahun 1970/1975
    Source: Direktorat Perekonomian, Kantor
    Gubernur Sul-Sel. Ujung Pandan
16. Studi Tentang Pengembangan Wilayah
    Pembangunan Ujung Pandang
    Buku I
    Tahun 1975/1976
    Source: Bappeda Prop, Sul-Sel
17. Team Survey Monografi
    Monografi Kabupaten Pangkep
    Source: Sub Dinas Bina Program, Inspeksi Dinas
    Pertanian Rakyat, Propinsi Dati I Sul-Sel,
    Ujung-Pandang

18. Gowa Dalam Angka, Tahun 1975
    Propinsi Dati I Sulawesi Selatan
    Penerbitan I
    Source: Kantor *Sensus & Statistik Kabpaten*
    Pati II Gowa

19. Hasil Seminar Penyeragaman Data
    Propinsi Dati I. Sul-Sel.
    Tahun 1976
    Source: Bappeda Prop Sul-Sel:

20. Study Keterampilan Tenga Kerja
    Di Sul-Sel.
    Tahun 1975/1976
    Source: Bappeda Prop Sul-Sel.

21. Studi Tentang Problemaz Pelaksanaan
    Perencanaan Di Sul-Sel.
    Tahun 1975/1976
    Source: Bappeda Prop Sul-Sel.

22. Penduduk, Produksi, Pengadaan,
    Penyaluran, DSB.
    Beberapa Data
    Sulawesi Selanan
    Source: Dolog Solsel Ujung Pandang

23. Statistik Dolog Sulsel.
    Ujung Pandan
    1977
    Source: Bulog

24. Statistik Pertanian
    Nerace Bahan Makanan Di Indonesia
    Tahun 1975
    Oktober 1977
    Source: Biro Pusat Statistik Jakarta-Indonesia

25. Petunjuk Pelaksanaan
    Pengadaan
    Tahun 1977
    Source: Bulog

2. Current Maps of Topography, Land Use, Rivers and Roads, etc.

They have been obtained during the field survey (South Sulawesi and Bandung) as they seemed necessary for regional agricultural development planning.

A key map has been prepared to show the area coverage and contents of each map according to the scale of the map.

The right Table IV– 2 gives 6 contents on the vertical axis and 8 scales (1/2,500,000 to 1/25,000) on the horizontal axis.

Figures indicate the number of maps and contents.

Table IV–2 List of the Available Maps

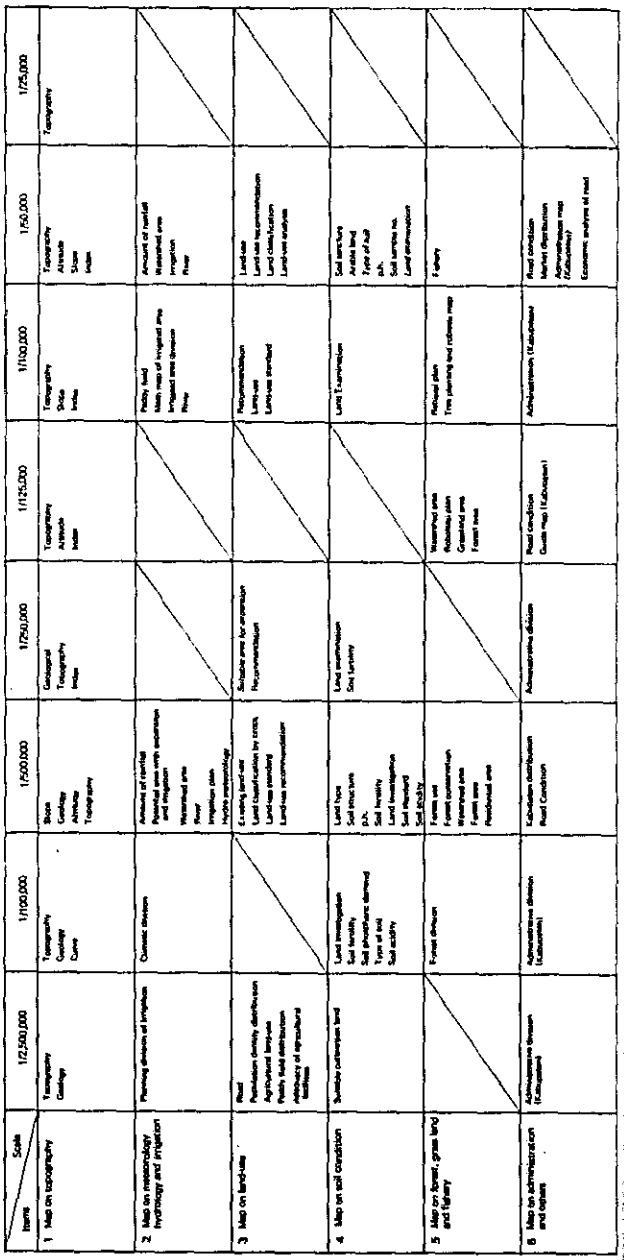


Fig. IV– 1 Map Index on the Scale of 1:1,000,000 (Indonesia)

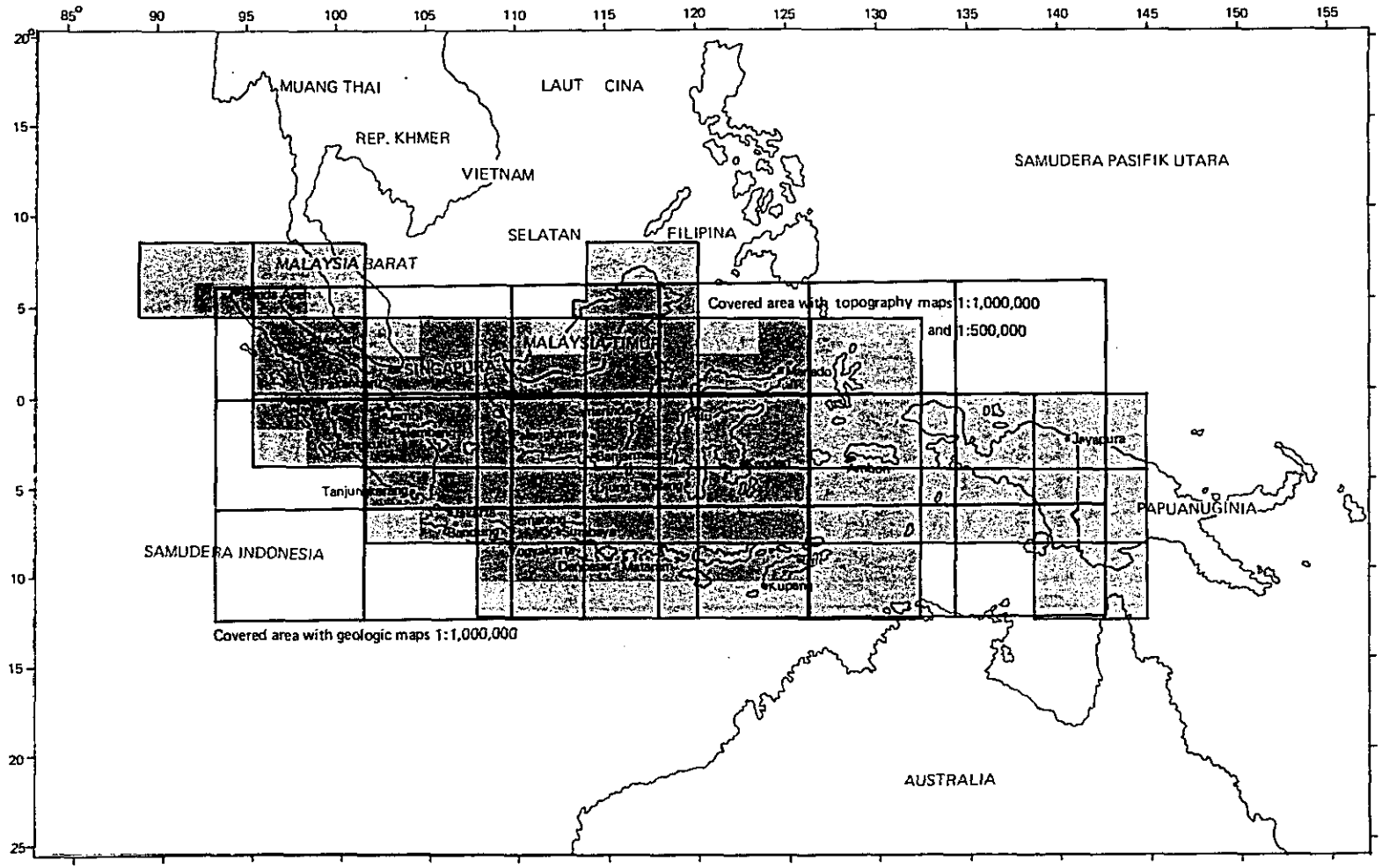


Fig. IV– 2 Map Index on the Scale of 1:2,500,000 (East Indonesia)

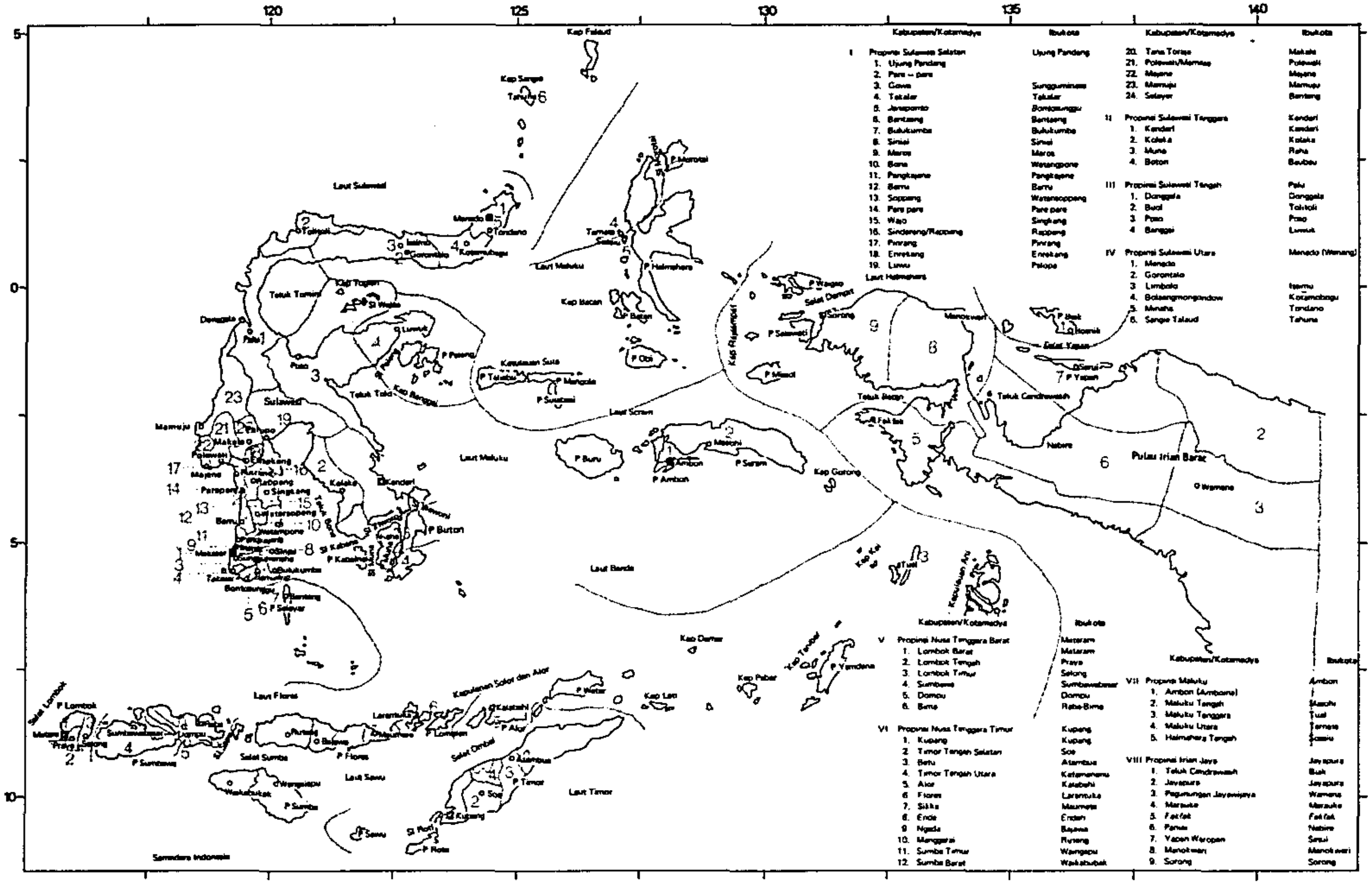


Fig. IV– 3 Map Index on the Scale of 1:250,000 (South Sulawesi)

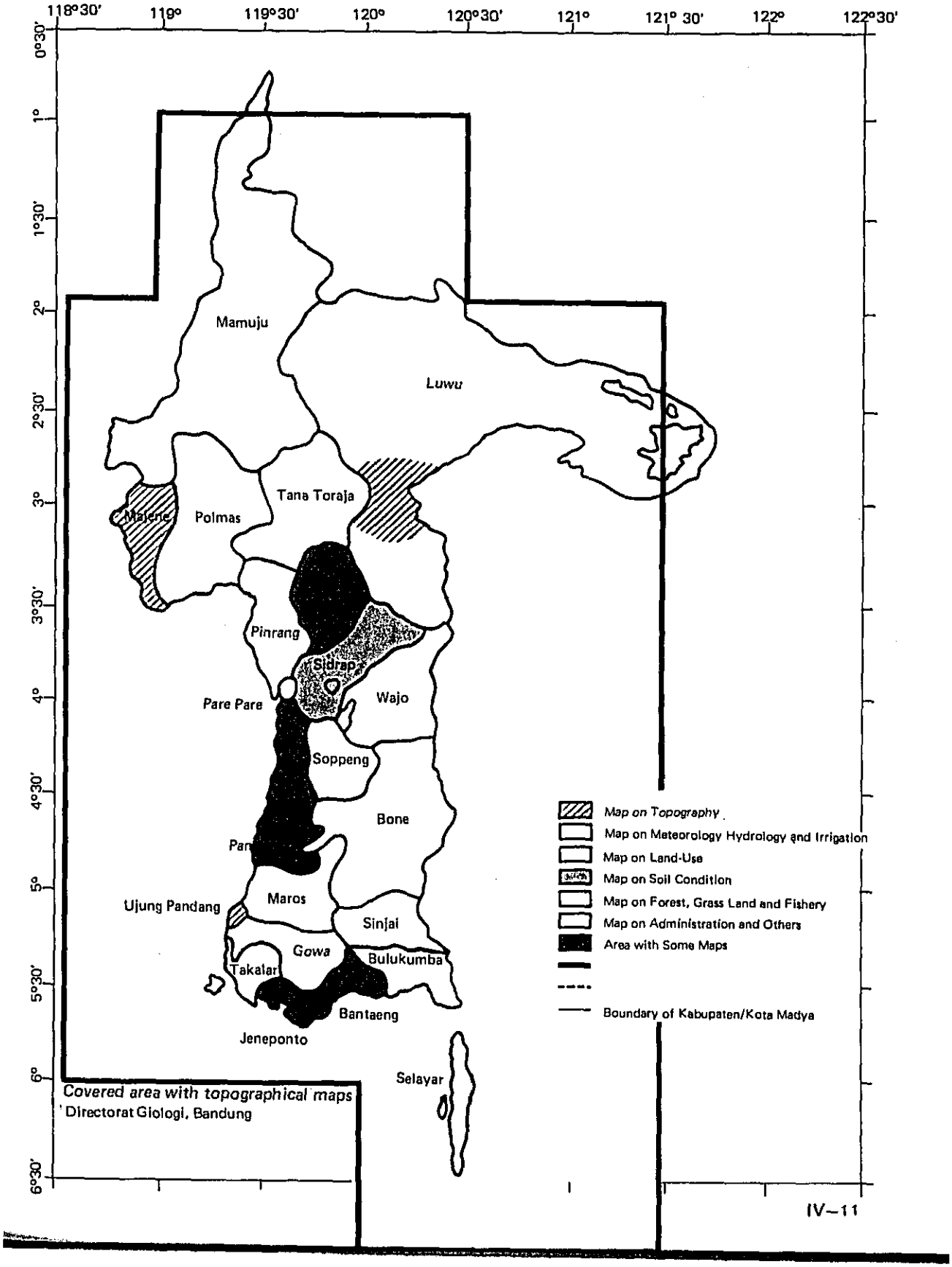


Fig. IV– 4 Map Index on the Scale of 1:125,000 (South Sulawesi)

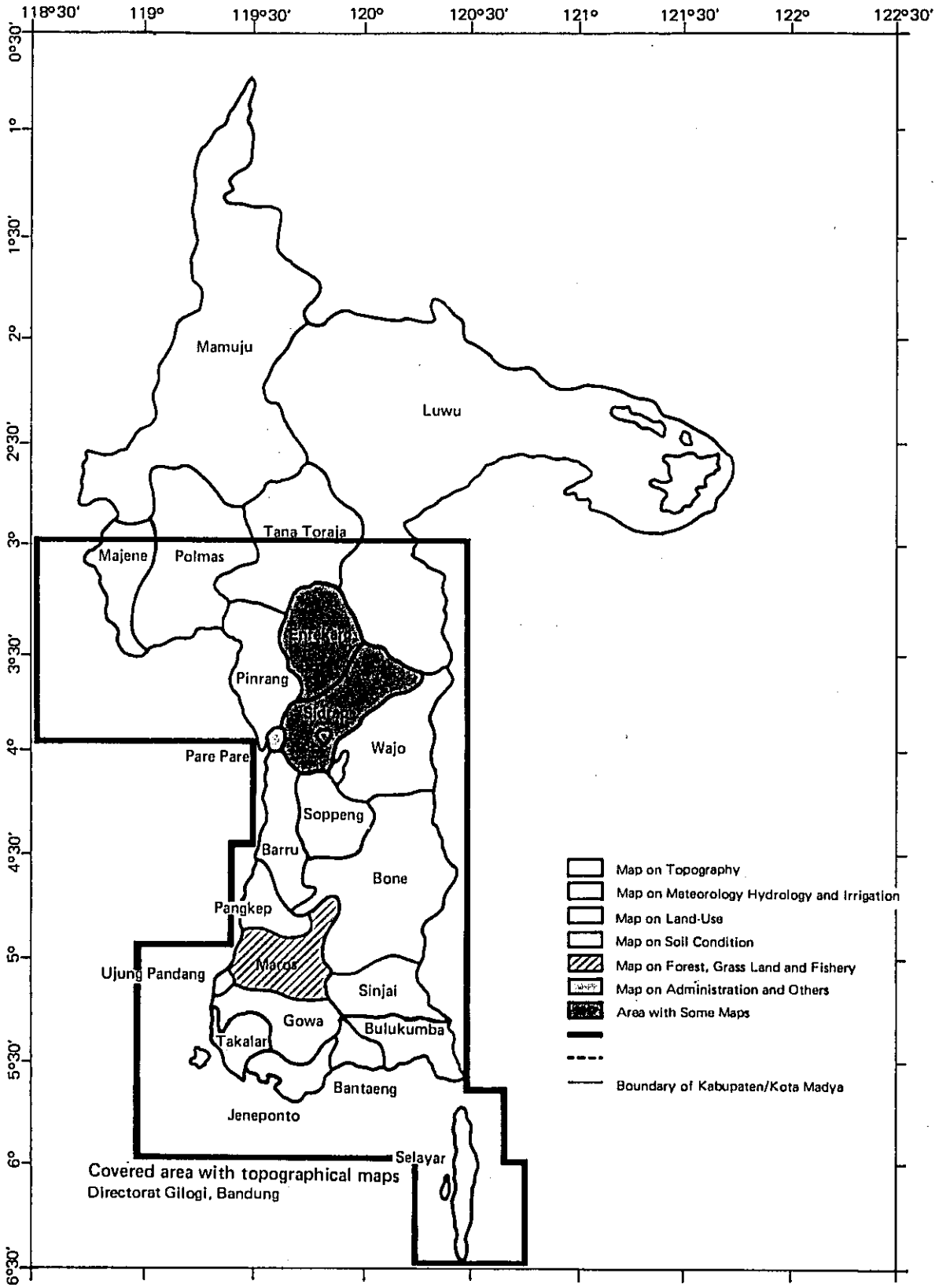


Fig. IV– 5 Map Index on the Scale of 1:100,000 (South Sulawesi)

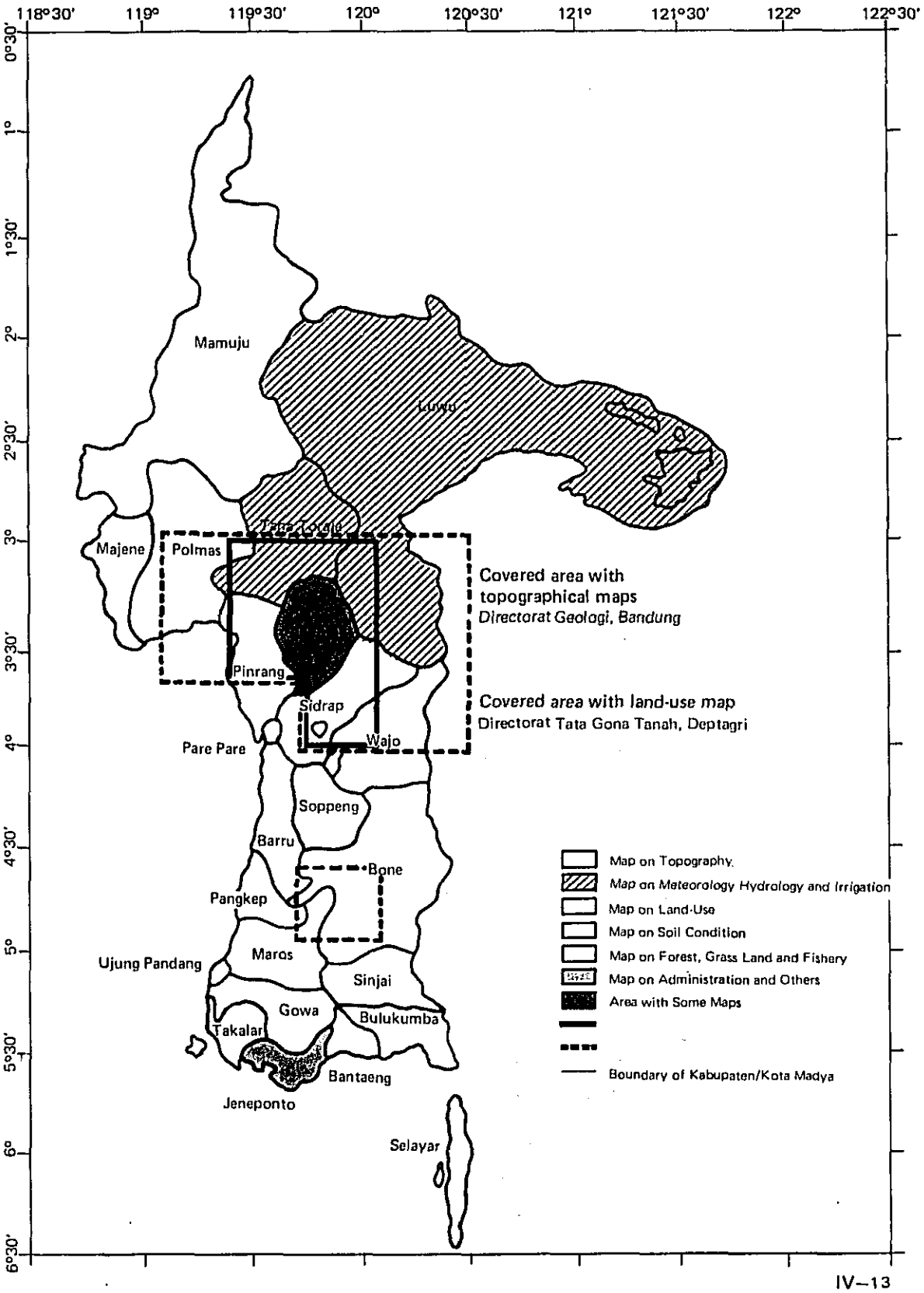


Fig. IV– 6 Map Index on the Scale of 1:50,000 (South Sulawesi)

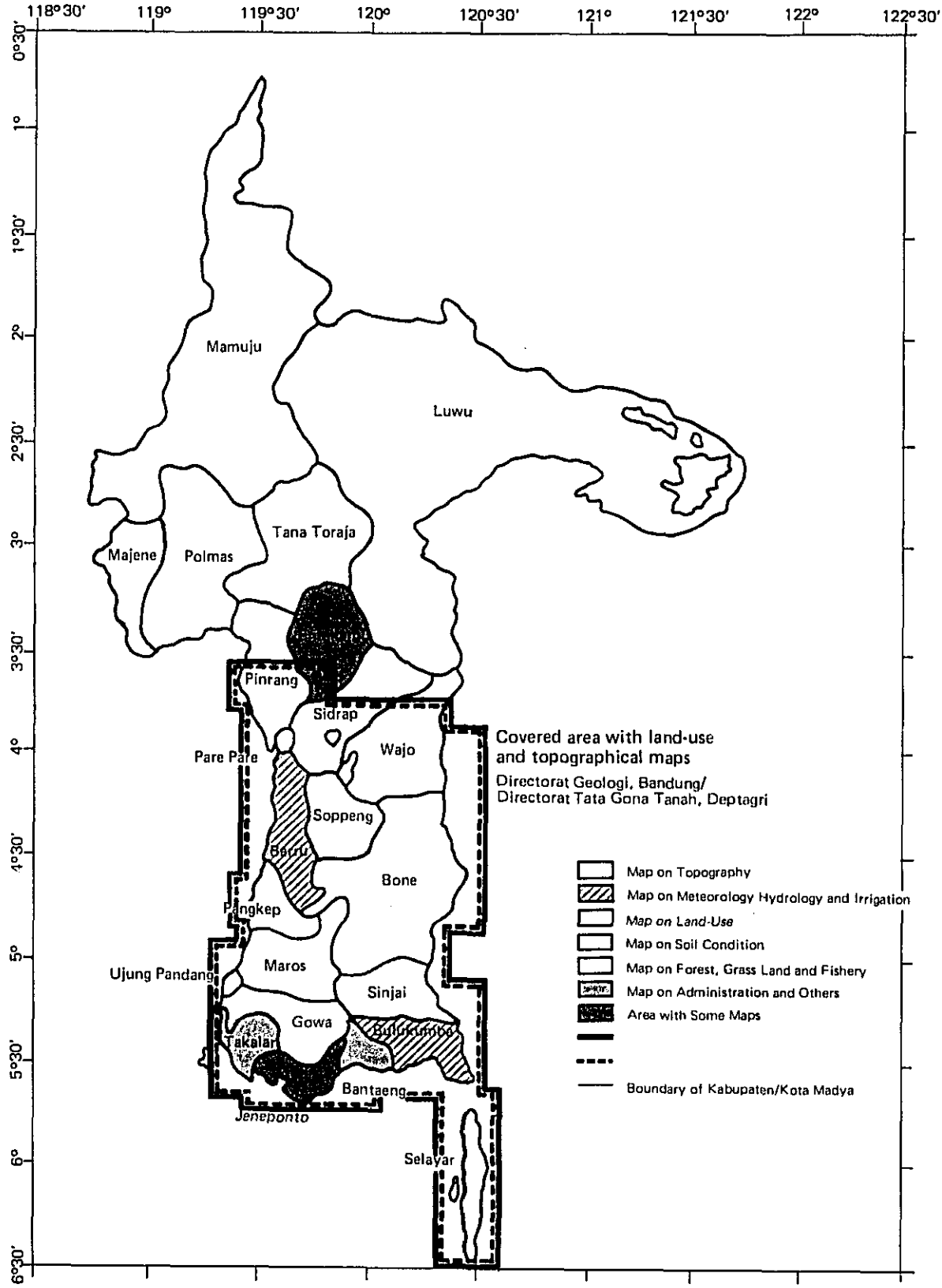
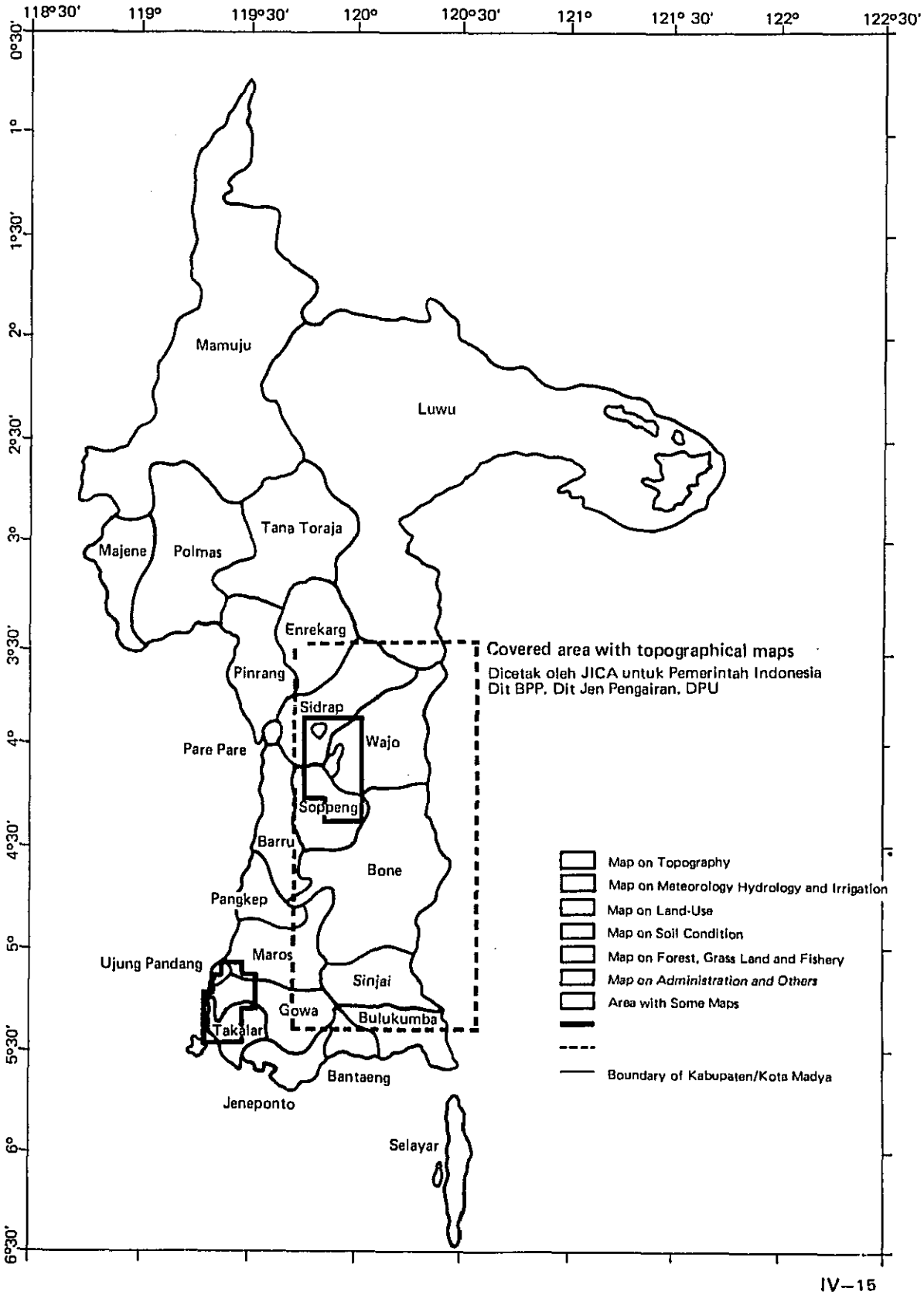


Fig. IV– 7 Map Index on the Scale of 1:25,000 (South Sulawesi)



3. Major Existing Survey Plans under Foreign and State Aid

These are major plans in force relating to regional agricultural development planning, particularly to entire regions.

The table gives the name of each plan, planning body, planning level, field, projected area, scale of map/plan, duration, etc.

(See Table IV– 4 on the right page)

4. Contents of the Projects Implemented during the REPELITA II Phase

This is to show what projects are in progress currently, by what agencies and with what financial sources.

Types of project, developing bodies and managing bodies placed on the vertical axis, and financial sources, e.g., state, province and IMPRESS, on the horizontal axis. Names of projects are included in the table.

Note: Please note that in order to list as many projects as possible, they have been arranged regardless of their scales, and also that some of them may have been wrongly placed due to misunderstanding in translation.

Bibliography:

– Laporan Tentang – Realisasi Pencairan Kevangan dan Perkembangan Fisik Proyek Pembangunan *Daerah Tingkat I Sulawesi Selatan* 1978/79 (s/d 31 Dec. 1978)

  Source: BAPPEDA SULSEL

– Laporan Tentang – Realisasi Physik/Finansil Proyek – Proyek Program Bantuan Pembangunan Kabupaten/Kotamadya
  Team Pembina Program Bantuan Pumbangunan SULSEL 1974/75 – 1977/78

  Source: Kepala Biro Pembangunan, Ujung Pandang 25 Jan. '78

– Laporan Tentang – Realisasi Pelaksanaan Program *Bantuan Pembangunan Sekolar Dasar* (IMPRES SD)
  SULSEL 1973/74 – 1977/78

  Source: Kepala Biro Pembangunan, Ujung Pandang 25 Jan. '78

(See Table IV– 5 on page IV–16 ~ 17)

Table IV– 4 Major Existing Plans

Characters of plan / Name of plan	Planning body
Sulawesi Regional Development Sutdy – Drfat Final Report	Department of Public Works – Directorate General of Housing Building *Planning and Urban Development* – Directorate of City and Regional Planning in Cooperation with Canadian International Development
South Sulawesi Regional Agricultural Development – Planning/ATA-140 Project Final Report on Phase 1 – *Volume 1* A Master Plan on South Sulawesi Resional Agricultural Development	The Term of the Project on South Sulawesi RADP/ATA-140 in Ujung Pandang The Ministry of Agriculture, Indonesia *Japan International Cooperation Agency*, JICA
Retunjuk Pengolahan Date Dan *Penyusunan – Klasifikasi Tipe* – Tipe Desa * Not under the aid.	Direktorat Dembangunan Desa Propinsi Sulawesi Selatan, Indonesia
Industrial Estate Development in Ujung Pandung	*BKPM, BAPPENAS, Ministry of Industry*, South Sulawesi Provincial Kovernment, Project Team, Ujung Pandang City, Indonesia Japan International Cooperation Agency
Report on Feasibility Study for Model Shrimp Pond In Jeneponto South Sulawesi Province	The Term of the Project on South Sulawesi RADP/ATA-140 in Ujung Pandung. *The Ministry of Agriculture, Indonesia* The Team of the Project on South Sulawesi RADP/ATA-140 Japan International Cooperation Agengy
Irrigation Development for the North Luwo Plain	Ministry of Public Works and Power Directorate General of Water Resources Development, Indonesia Ministry of Foreign Affairs Directorate of International Technical Assistance, Netherlands

Term of study	Stage of plan	Nature of plan	Area involved	Scale of plan	Period of plan	Brief description
1976 ~ 1978 (Study term) Dec. 1978 Published	Policy and Master Planning	Comprehensive	Provincial	1:250,000	1984	1. The perparation of a regional development study focusing on the Indonesian third five year plan time period (REPELITA III, 1979–1984) and designed for use in the REPELITA III development plans prepared by the National and Provincial Development Planning Boards; 2. Identification of a number of priority regions and preparation of project proposals for their regions; and 3. On-the-job training of Indonesian staff to upgrade the Indonesian capacity to carry out regional development planning.
1976 ~ 1979 (Study term) Feb. 1979 Published	Master Planning	Agriculture	Province 72,781km^2 (South Sulawesi Province)	1:500,000	1990	1. Survey and analysis concerning agriculture in South Sulawesi Province; 2. Review of the Repelita II formulated by the BAPPEDA and other existing projects and recommendations thereon; 3. Drawing up of sector plans in conformity with the plan mentioned in 2.; 4. Drawing up of the implementation plans including project preparations and feasibility study for agricultural development projects in certain agencies in conformity with the mentioned plans.
Annual 1977 Published	Survey and Analysis	Social	Province (By Desa) 72,781 km^2 (South Sulawesi Province)			This report is a result of the survey and study conducted on the extent of modernization in the villages of South Sulawesi. The report contains evaluation in three stages of nature, population, position, production, topography, educational and cultural facilities, and cooperative organizations for each Desa in the province. Finally the evaluation is given a score which shows the stage of development in each Desa.
1976 (Study term) Sep. 1976 Published	Project Planning	Industry	City 1.6km^2 (City area) about 200ha (Industrial estate area)		1990	1. Present condition and future survey of development in Ujung Pandung. 2. Significance of constructing industrial estate in Ujung Pandung. 3. Investigation of proper scale and site proposed for industrial estate from viewpoint of city planning and regional planning. 4. Analysis of present industrial development in south Sulawesi and investigation of its strategy. 5. Investigation of industrial classification proposed for invitation. 6. Conceptual layout of industrial estate.
1978 ~ 1979 (Study term) Feb. 1979 Published	Project Planning	Agriculture	Kabupaten 18.7ha (Project site)	1:250,000		Drawing up the implementation plans including project preparations and feasibility study for agricultural development projects in certain regencies (Enrekang and Jeneponto) in conformity with the Master Plan of the South Sulawesi Province, which was planned in the 1st Phase.
1973 ~ Mar. 1977 Published	Master Plan Project Plan	Comprehensive with Agricultural Oriented	1,930km^2	about 2000		The objectives of The Project are the increase of the agricultural production of the region and the improvement of te living conditions of the rural population. In order to achieve these goals it is envisaged, that a number of irrigation schemes will be created for the production of wet sawah paddy on small-holders farms.

Table IV- 5 List of the Current Projects

Items / Categories	Types of projects	Department	Financial sources: Central	Local	Impress
Public administration	*Improvement to lower level establishments*	Kejaksaan Agung	●	●	
	Improvement inthe basic facilities of the central statistical instutute	Non Departemen	●	●	
	Development and perfection of statistics	"	●		
	Improvement in the facilities and basic equipment of the migration bureau	Kehakiman	●	●	
	Establishment of law.	"	●	●	
	Improvement in the facilities and basic equipment of the court	"	●	●	
	Re-training of the capability of the messes	"	●		
	Improvement in the basic equipment of the social research institute	"	●		
	Improvement in the equipment of detention facilities	"		●	
	Improvement in local financial control	Keuangan	●		
	Improvement in tax collection	"	●		
	Improvement in the efficiency of expenditure by the budget control bureau	"	●	●	
	Local financial agency building plan	"		●	
	Betterment of tax collection system	"	●	●	
	Programming of working rule	Nakertranstkop	●	●	
	Manpower planning at central and local level	"	●	●	
	Improvement of basic equipment for related offices	"	●	●	
Communication	Mass media by radio and TV	Penerangan	●	●	
	Training of staff at the ministry of information	"	●		
	Establishment of public information activities	"	●		
	Improvement in the facilities of the ministry of information	"		●	
	Public information operation plan.	"		●	
Public order and environment conservation	Protection forest. Flood prevention.	Non Departemen			●
	Land use act.	Dalam Negari	●		
	Political stabilization	"	●		
	Improvement in police mobility and facilities	"		●	
	Protection and improvement of rivers	P.U.T.L	●		
Transportation	Special state aid	Non Departemen			●
	Construction and restoration of rural roads and bridges. Bus stations. Ports	"	●	●	
	Improvement in facilities for road and traffic observation	Pertambangan	●	●	●
	Improvement in port and harbor facilities	"	●	●	
	Improvement in navigational safety	"	●	●	
	Construction of a navigational school.	"	●	●	
	Experimental convoys.	"	●	●	
	Improvement in state survey and relief capability.	"	●	●	
	Improvement in transport service.	"	●	●	
	Protection, restoration and improvement of roads and bridges.	P.U.T.L	●		
Agriculture	Installation and restoration of irrigation facilities.	Non Departemen			●
	Development and survey of food crops.	Pertanian	●	●	
	Development of the livestock industry.	"	●	●	
	Group guidance.	"	●	●	
	Development of fisheries.	"	●	●	
	Development of plantations.	"	●	●	
	Afforestation of river basins.	"	●		
	Training in agriculture and forestry.	"	●	●	
	Survey of cross-bred coconut trees.	"	●	●	
	Improvement in the basic facilities of government agency buildings.	"	●	●	
	Survey of forests.	"	●	●	
	Development of silk production.	"		●	
	Irrigation, collection of hydrological data.	P.U.T.L	●	●	
	Survey of water sources.	"	●		

Market and manufacturing	Market	Perdagan			●
	Establishment of cooperation projects and guidance.	"	●	●	
	Personnel training for cooperation projects.	"	●		
	Promotion of exports	"	●		
	Development of small and medium industries and guidance.	Perindustrian	●	●	
	Development survey of local industries.	"	●		
	Chemical research institute.	"	●	●	
	Technical school education.	"	●	●	
Health & medical care	Eradication of infectious diseases.	Kesehatan	●		
	Guidance for social mental health	"	●		
	Planning statistical survey.	"	●		
	Development of social health centers and public hospitals.	"	●		
	Improvement in the safety of foods and medicine.	"	●	●	
	Eradication of infectious diseases.	"		●	
	Improvement in health facilities.	"		●	
	Improvement in social mental health service.	"		●	
Water supply and sanitary	Manual pump for water supply.	Non Departemen			●
	Survey of water sources and planning.	P.U.T.L	●	●	
	Drinking water plan.	"	●	●	
	Collection of scientific data regarding water.	"	●	●	
Education and culture	Construction and restoration of state and private elementary schools.	Non Departemen			●
	Vitality and organization of the young generation to be established.	Pendidikan & Kebudayaan	●		
	Protection of archeological remains.	"	●		
	Athlets to be fostered.	"	●		
	Survey of the language and literature of Indonesia.	"	●		
	Basic social education to be established.	"	●		
	Expansion and development of museums and libraries.	"	●		
	Construction of various schools and installation and improvement of various facilities. (excluding elementary schools).	"	●		
	Vitality and organization of the yough.	"		●	
	Protection of archeological remains.	"		●	
	Establishment of basic social education.	"		●	
	Improvement and restoration of museums, development of libraries.	"		●	
	Development, construction and improvement of various schools.	"		●	
Religious	Construction and restoration of *private Islamic schools.*	*Non Departemen*			●
	Clarification of Islamic guidance and teaching.	Agama	●		
	Improvement in the basic facilities of the Ministry of Religion.	"	●		
	Improved religious education at school.	"	●		
	Aid to the construction of mosques.	"	●		
	Resturation and improvement of Islamic schools.	"	●		
	Improvement in the quality of Islamic schools.	"		●	
Energy supply	Gas supply	P.U.T.L	●	●	
	Power supply.	"	●	●	
	Improvement in the equipment for supplies.	"	●	●	
Urban and rural	*Land-use Act.*	Dalam Negari	●	●	
	Improvement and stabilization of landownership.	"	●	●	
	Observations and mapping of the linkage between migrated areas.	"	●	●	
	Replacement of rural residential areas.	"	●	●	
	Topographical land survey for land use is migrated areas.	"	●		
	Repairing of housing in residential and village areas.	P.U.T.L	●	●	
	Provision of residential area for migrants.	Nakertranskop		●	
	Development and construction of migration village.	Social	●	●	
	Development project of migration area.	"	●	●	
	Construction of industrial vocational center.	"	●	●	

Afterword

To Indonesia, South Sulawesi is a valuable land rich in natural and human resources which has up until now experienced little infrastructure development. The causes of this are the province's being externally governed and its lagging behind on the fronts of technology, the development of administrative systems and other organizations, and in the taking of measures to improve the situation.

On the other hand, according to Repelita the province can be made into the real center of East Indonesia (D Zone), and from the naional point of view very high hopes are pinned on it as a land with high development potential. In this respect, the development of agriculture with the constructive policy of having this province become the food-supply base for Eastern Indonesia is particularly impressive. With this background, the role of the planners in South Sulawesi becomes very important.

The questions for the province are: What kind of image is seen for Sulawesi's future? To make this image reality — what kind of measures need to be taken? How can the growth and stability objectives be spatially and temporally solved? — there is so much that the area's planners have to keep under basic consideration.

This report presents from various angles the issues involved in creating a plan which will serve as a tool for bringing about the realization of ideas for the agricultural development of South Sulawesi.

This tool called a plan can be fruitfully or impotently used depending on the user. It goes without saying that it is necessary for the person actually applying the plan to amend and innovate where needed.

It is our hope that the plan elaborated in this report will be used as a tool by many persons who will take it up as their own, and find it to be a solid instrument for the development of South Sulawesi.

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CONTENTS: