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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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METHODOLOGY FOR THE ASSESSMENT, PROGRAMMING AND MANAGEMENT OF PRODUCTION AND CONSUMPTION SYSTEMS

User's Guide

Sectoral Studies Series
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Main results of the study work on industrial sectors are presented in the Sectoral Studies Series. In addition a series of Sectoral Working Papers is issued.

This document presents major results of work under the element Food-processing Industries in UNIDO's programme of Industrial Studies 1986/87.

Preface

This document contains a guide to the practical use of the methodology for processing and programming food production/consumption systems (MEPS).

In addition to the present guide there are three other documents for the application of MEPS to a given industrial sector and for its full implementation in a specific country: the MEPS Reference Manual, the MEPS User's Guide for the consultant and the MEPS Computer Manual. The present user's guide has been designed to establish a link between the reference manual and the computer manual.

The reference manual details the theory and construction of MEPS and gives a clear exposition and a comprehensive description of all possible applications of MEPS. The computer manual indicates how to functionally operate MEPS software while the user's guide indicates the steps required to select and practically handle the sort of data actually available, and to synthetize, manipulate and format those data in a way that will allow the MEPS computer numerical model to process them.

Though being generic in nature, the present guide gives specific examples to illustrate the different phases of work to be performed. Examples correspond to previous applications of MEPS to the assessment and programming of sub-sectors, such as fisheries, oils and fats and cereals.

It is hoped that with the availability of the present user's guide the application of MEPS for assessing and programming production/consumption systems will be facilitated and encouraged. The user's guide should minimize the duration of training of local teams thus accelerating the successful transfer of MEPS to developing countries.

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1. INTRODUCTION

MEPS is an acronym for "Metodología de Evaluación, Programación y Gestión de Sistemas de Producción y Consumo", or translated into English, Methodology for the Evaluation, Programming and Management of Production and Consumption Systems.

MEPS was originally developed by the Junta del Acuerdo de Cartagena (JUNAC). JUNAC in co-operation with the United Nations Industrial Development Organization (UNIDO) has further developed this methodology. MEPS permits the practical assessment and programming of industrial production and consumption systems. It considers all economic, technological and policy variables that affect a given system, the linkages between its components and the interdependence between micro and macro aspects as well as the relationship between economic policy instruments and the system and its components.

A production and consumption system can be defined within MEPS as the set of interrelated productive components within a particular institutional framework, which has as objective the satisfaction of a particular consumption need.

The principal tool of the methodology is an accounting and engineering simulation model, containing a great number of equations, in which the parameters relating to production, inputs, investments, manpower, imports, etc. are estimated for each component and for the system as a whole. Exogenous data are fed into the model. These data are obtained from the analysis at the stages of disaggregation and identification.

The advantages of this methodology over conventional methods of techno-economic assessment and programming of the development of industrial sectors are the following:

(a) Development programmes are generally formulated with a macro-economic focus with reference to national economic policies and with a micro-economic focus when a specific project is formulated and assessed. This methodology combines the macro and micro analysis and makes it possible to assess the development programme on both levels and at the same time, determining the necessary policy measures to make it viable;

(b) The use of this methodology allows an immediate comparison between different technical and/or economic operations facilitating the decision making;

(c) It links the methodology directly to the components of the production and consumption system and allows the assessment of the interaction effects between supply and demand;

(d) The methodology measures the sectoral interdependence of a given system, thereby facilitating the analysis of the integrated development of industrial systems and also allows a quantitative assessment of the different interactions of options, vertically as well as horizontally;

(e) The integrated development of an industrial sector is understood as the linked development of production/consumption systems in which the feasibility of a project in a given component of a system meets a high degree of interdependence with the feasibility of the project in other components of

the system. To promote the linked development of all components it is necessary to develop studies and actions together and this can be achieved by applying this methodology.

There are two overall objectives of MEPS. The first is to evaluate and assess in an efficient and consistent manner a current industrial production/consumption system. The second objective is the integration of MEPS into the decision-making process of a country's policy making bodies. This latter objective requires the establishment of a local multi-sectoral team within the government. The fulfilment of these objectives implies the training of a multi-sectoral team in the selection and systematization of specialized techno-economic information as well as in the use of the MEPS computer numerical model.

The present guide facilitates the attainment of these objectives by giving clear instructions on how to carry out the data collection, its systemization and utilization. For example it answers questions on which enterprises to select for data collection, which base year to use, etc. Specific examples are provided and screens from the software are included for illustrative purposes. The user is taken step by step from the definition of development objectives of a given production/consumption system to the selection of the minimum structural components and processing stages to be included in the system, through the disaggregation, assessment and programming stages.

2. DEFINITIONS, RESOURCES AND PROCEDURES

2.1 The model

MEPS uses, as a quantitative tool, a numerical simulation model. Using mathematical language, this model expresses the techno-economic inter-relationships between the variables making up a given system.

It is an accounting model using a combination of variables or equations defining variables, enabling the calculation of results as a function of exogenously determined coefficients and parameters.

The model has been transferred to a microcomputer in order to be applicable to a large number of countries. This model contains relations of functional behaviour, however, the relations do not reflect preconceived theories, on the contrary, the inputs are coefficients which are strictly technical and controllable. Simulation of economic policies can be introduced into the model and using the equations of the model, the effect that the simulated policies can have on the system itself and on the remainder of the economy can be measured.

The model is different from econometric projection models which are based on an analysis of historical data and it is also different from models of optimization which imply the aggregation of results in a unique objective function. It is not a predictive model but an instrument to facilitate the comparison of hypotheses based on alternative policies through successive approximations.

In general terms, the model makes it possible:

(a) To calculate the sectoral demands derived from the production of final goods, based on the level of disaggregation of the components linked to this production;

(b) To determine the effects of operating the system on resources (natural, external, investment and financial) and on agents (wages, profits, taxation);

(c) To analyze intersectoral linkages (concerning technology, marketing and state intervention) in the determination of prices;

(d) To reflect through a combination of indicators the specific features of the system as related to the rest of the economy.

The calculation process is carried out through a series of simulations at different levels of demand for final goods, exogenously defined and differentiated. This demand will determine levels of production of final goods which in turn will require the production of inputs, services and capital goods. In general, the levels of production will be determined by the volume requirements for its utilization in other components within the system, and so on up to the point where the demand for final goods is determined.

The performing of different simulations with changes in specific coefficients (technical, economic, income distribution, policy, etc.) allows an assessment of these alternatives, leading in turn to the drawing of final conclusions from the study and the formulation of corresponding policy recommendations.

2.2 The base scheme

In order to define the boundaries of a production and consumption system a diagram, the base scheme, is used. It represents a specific system and its consumption and production components and the policies that affect it. An example is shown in figure 1.

A production and consumption system's base scheme covers:

(a) Final consumption/demand structure: population and income shown in figure 1 as two superimposed opposite triangles;

(b) The final consumer goods industry. For example domestic appliances, processed foods, motorcars, etc;

(c) The sectors producing the goods and services needed for production in the final goods industry. These productive and service sectors are: agricultural intermediate and final goods, intermediate goods industry, productive services, and the capital goods industry;

(d) Storage, transport and distribution activities, required for the exchange of goods and services between the agricultural, intermediate goods, capital goods and productive service sectors, and the final goods industry, together with activities needed to distribute final consumer goods. The activities are shown in figure 1 as the symbols W, T, and D (W = warehousing and storage, T = transport, and D = distribution);

(e) The import of final goods, intermediate goods and services destined for final consumption by both the population and all productive activities. Imports are designated by the letter M in figure 1;

(f) The export of goods and services provided by the productive sectors involved. Exports are shown by the letter X in figure 1;

(g) The policies expressly regulating the functioning and behaviour of the system as well as policies concerned with relationships between the systems components. These policies are:

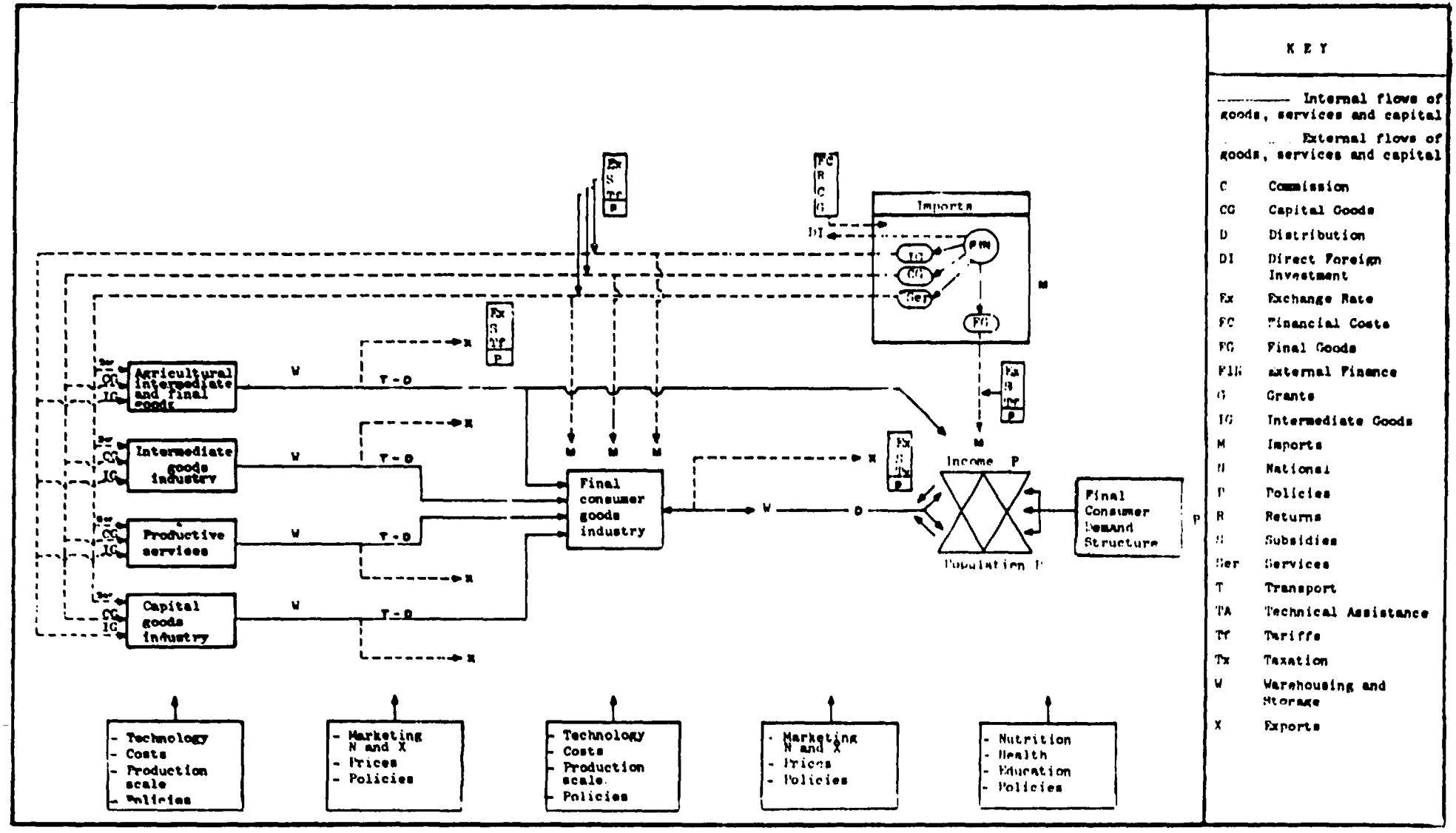
(i) Policies concerned with the consumer: income, population, nutrition, health, etc.

(ii) Policies relating to productive activities: wages, taxation, finance, ownership, etc.

(iii) Policies concerning relationships between the components of the system:

- Relationships between national components: policies with regard to prices, subsidies, finance, taxation, etc.;

Figure 1. Production and consumption system, base scheme



- Relationships between national and international components: policies concerned with export promotion, tariffs, taxation, foreign exchange, etc.

The relationship between the complete set of components making up the system is not a simple one consisting only of the exchange of goods and services, but rather a structural one with a consequently high degree of interdependence. This interdependence is interactive in character, so that any change occurring in one of the components tends to modify the whole, in a variety of ways and to a varying extent. For example, an increase in the cost of foreign exchange (caused by fluctuations in the exchange rate) changes the prices of imported inputs, thus altering the cost structure and affecting the final value of a good and/or service produced anywhere in the system.

The system shown in the base scheme implies a sequential chain of inputs and products. It is a system in which the components may be situated in a variety of geographical locations, both within the country and internationally.

The idea of a production and consumption system can be applied to a variety of consumer goods or services, both at the aggregated or sectoral level and to groups of products or individual goods. The degree of disaggregation will depend on the desired objectives.

2.3 The productive structure

The productive structure is the basic tool for analyzing productive components and consists of a table (see table 1) including:

(a) Factors of production (inputs of services, capital goods, natural resources, labour) required for the production of a good and/or service;

(b) The components of value added (salary/wages, taxation, gross savings, returns);

(c) Price components for each of the factors;

(d) Value of production; and

(e) Market or destination of products and by-products.

The productive structure concept is a techno-economic tool for analysis and programming of the input-product type. It has inputs, such as capital goods and production services, and products, such as the good or service produced by using these productive factors.

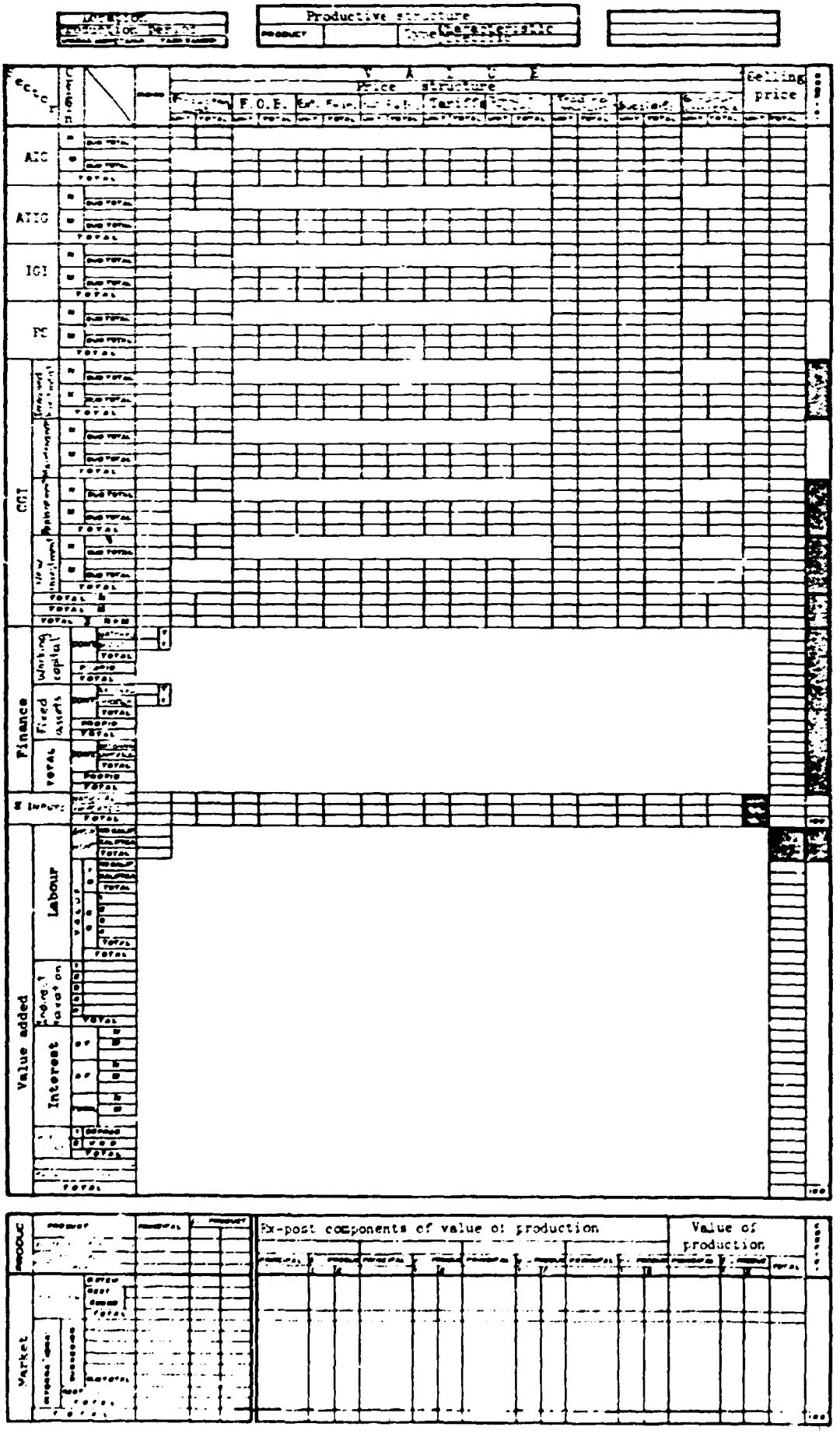
With the productive structure it is possible:

- To assess production technologies (input-input and input-product ratios);

- To assess the price structure of each of the factors of production;

- To assess the composition of value added;

Table 1. Productive structure



- To assess cost structure;

- To assess the effects of the instruments of economic policy (tariffs, exchange rates, interest rates, subsidies, taxation, etc.) on a productive component;

- To assess national and international relationships of the components;

- To design and select technological and economic policies.

2.4 Resources needed for applying MEPS

(a) Human resources

The multisectoral approach on which MEPS is based implies that any application should be done by a multidisciplinary team. The basis of MEPS is to integrate the different sectors of a particular system. Due to the fact that almost all the current planning analysis is done sectorally, and that a system spans various sectors, the working team of MEPS must be formed of people with different sectoral backgrounds. Furthermore, the analysis of MEPS implies the gathering of specialized information in many areas, thus a multidisciplinary team is recommended.

The above appears to imply that the working team has to be formed by a lot of people and at a huge cost. However, the participation of many of the members of the group is only periodically required and the permanent working team is usually reduced to two persons. The following is a description of the teams and of their functions.

(i) Permanent team

Function: This group must be in charge of the management of all the MEPS application processes.

Members: Two persons with a deep knowledge of MEPS and with a background in economics or industrial engineering.

(ii) Local team

Function: Acquaint the MEPS permanent team with the actual local conditions of the system, within a national development framework. This team should participate in:

- Defining objectives
- Base scheme design
- Simple disaggregation
- Selection of feasible alternatives
- Final selection of alternatives
- Programme design.

Members: The number of persons included in this team may vary, but people with the following background are suggested:[1/]

1/ When applying MEPS to agroindustrial systems. Adjustments should be made for other applications.

- Agricultural planning - to assist primarily in all the agriculture components, and also to give advice on the actual situation and the domestic potential.
- Agroindustry - basically with the same functions as above, but in the agroindustry field.
- Industrial planning - same as above, in the industry field.
- Economics - basically to link the system with the macroeconomic priorities of the country, as well as to design alternative economic scenarios for the local economy.
- Economic agents - should be the link between the planning process and the implementation phase. Industrial associations could fulfil this role. Their presence will also be useful to assess attitudes and interests of the private sector. Also, their presence provides a means of detecting private interest in project implementation.

(iii) Expertise team

Function: This team will be responsible for the technological and techno-economic data required and will participate mainly in the following steps:

- Base scheme design
- Structural disaggregation
- Options search
- Data validation.

Members: The number and field of expertise will vary according to the components involved in the system. In general, the people involved in this team should have an outstanding knowledge of the following factors:

- Technology
- Raw materials
- Final goods and their variety
- By-products and potential use
- Inputs and packages
- Links with other industrial activities
- Production costs
- Investment and equipment costs
- Raw materials, inputs and final product prices
- Yields
- Legislation.

These three teams will form the MEPS working team, and will have as aids the following sources:

- MEPS main manual
- MEPS user's guide
- MEPS consultant's guide
- MEPS software manual

(b) Technical resources

The MEPS model was devised for operation on personal microcomputers and its design was based on the Lotus Spread Sheet. It was developed on an IBM Personal Computer but other types of computers can be used provided that they support the Lotus 1-2-3 software package running in the MS-DOS operating system.

The equipment listed below is necessary for executing the programmes. This equipment also enables the programmes to be run simultaneously with the printing of output:

- CPU with a RAM memory of at least 512kb
- Two double-sided, double-density disk-drives
- Monochrome display
- 80 column printer.

2.5 User's manual general operation procedure

This section explains the procedure used by the present manual to apply MEPS to a production-consumption system (see figure 2).

The starting point of any MEPS application is the definition of objectives. The next step is to collect the background information in order to identify the main components of the system. This information should allow the working team to draw a first draft of the base scheme.

With this first draft the data collection process should be organized. This has three purposes: first, to define more precisely the components of the base scheme; second, to develop later on the simple disaggregation phase; and third, to begin the construction of the productive structures for the components of the system. On the basis of the data collected and a better knowledge of the system, the objectives can then be adjusted if considered necessary.

At this point the definite base scheme is designed, based upon the data collected, the first draft of the base scheme and the objectives of the study.

Once the base scheme has been defined, the simple disaggregation step follows. This step consists of a traditional diagnosis of each of the components of the system, in order to assess the overall situation and also to identify the potential development of each of the components.

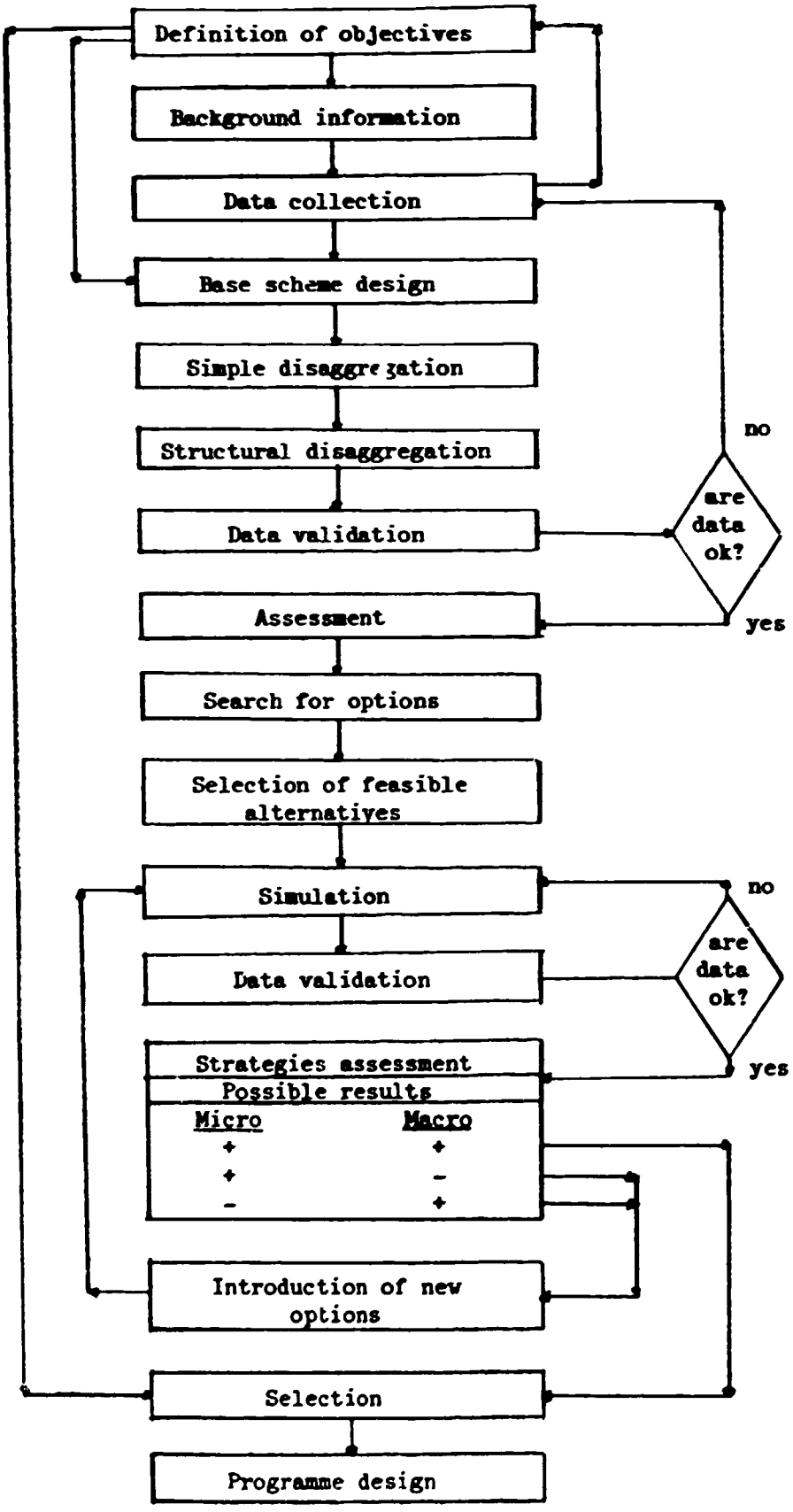
The structural disaggregation of the productive components is the process of filling in the productive structures for each one of the productive components. This structural disaggregation process allows through the use of MEPS to assess the system.

After the structural disaggregation, the next step to be undertaken is data validation. The first output, the initial situation of the system should be checked as to whether it is an accurate representation of the real system. If this is not the case, the data input should be reviewed and modified, or even the base scheme may have to be modified.

After the validation process has shown the data to be in order, the next stage is the assessment of the system; this assessment is performed at various levels: productive structure, inter-components, intra-system, and at the aggregated system level. The objective is to identify the advantages and disadvantages of the present system and its components.

After the assessment of the system, the seeking of new options follows. This process has as objective the identification of economic, technical and policy options that could be implemented in the system, in order to improve the performance of the productive components as well as the system as a whole.

Figure 2. Operational sequence for a hypothetical MEPS application



The options identified are analyzed. The combinations of feasible options give different alternative strategies for the development of the system. This step is called selection of feasible alternatives. An alternative strategy includes several options, but only one of a kind for each component. The final purpose of this step is to set up alternative development strategies that can be implemented in the system.

The simulation of each one of the strategies defined before is the next step of MEPS application.

After the strategies have been simulated, there must be a data validation analysis in order to check the validity of the input data through checking the validity of the output.

The next step is the strategies assessment; this is done by using the same levels described in the former assessment procedure. At this point the strategies are assessed individually. If the results are positive at the micro and macro levels, then the next step is the selection of the best alternative strategy; but if the assessment shows negative results for one or both levels, the next step is the identification and introduction of new options.

The introduction of new options consists of the identification and introduction to the strategies of new options to solve the problems identified in the previous step (strategies assessment), aiming at achieving positive results at the micro and macro levels. When this is accomplished, those strategies are used for the selection step.

The selection of the best strategy is based on choosing which of the alternative strategies satisfies best the development objectives defined at the beginning of the study.

The last step considered by the manual is the programme design, i.e. the identification of all the activities and projects to be undertaken in order to implement the selected strategy.

The above is the sequence followed by the user's manual in applying MEPS. More information can be found when required in the MEPS main manual (Metodología de Evaluación y Programación de Sistemas de Producción y Consumo MEPS, JUNAC, Lima, Perú, 1984).

3. STARTING TO USE MEPS

3.1 Defining objectives

In any application of MEPS the first question should be: What is MEPS being applied to? An answer to this question must follow a very clear and specific definition of the objectives that the particular MEPS application will achieve. This first step is very important because it is essential to specify the needs for data and it will also play a key role in the design of the base scheme of the system. A good specification of the base scheme guarantees that the study has been started correctly.

The definition of the objectives must also specify the variable(s) that will make it possible to measure the level of fulfilment of each goal.

Example:

Overall objective: To promote the development of the particular system.

Specific objectives: The development will be measured by the following variables:

(i) Production growth
(ii) Income distribution (improvement)
(iii) Employment increase
(iv) Improvement of trade balance
(v) Improvement of fiscal accounts
(vi) Increased fulfilment of minimum nutritional requirements in low income population groups.

For each of the above objectives an indicator can be selected as a measure of the system's performance with respect to the established goals. For instance, the following variables can be used to measure the objectives already defined:

(i) Value added or physical production
(ii) Factor share among salaries, taxes, profits and interests
(iii) Job creation
(iv) Trade balance
(v) Fiscal balance
(vi) Calories/per capita, proteins/per capita in low income families.

Each of these variables can be quantified thus providing the possibility of comparison between two options and defining which of them satisfies best the objective pursued.

A trade-off between objectives is often required; in those cases, the criteria of the policy makers based upon national development objectives will be the final decisive factors. However, this topic will be elaborated later.

3.2 Background information

The first set of information to be collected must allow the identification of the main components or elements of the system and, at the same time, give a general idea about the magnitudes involved in the system.

The user starts to collect qualitative data to help in the identification of the main components of the system; then, the quantitative data will give some idea about the relative importance of each component to the system.

(a) Qualitative information: the purpose of this kind of knowledge is to identify the backward and forward linkages of the system, starting from the main activity. It also must classify the different final goods involved. To help in this task, a brief guide is provided below:

(i) Identify the main activity of the system;
(ii) Identify the key inputs in the production of the principal product of the system;
(iii) Identify the main inputs for the production of the inputs identified in (ii);
(iv) Repeat (iii) and stop when, in the production of an input, there is not a unique input directly related to the system that has a significant share in the production of the good previously identified;
(v) Identify the users of the principal product of the system, as well as those of any important by-products;
(vi) Repeat analogically stages (ii) to (iv), until the users of the previously identified good are the final consumers;
(vii) Identify the level of state intervention in the production of the identified goods.

(b) Quantitative information: these data are a complement to the qualitative data and will be used to make a first assessment of the importance of each component. It will also show the magnitudes of the main variables of the system.

The following are the basic quantitative data to be collected:

(i) Level of consumption of the final goods;
(ii) Number of enterprises involved in the production of the final goods and also in the production of each of the main inputs of the system;
(iii) Level of foreign trade balance of the system's main goods;
(iv) Installed capacity for each component;
(v) Quantity produced of each of the goods previously identified.

Generally, there are two sources of information that can be easily used to get the above information. The first one is a quick literature review, especially recent general reports produced on the main components of the system. The second source of information are meetings with people who are involved in the decision making processes of the system. As past experience has shown, both sources have been very helpful for collecting the information needed at this point of the MEPS application.

The final output of the collection of background information must be a first draft of the base scheme of the system, which will be used as a guide for the process of collecting more refined information.

The following gives some hints for deciding whether or not a particular good may become a new productive component, by disaggregating it through the definition of a new linkage.

(a) When the relative importance of the particular input in a given productive structure can be established. This input could be important because it represents a significant share of the total cost, or because its physical consumption is essential for the product for which it is an input.

(b) Even though it may not be an important good from the point of view of the productive structure, an input can be disaggregated as a productive component if the system is an essential market for it.

(c) When the purpose is to implement a given type of import substitution programme for a particular input or good.

(d) When the installed capacity for a given input plays a key role in the operation and development of the system, or of a section of the system.

(e) When the final goods of the system can be disaggregated as new linkages to other industrial activities or because the end products serve very different domestic markets.[2/]

Example:

This example refers to the process that led to the design of a first approximation to the base scheme of the fish meal system in Peru. The information reported was the following:

- The main activity of the system is the production of fish meal.
- The key input into the production of fish meal is the fish caught by vessels.
- The main inputs involved in the fish catching activity are fish nets and other gear, oil and vessels.
- The marine resources determine the level of catches by the fleet.
- The biggest market for fish meal is normally the feed industry. However, in the case of Peru, the export market is the most important destination of the fish meal.
- The first use as feed is in the poultry industry.
- The poultry industry provides consumers with eggs and poultry meat.
- The poultry meat constitutes about one third of all meat consumed in Peru, and eggs are also a major consumption good.
- There is a very important by-product in the production of fish meal, which is fish oil.
- Fish oil is refined and used by the oils and fats industry.

2/ i.e. consumption goods in figure 3.

- The oils and fats industry uses the refined fish oil to produce edible oil, by mixing the fish oil with vegetable oils; it also produces shortening and margarine using the same procedure. Finally, when using the lower quality of fish oil, it produces soaps.

- Edible oil, shortening and margarine are goods of massive consumption and are also very important sources of calories.

- Besides fish meal, the feed industry uses corn as another important input.

- The corn used by the feed industry is produced domestically (40 per cent) and is also imported (60 per cent).

- Almost all the domestic production of corn has, as its destination, the feed industry.

- The oils and fats industry also uses cotton seed and soybean oil as important inputs.

- The cotton seed production determines the cotton seed supplies for the oils and fats industry.

- Almost all the soybean oil is imported.

Using all the above information, the base scheme for the fish meal industry that appears in figure 3, was designed. This base scheme was used as a guide for the next step of the data collection process.

3.3 Data collection

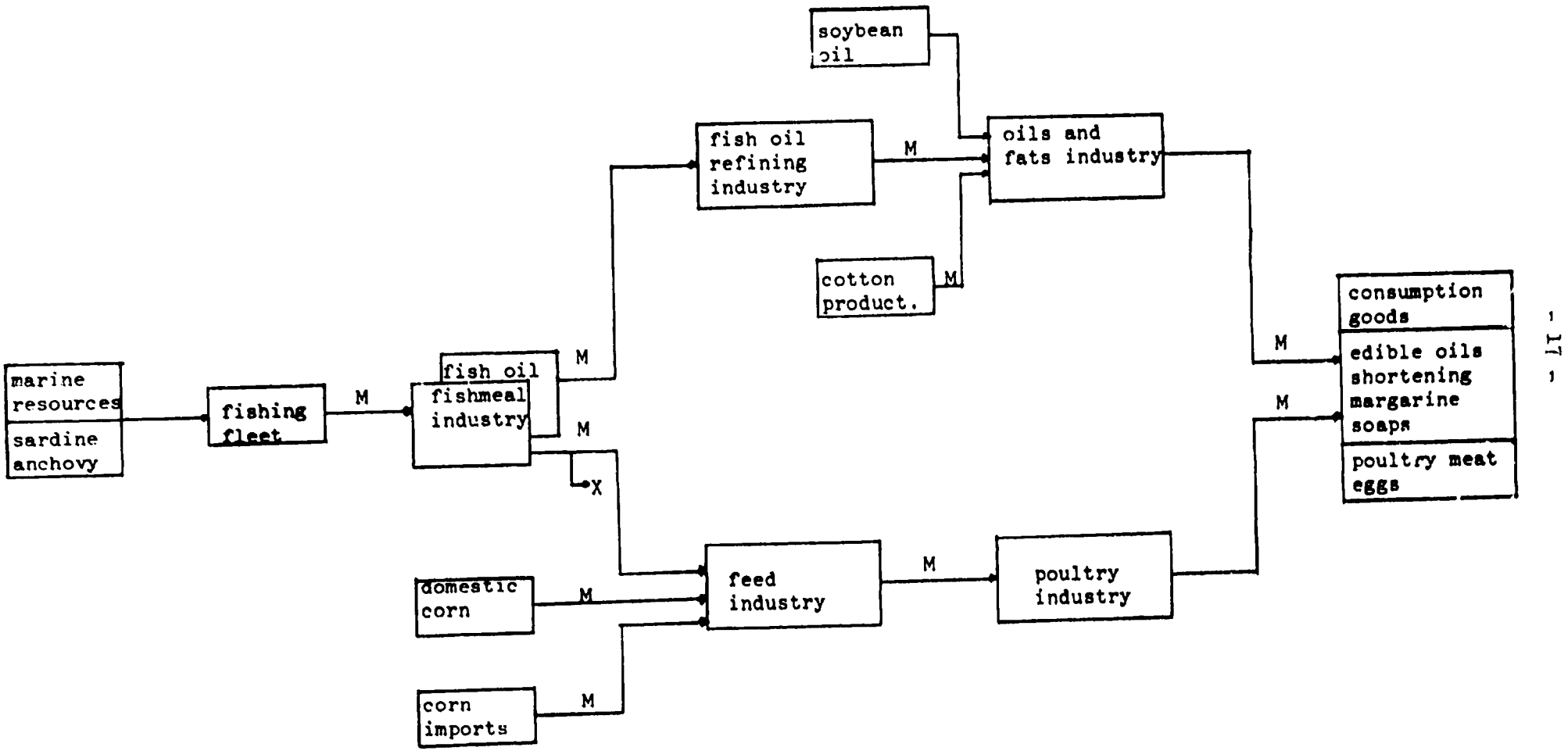
There are three different purposes for collecting data in MEPS. The first purpose is to define more precisely the components of the base scheme. The information at this point is related mainly to the operative structure of the system and how the different linkages are related to each other.

The second purpose of the data collection is to develop later on the simple disaggregation or diagnostic of the components of the system. These data will have a descriptive character; descriptive in the sense of identifying the main features of each of the components and also describing how the system developed in the recent past.

The third purpose of data collection is to construct the productive structure for each of the productive components to be structurally disaggregated according to the definite base scheme of the system. The productive structure format is used for this purpose. This will be discussed under the section on structural disaggregation.

The first and second types of data mentioned above can easily be included in one general set of data. The user has to take into account that when time series information is required, as much information as possible should be collected. In most cases, this information is requested on a yearly basis, however, monthly or quarterly information, or with any other periodicity could be used instead of the yearly data. Only when a certain period of time is specified by the user or by any MEPS requirement, this should be strictly observed.

Figure 3. Draft of the base scheme of the fishmeal system in Peru



M = marketing, X = exports

The following information is given as an aid to the data collection activity to be carried out by the user.

(a) Consumption/demand component

Before collecting the data, or during collection, it is very convenient to decide which options should be considered for the treatment of this component. For example, the consumption/demand component can be analyzed by classifying the population according to a variety of criteria, such as by income group, by geographical regions, by residence areas (urban-rural), by types of consumer (i.e. pregnant women, infant population), by age, or by any other category. It can also be treated as a unity, that is, without any classification.[3/]

The data to be collected are contained in table 2.

In addition, the user is advised to look for the following data:

- Income elasticities, price, crossed elasticities
- Consumption by months
- Consumption by regions
- Goods that are substitutes and/or complementary goods.

(b) Productive components

For each one of the productive components previously identified, the information contained in tables 3, 4, 5 and 6 must be considered.

Besides the above, the following information will also be very important:

- A process diagram for each of the productive components
- The ownership pattern for each of the components
- A brief description of the process, followed by each of the productive components when each of them become an element of the actual system
- The market structure of each of the components of the system, i.e. those that will be disaggregated.

The information collected at this stage will be used for the design of the definite base scheme of the system, in the simple disaggregation process, and finally, in building up different types of informative base schemes as described in the coming section.

3/ Actually, this type of classification should be done when defining objectives, but usually at that point of time the lack of information does not allow it. Therefore, it is during the data collection, and based upon the data that will be collected, and all the sources available, that this decision should be made.

Table 2. Data required for the consumption components

Determining variables	Information required	Analytical objectives
Socio-demographic	POPULATION: - Division by age - Division by sex - Division be socio-economic stratum - Urban-rural division - Division by region - Birth rates - Mortality rates - Observed growth - Vegetative growth - Immigration rates EDUCATION: - Levels of education EMPLOYMENT: - Distribution of the economically active population between employed, unemployed and under-employed - Distribution of the population by type of activity and occupational category	- Determination of the basic population indices to calculate national and regional demand by socio-economic stratum, sex, age and urban-rural division. - Estimate and projection of population growth at national, regional and urban-rural level by socio-economic stratum, sex and age. - Determination of the correlation between demographic structure, employemnt and level of education.
Income	- Origin and composition of income - Sources of income - Types of income - Average income for each class of activity and occupational category - Distribution of income - Per capita income	- To estimate the extent of access by the population to income distribution. - Determination of the level of demand as a function of population and income level. - To estimate per capita income on a regional basis, and comparing urban-rural.
Expenditure-Consumption	- Pattern of expenditure on consumer goods - Food expenditure - Pattern of consumption	- Determination of expenditure on groups of consumer goods (and/or specific products) at national, regional and urban-rural level by socio-economic stratum or population group. - Estimate of consumption habits for each socio-economic stratum or population group at national, regional and urban-rural level. - Determination of elasticities.
The Family	- Composition of the family - Family income - Family wealth - Family expenditure	- Determination of the division of labour within the family according to occupational category by socio-economic stratum or population group at national regional and town-country level. - Determination of family income structure. - Estimate of family capital wealth. - Determination of the pattern of total family expenditure on food (and/or specific products).
Nutritional Economy (only for the study of consumption of food-goods)	- Consumption of food products by physical quantity and value - Per capita nutritional needs - Consumption of fresh and processed foods	- Determination of intake of proteins and calories. - Determination of expenditure on food and/or specific products quantifiable in terms of proteins and calories. - Determination of deficit in proteins and calories by socio-economic stratum, age and sex at national, regional and town-country level. - Quantification of actual and potential demand for food and/or specific products. - Determination of the origin, domestic or imported, of food consumption (and/or specific products) prices or materials.

Table 3. Data required for agricultural components

Type of information	How to use the information
1. Total cultivated area and spatial location. (WS 1) a/ 2. Spatial location of the agricultural components of the system and relative importance of the component to the regional economy. (WS 2)	- To determine and analyze comparatively the distribution of the cultivated area according to type of products. - To assess the use of land as a resource in the system. - To determine and analyze comparatively the regional location of the agricultural productive components.
3. Area, volume and value of the production of agricultural components of the system according to size of production units. (WS 3)	- To determine and analyze comparatively participation in production of different size of unit. - To analyze the existing relationship between agricultural area and size of production units.
4. Number of production units by agricultural component of the system and by technological pattern. (WS 4) 5. Patterns classification and category of production units used in the production. (WS 5) 6. Area, volume and value of production of the agricultural components of the system by technological pattern. (WS 6)	- To analyze for each agricultural productive component the existing relationship among category units, number of units, production, area and technological pattern. - To assess the production levels and agricultural area according to the technological pattern. - To analyze comparatively among the components, the number of production units, area, volume and value of production
7. Typical costs structure by technological pattern and by space for each agricultural productive component of the system. (WS 7)	- To determine and analyze the costs structure by technological pattern for each good according to the regions. - To systematize the information on costs structure of the components subject to disaggregation. - To assess the cost_structure by technological pattern.
8. Productivity of the factors by technological pattern. (WS 8)	- To determine and analyze comparatively the productivity of land and work according to the technological pattern. - To assess the productivity of the factors according to the technological pattern.
9. Historical behaviour of: - Area - Production volume - Production value (WS 9) 10. Historical behaviour of prices of: - Product - Main inputs (WS 10)	- To determine and analyze the changes which have occurred in the historical series of area, production volume, production value and prices of inputs and products. - To assess the historical behaviour of the variables.
11. Type and origin of financing by space for each agricultural product involved in the system. (WS 11)	- To determine and analyze the internal and external financing characteristics orientating the agricultural productive components. - To systematize the information on financing of the components subject to disaggregation. - To assess the financing of each agricultural productive component.
12. Chronogram of cultivation for each agricultural component by location involved in the system. (WS 12)	- To determine and analyze the chronogram of harvests by productive component. - To assess the chronogram of harvests for each agricultural component.
13. Classification of production and employment by type of ownership and by location of the agricultural components of the system. (WS 13)	- To determine and analyze comparatively the participation of different types of ownership by spaces in production and employment in different locations. - To assess the participation of the types of ownership in production and employment.

a/ Annex 1 contains worksheets 1 to 44.

Table 3. (continuation)

14. Imports of inputs used in the agricultural production by location. (WS 14) 15. Destination and distribution of the production by location. (WS 15) 16. External competitiveness of the agricultural components of the system according to the location. (WS 16)	- To determine and analyze the structure of imports of inputs and capital goods used for the production of final and intermediate consumer goods. - To determine and analyze the orientation of the production of final and intermediate consumer goods. - To determine and analyze the external grade of competitiveness of the agricultural productive components. - To systematize the information on imports of inputs and capital goods and destination of the agricultural production. - To assess the external competitiveness of the agricultural components.
17. Projects related to the system's productive agricultural components. (WS 17)	- To assess the socio-economic and techno-economic aspects of each project. - To design development alternatives on the basis of these projects. - To simulate the effect of the projects on the system in order to establish priorities and select the most appropriate option.
18. Non-cultivated agricultural area by location. (WS 18) 19. Annual potential supply for each product by location. (WS 19)	- To determine and analyze the causes of non-exploitation of the agricultural area. - To determine by region and by cultivation the availability of land. - To assess the causes determining the non-exploitation of the agricultural area.
20. Competitive products of the agricultural components of the system. (WS 20) 21. Costs structure of competitive cultivations of each component in different locations. (WS 21)	- To analyze and assess the causes of competitiveness (or non-competitiveness) of the local producers of the system

WS = Worksheet

Annex 1 contains worksheets 1 to 44.

Table 4. Data required for industrial components

Type of information	How to use the information
1. Economic identification of the enterprises by industrial component. (WS 22)	- To systematize the information of the enterprises and of the component as a whole. - To determine and analyze comparatively the number of enterprises, their location, ownership, installed production capacity, real level of production, idle capacity and destination of production.
2. Grouping the industrial enterprises by scales of production for each component. (WS 23)	- To systematize the information on scales of production by each one of the productive components subject to disaggregation. - To assess the levels of production in terms of production scales.
3. Characteristic costs structure by enterprise. (WS 24)	- To determine and analyze the costs structure by technological pattern for each good according to regions. - To systematize the information on costs structure of the components subject to disaggregation. - To assess the costs structure by technological pattern.
4. Productivity of the factors by enterprises. (WS 25)	- To determine and analyze comparatively the productivity of the factors according to the pattern. - To assess the productivity of the factors according to the pattern. - To assess the productivity of the factors according to the technological pattern.
5. Spatial location of the industrial enterprises. (WS 26)	- To determine and analyze comparatively the regional distribution of the productive components. - To assess the participation of the region at the national production level.
6. Historical series of the industrial production (physical and value) of the productive enterprises of the system. (WS 27) 7. Historical behaviour of the prices for inputs and products. (WS 28)	- To determine and analyze the changes which have occurred in the historical series of the variables. - To assess the historical behaviour of the variables.
8. Financing of each component by enterprises. (WS 29)	- To determine and analyze the internal and external financing characteristics. - To systematize the information on financing of the components subject to disaggregation. - To assess the financing of each industrial productive component.
9. Classification of the production and the employment by type of ownership and the location of the industrial components of the system. (WS 30)	- To determine and analyze comparatively the participation of the types of ownership in production and employment. - To assess the participation of the types of ownership in production and employment.
10. Imports of inputs and capital goods used in the industrial production. (WS 31) 11. Identification of the destination of the production of industrial components of the system. (WS 32) 12. External competitiveness of the industrial components of the system and by spaces. (WS 33)	- To determine and analyze the imports structure of inputs and capital goods used in the production of final and intermediate consumer goods. - To determine and analyze the orientation of the industrial production of final intermediate consumer goods. - To determine and analyze the grade of external competitiveness of the industrial productive components. - To systematize the information on imports of inputs and capital goods and on the destination of the industrial production. - To assess the imports structure of inputs and capital goods necessary for the production of industrial components of the system. - To assess the external competitiveness of the industrial components.
13. Projects related to the industrial components of the system. (WS 34)	- To assess the socio-economic and techno-economic aspects of each project. - To design development alternatives on the basis of these projects. - To simulate the effect of the projects on the system in order to establish priorities and select the most appropriate option.

Table 5. Data required for service components

Type of information	How to use the information
1. Identification of the enterprises producing the service (name, location, ownership, installed capacity): - For industrial services (WS 35a) - For agricultural services (WS 35b)	- To analyze and assess comparatively the type of productive services supplied to the components of the system.
2. Costs of services. (WS 36)	- To determine and analyze the costs structure of each productive service by enterprises. - To assess comparatively the costs structures.
3. Series of production and prices of the services. (WS 37)	- To determine and analyze the changes which have occurred in the historical series of the variables. - To assess the historical behaviour of the variables.
4. Projects related to service components. (WS 38)	- To assess the socio-economic and techno-economic aspects of each project. - To design development alternatives on the basis of these projects. - To simulate the effect of the projects on the system in order to establish priorities and select the most appropriate option.

Table 6. Data required for marketing components

Type of information	How to use the information
1. Identification and quantification of the phases and the marketing route of the agricultural and industrial product. (WS 39) 2. Identification of the enterprises by phases of the marketing route. (WS 40) 3. Quantification of the national and international market flows in quantity (physical and value) of the products in each phase of the marketing route. (WS 41)	- To determine and analyze the phases of the marketing route of each productive component (agricultural or industrial). - To determine and analyze type and number of enterprises in each phase of the marketing route of the products. - To determine and analyze the flows (physical and value) of the products marketed in each phase of the circuit. - To systematize the information for the commercial enterprises subject to disaggregation. - To assess the marketing route of each product. - To assess the quantitative flows of marketing.
4. Identification of the characteristics of the principal enterprises: names and location in the marketing route, geographical location, ownership, volume of commercialization by products, infrastructure. (WS 42) 5. Activities developed by the principal enterprises. (WS 43) 6. Structure of characteristic units costs of distribution of the enterprises by products and regions. (WS 44)	- To determine and analyze the principal marketing enterprises. - To determine and analyze the activities developed by the principal enterprises. - To determine and analyze the unitary cost structure, distribution characteristics of the enterprises by product and region. - To systematize the information on the enterprises subject to disaggregation. - To assess entrepreneurial-technically and economically the main units of marketing.

WS = Worksheet

4. THE DESIGN AND DISAGGREGATION PHASE

4.1 Base scheme design: the disaggregation and construction of different kinds of base schemes

This section guides the user to build up the definite base scheme for the system. To build up this system the user has two elements to consider. On the one hand, the set of information just collected, and, on the other, the draft base scheme of the system.

In order to get a final base scheme the user has to start from the draft, check it for completeness and then start the structural disaggregation process of the system, analyzing each of the components and deciding what level of disaggregation will be used for each one of them.

The following are some hints that can be followed for the final design of the base scheme of the system.

(a) Checking for completeness

To check for completeness, the user has to take the draft of the base scheme and the process diagrams collected in the previous step. The purpose is to test whether or not there are missing components in the draft.

Usually, MEPS concentrates on tradable goods, i.e. products that use markets as the main channel of distribution. When looking at the process diagrams of most of the end products often a number of intermediate products which never reach the markets are found. These are products which are immediately transformed inside the same productive facility and they are seldom taken into account as a productive component, because MEPS, as stated, concentrates on those goods that reach the market.

Example:

It has been found that in the previous step of data collection there is a productive process between the production of cotton and the production of oils and fats. This is the ginning process, which is usually separated from the cotton production and also from the oils and fats production component. The ginning as a productive component is important because it will determine the availability of cotton seeds for the oils and fats industry. (See figure 4)

For the same base scheme it has been found from the process diagram information that the production of fish oil hydrogenated fat is a very important process. While this fat is a very important input for the production of edible oil and fats from fish oil, most of it is used in the same plant and in a series of steps is transformed into a final good. Therefore, this production step should be considered as a new component.

Assuming that these are the only new factors, the system's base scheme in figure 5 is considered complete because it is well disaggregated and shows all the linkages.

After the base scheme has been checked for completeness, the user may proceed to the structural disaggregation of the scheme.

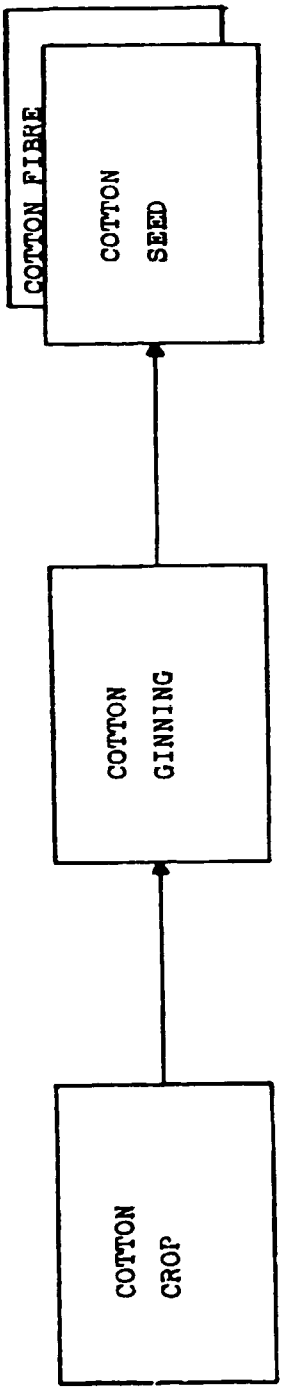
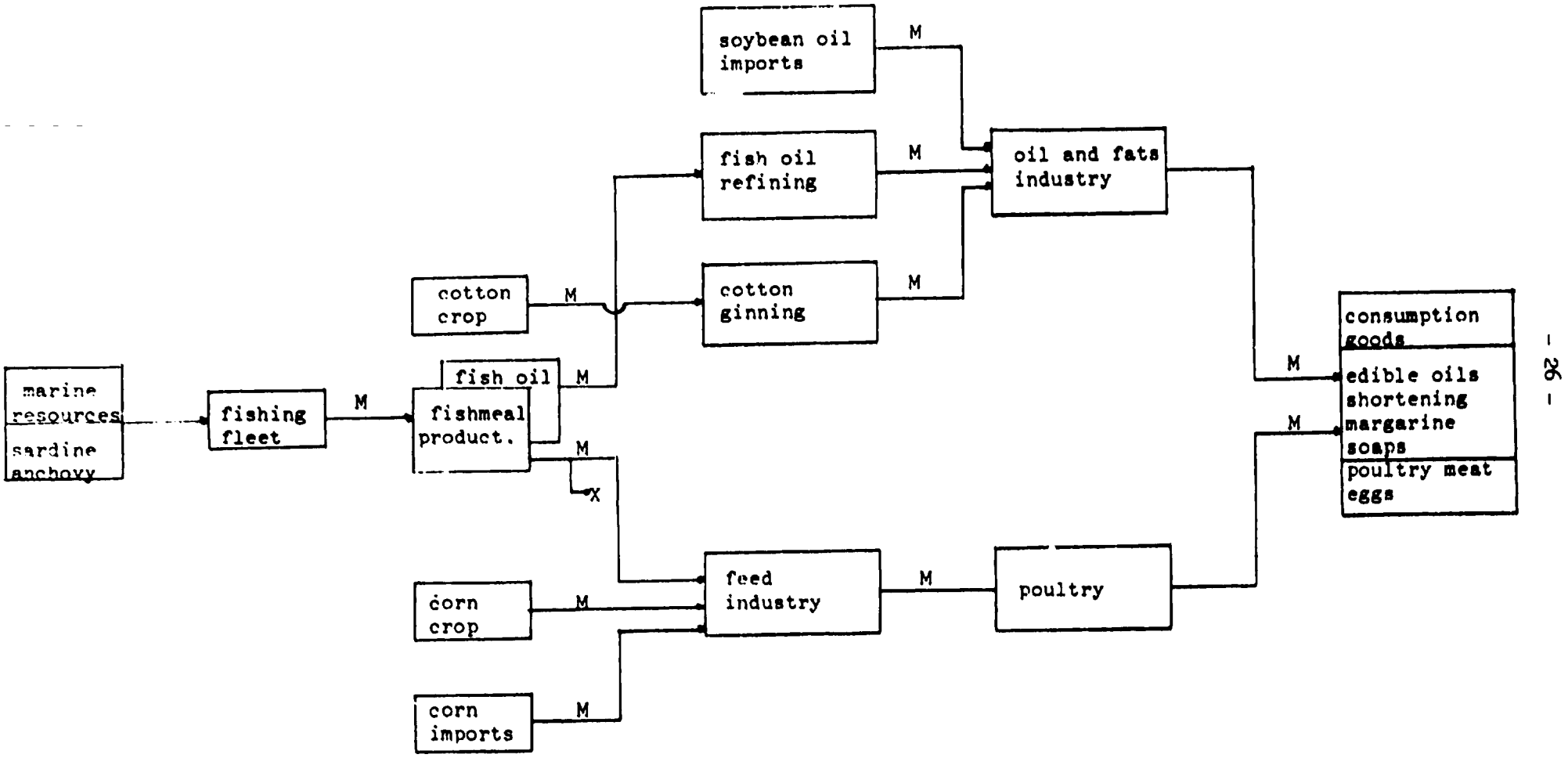


Figure 4. New linkage description

Figure 5. Base scheme of the fishmeal system of production and consumption in Peru



M = marketing, X = exports

(b) Structural disaggregation of the base scheme

Up to this point, the components contained in the base scheme represent specific productive activities, where the activity is viewed as a unit. However, each of the components can be disaggregated to a more specific level, using criteria such as size and capacity (360 metric tons, 270 metric tons, 180 metric tons, in the case of boats or plants), technology (high, medium, traditional, in the case of processing or agricultural activities), or by regions (coast, highlands, plains), or any other operative criteria. This disaggregation will depend on the objectives of the MEPS application, and on the particular characteristics of each component.

The level of disaggregation applied to any component, even the consumption/demand component is totally independent from that applied to other components, no matter what its location in the base scheme of the system is.

With the examples given, the user will find it easy to understand the evolvement of the individual criteria to be considered in this process. In the following section some of the criteria generally used to structurally disaggregate the base scheme are given and these are grouped according to the different components of the system.

(i) For the consumption component

Regionally: the population or the consumers can be classified by geographic regions of the country. The reason may be the user's interest in regional elements of the consumption. Moreover, the MEPS planning process permits the handling of such a situation.

Example:

Referring to the fishery system (for human consumption), the consumption of fish products will depend on the geographic location of the population. For regions near the ocean or any other body of water with fishing activity the expected consumption of fish will be high compared with regions located far away from any body of water. Therefore, if one of the objectives of the MEPS application is to promote or increase the fish consumption of the population, a regional disaggregation of the consumption component will be necessary. Thus, the consumption will be divided by regions, each with very specific characteristics. Moreover, the strategy to follow in order to achieve the objectives could be different qualitatively and quantitatively for each region.

Income group: The population can also be divided by income groups. This would be specially important when the objectives, or the final goods characteristics, are directly associated with the population's income level.

Example:

The objectives of the MEPS's application state that there must be a well defined policy to promote increased consumption of fish within low income groups in order to improve their nutritional level. In this case, the required structural disagreggation of the population will be by income groups. This will permit the analysis and establishment of specific policies to improve the situation of a specific group, as well as allow the analysis of the effect of those policies on other income groups.

Nutritional conditions: Another way to disaggregate the consumption/demand component is by dividing the population according to nutritional levels. In this way, the user will be able to design particular policies to achieve specific nutritional levels for each of the defined groups.

Example:

If the study is aimed at the improvement of the nutritional level of the population, the consumption component would be structurally disaggregated by dividing the population according to nutritional levels. Furthermore if, like in the fishery system, there is a final good in the system that has high nutritional qualities, this component should be disaggregated by nutritional levels, so that its nutritional effect could be assessed in each group.

Age group: Classifying the population by age group will be another way to disaggregate the consumption component.

Example:

Referring to the dairy system, and specifically to milk consumption, given its importance for specific age groups (children), it would be very useful to disaggregate the consumption by age groups, so that the impact of the programme on the target groups may be best assessed.

The consumption component can be disaggregated in many ways. The way chosen will depend principally on the objectives of the particular MEPS application. It is important to note that different ways of classifying the population can be combined.

The classification of the population will define the manner in which the consumption component will be structurally disaggregated.

Sometimes there will be no need to disaggregate the consumption component and it is possible and reasonable to work with the whole population as the analysis unit. This will be the case for an export commodity or a final good which does not play a key role in the domestic diet. At other times, because of lack of information, the only possible level of analysis of the consumption component may be with the aggregated population.

This would be the case of the fish meal system, because of the nature of the fish meal as an intermediate product, there will not be direct interest in any special consumption group or nutritional consideration. Hence, the consumption component will not be disaggregated.

The data required by the different types of disaggregation will be described later on.

(ii) For the productive components

The user must be aware that each of the productive components already identified will be disaggregated independently. Generally the disaggregation of one component is not related to the disaggregation of others, unless a reason for this has been previously established. The disaggregation of the productive components has to take into account the following criteria:

Objectives: The choice of the objectives may explicitly state a particular way to disaggregate a productive component. In that case (unless there is a strong reason) the user must disaggregate the component according to the statement of objectives.

Example:

Suppose that in the objectives statement the following is found: "One of the aims of this MEPS application is to evaluate the different technological levels used to produce fish meal." Given that statement, the productive component fish meal should be disaggregated by technological level. Therefore, the user must get the expert advice or assistance of a technician in fish meal production in order to learn how to classify the existing fish meal factories by levels or types of technologies, identify the main differences between them, and learn about new technologies that could be applied for the improvement of present plants and facilities.

Technology: Many times there could be different technological options for the production of a given good. In this case the component should be disaggregated by technological levels or options.

For the application of MEPS, there are significant technological differences in the production of a good when the technological options imply either a relatively large difference in cost or a relatively large difference in the consumption of a key input. In cases were technological options to produce the same good do not imply any of these effects, the technological disaggregation is not necessary.

Example:

It was found that there are technical differences among factories which produce fish meal. These differences are mainly in the drying process, e.g. while some plants have a continuous process, others have a batch one. Finally, another group has a combination of both. The decision not to disaggregate this component by technological options was taken because there were no significant differences either in the production cost of the fish meal nor in the physical consumption of the main raw material, fish.

In another MEPS application in which the fish canning industry was being analyzed as a productive component, it was found that there were two different kinds of processes, an automatic one and a manual process, and that technical differences had a great impact on the ratio of fish/unit of canned fish. Hence, the decision was made to disaggregate the canned fish productive component into two different levels of technology: automatic and manual, each one representing a group of factories with those characteristics, and together representing the fish canning industry as a unit.

Size: The size of a productive unit measured by its installed capacity is another very important criterion to take into account. Very important differences in inputs consumption and/or cost of production can be found due to plant size. When this occurs, it is important to analyze if disaggregating by plant size is necessary. (Again the rule is: if different plant sizes within a productive component produce significant differences in production costs and/or inputs (physical) consumption, the component should be disaggregated by plant size).

Example:

From the data collection it was observed that there were very important differences in the extraction cost among the fish fleet due to the size of the ship. The size of each unit varied from 100 metric tons of storage capacity to 360 metric tons. With the help of an expert the fleet was classified according to size into three typical units: 180, 270, and 360 metric tons of storage capacity, each of them representing more or less accurately the range of sizes. Significant differences in the costs of production were observed due to the size variable.

Regional location: This criterion is often used when there is a particular interest in assessing the regional impact of a specific change in a productive component or even in the system as a whole. However, there are cases in which significant differences exist among productive units of the same component due to their regional location.

Example:

The fish meal industry in Peru is located along 2,000 kilometers of coast. Due to the migration of the marine species and the differences in oceanographic conditions, the fish biomass is not uniformly distributed in quality and species along the Peruvian coast. This affects the fish meal industry in the sense that the quantity and quality of fish used in the fish meal processing varies according to the plant location on the coast. A regional classification of the fish meal industry was necessary to take into consideration these important features.

There was another reason to regionally disaggregate this component, viz. to measure the decentralization effects of an activity developed along 2,000 kilometers of coast.

Hence, given the above factors, a decision was taken to perform a regional disaggregation of this component.

Enterprise organization: This criterion is specially useful when a productive component includes different forms of enterprise organizations: private, public, co-operatives, transnationals, or other forms.

The aim to disaggregate a productive component in this way should be to analyze the economic and technical performance of each type of enterprise organization and/or to design policies that may affect differently each one of them.

Example:

In the Peruvian fish meal system, the fish meal productive component make up two different kinds of producers. On the one hand there is a public enterprise which produces fish meal from anchovy and sardines. This enterprise has the monopoly to produce fish meal from whole fish. On the other hand, there are private enterprises which are only allowed to produce fish meal from by-products from canning operations. Both productions are important. To analyze the above problem and to study the impact of any new regulations, this component was disaggregated into two types of enterprises: the public enterprise and the private enterprises.

In final goods, the packaging systems play an important role. There are, for the same product, a variety of packages. Special packages are used to attract particular consumer groups and this is why this criterion becomes important.

Often, the final consumption component needs a special disaggregation in the productive component related to the size and presentation form of the final good.

Example:

In the oils and fats system edible oil was disaggregated according to the packaging type or system. It was disaggregated into one liter bottles and 15 liter cans. This differentiation was made because each type of package goes to specific consumer sectors, and also because each kind of package demands particular inputs for packing.

The disaggregation criteria developed above are those used most often in the situations described. Additional criteria may be required for other applications of MEPS the user may perhaps have to develop.

As stated before, the way in which a particular productive component is disaggregated is not necessarily related to the way in which other components of the system have been disaggregated.

As an output of this section the user obtains the base scheme which he will use in all other steps of the MEPS application. The base scheme of the fish meal system, used as a starting point at the beginning of this section, is shown in figure 6. The base scheme resulting from the disaggregation process described in this section is shown in figure 7. By comparing these two base schemes, the user can see the effect of the disaggregation process applied to the initial base scheme.

Some general points on structural disaggregation of the scheme and the information that may be shown in it is given below.

- The boundaries of the system are set by the user and the inclusion of all the relevant components must be ensured. It is, however, important to be selective in choosing what is relevant; too many components could be hard to handle.

- When any component is disaggregated, this should be done up to a manageable level. Even though MEPS does not limit the number of disaggregations of a component, to use more than four may cause difficulties at the assessment and planning stages. The problem increases with the number of productive components structurally disaggregated into more than two levels.

- Disaggregation is only useful when it increases the power of analysis, or helps to improve significantly the fulfilment of the objectives.

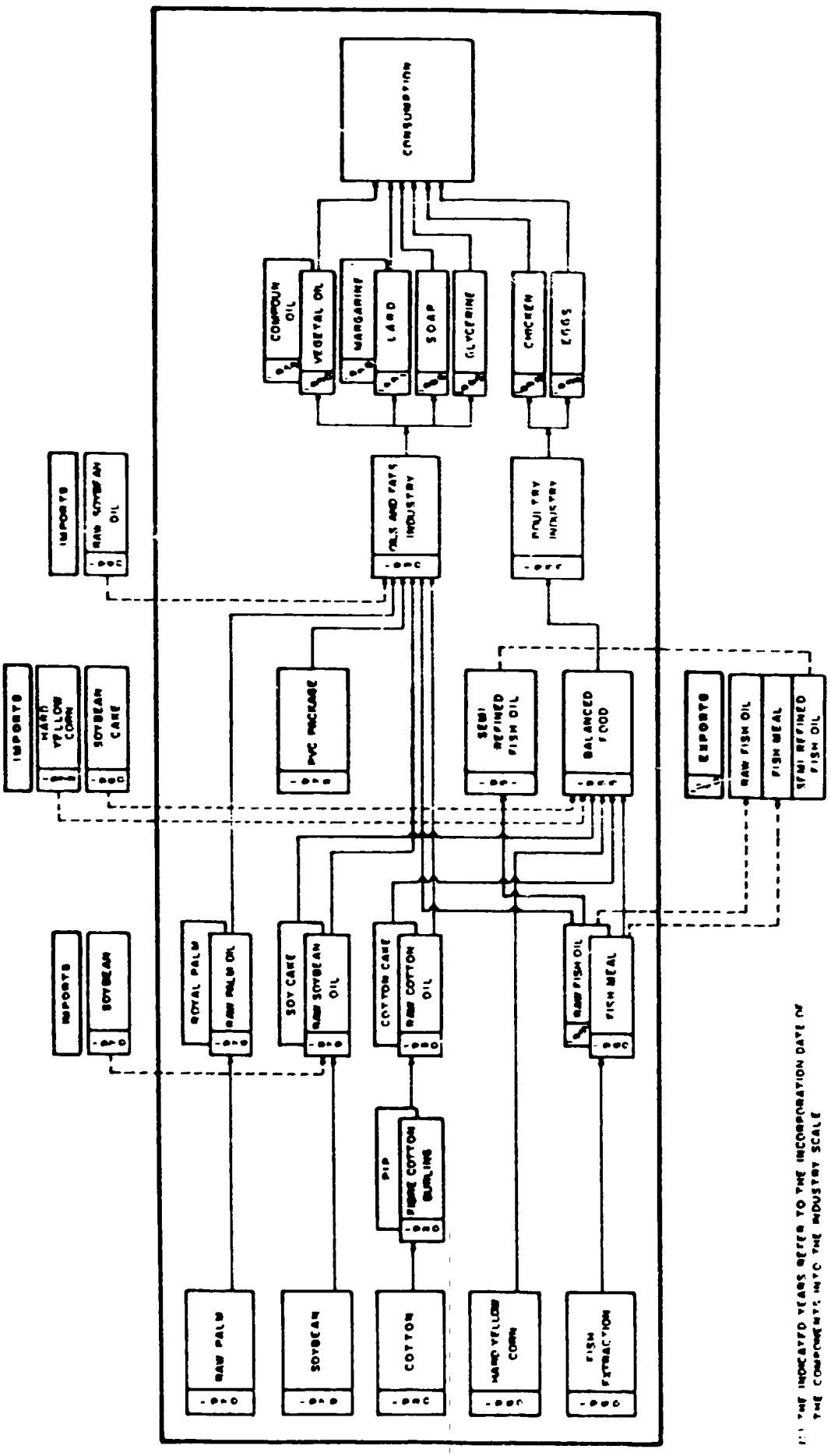
- If information is not immediately available, this does not mean that it should be disregarded but rather collected at a later stage.

(c) Information that can be displayed in a base scheme

A base scheme has many other uses apart from being a diagram that shows the particular components of that system and the linkages among the components.

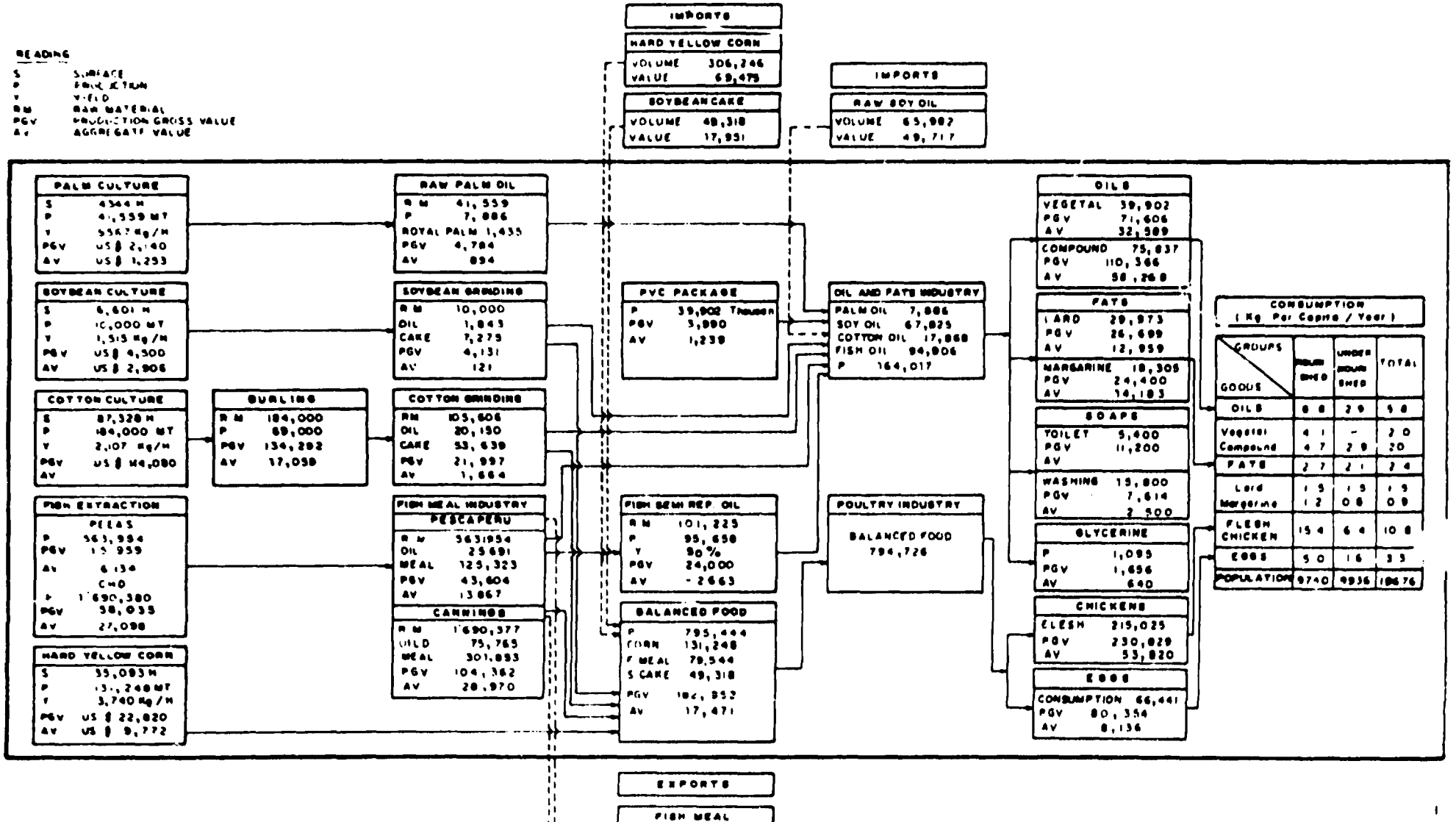
FIGURE Nº 6

BASE SCHEME BY PRODUCTIVE COMPONENTS OF THE PRODUCTION AND CONSUMPTION SYSTEM OF OILS AND FATS
PERU (1)



(1) THE INDICATED YEARS REFER TO THE INCORPORATION DATE OF THE COMPONENTS INTO THE INDUSTRY SCALE

Figure 7. BASE SCHEME OF THE ECONOMIC FLOWS OF THE PRODUCTION AND CONSUMPTION SYSTEM OF OILS AND FATS - PERU
YEAR 1984 (M T AND THOUSANDS U S $)



Within a base scheme qualitative and quantitative information can be represented to give a quick view of the main features of the system.

The following are some of the possibilities of representing specific information in a base scheme:

Historic development of the system: The components of the system are displayed and for each the date on which it first appeared is given. This is particularly interesting to assess the historical development of a particular system.

In figure 6, an example is given from the oils and fats system in Peru.

System economic flows: The data displayed refer to some flow variables that characterize the system. Any flow variable that happens to be important for the particular situation in which MEPS is applied can be chosen.

An example is the case of the oils and fats system in Peru shown in figure 7 in which variables were chosen to describe the system economic flows.

Institutional framework of the system: The type of information displayed in this base scheme refers to the different economic agents that participate in the different components and activities of the system, and illustrates how they are organized. The degrees of horizontal and vertical integration, and degree of concertation can be identified as well as the institutions with whom the concertation process will have to be done, once the development programme has been drafted.

As in the previous cases, the oils and fats system in Peru is given as an example and details are shown in figure 8.

Systems stock variables: The systems stock variables are another kind of information that can be used in a base scheme in order to give an overview of the main resources of the system.

In figure 9, as in previous cases, the case of the oils and fats system in Peru is shown as an example.

System's main indicators: The main economic indicators of the system provide another important set of variables to be shown in a base scheme. The advantage of this is that with these indicators it is possible to describe the performance of each productive component in a diagram in such a way that the links can easily be detected. An example is provided in figure 10.

Regional location and relevance of the system: Another very important information that a base scheme may contain is the regional location of the productive and consumption components. It permits the illustration of regional concentration as well as the relative importance of each region with respect to the productive and consumption components. An example from the oils and fats system is provided in figure 11.

The above are only some examples of what can be represented in a base scheme. There are many more features, variables and other pieces of information that can be shown in a base scheme for specific MEPS applications.

FIGURE Nº 8

BASE SCHEME OF THE AGENTS OF THE PRODUCTION AND CONSUMPTION SYSTEM OF OILS AND FATS

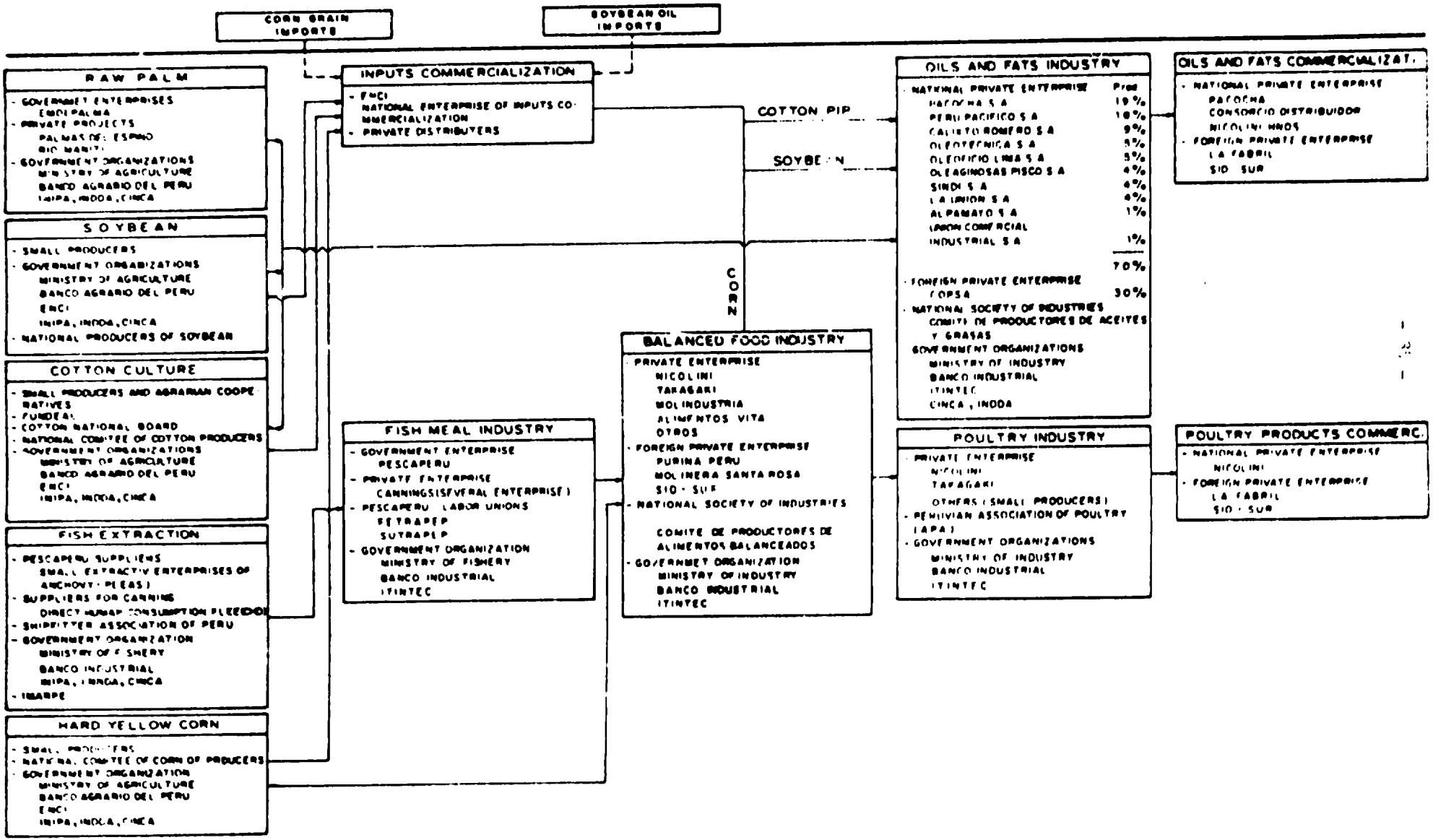


Figure 9. **BASE SCHEME OF THE STOCK OF THE CONSUMPTION AND PRODUCTION SYSTEM OF OILS AND FATS**

(M T THOUSANDS U S $)

FC FIXED CAPITAL
WC WORKING CAPITAL
IC INSTALLED CAPACITY
FF FOREIGN FINANCING

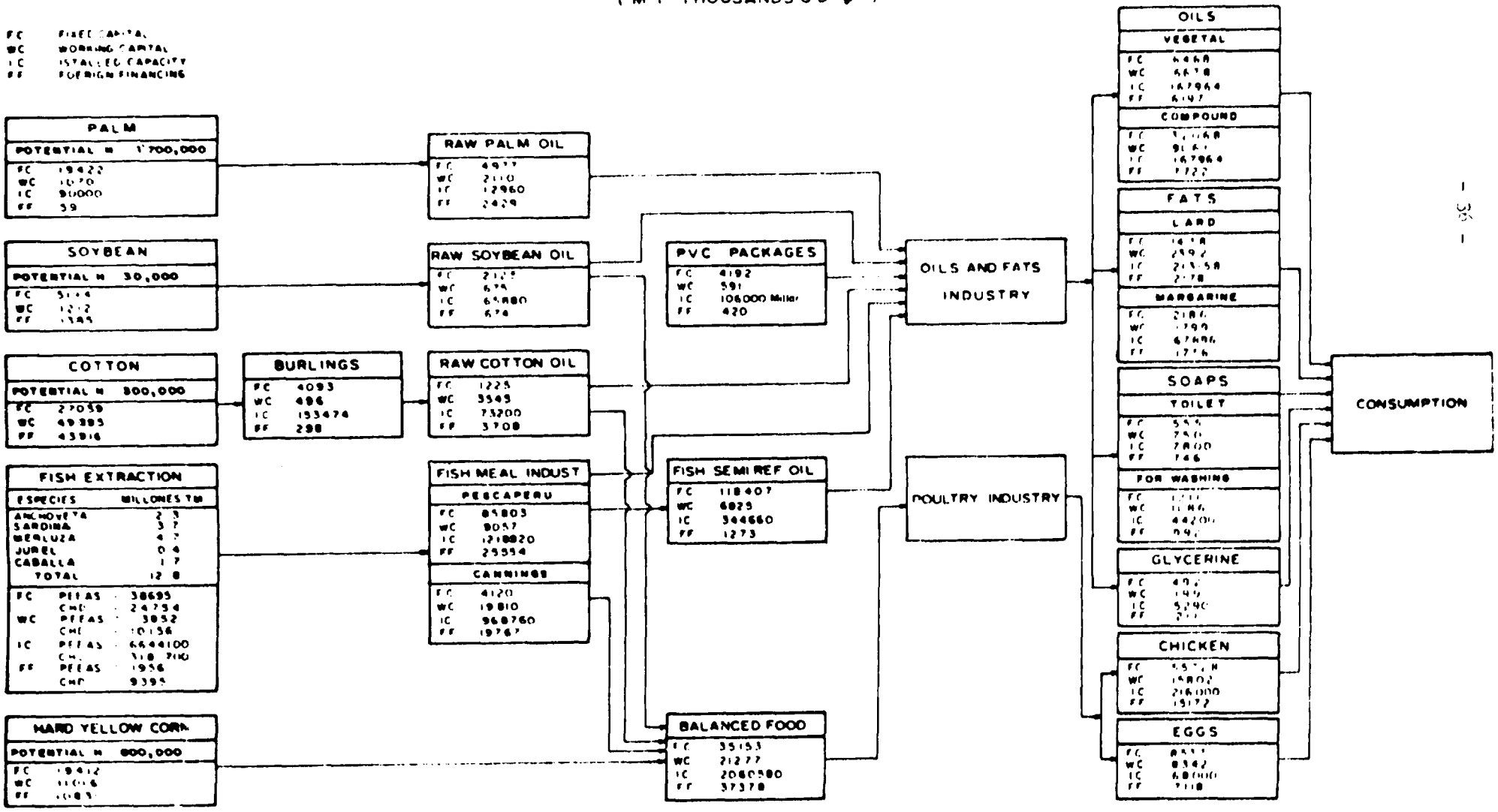


FIGURE Nº 10

BASE SCHEME OF THE INDEXES OF THE PRODUCTION AND CONSUMPTION SYSTEM OF OILS AND FATS YEAR 1984

READING

EP = ECONOMIC PROFITABILITY (Profits + Interests / Total Capital)

UC = USED CAPACITY

Y = YIELD

AV = AGGREGATE VALUE

GVP = GROSS VALUE OF PRODUCTION

FC = FIXED COST

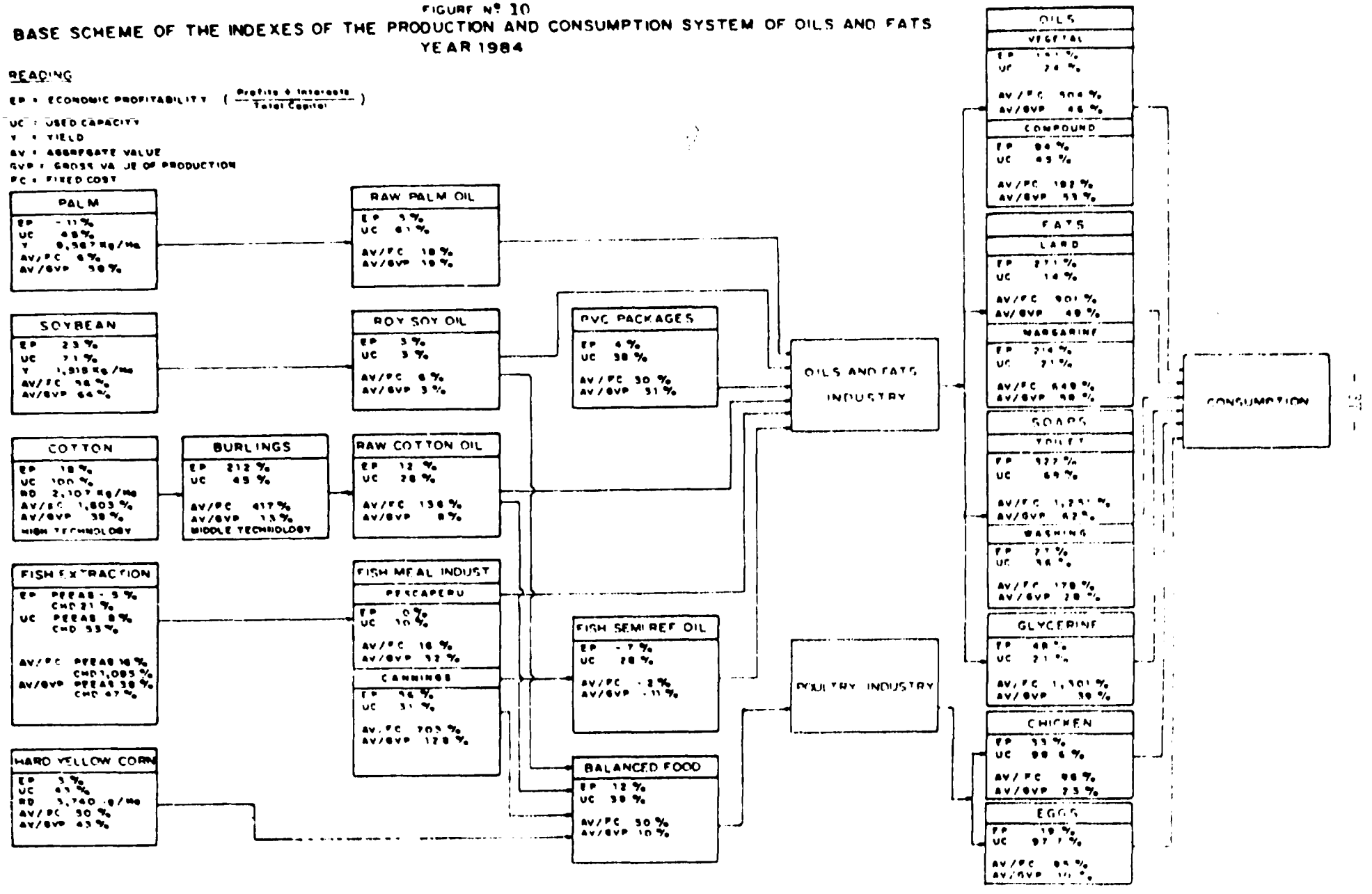
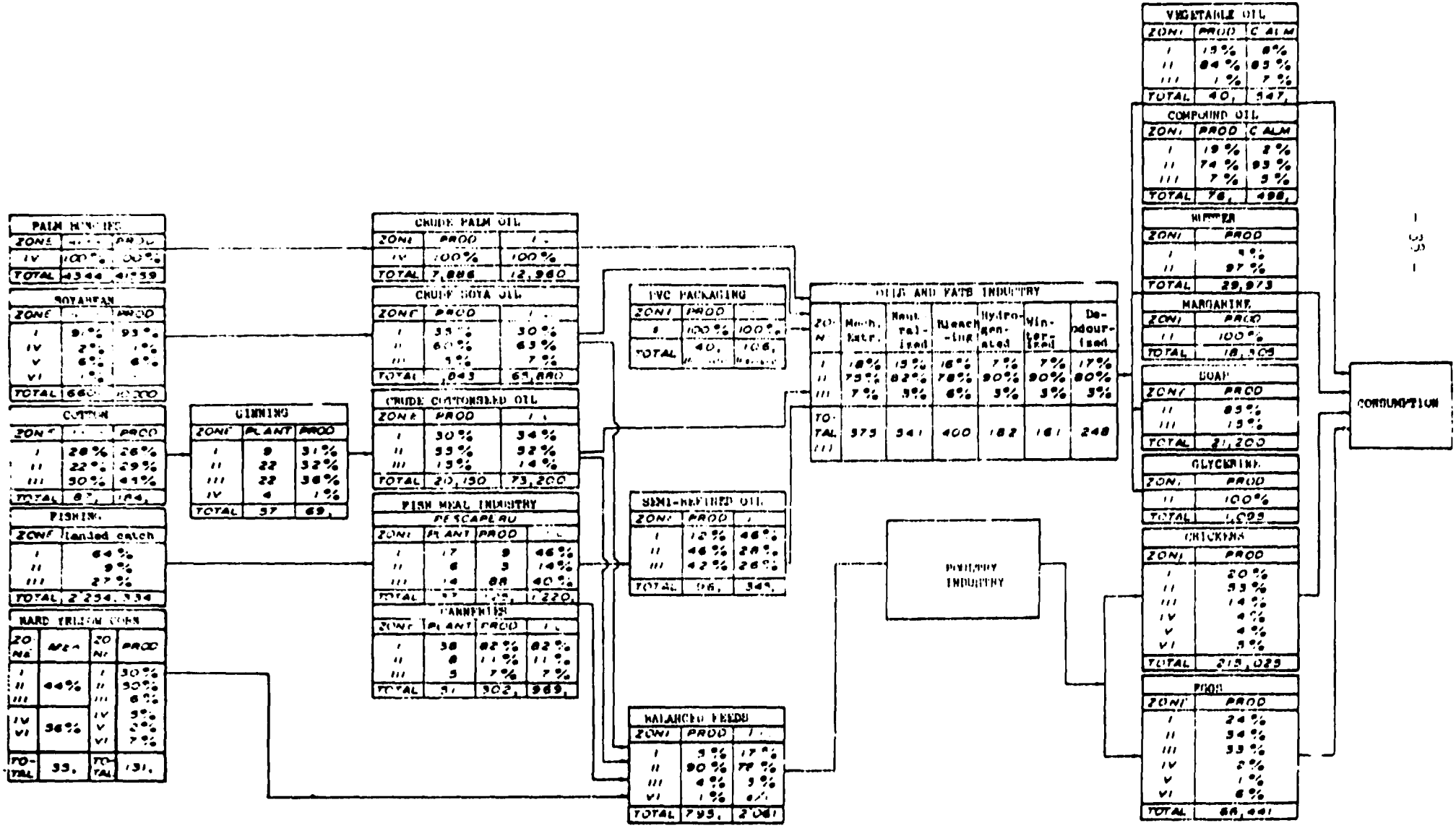


Figure 11. Regional base scheme of the production and consumption system of oils and fats - Peru



a/ No information

The base scheme is a tool to increase the comprehension of the system, especially its most important variables. This is particularly important because of the multidisciplinary characteristic of the MEPS approach, and because professionals involved in any particular area of the system may not be acquainted with the whole. The display of specialized features of a system in a set of base schemes contributes to the comprehension of the system.

4.2 Simple disaggregation: the components of the system (diagnosis of the components)

This section will analyze the principal variables in each component and determine, on the one hand the development constraints, and, on the other, find the potential resources that can be used for further development. By doing so, the user can identify the key problems of the component and also the limits to development.

The quality of the work done at this stage will depend on the availability of previous studies concerning the components of the system and also on the knowledge that the MEPS team has about the system.

The analysis is divided into consumption component, productive components and international linkages.

(a) Consumption component

The criteria that can be used to analyze this component are: products, regions, income groups and nutrition. Likewise, the historical development of consumption, the variables which determine the consumption/demand, the price policy and the real income of the population should be analyzed. The data to be used for the analysis are those already collected.

As a guideline for this stage, the user must take into account the following tasks:

- Identification of variables that constrain the consumption/demand for the specific final goods of the system.
- Identification and analysis of substitute and/or complementary goods.
- Analysis of the nutritional situation of the consumers and the nutritional role played or to be played by the final goods of the system.
- Estimation, if possible, of own price and income elasticies, also cross elasticities with respect to the substitutes and complementary goods identified.
- Identification of any kind of seasonality in the consumption.
- Analysis of the marketing channels.
- Identification of the possibilities of increasing the consumption of the final goods of the system and the requirements to achieve that increase.

(b) Productive components

For these components the guidelines to be used must consider the following aspects and tasks:

- Historical development of the component: production, investment, prices.
- Spatial distribution of the production and installed capacity.
- Brief analysis of supply characteristics for the main raw materials and inputs.
- Identification of production seasonality.
- The technological level of the component.
- Identification and analysis of any specific legal constraints that affect the component.
- Potential resources that could be used to increase the performance of the component.
- Marketing channels used to market the production of the particular productive component.

This information serves the purpose of identifying the restrictions and the potential resources that have to be taken into account in the system's planning process.

(c) International linkages

The objective of this section is to give an overview of what is happening in the world markets to the commodities that are involved in the system, either as export or import goods.

The aim is to review specialized information concerning markets, to have an idea of the main factors that affect each market and price forecasts for the period of time involved in the MEPS application.

The topics to take into account for this section are the following:

- Price development and determinants.
- Substitute goals.
- Price forecast.

This simple disaggregation process is developed in more detail in sections I.I, I.II, and II.I of the MEPS Main Manual. In the present user guide the simple disaggregation and the simple assessment section have been combined because in practice they can hardly be differentiated.

In practice within a simple evaluation, a deeper analysis of some topics that are of special interest for the system can be performed.

Example:

To illustrate the last statement in the simple assessment section of the oils and fats system in Peru, the following topics of analysis were included:

- The oligopolic nature of the oils and fats industry.
- Effects of the presence of transnational enterprises.
- Health and consumption of fish oil.
- The nature of the fish resource.

These topics played an important role within the system and were developed separately in the simple assessment section.

4.3 Structural disaggregation: the link with the model

This section describes the input of data into the model for the consumption component and for the productive structure of each of the components structurally disaggregated in the base scheme.

The data needs and the data manipulation required to fill-up the consumption format to input the data to the model and the productive structures for each productive component will be described below. In both cases the formats to be used to input the data to the model will be utilized as guidelines for the discussion.

The first set of input data should be that of the base period. For MEPS this is the year that shows the present state of the system. Usually it is the last year for which data are available for all of MEPS requirements. Before selecting the base period the user must familiarize himself with the data requirements to complete the consumption and productive structures.4/

Some of the information needed in this section probably has been already collected. However, there will be new data requirements due to the fact that at this stage data requirements are more specific.

(a) Consumption structure (data for the model)

The variables that the model requires as input are described below, together with an explanation as to how these data may be obtained.

In this case the model format 1 (table 7) will be used as a guideline:

- Needs to satisfy: this refers to the purpose of the system. If it is the oils and fats system, the need could be edible oil, shortening, margarine, etc. Also, this need can be expressed in terms of a nutritional characteristic, like calories or proteins.

The following are data about the target population, and they will depend on the disaggregation done before.

- Group name: the segments into which the population has been divided must be entered.

4/ The problem of the selection of the base period will be addressed later on.

Table 7. Model input format 1 for the consumption component

Demand of final goods

* Needs to satisfy (Unit)

_____

_____

* Target population

	Group name	Population	Goal	Needs (PC) Actual	Deficit
1					0
2					0
3					0
4					0
5					0
6					0

Total/Average values

* Alternative final goods for consumption and/or export

	Good	Unit	Coefficient P/N	Consumption	Exports
1					
2					
3					

Entered good

_____ _____ **********

Average needs Apparent _____ 0 **********

****

* Description of the base scheme

In a case where the population has been divided by age, the data to be entered are the age ranges used. The space provided for the number of groups in which a population can be divided is six, however, later on a procedure to extend this number will be shown.

Population: here the size of each of the groups in which the population has been divided has to be entered. Following the above example, the number of persons included in each age group should be entered here.

Goal: if there exists a specific consumption goal to be fulfilled, it should be entered here. This refers to a goal measured in the same units established for the need to be satisfied; that is, it should be in calories if the need to satisfy was defined in those units, or in kilograms, if the need to satisfy was, e.g. edible oil. It is important that the goal should be expressed per capita.

Actual: this title refers to the actual level of consumption i.e. the present per capita consumption. If a goal has not been defined, the actual should be equal to the goal in order to complete the information required. The other variables in this area are calculated by the model.

The next set of data refers to data concerning the goods and is entered under "Alternative Final Goods for Consumption and/or Export". The term alternative is used because many times alternatives have been defined to satisfy a need or to supply a good. For instance, when talking about edible oil, it may be possible to define three technologies to produce edible oil, so each one is treated as an alternative good to satisfy the need for edible oil. In another case the need may be defined in caloric terms; three different goods can be used as alternative sources of calories to satisfy the need defined. Sometimes when working with the present or initial situation there is only one good to be used. Also, in the case of more than three goods, a procedure to extend this number will be shown later on.

Good: name each of the alternative goods used to satisfy the established need; this refers to domestic goods only.

Coefficient P/N: this refers to the conversion coefficient of the good to the need. That is, if the need was defined in caloric terms, here the model is asking for the number of calories that each of the alternative goods have. If the need is defined in terms of edible oil, and the goods are edible oil, the conversion factor will be one.

Consumption: the level of actual consumption of each good in absolute physical terms.

Exports: the level of actual exports of each good in absolute physical terms.

Entered good: if there is one imported good that can be or will be included as an alternative to satisfy the given need, it must be stated here. It will be the same kind of data asked for in the case of the domestic alternative goods.

The other variables of this set of data are calculated automatically by the model.

Once the above characteristics have been defined, the user must go to the next set of data which shows how the identified alternative goods are combined to satisfy the specific given need for each of the population groups (table 8).

Population rate of growth: for each of the population groups, the rate of growth must be entered; if the user is working also with the base line situation, only year 1 can be filled in. However, if all the information is available, it should be entered at once.

Fulfilment of goals: this variable links the set goal with the actual satisfaction. For the initial or present situation, the goal set and the actual satisfaction (both in per capita terms) have to be taken into account and related to each other. The satisfaction goal fulfilment which the actual consumption represents must be found, and this coefficient entered under year 1. For example, the goal set was 50 kg/per capita and the actual consumption is 35 kg/per capita. Then, the satisfaction goal fulfilment is 35/50, that is, 70 per cent. When working with more than one time period, the user team can make some hypothesis for the following periods.

Imported goods share: if it was already defined that there may be an imported good that represents an alternative way to fulfil the need, the share of the actual consumption (initial situation) that the imported good satisfies has to be specified here.

Allocation between domestic alternative goods: with the definition of the imported good share, the domestic good share is also indirectly defined. How the alternative domestic goods combine to reach the actual consumption share that they satisfy has to be entered, i.e. the user has to explicitly state in percentual terms the mix in which the alternative domestic goods combine to satisfy the share of actual consumption which the imported good does not satisfy.

In the model, the consumption routine runs completely independently from the production routine. The purpose of the consumption routine is to determine the levels of output to be provided by the final goods industry. Given the above, there is an easy way to overcome the limitation in the number of final goods and population described before: the consumption component can be divided into two or more parts, calculating separately each quantity demanded. Please also see the MEPS Computer Manual.

(b) Productive structure (unitary productive structure)

A productive structure must be built for each of the productive components structurally disaggregated in the base scheme of the system. The productive structure is the basic tool for analyzing productive components. It lists the inputs, such as capital goods and services and the outputs, i.e. the good or services produced by using these productive factors.

The productive structure should be expressed in unit terms, that is, input and services consumed by one unit of product.

A detailed explanation of the data required to fill in a unitary productive structure follows, together with a description of how to build up the productive structure and problems commonly encountered. Some hints to solve those problems are also discussed.

Table 8. Model input format 2 for the consumption component

Demand of final goods

		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Population rate of growth (percentage)							
Year 1							
Year 2							
Year 3							
Year 4							
Year 5							
Satisfaction goals fulfilment (percentage)							
Year 1							
Year 2							
Year 3							
Year 4							
Year 5							
Imported goods share (percentage)							
Year 1							
Year 2							
Year 3							
Year 4							
Year 5							
		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Allocation between domestic alternative goods (percentage)							
Year 1	FG 1	100	95				
Year 1	FG 2		5				
Year 1	FG 3						
Year 2	FG 1						
Year 2	FG 2						
Year 2	FG 3						
Year 3	FG 1						
Year 3	FG 2						
Year 3	FG 3						
Year 4	FG 1						
Year 4	FG 2						
Year 4	FG 3						
Year 5	FG 1						
Year 5	FG 2						
Year 5	FG 3						

Again the input format of the model will be used as a guideline for this explanation (see table 9).

The data required to fill in the productive structure are the following:

Inputs (name and measurement unit): under this column the user must specify the inputs and services involved in the production of the good for which he is building the productive structure. A lot of inputs are usually involved in the production of any good. However, there are a few of them which are very important in terms of their relative participation or in terms of their importance in the productive process. Therefore, the user must make every effort to obtain information on those inputs and services, which are really important. For all the other inputs and services it is possible to aggregate them and use them as a group, instead of using each one by itself in order to avoid any unnecessary complications in later analyses. It is very useful to specify at this moment whether the input or service utilized is produced domestically or has to be imported. There are cases in which an input that is locally produced is also imported because the local production is not sufficient to cover the normal requirements of industry. This input has to be considered as two: one local, and the other imported.

Example:

For the case of the productive structure of vegetable edible oil, the following inputs were considered:

Soybean oil (metric tons)
Soybean oil M[a/] (metric tons)
Cotton oil (metric tons)
Chemical inputs (Kg)
Chemical inputs M[a/] (Kg)
Electricity (Kwh)
Steam (Kg)
Water (m^3)
Bottles 1 Lt (Unit)
Stickers (Unit)
Boxes (Unit)
Indirect expenses (US$)

a/ Imports.

In this example it can be seen that there are two sets of inputs with the same name, but the difference lies in their origin. These are soybean oil and chemical inputs. It is important to note that under chemical inputs a large number of different chemical products are included. However, for the purpose of the analysis it was not necessary to handle them separately, it was enough to include them as an input group.

It is advisable to try to avoid having more than 15 inputs. If the number of inputs can be limited to 10, this is even better. But in reality this will depend of the kind of good for which the productive structure is being built, and also on the quality of information available. Finally, if there is a backward link to the component represented by this productive structure, the good at the end of the backward link must be stated as an input. For example, if soybean oil was disaggregated and it corresponds to the immediate backward link, then in the productive structure to be built, it should appear as a differentiated input.

Table 9. Unitary productive structure

Input component E: Product:
Period : Unit:

Inputs (name & unit)	Physical: Unit variables	Physical: Fixed quantity	Price components (by unit of input): Producer price	FOB	Fr.& ins. external	Fr.& ins. internal	Duties	Import taxes	Market. margin	Sub-sidies	+/- Exchange differences	Rest of components

Sub-products: Name & unit	Coeffic.	Price	Employment: Concept	Not qualified	Qualified	Production demanded: Destination	Physical	Price
			FT variable			Demand of sub-system		
			FT fixed			Exports		
			Remuneration			Rest of economy		

Input-output physical coefficients: for each of the inputs the input-output technical coefficient has to be specified. All this information is entered in unit terms, unless otherwise specified. Thus, the coefficient to be entered is: how many units of input X are needed to produce one unit of output. Sometimes particular inputs are not related to the production quantity; machinery and facilities have some sort of fixed consumption independent of the production level. Insurance expenses are a good example, no matter what the level of production the insurance costs will be the same. For these cases the column "fixed quantity" should be filled in. The data can be actual figures or taken from a feasibility study for a new productive component.

Other cases in which a variable coefficient and a fixed quantity may be found are possible. They also can be filled into the productive structure in a straightforward manner.

Price components: for each of the inputs stated the price must be entered. This price, as far as possible, should be disaggregated into various components. These components are:

- For the domestic goods:

  Producer's price: the price at which the producer sells the product, that is, the gate price.

  Marketing margins: the mark up that the dealer charges when he sells the product.

  Subsidies: in the cases in which the government has a specific subsidy policy for a particular input. When instead of a subsidy there is a tax for buying an input, this should be included as a negative subsidy.

  Other components: if other components are involved, they should be included here.

When it is difficult to establish the producer's price and the marketing margins separately, the whole price must be taken as producer's price.

- For the imported goods:

  F.O.B. price: the "free on board" price of the imported good.

  Foreign freight and insurance: the cost of transporting the good from the foreign port to the local port.

  Domestic freight and insurance: this is the cost of moving the good from the arrival port to the production site.

  Tariff: the tariff to be paid for importing the input.

  Import duties: additional taxes to be paid for importing the good.

  User's subsidies: any specific subsidy [illegible] utilization of this specific input.

Exchange rate differences: there are cases where special exchange rates exist for importing certain goods. These exchange rates could be above or below the regular exchange rate. The differences between the special exchange rate and the regular one must be entered either with a negative or positive sign.

In the same way as for domestic inputs, the price components, the marketing margins and the other components are to be entered.

In the case of imported goods it is also often difficult to find the marketing margin. One way is to calculate each of the price components on the basis of known information: the F.O.B. price, the foreign and domestic freight and insurance, tariffs, import duties subsidies and exchange rate differences. Usually this price is below the actual user's price and the difference could be allotted to either the marketing margin or other components.

For both kinds of inputs, domestic and imported, it must be noted that the purpose of the price component is to permit the disaggregation of the user's price in the main component. For example, a factory buys some kind of chemical product. The price paid by the firm can be disaggregated in producer's price, marketing margins, subsidies and other component. When added their sum will equal the price paid for the chemical product. The different components should be expressed as a share of the user price which, when added, will equal 1.

Example:

In the case of an imported input, e.g. chemical products, the input may have been expressed in monetary terms because it is a category that groups a set of chemicals and not only one. Then, the hypothetical price components could be like this:

F.O.B. price	0.80
Foreign freight and insurance	0.05
Domestic freight and insurance	0.05
Tariff	0.10
All of the others	0.00

As can be seen, they add to 1, the user's price.

By-products:

- Name and unit measurement: here by-products resulting from the processing of the main product, and also the unit of measurement, must be entered.

- Coefficient: this is the technical coefficient: units of by-product per units of final product. This coefficient is required for each by-product.

- Price: the price at which each by-product is sold is entered here.

Employment: This variable is divided into unskilled and skilled labour, and also into variable and fixed labour. The definition of skilled and unskilled labour is very arbitrary and can in practice refer to both wage and salary earners.

- Variable labour: here the technical coefficient of the labour units by unit of product, for both types of workers, skilled and unskilled are entered.

- Fixed labour: the data to consider here refer to the level of labour units employed, independent of the level of production.

In both cases the definition of a fully employed worker can be taken as a unit of labour. This definition probably varies with different situations. The idea is to be able to measure the employment level and its change.

Required production: This variable refers to the level of production that this component will have to reach.

- Use: there can be three different uses: for the components of the system, to export or for the activities from the system.

- Physical: the quantity demanded by each of the three different users stated above. These data have to be found specifically for each use.

- Price: the price at which the production is sold to each set of consumers. The prices could be different.

The variables for the next input screen (table 10) are:

Capital ownership: identify the capital share owned by each of the three types of owners specified: national private, state owned and foreign.

Relative rentability: in the further development of this model the function will be more clearly defined. For the time being the number 100 should be put in each cell.

Production installed capacity: the maximum production that can be reached given the existing production facilities. This refers to the total installed capacity of all the firms represented in this productive structure.

Last period production: the total production reached by the firms representing this productive structure during the latest period under consideration.

Investments: the data refer to investment values of three types: reposition, new investment and external financing.

- Reposition: the amount invested in the replacement of all equipment without changing any of the production conditions, yield or performance.

- New investment: the amount invested in new machinery, equipment or any facilities in order to increase the actual installed capacity.

- External financing: these data refer to the amount of investment financed externally i.e. apart from the capital capacity of the firm.

Table 10. Unitary productive structure

Type of enterprise	Capital ownership (percentage)	Relative rentability (Index)	Production capacity: production: Investments
Private national		100	Reposition:
State owned			New investment:
Foreign			External financing:

Long term debt:		Coefficients
(Percentage)	Debt amortization LT:	Working capital/production:
		Investment/capacity:
(Percentage)	Foreign debt LT:	Imported investment (%):

Rate of interest long term loans:
Rate of interest short term loans:
Production taxes - Fixed global amount:
Production taxes - (% on value sales)
Production taxes - (% on value added)
Exports retention (%)
Exports reimbursement (%) - Export tax refund
Sales taxes (%)
Fixed assets depreciation rate(%)

Natural resource Type	Coefficient	Notes

Coefficients:

- Working capital/production: this coefficient has to be calculated on the average working capital. This is usually done by dividing the average cost by the inverse of the payback period expressed in annual terms. This is one way to calculate the working capital by units of production. If the user finds other more suitable methods, these can also be used.

- Investment/productive capacity: this coefficient refers basically to how much has to be invested to generate one additional unit of productive capacity. This information can be obtained from an engineer who is familiar with this component or from a feasibility study.

Imported investments: this is the share of the investment for the import of machinery and equipment required. In other words, which share of the total investment was spent outside the country.

Long term debt: usually the debt for which the payback period is longer than one year.

Long term debt amortization: this is the share of the long term debt which will be repaid during the period of study.

Foreign long term debt: the percentage representing the foreign long term debt of the total long term debt.

Long term loans interest rate: the interest rate payable for the already contracted loans.

Short term loans interest rate: the interest rate for short term loans, mostly working capital.

Production taxes (sales taxes): the rate.

Production taxes (value added tax): the rate.

Note: when one of these two taxes is applied, set the other at zero.

Export taxes: rate of export taxes.

Export tax refund: usually this is given as a promotional policy and is based on the F.O.B. export value.

Tax revenue: the rate applicable, if there is no flat rate. The user must record the different ranges and after the first output is obtained from the computer, he must insert the precise rate and run the model again.

Fixed assets depreciation rate: the rate used to depreciate the fixed assets, if it is not readily available it must be calculated. For each new run or simulation, this rate must be changed.

Natural resource: the kind of natural resource consumed by the productive component has to be established. The units consumed or utilized by units of production (coefficient) should also be established.

This completes the data requirements for a productive structure.

(c) Special comments about the productive structure

This section identifies some of the difficulties of the productive structure, some of its advantages, its flexibility, and also its rigidity. Some ways to get specific data when there are not readily available, are also shown.

(i) The pricing problem

When filling in the data for the productive structure the critical question is which prices should be used. To be consistent, all the prices have to refer to the same time period, but which time period?

Generally, when applying MEPS, a time unit of reference is defined implicitly or explicitly. It could be a year, a semester, a quarter, or a month. It usually is a year. Therefore, once the period unit of analysis is specified, the prices should automatically refer to that period. So, in the case in which the user is interested in recording the performance of the system on a yearly basis, the prices to be used should be annual average prices. In the case of a monthly period, monthly average prices should be used.

For programming the system it is convenient to use constant units, and for economies with a significant inflation rate it would be better to express prices in hard currency and use also constant units. Predictions could also be used when available. However, at all times should constant currency units be used.

The above is usually the rule for the first analysis of a system. However, for following up the system the use of actual prices for all variables would be required. The same reference date must be used for all prices.

The user may feel that because of the kind of data available to him, another type of price would be more suitable than the average price. The decision is left with the user. In any case, in order to obtain an accurate measure of the productive structure and the outputs from the model, the prices must accurately represent actual prices.

(ii) The productive structure data base

It was mentioned earlier that the productive components may be disaggregated taking into account a set of criteria. It was stated that when a productive component was disaggregated, for example into three technologies or three plant sizes, a productive structure had to be filled in for each one of them. The question arises which one should represent the productive structure: the bigger plant, an average of all the plants of a specific type, a theoretical situation, or something else? This question has no easy answer, and the answer will depend on many factors.

A given productive structure should represent a set of firms that have some sort of similarities. Sometimes there are a large number of similarities and at other times there are just a few. When the productive structure represents firms that are very alike, it is possible to take one firm as representing the others and with these data build a productive structure that accurately will represent the whole group. It is possible to have a productive structure that, while not representing any of the firms perfectly, is nonetheless an accurate representation of the group, by detecting where the differences are and by trying to represent them into the productive structure through the adjustment of some of the coefficients.

A productive structure can also be built up from theory. By discerning the differences existing among the theoretical and the real cases, the coefficients of the productive structure could be modified in order to get the nearest representation of reality.

These two ways of building up productive structures have the advantage that in the filling in process, the user is already discussing the differences, similarities and problems of the productive structures of the group and is prepared for the search of alternatives.

Another way to obtain a productive structure is to start from official information about cost structure and to try to assess if it is a good representation of reality. If not, the user can correct and adjust it with the help of new available data.

When the criteria used to disaggregate is regional location, a large number of differences among firms may be found. In this case it is important to get as much data as possible, analyze the differences to be taken into account and to construct the productive structure to be used for MEPS as an average of all the productive structures of the specific productive component.

As can be seen, there are a number of starting points: a theoretical productive structure, the one for the best firm, for example, and then with the help of a technical expert to modify the coefficients to get a good representation of reality.

At this point it is particularly important to have the advice of a technical consultant in the specific productive component; someone who knows the industry very well and who has a good knowledge of the process of production technology, as well as someone with that knowledge of the production of agricultural raw materials. Persons with those skills will be very useful as advisers in the building up process of the productive structure. However, the main emphasis of MEPS is placed on differences in inputs, consumptions and yields. A MEPS user's guide for the consultant has been prepared for consultants in specific technical areas.

(iii) <u>The fixed input mix</u>

What appears to be a problem is really an advantage of MEPS. The productive structure is built up on a fixed input mix and this gives a certain rigidity. However, this is only the representation of one point in time, and in it the input mix is fixed anyway. For simulations, however, and for new time periods, MEPS allows for a totally new input mix if necessary. This will depend on the information available.

While collecting the input-output coefficients to build up the productive structure, the assistance of a technical expert is important. This expert should provide acceptable ranges for those coefficients with respect to capacity utilization and size of plant. With this information, the user will be able to have well defined ranges of production functions for each of the inputs. This information will also be the source for variations of the input mix in a given productive structure.

Example:

An example to illustrate the kind of information to be requested from a technical expert is given below. Assume an oils and fats processing plant that can produce 100 metric tons of final product per day. The following will be the information provided by the consultant on power consumption.

Power consumption (Input-Output Coefficient)	Level of daily production (Max.100 mt) (metric tons)
1,050 kwh	up to 20
975 kwh	20 to 40
850 kwh	40 to 60
700 kwh	60 to 80
500 kwh	80 to 100

Thus, for a 100 metric tons plant, there is already a step function of the electric energy consumption. This could be similarly done with other inputs for the required plant sizes and for the required technological levels. This will enable the user to build up step production functions and establish variable input mixes.

Multiproduct cases and undifferentiated costs

It may be difficult to find the productive structure for a good that has a productive process in common with other goods, or, in other words, a productive structure for a multiproduct production line. There are two possible cases. The first, when the productive process is constant and the final goods are different, the other in which a few steps of the productive process are either similar or different and the final goods are also different.

Example:

The first case will be the case of the poultry and beef industry, the final products being poultry meat or beef. In both industries a unique productive process, (raising chickens or cows) produce different outputs, i.e. different kinds of beef and poultry products. In these cases there is a more or less standard yield between the whole and each of the different parts of meat, so the same conversion coefficient could be applied to all of the productive structure to get a sort of productive structure for each of the parts, in as much as to produce chicken legs the whole chicken must be raised. Another alternative is to take all the parts as a whole and treat the product as one unit. Neither way to get a productive structure is difficult.

When there are different products which pass through similar processes the building up of a productive structure is more complicated, because the input consumption in each of the common processes must be allocated to each good according to its own technical coefficient.

Finance cells

The financing aspects of a productive component are not completely developed in the present model. It was designed in such a way that the finance information should be calculated outside the model and then entered into the model. Many times due to the lack of information it is very hard to fill these cells with high quality data. Many simplifications can be made to input the data into the model. Often, the working capital can be estimated, but probably the information about its financing is not available, therefore assumptions should be made. It could be 100 per cent by bank loans, 50 per cent bank loans and 50 per cent by own resources, or similar. Thus, if there is no information available, assumptions can be based upon the usual behaviour of the particular economic environment in which MEPS is applied. The important point is to have a close representation of the real situation.

A problem arises when estimating long term debts because this aspect varies a great deal from firm to firm, and a productive structure designed to represent a set of 20 or more firms will not be able to reflect all of them. In this case the following can be applied. Usually, there is information about interest payments by an industry and, as said before, the working capital can be easily estimated. Once the working capital is estimated, the interest payments should be calculated. Given the total interest payments and the working capital interest payments, it can be assumed that all the other interest payments are for long term debt. Given an average interest rate for long term loans, a principle can be roughly determined and this can be used as the data to enter into the model.

The above is an approach that can be used when no information is available. It is a very rough estimate and starting from actual data will be better than the procedure described above, however, as mentioned, this is one of the most difficult pieces of information to obtain.

The depreciation cell

The depreciation is calculated by applying a rate over the fixed assets value; many times enterprises do not follow that procedure, but it is the only one accepted by the model and must be entered as such. However, this rate can be changed any time the model is run and it is more a calculation than a theoretical problem.

Taxes

Even though there are several types of taxes already included in the productive structure, often, in reality, there will be even more. It must be remembered however that the goal is to represent reality without excessively complicating the process. Therefore, the user must strike an appropriate balance between excessive realism and modelling abstraction depending upon the projected uses of the MEPS exercise. The original objectives of the analysis can serve as guidelines in this respect.

As in the case for depreciation, almost any tax can be expressed as a rate to be applied to sales or value added. However, there may be cases where more ad hoc means are required to represent special tax like policy instruments. Though the model allows the user to make adjustments manually, it should be kept in mind that this can become very cumbersome especially, when carrying out multi-year forecasts over long periods.

Exports of by-products

The model does not allow for the by-products to be exported,[5/] and in order to cover this aspect, a slight change has to be made. The model counts as exports earnings only the quantity of the good that is under the title "exports" in the productive structure input. Thus, for a by-product to be included as an export good, it has to appear in a productive structure as the main product and have some export demand.

In such a case, it is necessary to create a new productive structure for a good called "by-product exports". This productive structure will have as only input the by-product and its coefficient will be 1, with the producer prices equal to the export price of the by-product. Then under the title "export demand" will be the quantity to be exported and valued at the export price. With this the model can consider the export earnings within the foreign currency account.

At the same time there is the "by-product" title in the productive structure to which the by-product originally belongs. Here the by-product valued at its domestic price is entered. If the export price is different from the local one, there has to be another title called "price difference" with the same technical coefficient as the by-product but valued at the difference between the export and domestic price. If the domestic price is higher, then the difference should be negative.

Many of these manipulations can be used to avoid some of the model's rigidities. The way to perform them successfully is by understanding how the model works and also what the expected effects of these are. The user should experiment with the model and check whether the expected effects have been correctly recorded by the model, and if not, try to find out why it has not been so.

4.4 Validation of the data

After filling in all the productive structures of the system and the consumption format, the user is ready to do the first run of the model. This output will probably represent the present or initial situation of the system. Up to this point, the user has made all efforts to have an accurate output. However, he may have some doubts about the quality of the output obtained. Therefore, at this point, some procedures or ideas are given to help the user test the validity of the output.

Because the so called present or initial situation of the system is usually a past situation, the first thing to analyze is how different is the output, given by the computer, from the real situation. Probably there will be some differences but the idea is to analyze if those differences are significant, and if they are, to try to understand why they are so. This may be due to some errors in the coefficients or in some of the assumptions. At this point a fine tuning process has to be applied to the productive structures already built.

5/ Because of design rigidities.

A second step in the validation process could be the representation of a situation previous to the initial or present situation. The user should try to see if the data fit, and whether the differences found are significant or not. If they are, an explanation must be sought. It must be investigated if the differences are caused by the existence of other environmental conditions or because of errors present in the productive structures.

A third validation alternative could be to analyze the model's output together with a group of experts, people involved in different steps of the system, and test their opinion of the model output.

If some differences are found during the validation process it should be checked whether the following variables are well represented in the model:

(a) Policy variables like taxes, subsidies, exchange rate;

(b) Key input-output coefficients;

(c) The pricing process of the different inputs and goods;

(d) Consumption and demand variables.

However, the first thing is to check if the model took as input what the user meant to give as input.

5. THE PROCESSING PHASE

5.1 System assessment: the purpose of the model

The first goal of the model is to assess the present or initial situation to the system, and all the steps taken up to this point have been directed up towards that target. This section explains how the system assessment may be done, based upon past experiences with MEPS. However, it does not mean that it is the only or the best way to do it. The user can improve the approach and be creative in developing new assessment approaches using MEPS.

The assessment procedure has a number of steps. First, the assessment of the aggregated variables of the system; then, the assessment of the system links. Third, the assessment between options for the same component; fourth, the assessment of the productive structures of those components which have rentability problems; fifth, an assessment of the consumption structure and, finally, special topics assessments such as food security and regional impact.

(a) Assessment at the system level

The objective at this stage is to measure the macroeconomic contribution to the system of each of the productive components.

This assessment is based upon the output obtained from the model by using the data given by the productive structures. The output model section to be used is the one which includes the tables calculated under the software command TOT-SIST and this output is presented in tables 11 to 15.

At this level, it is necessary to compare the outcome of the system variables with the total domestic figures for those variables, in order to measure the contribution of the system to the domestic economy, and also the domestic resources used from the system. An example is given in table 16.

Finally, this section should address all the topics which have some macroeconomic relevance. The analysis of subsidy policies affecting the system could be an example.

(b) Intra-system level

The intra-system assessment seeks to identify the system's bottlenecks which are restricting the short and long term development of the system.

The bottlenecks that could be present in any system could be the following:

- Lack of natural and human resources.
- Lack of productive and service facilities.
- Lack of profitability in some productive components.
- Absence of adequate marketing channels.
- Considerable changes in relative prices which may affect the economic feasibility of some of the productive components. Likewise, major distortions that could change the existing comparative advantages.

Table 11. System totals - General results

Component	Unit	Gross value production	Value added	Employment	Gross investment	Foreign exchange requirements	Government account	Finance requirements
Total		0	0	0	0	0	0	0

Table 12. System totals - Production and capacity

Component	Unit	Total	Destination of production			Production capacity		
			System	Export	Rest of economy	Installed	Idle	Generated

Table 13. System totals - Government account

Component	Unit	Total	Duties and taxes		Public enterprises profits	Exchange differentials	Subsidies
			Import/input	Indirect income			
Totals		0	0	0	0	0	0

Table 14. System totals - Value added distribution

Component	Unit	Total amount	Salaries	Indirect taxes	Interests	Gross savings	Profits	Income tax
Total			0					

Table 15. System totals - Foreign account

Component	Unit	Total effect	Imports		Remittance		Exports	Net external loan
			Inputs	Equipment	Profits	Interests		
Total		0	0	0	0	0	0	0

Table 16. Contribution of the oils and fats system to the Peruvian economy (thousands of US$)

Aggregated / Variable	System	Peruvian economy (1983)	Participation in the system (per cent)
1. Value added (gross product)	359	17,672	2.0
2. Employment (men/year)	63,266	2,647,800	2.6
3. Current account[a/]	-3	-850	
3.1 FOB exports	155	3,015	5.1
3.2 FOB imports	-126	-2,122	4.6
Balance of trade	29	293	
3.3 Financial services	-6	-1,108	0.5
3.4 Non-financial services	-26	-254	10.2
Balance of services	-32	-1,362	
4. Current government accounts	86	-2,032	
4.1 Current income	111	8,987	1.2
Central government	111	2,359	4.7
Public enterprises	-	5,962	
Other entities	-	666	
4.2 Current expenses	25	11,019	0.2
Central government	1	4,822	
Public enterprises	24	5,577	0.4
Other entities	-	621	
5. Financing (Banking system credit)	186	5,540	3.4

a/ The system's capital account is negative by $US 12 million.

Source: Economía Nacional: BCR. Junta del Acuerdo de Cartagena (JUNAC), Lima.

- Institutional rigidities, such as labour stability.

- Absence of adequate co-ordination between economic agents, and lack of negotiating mechanisms among the diverse interest groups within a system.

- Change in the demand levels that could constrain an optimal production level, in such a way that it will not be possible to take advantage of economies of scale.

Some of these bottlenecks are interrelated. For example, the lack of profitability in a productive component could be caused by a decrease in the demand level due to a fall in the real income, or a change in a relative price (like the exchange rate), or be due to the lack of natural resources. Anyone of these phenomena constitute a constraint to reach the break-even point in a given productive component.

The data to be used in this analysis are only partially provided by the model. The user will find that most of the data are in a raw stage in the model output and it will have to be further elaborated, in order to obtain the indicators required by the assessment.

(c) Inter-component level

The inter-component level of assessment covers aspects related to the different types of technologies, ownership, plant size, regional location, etc. in which a productive component has been disaggregated, with the purpose of determining the comparative advantages of each type.

If for a productive component three technological options have been defined, the inter-component assessment seeks to find which of the technological options is the most appropriate to follow, and which should be discarded.

The criteria to take into account are broader than general economic feasibility. They also concern domestic human and natural resources and must also consider the institutional framework in which the system develops.

For example, it is not enough to state that in order to grow soybeans it is better to use a high technology than a traditional one. The natural conditions of the soil and its appropriateness for an intensive exploitation must also be analyzed. The feasibility of applying such technology in view of other constraints to operate the machinery needed, due to human, economic, and geographic conditions should also be considered. All of these and other factors must be analyzed to decide whether a given option is more suitable than others.

(d) Productive structure level

The assessment at this level concerns mainly the analysis of those productive structures which show profitability problems by the intra-system assessment. The question here is why these productive structures do have profitability problems, and what can be done to improve them?

To develop this analysis the user must pay attention to the following issues:

- Actual input-output consumption vs. theoretical coefficients
- Price components
- Price determination of the key inputs
- Price determination of the good produced
- Value added distribution
- Public policy affecting the component production process
- Production restrictions.

A close examination of the above facts will identify the real problems of the productive component and will also give some indication as to what could be done to solve them. Some indicators that may be used for this purpose are shown in table 17.

Table 17. Indicators that can be used to assess productive structures

1. Value added / Total revenue
2. Value added / Total fixed capital
3. Increase in production / Investment
4. Total fixed capital / Number of employees
5. New jobs / Investment
6. Value added / Number of employees
7. Net taxes paid / Value added
8. Imported inputs / Total inputs
9. Savings / Gross profits
10. Break-even point
11. Utilized installed capacity
12. Private rentability
13. Social rentability
14. Value added distribution - Salaries - Taxes - Interests - Profits

(e) Consumption structure assessment

If the final good is not directly or indirectly a foodstuff, this section does not apply.

The purpose of this section is to assess the role of the final goods as components of a dietary pattern of the population, and to try to identify the main elements that explain the consumption variable.

The quantitative analysis should be made in terms of degree of satisfaction of specific needs and the strategy to improve the level of satisfaction. Some indicators are presented in table 18.

Table 18. Indicators that can be used to assess the consumption component

1. Per capita consumption
2. Average need's satisfaction
3. Foreign dependence of consumption
4. Protein average cost
5. Calorie average cost
6. Protein subsidy
7. Calorie subsidy

(f) Other types of assessment - the degree of food security

As stated at the beginning of the assessment section, there is another type of assessment system that can be useful. As an example, the assessment of the degree of food security performed in the case of the oils and fats system will be presented below.

First, the concept of food security must be understood. The food security of a population can be adversely affected, among others, by the following variables:

- The population can become malnourished due to changes in their consumption-income structure.
- Given a high level of imported food in the diet, shifts in prices, due to fluctuations in the international market, introduce a risk level that can seriously affect the stability of the balance of payments.
- Likewise, the population must be protected from eventual foreign pressures exerted via imported food provisioning or from the extreme possibility of a war.
- Finally, the population must be protected from the possibility of low provisions due to a number of different reasons: droughts, marketing losses, low profitability in a productive component, etc.

In table 19, an indicator for each of these variables has been defined and the results obtained for the given oils and fats system in Peru are presented.

5.2 Programming: the search for alternatives

The purpose of this section is to identify different options that could be implemented in order to improve the performance of the system and two main aspects should be considered:

- The problems found at the assessment stage; and
- alternatives to increase the level of fulfilment of the objectives.[6/]

At this point it is also necessary to explain the difference between an option and an alternative. An option can be implemented into a component, while an alternative represents a set of options and refers to the system in general. Thus, the first step is to find options for each component, then with these to establish alternative strategies for the system.

There are three general types of options to search for:

(a) Options for the programming of the final consumption component.

(b) Development options for the programming of the productive components.

(c) Establishment of different scenarios for the economic environment.

A set of ideas is presented below to help the user in identifying alternatives for the system's programming.

(a) Options for the programming of the final consumption

The first type of options refers to the consumption component, dealing with the different goals to be reached. The variables to be considered are: the target population group, the per capita consumption and the type of final good to be consumed.

The target population group involves the setting up of different hypothesis of population rate or growth, and, if applicable, the definition of the particular population group to benefit by the system's programming.

The per capita consumption refers to the establishment of consumption goals to be reached in the programming process. The way to calculate these consumption goals may vary from using a very sophisticated econometric approach, to using rough estimates. This would depend on the data availability, user's needs and user's skills. Also, as the programming process has to be implemented within a defined length of time, the user has to establish the rate of achievement and the path to be followed to reach the consumption goal within the given time period.

6/ Defined at the beginning of the study.

Table 19. Degree of food security of the oils and fats system

Variable	Indicator	Results
1. Malnutrition degree	Percentage of malnourished population	52 %
	Average gap - calories	50,165 Kc/month
	Per capita	990 g/month
2. International prices effect	Oil subsystem:	
	$\frac{\sum_{i}^{n} CV \left(\frac{X_i}{VBP_i}\right)(Y)_i}{\text{Total imports of soybean}}$	10.5%
	Where i represents every productive structure requiring raw soybean oil	
	CV is the variation coefficient defined as: $\frac{\hat{s}}{\bar{x}}$ where $\hat{s}$ is the standard deviation and $\bar{x}$ the international price mean	
	X = cost of imported soybean oil Y = raw soybean oil importation VBP = gross value of production	
	Poultry subsystem:	
	$\frac{\sum_{i}^{n} CV \left(\frac{X_i}{VBP_i}\right)(Y)_i}{\text{Total imports of corn}}$	13.3 16.3%
	$\frac{\sum_{i}^{n} CV \left(\frac{P_i}{VBP_i}\right)(P)_i}{\text{Total soybean cake imports}}$	3.0 16.3%
	Where X = hard yellow corn importation Y = corn importation P = soybean cake importation	

Table 19. Degree of food security of the oils and fats system (cont'd)

Variable	Indicator	Results
3. Effect of protection	Oil subsystem Value domestic inputs/Total inputs	75.8%
	Poultry sybsystem Value domestic inputs/Total inputs	85.1%
4. Degree of provisioning	$\frac{\sum_{i}^{n} (CV_i)\ (\text{Raw oil production})}{\text{Raw oils total production}}$ In the case of palm, the variation coefficient is calculated considering the difference between projected production and real production	61.1%

Source: "A Programme for the Integrated Development of the Peruvian Oils and Fats Production/Consumption System", UNIDO/JUNAC Sectoral study, 1985, complete, unpublished version. Abridged version: UNIDO/IS.569, Sectoral Studies Series No. 19, October 1985.

The last variable to consider is the type of final good. There may be various ways to achieve the per capita consumption goal, and these ways will include probably various types of final goods. At this point the alternative set of final goods that can be used to achieve the given per capita consumption goal should be defined.

The set of options designed for these three variables will be taken into consideration later on, when defining the final programming strategies.

(b) Development options for the programming of the productive components

These options refer to the multiple options that could be implemented to improve the present or initial condition of any productive component. This also includes the identification of new goods that could be produced by the system in order to improve its overall performance. Therefore, the results obtained at the assessment stage are the very first source of information from which a solution to the problems can be looked for. These solutions usually will give the user a set of alternatives to attain that goal.

There are some very important factors that can be used as guidelines to follow in the search for options in the productive components. These are:

- Technological: all options which have to do with: improving input-output coefficients for present processes; the production of a good by a productive process that uses a higher technological level; the replacement of a good for another technically superior; and finally, the introduction of a new product.

- Size or production scale: this refers to all options regarding the implementation of the same productive process, but using different production scales.

- Organizational or institutional: these options refer to alternative ways of entrepreneurial organizations on which a productive process can be based, i.e. public enterprises, foreign enterprises, private domestic enterprises, co-operatives and any other form of entrepreneurial association.

- Marketing: these options refer to the different emphasis that can be placed on the marketing process, i.e. exports, or domestic sales to specific groups or geographical areas.

- Regional redistribution of the production: this involves options about different geographic locations for a given component, or whether one area of production is preferred to other areas.

- Production regulation: this includes different options about technical parameters that are usually given by national quality standards and other government regulations.

(c) Economic environment scenarios

A third very important type of option is the definition of alternative economic environments for the programming term. These scenarios involve, among others, the following variables:

- Fiscal policy (tax and subsidies)
- Exchange rate

- Interest rate
- International prices for the most important products of the system
- Domestic prices for the key inputs used in the system, and also for the goods produced.
- Tariff and trade policy.

These economic environment scenarios will later be organized in long term strategies for the system programming.

(d) Data collection

The above process, by producing further options to be implemented into the system, requires additional data collection. The user has to remember that for the case of new products, either intermediate or final goods, a productive structure must be built. This must be done by following the procedure described before. This also applies to all other options. It is important to note that only options which can be quantitatively expressed can be considered as such, otherwise their impact on the system during the simulation process cannot be measured.

The data to be collected depend on the type of options identified. Some of the information required will come from outside data and some may be derived by the user team, such as economic environment variables.

Before an option is tested and considered for the programming stage it should be quantitatively characterized by coefficients such as price, rates, productive structures, etc.

5.3 The selection of options for the simulation stage

At this stage there is a group of different options regarding the consumption component, productive components and economic scenarios, but all of them are probably isolated from each other. The purpose of this next step, therefore, is to obtain from this set of isolated options a set of linked alternative strategies for the development of the system, which will be used for the system programming phase.

The setting up of alternative strategies for programming the integrated development of the system consists of the identification (from the previously identified options) of development patterns independent from each other, that could be incorporated into the production and consumption system. These strategies will lead to the programming stage, always keeping in mind the need to achieve the objectives initially selected.

To set forth or define programming strategies, it is necessary first to analyze the identified options, to select those that can be implemented, to identify those that are complementary or that exclude each other. In this way the existence of one or more independent combinations may be determined to set up the programming alternatives for the system's development.

The later assessment process will be done by comparing the selected alternative strategies with a projection of the initial system at the end of the selected programming time period.

Besides the definition of the alternative strategies of development, the user has to provide a schedule, a time table for the implementation of the alternatives according to this schedule. This time table will be used as a guide during the programming stage.

5.4 Simulating the alternatives

The simulation process is relatively simple, because at this point all the information and the knowledge to run it is available.

First the different alternative strategies are implemented, one at a time, by entering into the model all options included in that alternative strategy according to the time table previously defined.

An output for each of the time units could be obtained. However, if the programming time span includes too many units, then the process will become cluttered with too many data to analyze and few results. The best method would be to select some ranges for which to print out the model output, or to run only the last period on the understanding that in the last period the objectives will be assessed and also from that point on the system will keep running in that way.

During this simulation process a validation process similar to the previous one must be done. At this time, because it concerns the future, expert advice should be used for the validation of the data.

To do the simulation process the user must have previously mastered the use of the model software, in order to be able to implement any data manipulations additional to the ones already explained before.

5.5 Alternatives assessment

(a) Assessment

This step is very similar to that developed in section 5.1. However, each alternative strategy is treated as if it were a system. Thus, the assessment at the system level becomes an inter-system exercise to assess which system performs better at the macroeconomic level.

All the other assessment features remain the same. Thus, the intra-system, intercomponent, and the productive structure level assessment should be done for each alternative strategy (each system), without necessarily comparing the outcomes of each assessment. Here the purpose is to assess the feasibility of each one of the alternatives.

(b) New simulations

The above assessment will probably have identified some problem areas that could easily be improved, or the user may want to introduce new changes in the alternative strategies. These can now be done. The whole process of alternative assessment must be repeated again for the modified alternatives. This can be repeated as many times as the user needs, the only constraint being time.

After all the simulations are run and the assessment process is finished, the user goes to the next step, the selection of the best alternative.

5.6 Selecting the best alternative

The selection process is based upon a comparative assessment between all the alternative strategies, and its goal is to identify which of the strategies achieves the objectives defined at the beginning of the study in the best way.

Table 20 gives an example of the indicators used in the selection of the best alternative for the case of the oils and fats system in Perú. The first column of the table represents the quantifiable definition of the objectives. The second column shows the indicator or indicators used to evaluate each objective. The next two columns present the value of the given indicators for each of the alternative strategies. Finally, the last column indicates which system satisfies best a given objective. Therefore, based upon this information the decision has to be taken as to which of the alternative system should be implemented. In the case of oils and fats only two strategies were evaluated. However, this could be done for more strategies.[7/]

When assessing several strategies it may happen that none is found that is clearly the best. Rather different alternatives may exist to fulfil the objectives of the study, in which case the objectives can be ranked according to their relative importance. Also the strategies could be ranked according to how they fulfil the different objectives. This could be a very helpful tool for the decision making process.

7/ Too many strategies may complicate the decision making process.

Table 20. Selecting the best system

Goal/effect[a/]	Indicator	System: Present (PSP)	System: Alternative (AS) [b/]	More advantageous system
1. Value added	Aggregated value (millions $US)	857	1,046	AS
2. Income distribution	Aggregated value			
	Distribution			
	Salaries	19.3	22.2	Depends
	Indirect taxes	7.9	6.5	upon
	Interests	5.5	3.1	political
	Gross savings	3.1	3.9	criteria
	Profits	49.0	52.6	
	Income tax	15.2	11.7	
3. Foreign currency account	Foreign currency balance (millions $US)	552	202	AS
4. Employment	Men/year	98,314	151,831	AS
5. Fiscal accounts	Fiscal account balance (millions $US)	210	212	AS
6. Use of installed capacity	Oleaginous grain extraction	15.8%	86%	AS
7. Required investment	Total investment (millions $US)	691	1,011	PSP
8. Food security	Gaps for:			
	calories/month	45,090	45,090	...
	proteins/month	900	900	...
	International prices effects:			
	Oils and fats subsystem	11%	0.7%	AS
	Poultry subsystem	18.2%	11.7%	AS

a/ Quantifiable definition of objectives.

b/ Alternative strategy.

Table 21. Selecting the best system (cont'd)

Goal/effect [a]	Indicator	System: Present (PSP)	System: Alternative (AS) [b]	More advantageous system
	External protection effect:			
	Oils and fats subsystem	63.3%	96.6%	AS
	Poultry subsystem	83.5%	89.3%	AS
	Supply effect	57%	37.3%	AS
9. Regional development	Distribution of aggregated value among regions	Oils subs. / Oils system	Oils subs. / Oils system	
	Region I	13.1 / 27.9	17.3 / 26.8	AS
	Region II	84.2 / 48.7	51.6 / 38.9	
	Region III	-1.8 / 12.0	1.9 / 10.7	
	Region IV	4.5 / 8.5	22.7 / 15.4	
	Region V	- - / 0.8	1.0 / 5.5	
	Region VI	0.1 / 2.1	5.1 / 4.7	
10. Degree of technological innovation	New end-products	None	-Milk extender -Composite flours	AS
	New intermediate products	None	-Palm-kernel oil -Tarwi oil -Corn oil -Palm stearin -Palm olein -Raw rice oil -Tarwi cake -Soy lecitin -Oil-free fishmeal	AS

a/ Quantifiable definition of objectives.

b/ Alternative strategy.

6. THE FINAL OUTPUT

6.1 Design of the programme or project proposal

The final output of MEPS is a set of projects, activities and policies which leads to the implementation of the previously selected strategy; this is usually called a programme.

This programme has to include everything needed to start implementing the strategy selected as the best one. Therefore, the programme must include:

Objectives and goals: The objectives should be the same or at least very similar to those defined at the beginning of the study. Also, up to this point it is possible to set quantitative goals for the system and for each component using all the data available through the model.

In the programme designed for the oils and fats system of Perú the following development objectives were considered:

- Increasing the local supply of oleaginous raw materials.
- Increasing the value added generated in the system (salaries, profits, taxes, interest, gross savings).
- Internal integration of the various productive processes that take place at the international level.
- Improvements of linkages between agroindustry and local agriculture.
- Spatial distribution of the economic effects generated by the system.
- Promotion of technological development in the various productive components of the system.

More specific objectives and quantitative goals derived for some of the components of the above system[8/] are given below.

Intermediate goods agriculture (IGA)			Intermediate goods agroindustry (IGA I)		
Palm	Soybean	Tarwi	Palm	Soybean Oil extraction	Cotton
		Objectives			
Expand cultivated area rationalize and improve efficiency of agroindustrial units	Expand cultivated area and introduce technical change	Expand cultivated area and introduce technical change	Increase fractionation capacity in accordance with agricultural production	Integrate soybean oil extraction into existing plants	
		Goals			
54,000 Ha 1,094,800 Ha	43,000 Ha 112,580 MT	,000 Ha ,000 MT fiel. from 1,1 Ha to 1,500 kg	135,027 MT of olein MT or	20,748 MT of raw oil	20,150 MT of raw oil

8/ Fats and oils system.

Policies and instruments: The set of policies that includes the strategy must have already been defined or at least identified. Also, there could be additional institutional policies needed to get a successful implementation of the strategy. All these must be stated very explicitly in the programme.

In the case of the oils and fats system[9/] of Peru the following economic instruments were recommended for application.

Economic instruments

		Soybean	Tarwi
Taxes	Tax exoneration	Tax exoneration	Tax exoneration
Prices		Establish a refuge price for farmers	Establish a refuge price for farmers
Interest rates		Preferential rate at -20% real level	Preferential rate at -20% real level

Activities: The programme also must include all the activities involved in the implementation of the strategy. These activities must include the promotional activities, the productive projects and the research activities. The team must take into account that in order to implement productive projects complete feasibility studies have to be undertaken before any funds are invested.

In the case of the oils and fats system the following activities were programmed.

Activities

	Palm	Soybean	Tarwi	Palm	Soybean
				Horizontal integration	Horizontal operation
	Expand sowed area at a rate of 3,000 Ha/ year	Expand cultivated area from 6,500 to 43,000 Ha	Expand cultivated area from 4,500 to 60,000 Ha	Installation of extraction plants for processing the whole crop	
Technical changes		-Use of improved seeds -Technical assistance	-Fertilizers -Technical assistance	Growing use of fractionation for raw palm oil processing	Adapt extraction plants for tarwi milling and soymeal production
Rationalization	Increment labour productivity and recovery of lands at the public enterprise ENDEPALMA		Increment labour productivity at the extraction plants of the public enterprise ENDEPALMA		

9/ Fats and oils subsystem.

Investments: Even though there will not be necessarily an exact figure for the investments, it will help very much if some estimates could be made. Basically, this will allow the team to estimate finance requirements for implementation. Precise investment requirements will be produced at the feasibility studies and investment promotion stages, which are outside the scope of MEPS.

Table 21 lists an estimate of the investments required by the proposed integrated development programme of the oils and fats system of Peru.

Table 21. Investments required by the proposed in ed development programme of the fats and oils system o a (programming period 21 years)

Activity	Investment
a. Promotion Activities	
1. Programme Agreement and Supervising	650
2. Information Dissemination System	150
3. Promotion of Consumption	150
b. Productive Project Activities	
1. Expansion of oil-palm cultivation	79,751
2. Expansion of soybean production	22,339
3. Expansion of tarwi production	2,037
4. Expansion of yellow corn production	12,218
5. Expansion of barley production	1,488
6. Palm oil fractioning plant	16,616
7. Raw palm kernel oil plant	600
8. Plant adaptation for tarwi oil and soybean meal elaboration	1,413 250
9. Yellow corn degermination equipment	1,200
10. Raw corn oil manufacturing equipment	1,5
11. Rice bran stabilization equipment	3,779
12. Rice bran raw oil extraction equipment	560
13. Residual fish oil extraction equipment and oil-free fishmeal elaboration	20,000
14. Corn meal productive capacity expansion	912
15. Horizontal integration for cotton seed milling	-
16. Milk extendor equipment	345
17. Composite flours production equipment	345
18. Chicken production expansion	23,738
19. Eggs production expansion	5,827
c. Training Activities	
1. Various raw oils processing	100
2. Uses of composite flours	100
d. Research Activities	
1. Evaluation of the effects of fish oil.	500
2. Modifying technical regulation for oleaginous end-products	250
3. Microeconomic evaluation for productive components	100
4. Tarwi processing plant design	500
Total:	197,492

a/ Investment discounted at a 12 per cent rate.

b/ If the system were to be programmed for the first ten years, the amount of investment would reach $US 135,127 thousands.

Source: Junta del Acuerdo de Cartagena (JUNAC), Lima.

Time table: Finally, a time table should be designed in order to give priority to the key activities and their linkages within the time span of the programme.

There are a variety of ways in which MEPS could be applied. The working group should feel free to design the programme under other guidelines but with the same objectives and purpose.

ANNEX - WORKSHEETS 1-44

Worksheet 1

Total cultivated area and spatial location
(in hectares)

Zone/region \ Products	1	2	3	4	5	6	7	n	Total
A:	q/o	q/o	q/o	q/o	q/o	q/o	q/o	q/o	100 q/o
B:	q/o	q/o	q/o	q/o	q/o	q/o	q/o	q/o	100 q/o
C:	q/o	q/o	q/o	q/o	q/o	q/o	q/o	q/o	100 q/o
N:	q/o	q/o	q/o	q/o	q/o	q/o	q/o	q/o	100 q/o
Domestic total	q/o	q/o	q/o	q/o	q/o	q/o	q/o	q/o	100 q/o

Worksheet 2

Spatial location of the agricultural components of the system

Zone or region \ Products / Production	1	2	3	4	5	n
A: Value						
A: Quant.						
B: Value						
B: Quant.						
C: Value						
C: Quant.						
N: Value						
N: Quant.						
Domestic total Value						
Domestic total Quant.						

Relative importance of the component in the regional economy

Zonal production as related to the rest of the economy				
Products (in %)				
1	2	3	4	n
100	100	100	100	100
100	100	100	100	100

Worksheet 3

Area, volume and value of the production of the agricultural components of the system according to the size of production units

Size / Unit types (Hectares)			Zone or region / Product	A			B			C			D			Production of unit types with respect to the rest of the economy			
				1	2	n	1	2	n	1	2	n	1	2	n	Products 1	2	3	n
0-1	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
1-2	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
2-5	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
5-10	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
20-50	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
50-100	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
100-500	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
+ 500	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
TOTAL	Number of units			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Area			%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
	Production	Q		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100
		V		%	%	%	%	%	%	%	%	%	%	%	%	100	100	100	100

Worksheet 4

Number of production units by agricultural components of the system and technological pattern

Zone/region	A:						B:					
Products	PRODUCT 1			PRODUCT 2			PRODUCT 1			PRODUCT 2		
T	Tec. 1	Tec. 2	Total	Tec. 1	Tec. 2	Total	Tec. 1	Tec. 2	Total	Tec. 1	Tec. 2	Total
Number of units	o/o	o/o	100o/o	o/o	o/o	100o/o	o/o	o/o	100o/o	o/o	o/o	100o/o

Tec: Technology

Worksheet 5

Unit range and number of units according tc type of technology

Agricultural productive component: X

Technology / Range	Total Hr. units	High			Medium			Low		
		Number units	Production	Area	Number units	Production	Area	Number units	Production	Area
0 – 1 Hás.										
1 – 5 Hás.										
5 – 10 Hás.										
10 – 20 Hás.										
20 – 50 Hás.										
TOTAL										

Note: Complete a worksheet for each agricultural component of the system.

Worksheet 6

Area, volume and value of the production of the agricultural components of the system according to technological pattern

Zone/reg. / Product / T	A: PRODUCT 1				B: PRODUCT 1				B: PRODUCT 2				N: PRODUCT 1			
	Tec. 1	Tec. 2	Tec. 3	Total	Tec. 1	Tec. 2	Tec. 3	Total	Tec. 1	Tec. 1	Tec. 2	Total	Tec. 1	Tec. 2	Tec. 3	Total
Area	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100
Production volume	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100
Production value	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100	a/b	a/b	a/b	a/b 100

Tec: Technology

Worksheet 7

Typical cost structure according to the type of technology and to zone or region

Zone or region / Technology / Costs	A: T_1 P	A: T_1 V	A: T_2 P	A: T_2 V	A: T_n P	A: T_n V	B: T_1 P	B: T_1 V	B: T_2 P	B: T_2 V	B: T_n P	B: T_n V	N: T_1 P	N: T_1 V	N: T_2 P	N: T_2 V	N: T_n P	N: T_n V
1. Direct costs																		
- Inputs																		
1.																		
2.																		
3.																		
N.																		
- Salaries																		
2. Indirect costs																		
1. Fuel																		
2.																		
3.																		
N.																		
3. Sales costs																		
4. Administrative cost																		
5. Financial costs																		
6. Total cost																		
7. Profit																		
8. Taxes																		
9. Producer's price																		
10. Marketing margin																		
11. User's price																		

Product: X (costs to produce one unit of X)

T: Technology

Worksheet 8

Productivity of factors according to technological pattern

Zone or region		A:						B:								
Products		1:			2:			3:			4:			5:		
T		T_1	T_2	Total (Av.)	T_1	T_2	Total (Av.)	T_1	T_2	Total (Av.)	T_1	T_2	Total (Av.)	T_1	T_2	Total (Av.)
Value added / Labour force	$\frac{V}{F}$															
	$\frac{V}{V}$															
Output / Land (Ha)	$\frac{P}{F}$															
	$\frac{VBP}{F}$															
Output / Labour force	$\frac{P}{F}$															
	$\frac{VBP}{V}$															
VA / Land (Ha)	$\frac{V}{F}$															
VA / Output	$\frac{V}{VBP}$															

T: Technology

Worksheet 9

Historical behaviour of the area, the volume and production value for each agricultural component of the system, according to zones or regions

Spaces / Products		A:		B:		C:		System's total
		1	2	3	4	5	6	
Year 1	Area							
	Production volume							
	Production value							
Year 2	Area							
	Production volume							
	Production value							
Year 3	Area							
	Production volume							
	Production value							
Year 4	Area							
	Production volume							
	Production value							
Year 5	Area							
	Production volume							
	Production value							
Year 6	Area							
	Production volume							
	Production value							
Year n	Area							
	Production volume							
	Production value							

Worksheet 10

Historical behaviour of the prices of inputs and services according to zones or regions 1/

Years	Zones or regions / Products / Inputs and services	A:			B:			C:		
Year 1	Inputs: - Seed - Fertilizers (1,2,....N) - Pesticides (1,2,....N) - Fodder and pasturage - Concentrate - Lubricants - Fuel - Packaging - Leasing - Others									
	Services: - Soil preparation - Sowing - Fumigation - Etc.									
	Daily wages									
	Product price									
Year 2	Inputs: - Seed - Fertilizers (1,2,....N) - Pesticides (1,2,....N) - Fodder and pasturage - Concentrate - Lubricants - Fuel - Packaging - Leasing - Others									
	Services: - Soil preparation - Sowing - Fumigation - Etc.									
	Daily wages									
	Product price									
Year N	Inputs: - Seed - Fertilizers (1,2,....N) - Pesticides (1,2,....N) - Fodder and pasturage - Concentrate - Lubricants - Fuel - Packaging - Leasing - Others									
	Services: - Soil preparation - Sowing - Fumigation - Etc.									
	Daily wages									
	Product price									

1/ A generic definition is given to those inputs and services present each year, when gathering information about prices, specific inputs and capital goods shall be considered.

Worksheet 11

Origin and type of financing, according to zones or regions

Type of financing \ Zone or region			A:			B:			N:			Total national		
	Origin		N	M	Total	N	M	Total	N	M	Total	N	M	Total
Working capital	Loan													
	Interest	Rate												
		Total												

Note: Fill in one square for each agricultural component.

Worksheet 12

Chronological cultivation sheet - Product: X

Cultivation phases \ Time	Months*									
	1	2	3	4	5	6	7	8	9	10
Soil preparation	X									
Sowing		X	X							
Cultivating work				X	X	X	X			
Harvesting								X	X	X

Note: Fill in one worksheet for each agricultural component and each space.
(*) : Indicate the month.

Worksheet 13

Output and employment classification of the system's agricultural components according to the type of ownership and the zones or regions

Types of ownership \ Zones or regions / Products			A:				B:				C:			
Individual	Production value	U												
		q/h												
	Physical volume of production	U												
		q/h												
	Employment	U												
		q/h												
Association	Production value	U												
		q/h												
	Physical volume of production	U												
		q/h												
	Employment	U												
		q/h												
Others	Production value	U												
		q/h												
	Physical volume of production	U												
		q/h												
	Employment	U												
		q/h												
Total	Production value	U												
		q/h												
	Physical volume of production	U												
		q/h												
	Employment	U												
		q/h												

Worksheet 14

Imports of inputs used in production according to zones or regions

Zones or regions / Imports \ Products	A:				B:				N:				TOTAL
	1	2	3	n	1	2	3	n	1	2	3	n	
Inputs: 1. 2. 3. 4.													
5. 6. 7. n.													

Worksheet 15

Destination and distribution of the production, according to zones or regions
(yearly)

Zones or regions / Products / Years / Destination of production			A:												B:												N:												Total											
			1				2				3				1				2				3				1				2				3				1				2				3			
			1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n	1	2	3	n
Self consumption	Q	U																																															
		o/o																																															
	V 1/	U																																														
		o/o																																															
Rural or urban final consumption	Q	U																																														
		o/o																																														
	V 2/	U																																														
		o/o																																														
Agro-industry	Q	U																																														
		o/o																																														
	V 3/	U																																														
		o/o																																														
Export 5/	Q	U																																														
		o/o																																														
	V 4/	U																																														
		o/o																																														
TOTAL		U																																														
		o/o																																														
	V	U																																														
		o/o																																														

1/, 2/, 3/: At market prices.
4/: FOB in national currency or at official exchange rate
5/: Should there be more than one export destination of the firm's production, the values and quantities should be specified for each of them.

Worksheet 16

External competitiveness of the agricultural components of the system according to zones or regions (Domestic prices at official exchange rates)

(In US$)	Zones or regions / Product	A:				B:				N:			
		1	2	3	n	1	2	3	n	1	2	3	n
Price of imports	FOB price												
	CIF price												
	Market price												
Domestic price	Producer's price												
	Market price												

Worksheet 17

Projects related to the system's productive agricultural components

Classification 1/	Location (place and region)	Status of project (mark with an X)					Increase in production (by products, units)	Increment agricultural area (by product in units)	Increment in the number of jobs	Maturity period					Sources of financing 2/				Amount (in US$)	
		Study of possibilities	Preliminary study	Feasibility study	Final study	Execution				Immediate	Less than one year	One to two years	Three to five years	More than five years	Government	Private domestic	Private international	International cooperation	Total	To be carried out during the year
1. Agrarian reform and rural settlement																				
- Colonization																				
- Rural settlement																				
- Rural land register																				
- Rural promotion																				
- Changes in land tenure																				
- Land consolidation																				
- Non-specified																				
2. Exploitation and improvement of natural resources																				
- Exploitation and improvement of land																				
- Exploitation and improvement of forests																				
- Exploitation and improvement of water resources																				
- Exploitation and improvement of climate																				
- Non-specified																				
3. Agricultural production and exploitation																				
- of crops																				
- of livestock																				
- of forests																				
- of game stock																				
- of poultry																				
4. Agro-industry																				
- Industrialization of agricultural products																				
- Industrialization of livestock products																				
- Industrialization of forestal products																				
- Industrialization of game products																				
- Industrialization of poultry products																				
- Non-specified																				
5. Marketing and distribution																				
- of agricultural products																				
- of livestock products																				
- of forestal products																				
- of game products																				
- of poultry products																				
- non-specified																				
6. Non-determined groups																				

(1) It is necessary to point out and to enumerate each one of the specific projects related to the agricultural components of the system for each of the six classification groups.
(2) These columns are to be considered only for those production-oriented projects.
(3) For production-oriented products one shall consider the amount of the loan, its interest rate, its amortization period and the number of years granted until payment will begin.

Worksheet 18

Non-cultivated agricultural area according to zones or regions

Zones or regions		A	B	C	D	N	Total
Cultivable agricultural area							
Cultivated agricultural area							
Non-cultivated agricultural area							
Causes	- Irrigation and/or climatological problems						
	- Credit problems						
	- Market problems						
	- Problems of lack of labour force						
	- Management ability problems						
	- Others						

Worksheet 19

Annual potential supply according to zones or regions
Product: X

Zones or regions		A:	B:	C:	N:	Total
Current supply (Quantity)	With high technology					
	With medium technology					
	With low technology					
	Total					
Potential supply (Quantity)	With high technology					
Gap between the current and the potential supply	Quantity					
	o/o					

Note: For each agricultural component a box must be completed.

Worksheet 20

Competitive products of the agricultural components of the system

Competitive products			1	2	3	n
Production	Q	A				
		B				
		N				
	V	A				
		B				
		N				
Area	A					
	B					
	N					
Product destination	N	CF				
		CI				
	X					
Imports	F					
	Prices	FOB				
		CIF				

CF: Final consumption
CI: Intermediate consumption
N: Domestic
X: Exports
Q: Quantity
V: Currency value
R: Regions
Z: Zones

Note: This worksheet must be completed for each product

Worksheet 21

Cost structure of competitive farming of the currently studied component according to zones (According to the type of typology and the zone)

Zones / Costs	A:			B:			N:		
	T_1	T_2	T_3	T_1	T_2	T_n	T_i	T_2	T_n
1. Direct costs									
- Inputs									
1.									
2.									
3.									
n.									
- Salaries									
2. Indirect costs									
1. Fuel									
2.									
3.									
n.									
3. Sales costs									
4. Administrative costs									
5. Financial costs									
6. Total cost									
7. Benefits									
8. Taxes									
9. Producer's price									
10. Marketing margin									
11. User's price									

Worksheet 22

Economic identification of the firms according to industrial component

Producers	Name and trade name	Location	Ownership	Installed capacity (Q)	Production		Idle capacity	Destination of production				TOTAL	
								M		X			
					Q	V	Q	P	V	P	V	P	V
1. Firm													
2. Firm													
3.													
4.													
5.													
N.													
TOTAL				100	100	100	100					100	100

Note: 1. Complete a worksheet for each industrial component.
2. Should there exist sub-products related to the product register their value and their volume.

Worksheet No. 23
Grouping of industrial firms according to
production scale, and for each industrial component
Productive industrial component: an example for powdered milk (daily output)

Location	Scale / Firm	Production Scale 0-3 T.	Production Scale 4-36 T.	Production Scale 37-79 T.	
1.	1. Firm ... 2. Firm ... n. Firm ...	1.4 1.5 1.7			
2.	1. Firm ... 2. Firm ... 3. Firm ... 4. Firm ...	2.5 2.6 2.7 2.8			
3.	1. Firm ... 2. Firm ... n. Firm ...		5 8 10		
4.	1. Firm ...			40	
TOTAL		15.2	23	40	78.2

Note: Complete a worksheet for each component.

Worksheet No. 24
Characteristic cost structure, by firm

Costs / Firms	1	2	3	4	5	6	7	8	n
1. Direct costs									
- Inputs									
1.									
2.									
3.									
4.									
n.									
- Salaries									
2. Indirect costs									
1. Fuel									
2.									
3.									
n.									
3. Sales costs									
4. Administrative costs									
5. Financial costs									
6. Total costs									
7. Benefits									
8. Taxes									
9. Marketing margin									
10. Users' price									

Note: Complete for each industrial component.

Worksheet 25

Productivity of the production factors by enterprises

Indicators \ Enterprise		1:			2:			3:			4:			n:		
Value added / Labour force	V/F															
	V/V															
Output / Labour force	F/F															
	VBP/V															
Value added / Output	VA/VBP															

Note: Complete for each industrial component.

Worksheet 26

Location of production by industrial enterprises

Location \ Enterprises	Enterprises	1	2	3	4	5	6	7	8	9	10	n
A:	Value											
	Quantity											
B:	V											
	Q											
C:	V											
	Q											
D:	V											
	Q											
Total Domestic	V											
	Q											

Note: Complete one worksheet for each industrial component.

Worksheet 27

Time series of the industrial production (value and quantity) of enterprises of the system

Location / Enterprise / Production		A:				B:				n:				Total System
		1	2	3	n	1	2	3	n	1	2	3	n	
Year 1	V													
	Q													
Year 2	V													
	Q													
Year 3	V													
	Q													
Year 4	V													
	Q													
Year 5	V													
	Q													
Year n	V													
	Q													

Note: Complete one worksheet for each industrial component.

Worksheet 28

Historical behaviour of the prices of inputs and products

	Location / Ent.	A: 1	A: 2	A: 3	A: n	B: 1	B: 2	B: 3	B: n	C: 1	C: 2	C: 3	C: n
Year 1	Inputs: 1. 2. 3. 4. 5. 6. n.												
	Services: 1. 2. 3. 4. 5. 6. n.												
	Salaries												
	Price of product												
Year 2	Inputs: 1. 2. 3. 4. 5. 6. n.												
	Services: 1. 2. 3. 4. 5. 6. n.												
	Salaries												
	Price of product												
Year n	Inputs: 1. 2. 3. 4. 5. 6. n.												
	Services: 1. 2. 3. 4. 5. 6. n.												
	Salaries												
	Price of product												

Note: Complete one worksheet for each industrial component.

Worksheet 29

Financing by firms

Financing \ Firms / Origin			1:			2:			Domestic total		
			N	M	Total	N	M	Total	N	M	Total
Working capital	Loan										
	Interest	Rate									
		Amount									
Fixed assets	Loan										
	Interest	Rate									
		Amount									
TOTAL	Loan										
	Amount										

Note: Complete for each industrial component.

Worksheet 30

Output and employment classification of the system's industrial components according to the type of ownership and the location

Types of ownership \ Location / Firms			A:				B:				C:			
			1	2	3	n	1	2	3	n	1	2	3	n
Private	Output value	U												
		o/o												
	Output volume	U												
		o/o												
	Employment	U												
		o/o												
Public	Output value	U												
		o/o												
	Output volume	U												
		o/o												
	Employment	U												
		o/o												
Self-management	Output value	U												
		o/o												
	Output volume	U												
		o/o												
	Employment	U												
		o/o												
Total	Output value	U												
		o/o	100	100	100	100	100	100	100	100	100	100	100	100
	Output volume	U												
		o/o	100	100	100	100	100	100	100	100	100	100	100	100
	Employment	U												
		o/o	100	100	100	100	100	100	100	100	100	100	100	100

Note: Complete one worksheet for each component.

Worksheet 31

Imports of inputs and capital goods utilized in industrial production

Imports \ Firms	1:				2:				3:				Total
Inputs													
1.													
2.													
3.													
4.													
n.													
Capital goods													
1.													
2.													
3.													
4.													
n.													

Note: Complete one worksheet for each industrial component.
Annual volumes of imported inputs.
1/ CIF value of inputs, quantity of capital goods (equipment and spare parts).
2/ CIF value of capital goods and spare parts.

Worksheet 32

Destination of output of the industrial firms, for each component

Destination			Firms / Years	1: 1	1: 2	1: 3	1: n	2: 1	2: 2	2: 3	2: n	3: 1	3: 2	3: 3	3: n	Total Components 1	2	3	n
Internal Market	F	U																	
		o/o																	
	V	U																	
		o/o																	
External Market	F	U																	
		o/o																	
	V_1	U																	
		o/o																	
Total	F	U																	
		o/o																	
	V	U																	
		o/o																	

Note: Complete one worksheet for each component of the system.
1/ FOB in domestic currency, at the official exchange rate.
2/ Should there be more than one destination for export of the firms' products, the quantities and values should be detailed according to final destination.

Worksheet 33

External competitiveness of the industrial firms producing the component, according to their location (internal markets)

(In US$) \ Location (Internal markets)		A:	B:	C:
Price of Imports	FOB price			
	CIF price			
	Market price			
Domestic Price	Output price			
	Market price			

Note: Complete one worksheet for each industrial component.

Worksheet 34

Projects related to the industrial components of the system

ISIC Classification	Location (Place and region)	Status of the project (mark with an X)					Output increment		Increment in the number of jobs (No.)	Sources of financing 2/				Maturity period					Amount (in US$)	
		Study of possibilities	Preliminary study	Feasibility study	Final study	Execution	Quantity	Value		Government	Private domestic	Private international	International co-operation	Immediate	< 1 year	1 - 2 years	3 - 5 years	> 5 years	Total	To be carried out during the year
311 Food manufacturing																				
313 Beverage industries																				
314 Tobacco manufactures																				
321 Manufacture of textiles																				
322 Manufacture of wearing apparel except footwear																				
324 Manufacture of footwear																				
331 Manufacture of wood and wood and cork products, except furniture																				
332 Manufacture of furniture and fixtures, except primarily of metal																				
341 Manufacture of paper and paper products																				
342 Printing, publishing and allied industries																				
351 Manufacture of industrial chemicals																				
352 Manufacture of other chemical products																				
353 Petroleum refineries																				
354 Manufacture of miscellaneous products of petroleum and coal																				
355 Manufacture of rubber products																				
356 Manufacture of rubber products not elsewhere classified																				
362 Manufacture of glass and glass products																				
369 Manufacture of other non-metallic mineral products																				
371 Iron and steel basic industries																				
381 Manufacture of fabricated metal products, except machinery and equipment																				
382 Manufacture of machinery except electrical																				
383 Manufacture of electrical machinery, apparatus, appliances and supplies																				
384 Manufacture of transport equipment																				
390 Other manufacturing industries																				

1/ Each of the specific projects related to the industrial components of the system must be enumerated and marked for each ISIC group.

2/ In these column one should consider production oriented products, the amount of the loan, the rate of interest, the amortization period and the years in which no payment will be made.

Worksheet 35a

Industrial services

Type of Services	Name	Location	Ownership	Supply capacity of services*
1. Electric energy 1. 2.				
2. Transport 1. 2. 3.				
3. Industrial water 1. 2. 3.				
4. Professional services 1. 2. 3.				
5. Publicity 1. 2. 3.				
6.				
n.				

* In physical units or other measure indicator of the installed capacity for services.

Worksheet 35b

Agricultural services

Characteristics / Type of services	Name	Location	Ownership	Supply capacity of services
Contracted services				
1. Soil preparation				
1.				
2.				
n.				
2. Sowing				
1.				
2.				
n.				
3. Fertilizing				
1.				
2.				
n.				
4. Fumigation				
1.				
2.				
n.				
5. Harvest				
1.				
2.				
n.				
6. Storage				
1.				
2.				
n.				
7. Transport				
1.				
2.				
n.				
8. Veterinary				
1.				
2.				
n.				
9. Others				
1.				
2.				
n.				
Lease of machinery and equipment				
1. Tractors				
1.				
2.				
n.				
2. Agricultural equipment				
1.				
2.				
n.				
3. Fumigation equipment				
1.				
2.				
n.				
4. Combine harvesters				
1.				
2.				
n.				
5. Others				
1.				
2.				
n.				
Technical assistance				
1.				
2.				
n.				
Irrigation				
1.				
2.				
n.				
Others				
1.				
2.				
n.				

Worksheet 36

Costs of services

Unitary cost structure for each firm in the services sector

Components	Value
I. Direct costs – Inputs 1. 2. N. – Salaries 1. 2. N.	
II. Indirect costs 1. 2. 3. N.	
III. Sales costs	
IV. Financial costs	
V. Administrative costs	
VI. Benefits	
VII. Total cost	
VIII. Taxes	
IX. Price	

Worksheet 37

Production series and prices of services

Years \ Services		1	2	3	4	5	6	N
1976	V							
	Q							
1977	V							
	Q							
1978	V							
	Q							
1979	V							
	Q							
1980	V							
	Q							
1981	V							
	Q							
1982	V							
	Q							
1983	V							
	Q							

Worksheet 38

Projects related to service components

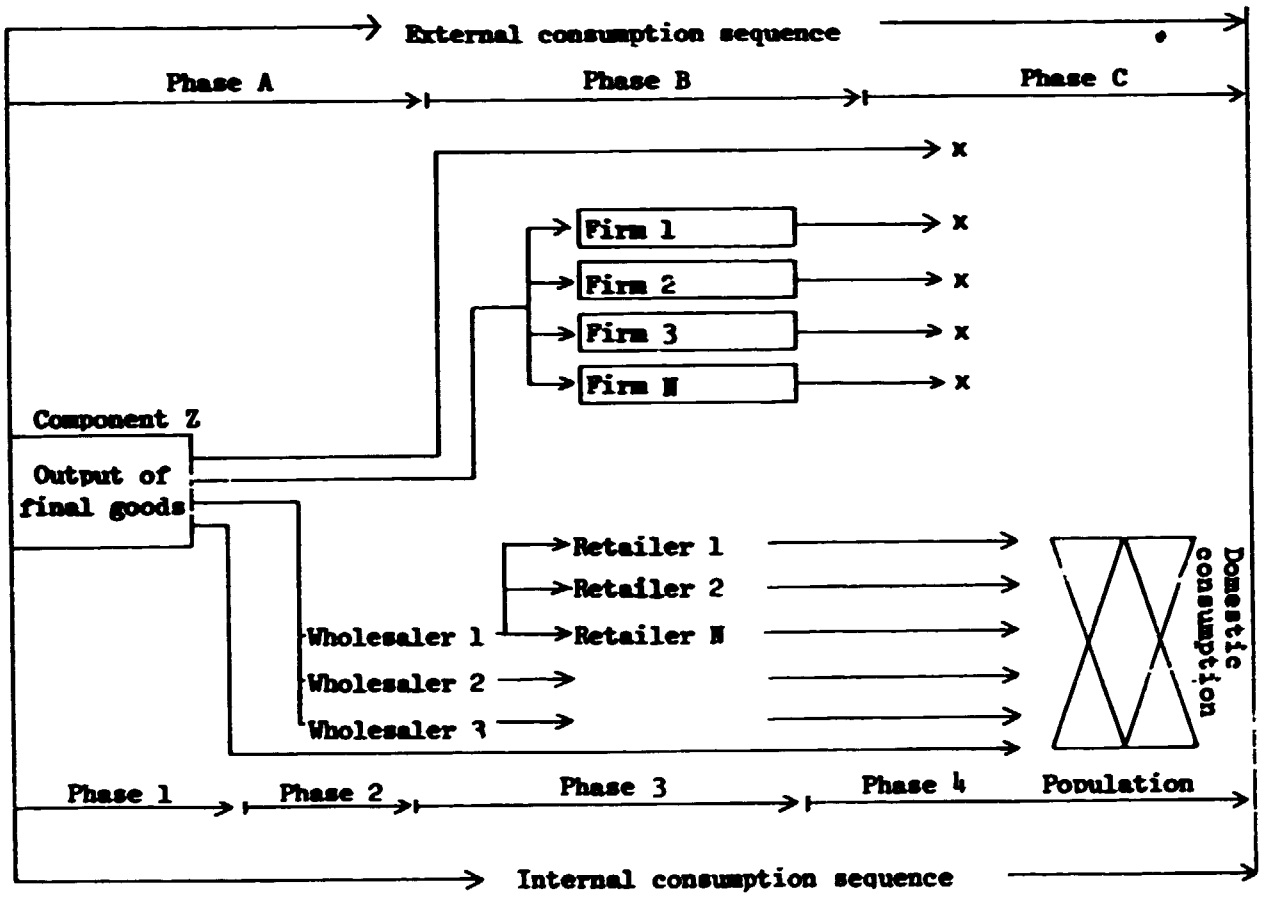
Services	Location (Place and region)	Status of project (mark with an X)					Output increment		Increment in the number of jobs (No.)	Sources of financing 2/				Maturity period					Amount (in US$)	
		Study of possibilities	Preliminary study	Feasibility study	Final study	Execution	Quantity	Value		Government	Private domestic	Private international	International co-operation	Immediate	< 1 year	1 - 2 years	3 - 5 years	> 5 years	Total	To be carried out During the year
Industrial services																				
1																				
2.																				
3																				
4.																				
5.																				
6.																				
.																				
N.																				
Agricultural services																				
1																				
2.																				
3.																				
4.																				
5.																				
6.																				
N.																				

1/ Each of the specific projects related to the industrial components of the system must be enumerated and marked for each ISIC group.

2/ In these column one should consider production-oriented products, the amount of the loan, the rate of interest, the amortization period and the years in which no payment will be made.

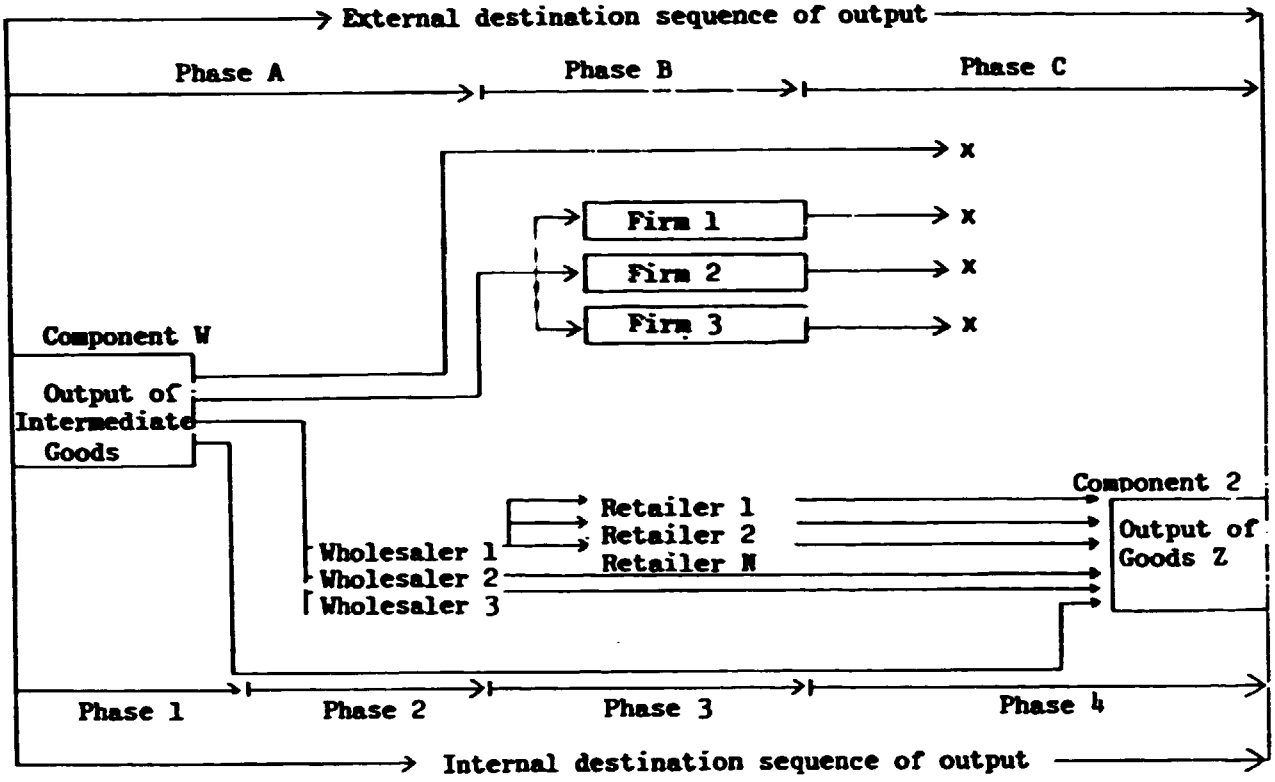
Worksheet 39A

Marketing circuit and phases of the system's final goods



Worksheet 39B

Marketing circuit and phases of the system's intermediate goods



Worksheet 40

Marketing circuit phases for the most important firms

	Internal consumption sequence				External consumption sequence		
	Phase 1	Phase 2	Phase 3	Phase 4	Phase A	Phase B	Phase C
Product X							
A. Internal consumption							
I. Wholesalers							
1.							
2.							
3.							
N.							
II. Retailers							
1.							
2.							
3.							
N.							
B. External consumption							
I. Business firms							
1.							
2.							
3.							
N.							
Product N							
A. Internal consumption							
I. Wholesalers							
1.							
2.							
3.							
N.							
II. Retailers							
1.							
2.							
3.							
N.							
B. External consumption							
I. Business firms							
1.							
2.							
3.							
N.							

* Complete one worksheet each for the marketing of the final and the intermediate goods.

Worksheet 41

Quantification of national and international marketing flows in quantity and value of products for each phase of the marketing circuit

		Internal consumption sequence				External consumption sequence		
		Phase 1	Phase 2	Phase 3	Phase 4	Phase a	Phase b	Phase c
Product X	Quantity							
	Value							
Product Y	Quantity							
	Value							
Product N	Quantity							
	Value							

* Complete one worksheet for the marketing of final goods and one for the intermediate goods.

Worksheet 42

Data of main firms (Example)

Data		Internal consumption sequence				External consumption sequence		
		Phase 1	Phase 2	Phase 3	Phase 4	Phase a	Phase b	Phase c
1. Name of the firm and place in the circuit			Whole-salers "XYZ"					
2. Geographical location								
3. Ownership			Private					
4. Marketing volume*	Product X Q/V							
	Product Y Q/V							
	Product N Q/V							

* Annual data.

Worksheet 43

Activities undertaken by each of the main firms

Name of the firm:	
Activities	**Description**

- Resale (sale without transformation)
  • to retailers
  • for direct consumption
  • to industrial or agro-industrial firms
  • to wholesalers
  • for export
- Classification and grouping
- Stock and storage
- Packaging
- Re-packaging
- Refrigeration
- Bottling
- Transport
- Sales promotion
- Others	

Worksheet 44

Unitary cost structure characteristic of each firm distributing product X

Costs	Value	Percentage
I. Price of marketed goods		
II. Direct costs		
– Inputs		
1.		
2.		
3.		
n.		
– Salaries		
1.		
2.		
n.		
III. Indirect costs		
1.		
2.		
3.		
IV. Sales costs		
V. Administrative costs		
VI. Financial costs		
VII. Benefits		
VIII. Total cost		
IX. Taxes		
X. Production price		100
XI. Marketing margin (X – I = XI)		

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(5)	Did you find the recommendations sound?	/_/	/_/
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