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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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JUNTA DEL ACUERDO DE CARTAGENA
(JUNAC)

A PROGRAMME FOR THE INTEGRATED DEVELOPMENT OF THE PERUVIAN OILS AND FATS PRODUCTION/CONSUMPTION SYSTEM

Sectoral Studies Series
No.19

PREPARED BY JUNAC
IN COLLABORATION WITH
SECTORAL STUDIES BRANCH
DIVISION FOR INDUSTRIAL STUDIES
UNIDO

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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 Studies on Food-Processing Industries in UNIDO's programme of Industrial Studies 1984/1985.

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FOREWORD

The present paper is a resumé of a study undertaken jointly by JUNAC and UNIDO for assessing and programming the integrated development of the oils and fats sector in Peru. This is a case study elaborated in the wider context of planning and programming of priority food production within the Andean Pact Food Security Scheme.

The interest of this study for a wider readership derives from the fact that it is the result of a practical application of a methodology for assessment and programming of industrial production/consumption systems. This study compares in quantitative terms the output and costs of a continuation of the present oils and fats system with a new system integrating a number of policy measures aiming at improving the output and functioning of the system. It contains a proposal for programming the development of all components of the oils and fats system in Peru, an assessment of the investment required and a time schedule for implementation covering a period of over 20 years.

It is believed that by using this methodology industrialists and policy-makers from developing countries could obtain a clear picture of industrial integrated development and of its advantages compared to present practices of establishing plants without due consideration of forward and backward linkages and of national agro-industrial development plans. Investments could thus be rationalized and policy formulation facilitated. Moreover, donor agencies from industrialized countries in general could be induced to reorient their bilateral assistance programmes towards integrated development. The benefits of this can be clearly described and estimated in quantitative terms by means of the methodology presented here.

The methodology applied in the study originated in the Andean Pact Secretariat (JUNAC) and was further developed by JUNAC in co-operation with UNIDO. The methodology allows a practical assessment and programming of industrial production/consumption systems. It considers all economic, technological and political 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.

The methodology is available at UNIDO. Its application and transfer to other developing countries through specific case studies is envisaged with the co-operation of local government officials and industrial associations.

The complete study of the oils and fats sector of Peru comprises about 700 pages and can be made available upon request. The proposal presented here is presently being studied by the Government of Peru and will be used as a reference case by the other four Andean Pact countries within their food security schemes. UNIDO and JUNAC present this document for the consideration of other developing countries to illustrate in a practical manner the availability of a tool for assessing quantitatively the advantages of integrated development of the food industries and for designing concrete development proposals.

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EXPLANATORY NOTES

References to dollars ($) are to United States dollars, unless otherwise stated.

A comma (,) is used to distinguish thousands and millions.

A full stop (.) is used to indicate decimals.

A slash between dates (e.g., 1980/81) indicates a crop year, financial year or academic year.

Use of a hyphen between dates (e.g., 1960-1965) indicates the full period involved, including the beginning and end years.

Metric tons have been used throughout.

The following forms have been used in tables:

Three dots (...) indicate that data are not available or are not separately reported.

A dash (-) indicates that the amount is nil or negligible.

A blank indicates that the item is not applicable.

Totals may not add up precisely because of rounding.

1. INTRODUCTION

The Peruvian food situation is characterized by an increasing reliance on imported foodstuffs, lack of co-ordination between local farming and food industries and a growing deterioration in the consumption patterns of middle and lower income classes, which has increased alarmingly in the past few years. This requires concrete and pragmatic proposals which, transcending ideology, should be feasible and serious alternatives contributing to the solution of the food problem. They should also aim at the improvement of food and industrial foodstuff production on the basis of better sectoral linkages and an overall integrated development.

The absence of an adequate technical instrument for illustrating in a quantitative fashion the advantages of integrated development and for programming and managing the development of a given industrial line has been a drawback for completing and executing specific integrated development programmes in the field.

The application of the Methodology for Managing and Programming Food Production/Consumption Systems (MEPS) to the evaluation and programming of the Peruvian Oils and Fats Production and Consumption System represents a step forward in this direction.

It is within this context that the study "Evaluation and Programming of the Peruvian Oils and Fats Production and Consumption System" becomes relevant. The study was undertaken because of the coinciding interest of the United Nations Industrial Development Organization (UNIDO) and the Junta del Acuerdo de Cartagena (JUNAC). This document is a synthesis of the study.

The present document contains a summary of the technique to programme food production/consumption systems applied to the study. The main output of the study is a programme proposal for the Integrated Development of the Peruvian Oils and Fats System which is included in the present document.[1/]

1/ Only the main lines are presented in this synthesis, together with the proposed alternative programme. The main study (in Spanish) could be made available to interested parties upon request.

The proposal which covers a period of 21 years, details projects, investments, financing and a schedule for the integrated development programming strategy selected. The proposed development strategy is supported by the design of specific policies and programmes. Its feasibility is verified through simulations and evaluations of alternatives to the projected development trends in the present oils and fats system. It is up to the agents participating in the system and the Peruvian Government organizations to execute the next stage, which is the promoting, discussing and agreement among all those participating in the system.

1.1 Methodology used in the study

The Junta del Acuerdo de Cartagena developed the Methodolgy for Evaluating and Programming Production and Consumption Systems, through its Andean Projects for Technological Development in the Foodstuffs Area. Recently in co-operation with UNIDO, the methodology has been further developed and in its new form has been applied to the present study. The basis of the methodology is a systems approach along the lines of a development concept, and it is directed towards promoting and conducting an integrated development of the components of a given production and consumption system.

The Methodology for Evaluating and Programming Production and Consumption Systems, called "MEPS", has been selected as the operative instrument for the Food Security Andean System, whose execution has been entrusted to the Junta del Acuerdo de Cartagena by the Andean Pact countries, by means of Decision 126, the "Jose Celestino Mutis" Food Security and Environmental Conservation Agreement. The methodology allows for the linkage of economic, social and technical variables that determine the availability, transformation, marketing and consumption of any product or group of products in relation to other global economic policy variables such as exchange rate, subsidies, etc. As an example, any given agricultural - food system - such as the oils and fats system, includes as variables, agricultural production, services, agroindustry and industry, marketing, population demand and consumption, imports and exports, and the economic policies that affect any of the above. The system is therefore made up of production, service and consumption components and

policies, with such a high degree of interdependence that any change in one component will tend to change the whole. Through the application of the generic definition of agricultural - food systems - the Peruvian production and consumption of oils and fats can be represented as in figure 1, which shows the relations among the production components of the existing system. Within UNIDO, the application of the integrated development concept to different industrial branches has been gaining importance in its work programme as a strategy for achieving a more dynamic industrial development in developing countries. In a recent UNIDO document,[2/] integrated development is defined as the handling of the matrix of factors that affect a given production and consumption system, where consumption, production, industrialization and trade components are simultaneously considered and the main potential development elements in the system are identified. MEPS makes operative the management of the matrix of factors at the programming and implementation stages.

1.2 Sequence followed in the study

The operative sequence applied in the study entitled "Evaluation and programming of the oils and fats production and consumption system" is shown in figure 2, and it basically corresponds to the MEPS method.

First, the study defines concrete objectives for an integrated development of the system. The most relevant of these goals is to attain the highest possible aggregate value for the Peruvian oils and fats system according to the economic and technical alternatives identified in the study, always within the framework of improving linkages of national components and the spatial distribution of the production activity. The other objectives are shown in figure 2. Defining the objectives is a necessary step because one of the goals for MEPS is to propose economic policy measures that are to be evaluated in terms of the planned objectives. Furthermore, the study makes a Disaggregation of the Peruvian Oils and Fats Production and Consumption

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2/ See: UNIDO/IS.477, "The Vegetable Oils and Fats Industry in Developing Countries: Outlook and Perspectives. Sectoral Studies Branch, Division for Industrial Studies. June, 1983.

FIGURE Nº 1

BASE SCHEME BY PRODUCTIVE COMPONENTS OF THE PRODUCTION AND CONSUMTION SYSTEM OF OILS AND FATS PERU

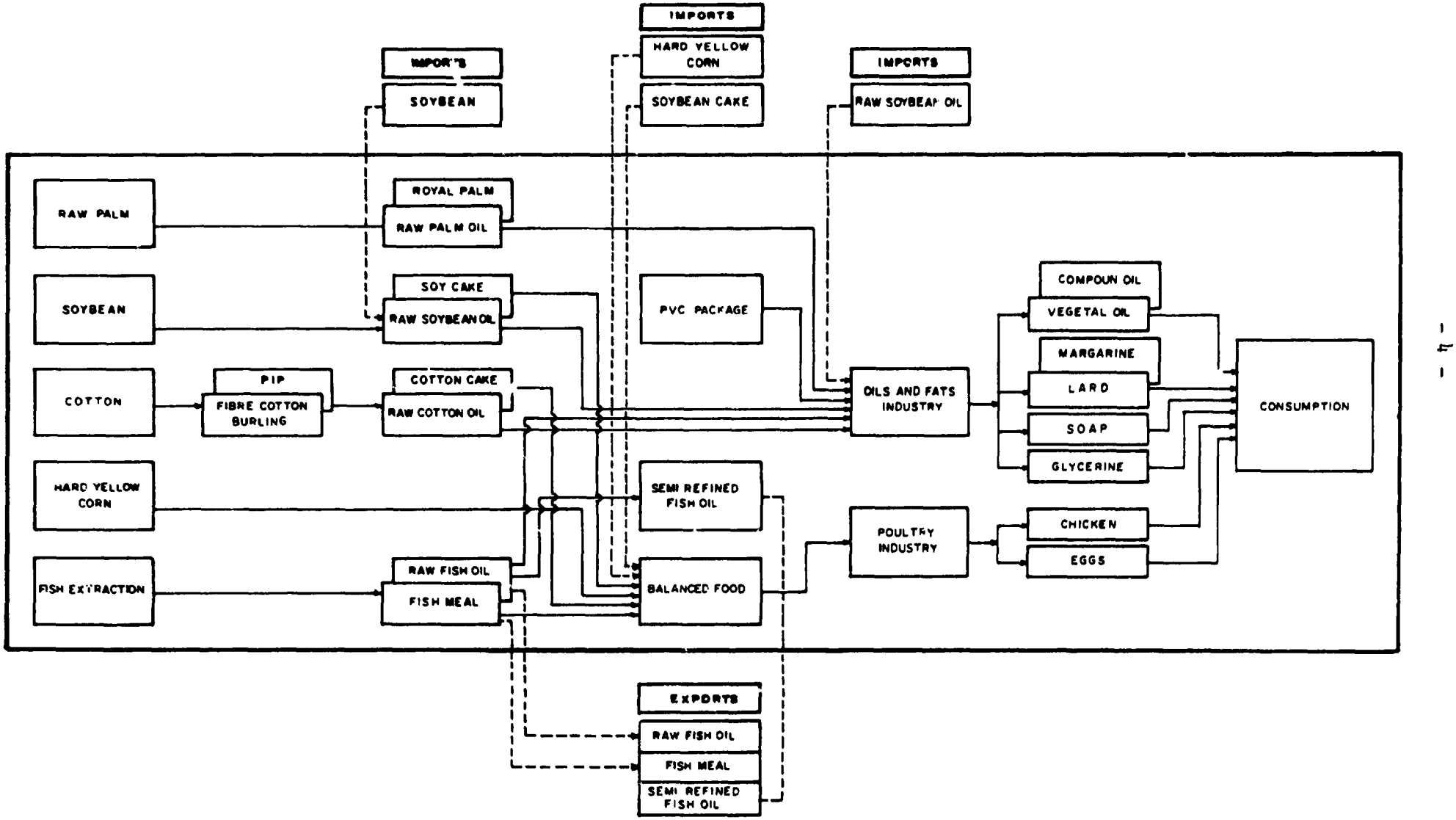
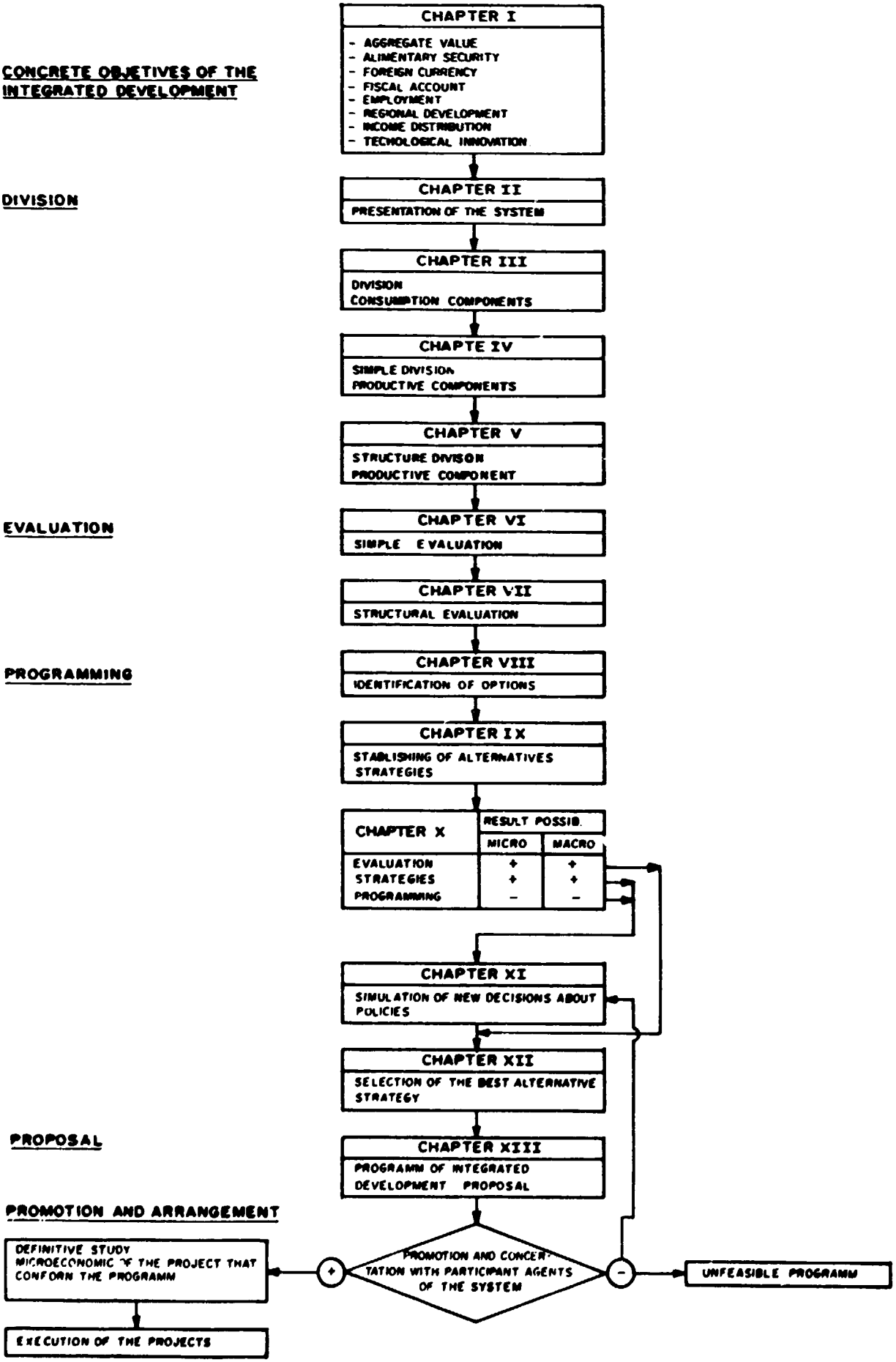


FIGURE Nº 2

OPERATIVE SEQUENCE OF THE PROGRAMMING OF THE INTEGRATED DEVELOPMENT OF THE OILS AND FATS SYSTEM



System. The resulting subdivision is shown as chapters in figure 2. For the purpose of this report only the part corresponding to the presentation of the Peruvian Oils and Fats System is detailed. The disaggregation stage in MEPS is applied to identify the specific characteristics of each component and its relationship to the rest of the components of the system (production components, demand, national policies, etc.). Using MEPS it is possible to work with different kinds of disaggregation (simple, structural, spatial) and different levels of disaggregation. These types and levels of disaggregation can be systematically combined, i.e. a production component can be disaggregated by technology levels, another one by regions, another by production scale, another by form of property, etc. The advantage of this type of disaggregation is that it allows to approach a given component at several levels of interest, thus enriching the analysis and providing different perspectives.

Disaggregation is particularly useful when evaluating the effects of macroeconomic policies on production components for the design and evaluation of selective policies; when simulating the different behaviour of production agents and when identifying the importance of the elements within a system.

The next step in the sequence is Assessment which, as shown in figure 2, consists of simple and structural assessment. For the simple assessment, the main variables of the existing system are analyzed based upon the information obtained in the disaggregation step. There are basically four variables used for the assessment:

(a) Oligopolistic nature of the industry;

(b) Analysis of the effects of the presence of transnational corporations in the oils and fats subsystem;

(c) Human health and the consumption of oils and fats;

(d) The instability in the supply of national raw oils.

The structural assessment is then made through a set of 24 accounts prepared from the information obtained on the production/consumption structure[3/] of each component at the structural disaggregation stage.

The programming stage is then undertaken, its sub-stages are shown in figure 2. The existing options in the components of the Oils and Fats Production and Consumption System are identified and alternative strategies are then devised to attain the objectives of integrated development. A comparative evaluation is then made between the different programming strategies.

To overcome the restrictions detected in the assessment stage it is generally necessary to adjust the programming strategies; therefore changes are introduced and successive approximations are made until a point is reached where it seems feasible to implement the strategies. Finally, a programming strategy that optimizes the attainment of the proposed goals is selected and a concrete programming proposal is formulated.

The next stage is the promotion of the programming proposal, its discussion and agreement among the Government and the different actors participating in the system. At this stage, an interactive integrated development programming process involving all the agents participating in the system takes place - by manipulating variables in the system - so as to adjust the proposal. The interactive nature of the programming process constantly uses MEPS to simulate the measures proposed by each agent, thereby facilitating the process and reducing enormously the transaction cost for the participating agents. Also, MEPS can be used later on as an effective control, tracking and reprogramming instrument in the event that the strategies selected by the participating agents are implemented.

3/ The production structure is the basic instrument for analysis and technical-economical programming of the production components. The consumption structure is the accounting unit by which the consumption pattern of a population under study is identified.

2. CHARACTERISTICS OF THE OILS AND FATS SYSTEM

The base scheme by components for the Peruvian Oils and Fats System is shown in figure 3. It details the flow diagram for agricultural, agroindustrial, fishing and industrial raw materials used in the system, and the alternatives for exporting the goods manufactured by the system.

The diagram has been designed to identify the main links in the processing between the oleaginous raw materials and the finished goods for the oils and fats industry. The external flows are represented through dotted lines and are of prime importance for the system. The main export item for the system is fishmeal, while the main imports are raw soybean oil, soybean cake, yellow corn and several chemicals.

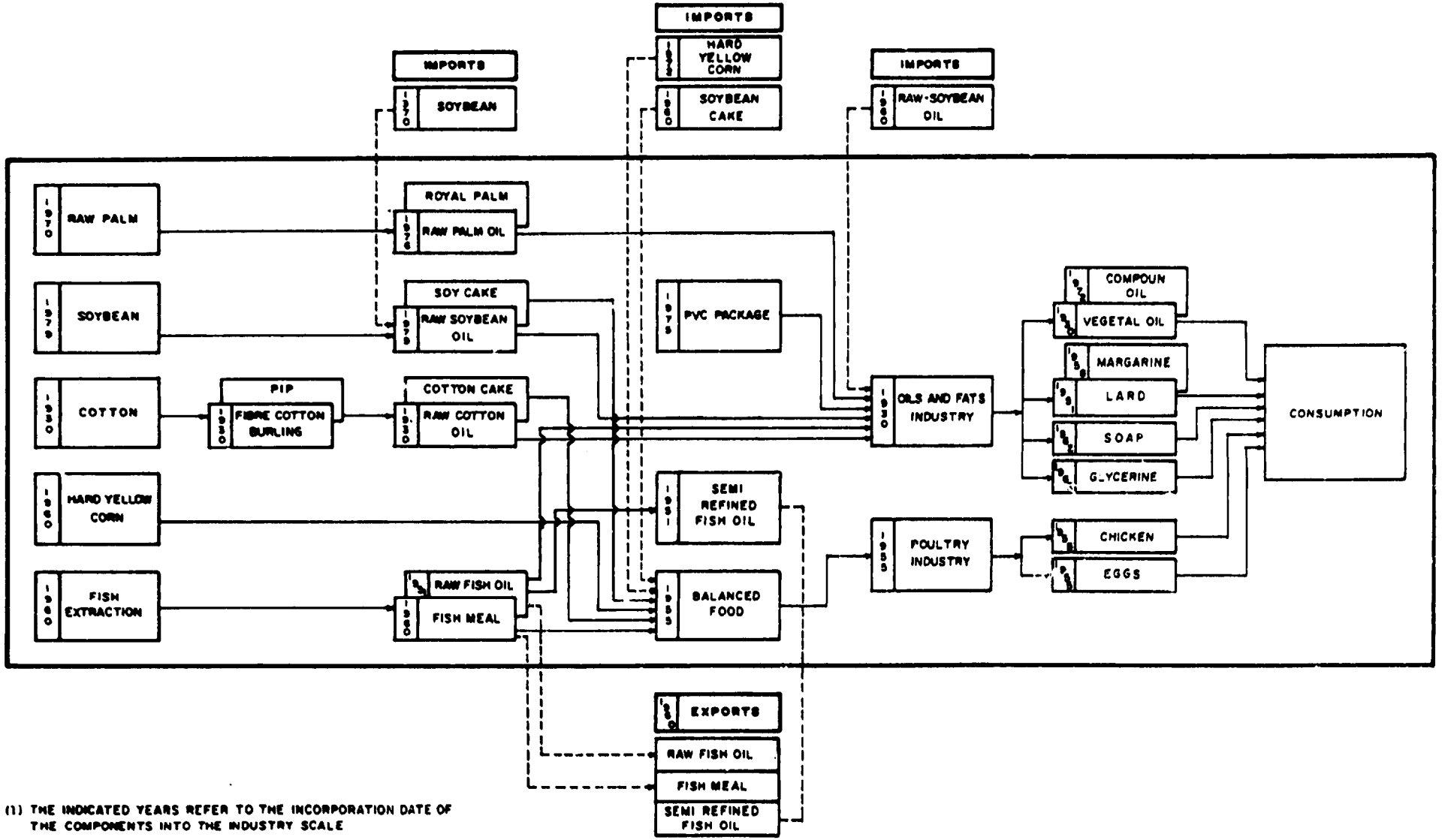
The base scheme by components shows the approximate year for the inclusion in the system, at an industrial scale, of a given production component.

The general aspects of the Oils and Fats System are briefly shown in table 1, presented at the subsystem level. The table shows the relative importance of each subsystem in terms of each variable. The oils and fats subsystem ranks first in terms of aggregated value (37.1 per cent) and government accounts (15.1 per cent),[4/] it is also the one that requires more foreign currency; the poultry subsystem requires financial resources and a good amount of foreign currency, but it takes second place in terms of aggregated value and fiscal accounts; the cotton subsystem ranks first in terms of employment (41.1 per cent) and second in terms of generating foreign currency; the fishmeal subsystem ranks first in terms of foreign currency generation.

4/ The fiscal account is the difference between current income and spending.

FIGURE Nº 3

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

Table 1. General variables for the oils and fats system (thousands of $US)

	Gross value of production	Aggregated value	Employment (man/year)	Foreign currency required	Government account	Required financing
Oils and fats	319,092	133,180	4,245	68,974	38,769	30,299
Poultry	526,955	89,199	21,504	65,325	31,749	40,365
Cotton	248,372	60,427	26,024	-31,512	8,572	59,193
Fishmeal	222,196	76,069	11,493	-87,882	6,947	55,683
Total	1,306,615	358,875	63,226	14,905	86,037	185,540

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

It is necessary to provide a frame of reference for the results obtained at the subsystem level and to compare them with the national economy. Table 2 shows the main results for the system and the corresponding macroeconomic variables. The present oils and fats system accounts for 2.8 per cent of the national income, 5.1 per cent of the exports, 4.6 per cent of the imports, 4.7 per cent of the central government income and 3.4 per cent of the total credit in the banking system.

2.1 Flows of the system

The main flows in the system have been identified and quantified in figure 4 "Base Scheme for the Economic Flows of the System": production, sales (GVP), aggregated value, consumption, fishing catches, exports and imports. The analysis of this Base Scheme indicates:

(a) The great importance of fish oil in the national production and in the consumption of oils and fats:

	Production (TM)
Raw fish oil	101,225
Vegetable oils	
- Cotton	20,150
- Palm	7,886
- Soybean	1,843
Total	131,104

Table 2. Comparison between the oils and fats system and the Peruvian economy (thousands of $US)

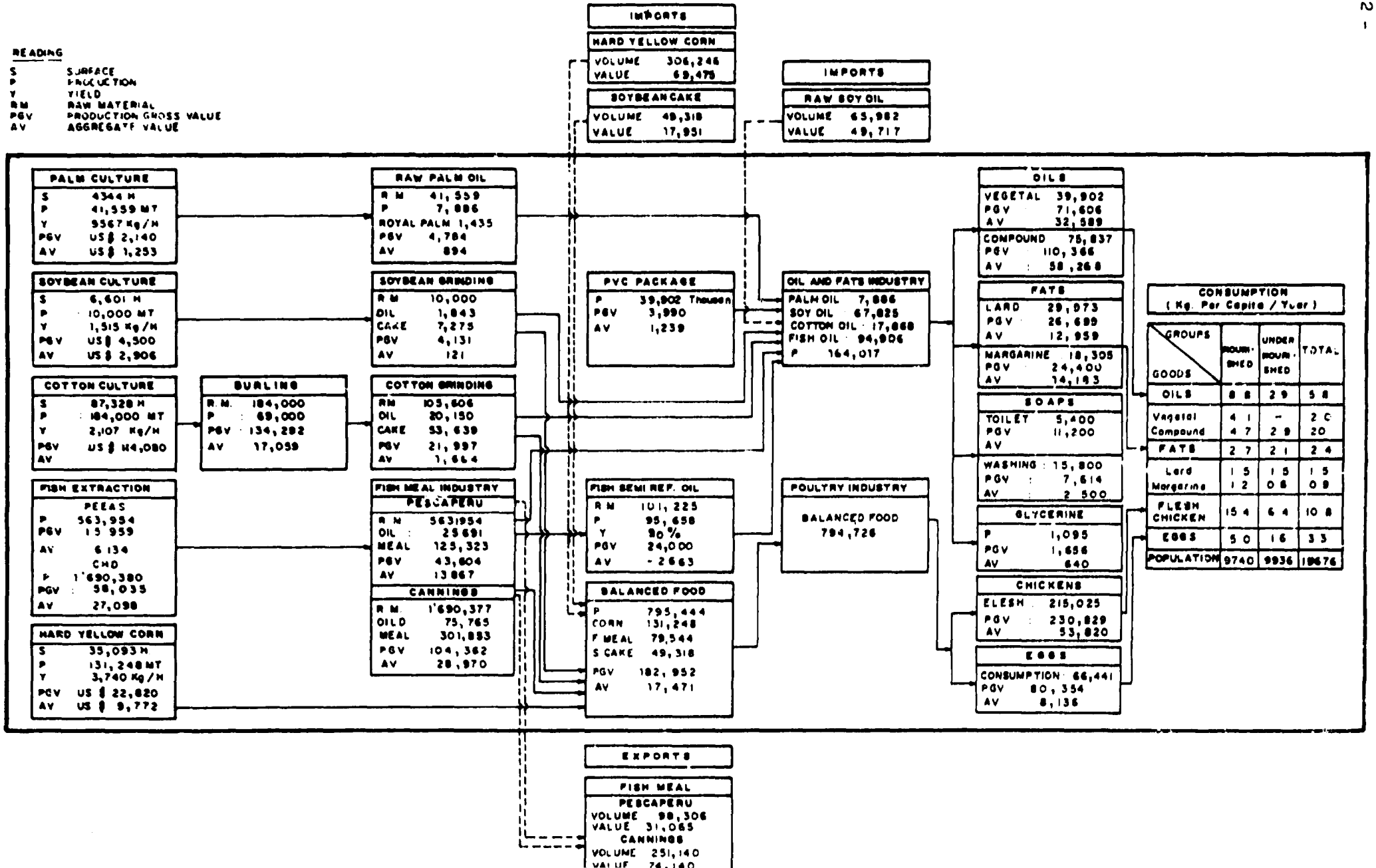
Aggregated / Variable	System	Peruvian economy (1983)	Participation in the system (per cent)
1. Aggregated value (gross product)	359	17,672	2.0
2. Employment (men/year)	63,266	2,647,800	2.6
3. Current account[a/]	-3	-850	
3.1 FOB exports	155	3,015	5.1
3.2 FOB imports	-126	-2,122	4.6
Balance of trade	29	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.

It can be seen that raw fish oil makes up 77 per cent of the national supply. In consumption, at least 50 per cent of all the fats and oils have fish oil as an ingredient. Peru is one of the few countries in the world in

Figure 4. **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. $.)



which the population consumes a huge amount of fish oil as part of the typical family diet. Also, 40 per cent of the total oils and fats consumed are imported. The national production of raw vegetable oils is minimal.

(b) It is possible to distinguish four industrial subsystems that make up the oils and fats system: the oils and fats subsystem, the cotton subsystem, the poultry subsystem and the fishmeal subsystem. The division is based upon the fact that each of these industrial subsystems can reproduce by itself.

(c) The products offered by the oils and fats industry are characterized by a policy of market segmentation according to the socio-economic level of the consumer. The segmentation is based on the use of differentiated products, both in quality - vegetable oil vs. compound oil for example - and in the container used - bulk oil vs. one litre plastic containers. It is important to emphasize that the products offered are different nutritionally and economically especially because of their varying content of fish oil.

(d) The oils and fats production system is tightly linked with the external sector of the economy. The main exports for the system are fishmeal and cotton while the main imports are grain, soybean cake and raw soybean oil, yellow corn, chemicals and capital goods needed for investment in the system.

Table 3. The foreign currency account by subsystems

Subsystem	Oils and fats	Cotton	Poultry	Fishmeal
Net (thousands of $US)[a/]	-68 974	31 512	-65 325	87 882

a/ Exports minus imports.

(e) It becomes necessary to consider the oils and fats system within the framework of the national economy to obtain an idea of its macroeconomic importance. Table 4 shows the participation of the system among the main macroeconomic variables.

Table 4 The oils and fats system in the Peruvian economy

Variables	Oils and fats system	National economy
Aggregated value (millions of $US)	359	17,672
Balance of current accounts (thousands of $US)	3,000	-850,000
Current fiscal account (thousands of $US)	86,037	-2,032,000
Employment (men/year)	63,266	2,467,800

(f) The flows shown in figure 2 are not stable. That is to say the behaviour of the system through time is not a uniform reproduction of its past flows but subject to small annual changes. The flows for the system can be affected by changes in any of the following variables: the high degree of uncertainty in projecting the fishing stock; price changes in the international marketplace for those components that are linked to the external sector; per capita income and the oligopolistic nature of the oils and fats and balanced foods industries. The food security strategy for the oils and fats system must include some shock-absorption mechanisms for the destabilizing effects of any of these variables.

For the oils and fats system to work each and every production component requires a technical, economical and financial base that allows for the generation of the flows shown in figure 4. Specifically, this base consists mainly of the following variables, which constitute the existing and the potential capital stock for the system: working capital, installed factory capacity, potential crop area and external financing for the productive component. The potential stock refers to the installed capacity in the industrial components, and to the potencial crop area in the agricultural

components. Figure 5 "Base Scheme for the Oils and Fats Production and Consumption System Stock" shows the figures for each production component. The stock variables for the system allow:

- The definition of the production capacity for the system;
- The identification of possible bottlenecks;
- The evaluation of investment needs, and also financing and technological needs when expanding the activities of the system;
- The evaluation of the performance of the system by comparing the generated flow to the existing stocks.

Figure 6 shows the "Base Scheme for the Indicators for the Production Components of the System". The indicators used are: profitability,[5/] actual working capacity, yield (kg/Ha), the ratios aggregated value/fixed capital, and aggregated value/gross value of production. These indicators, together with the system's aggregated indicators allow:

- The evaluation of the performance of the system;
- The identification of the structural nature of the system;
- The identification of the comparative advantages of the system.

2.2 Economic agents

Each component of the system - be it production, marketing or consumption - consists of the agents participating in the workings of the system, be they companies, economic groups, guild-type associations, etc.

Figure 7 shows the base scheme for the economic agents of the system. In this scheme the marketing component has been disaggregated for the more important linkages.

Figure 7 identifies the main participating agents for each production component, showing the nature of ownership for the companies, their share in the total production, their associative body and the state organizations that

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5/ Defined as: $\frac{\text{net profit + interest}}{\text{fixed capital + working capital}}$

Figure 5. **BASE SCHEME OF THE STOCK OF THE CONSUMPTION AND PRODUCTION SYSTEM OF OILS AND FATS**

(M.T. THOUSANDS U.S $.)

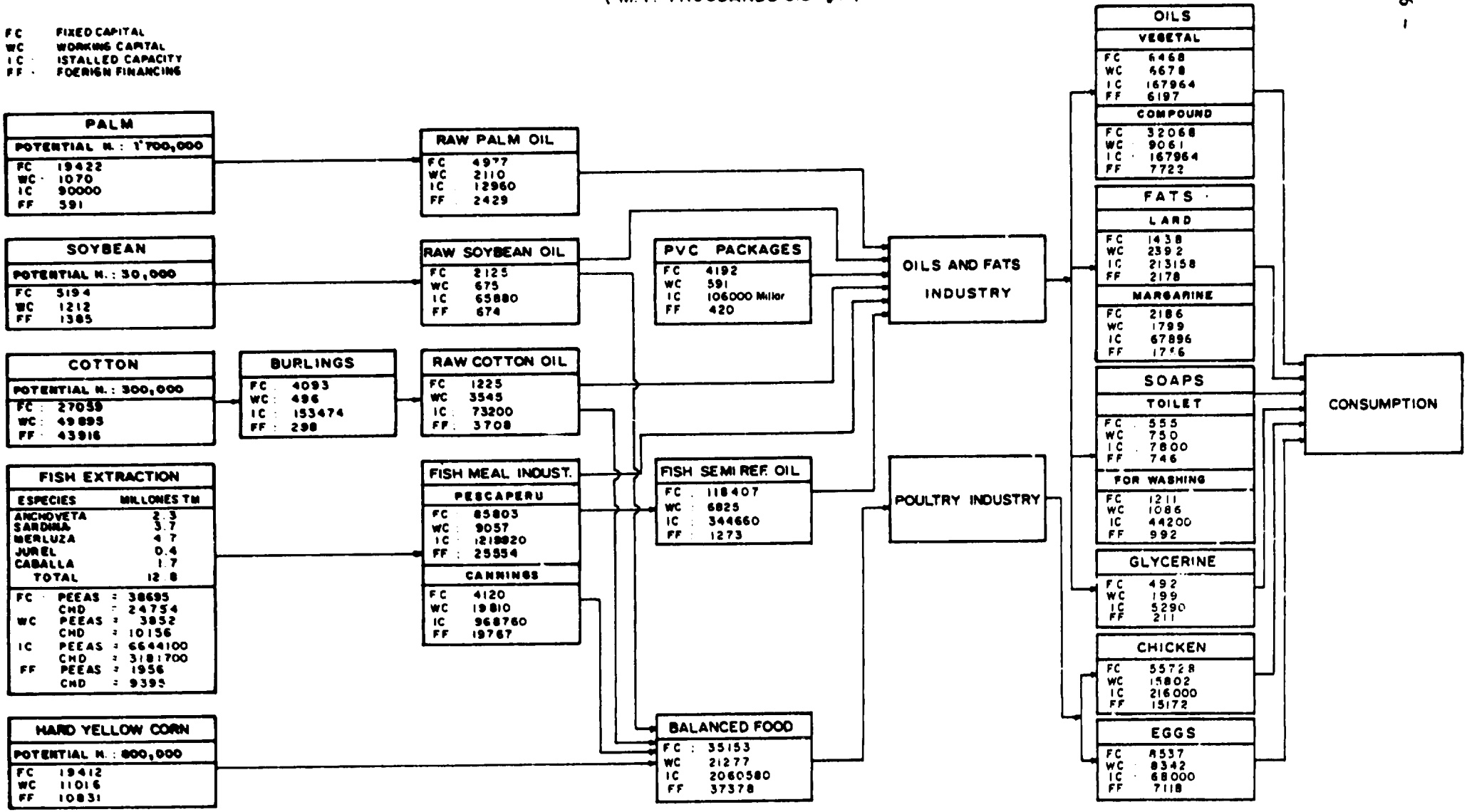


FIGURE Nº 6

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

READING

EP = ECONOMIC PROFITABILITY ($\frac{\text{Profits + Interests}}{\text{Total Capital}}$)

UC = USED CAPACITY

Y = YIELD

AV = AGGREGATE VALUE

GVP = GROSS VALUE OF PRODUCTION

FC = FIXED COST

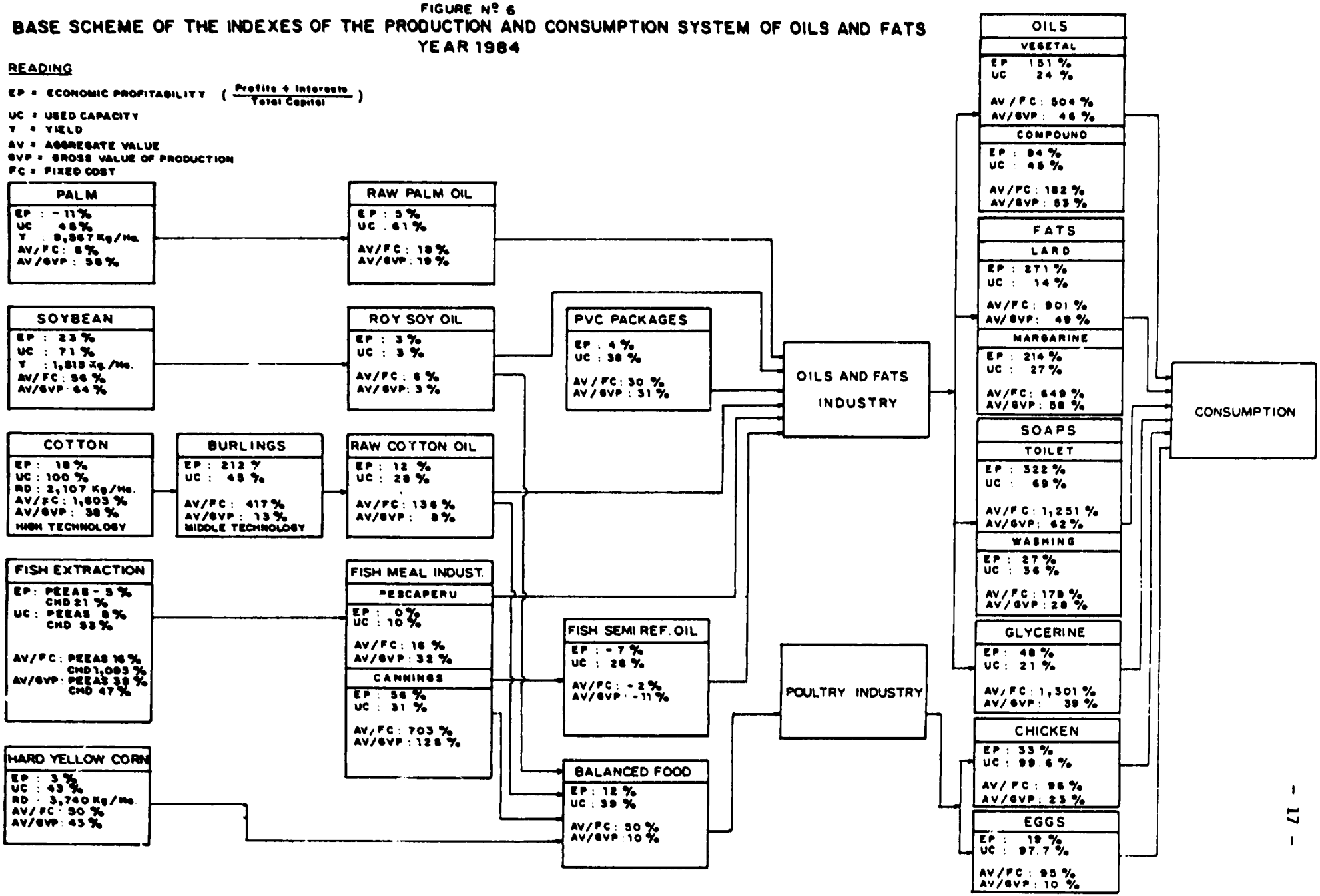
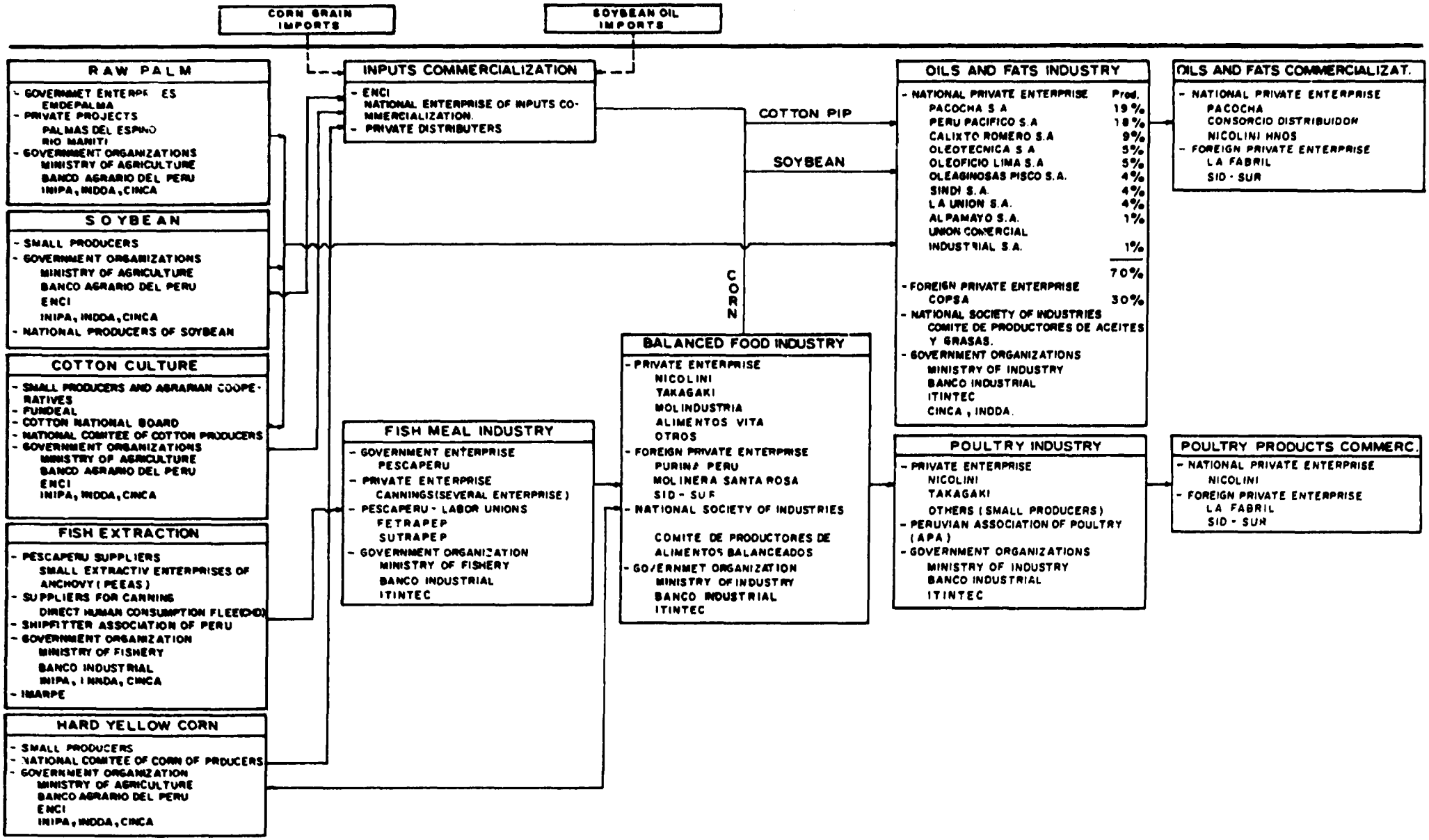


FIGURE Nº 7

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



influence the component. As an example, the production component for the oils and fats industry shows that the production is concentrated in only a few companies: there are ten local private companies and one foreign capital private company; these companies are associated to the Sociedad Nacional de Industrias. The government entities concerned are ITINTEC (quality standards and industrial investigation), INDA (agroindustrial technological investigation), INIPA (agricultural investigation), CINCA (nutrition), Ministry of Industry, Tourism, Integration and Trade, and the Ministry of Finance and Economics. An important feature of the system is the identification of its vertical and horizontal integration.

2.3 Vertical and horizontal integration

Vertical integration is defined in this context as the set of companies linked in different stages for the same kind of goods. On the other hand, horizontal integration is defined as the set of companies linked in the same production stage for a single kind of good.

Both vertical and horizontal integration encourage control and concentration of some of the production stages by a small number of companies. Nevertheless, this situation is not necessarily associated with the integrated development process of a particular system, which essentially consists of a greater linkage of the production and consumption components.

Regarding horizontal integration in the oils and fats industry, the companies Peru Pacifico, Calixto Romero and Oleaginosas Pisco all belong to the so called "Romero Group". The Romero Group also controls two important insurance companies and several commercial and industrial companies in Peru; they further have shares in the banking and mining sectors. The Romero Group initially owned the "Calixto Romero S. A." company, and in the 1970s they bought "Anderson Clayton & Co." -now Peru Pacifico- and Oleaginosas Pisco. Industrias Pacocha also carried out a horizontal integration process in the oils and fats industry: in the 1960s, Pacocha -local capital- merged with UNILEVER; in the 1970s UNILEVER left the country and Pacocha bought SINDI S.A. and Industrial Union S.A. Briefly stated, the industry is highly concentrated

around three conglomerates: the Romero Group, Pacocha and COPSA. This last one is a subsidiary of Bunge & Born through their Peruvian representative "La Fabril". These three groups control 88 per cent of the oils and fats market.

Vertical integration is more extended. In the oils and fats subsystem, the three main groups all own plants at every production and marketing stage, except for the farming of the oleaginous raw materials (table 5). The poultry subsystem also shows a high degree of vertical integration, especially since 1975, the time when the demand for chicken and eggs fell drastically because of an over-production. This situation removed small and medium farmers from the market because of their debts to balanced foods producers. These companies have then formed clusters in which several individuals are linked to a company from which they receive raw materials and services such as food and sanitary assistance and then have to sell the end-products at a fixed price. This technique is repeated down to the retailer level. Althought farmers and retailers do not lose their property they are practically operating as managers for the company.

Table 5. Vertical integration for the industrial groups in the oils and fats subsystem

Group	La Fabril	Romero	Pacocha
Component product			
- End-product marketing	X	X	X
- Laundry soap	X	X	X
- Bath soap	X	-	X
- Glycerine	X	-	X
- Oil	X	X	X
- Lard	X	X	X
- Margarine	X	X	X
- PVC containers	X	X	X
- Fish oil refining	X	X	X
- Cotton oil extraction	X	X	X
- Cotton ginning	X	X	X
- Palm oil extraction	-	X	-
- Palm farming	-	X	-
- Chicken	X	-	-
- Eggs	X	-	-
- Balanced foods	X	-	-

Each component of the system has a certain capacity to react in the face of changes in the variables that do affect them. This reaction capacity has been historically formed. In an economy where market mechanisms are paramount, the reaction capacity is reflected in the elasticities and the nature of the market for the component -monopoly, oligopoly, near-perfect competition, etc.- A tentative definition of the nature of the markets is shown in table 6. The production of brooding and hatching birds is included because of their importance in the subsystem. The table shows the importance of the oils and fats industry both in the supply and in the demand market.

Table 6. Nature of the markets for the components disaggregated by system

	Supply	Demand
Consumption	-	Competition
Oils and fats industry	Oligopoly	Oligopsony[a/] Competition[a/]
Chicken and eggs production	Competition	Competition
Brooding and hatching birds Production	Oligopoly	Competition
Balanced foods	Oligopoly	Competition
Palm	Monopoly	-
Soybean grain	Competition	-
Cotton	Competition	-
Corn	Competition	-
Fishmeal and fish oil	Competition[b/] Oligopoly	Competition
Fish	Competition	-

a/ Oligopsony: palm and soybean; competition in fish oil.

b/ Competition: international market; oligopoly in national market.

2.4 Geographical integration

Because a greater geographical integration is desired for the production activities, one of the variables to consider in the frame of reference of an integrated development is the spatial variable; a brief analysis of the importance of the regional variable is presented below.

Administratively, Peru is divided into twenty-four departments; they have been grouped into six regions (see figure 8), on the basis of the following four criteria: natural region - coast, mountains and tropical forest - the location of the existing and potential oleaginous crops, the high degree of industrial centralization and consumption in Lima, and possibilities of decentralization of agricultural and industrial production.

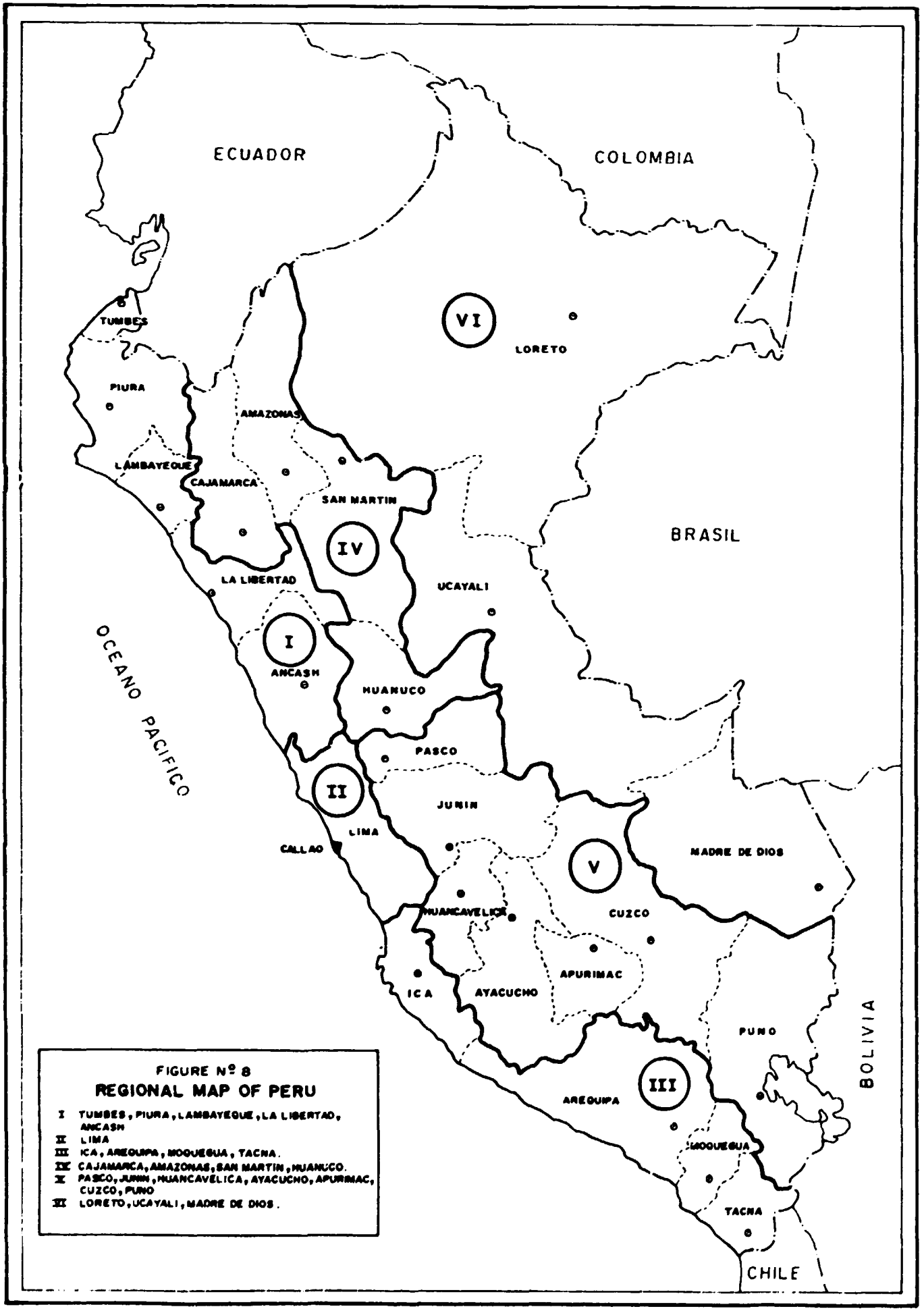


FIGURE Nº 8

REGIONAL MAP OF PERU

I TUMBES, PIURA, LAMBAYEQUE, LA LIBERTAD, ANCASH
II LIMA
III ICA, AREQUIPA, MOQUEGUA, TACNA.
IV CAJAMARCA, AMAZONAS, SAN MARTIN, HUANUCO.
V PASCO, JUNIN, HUANCAVELICA, AYACUCHO, APURIMAC, CUZCO, PUNO
VI LORETO, UCAYALI, MADRE DE DIOS.

3. CRITICAL POINTS FOR THE OILS AND FATS SYSTEM - DISCUSSION

At this point, an analysis is made of the main elements that - because of their nature - determine the dynamics of the oils and fats system.

In the oils and fats industry, four topics are emphasized:

(a) The oligopolistic nature of the industry. Concentration indices are to be analyzed, as well as profit levels and the barriers existing against entry that are associated with specific oligopolistic structures.

(b) An analysis of the effects of the presence of multinational corporations on the oils and fats subsystem.

(c) The consumption of oils and fats and human health. The effects of consuming oils and fats will be economically evaluated considering costs and benefits of the local consumption of edible fish oil.

(d) The instability of the supply of national raw oils and the social cost of excessive fish catches. The problem generated by the uncontrolled fishing and the subsequnet discontinous production of fish oil. Also, the rationality of the economic agents occurring because of the excessive exploitation of marine resources.

3.1 The oligopolistic nature of the oils and fats industry

The manufacture in Peru of oils and fats has oligopolistic characteristics which are mentioned below:

(a) First, there is a small number of companies in the field, whose relative participation in the total production is shown in table 7. The participation according to their installed capacity and their use of oleaginous raw materials is shown in table 8.

(b) The industry shows a high concentration in production, marketing, raw materials use, installed capacity and other variables relevant for oils and fats manufacture. Table 8 shows the concentration indexes that support this assertion.

Table 7. Oils and fats companies and their participation in total production

Company	Participation (per cent)
COPSA	30
PACOCHA S.A.	19
PERU PACIFICO S.A.	18
CALIXTO ROMERO S.A.	9
OLEOTECNICA S.A.	5
OLEOFICIC LIMA S.A.	5
OLEAGINOSAS PISCO S.A.	4
SINDI S.A.	4
LA UNION S.A.	4
ALPAMAYO S.A.	1
UNION COMERCIAL INDUSTRIAL S.A.	1

Source: Ministry of Agriculture.

Particularly, the Herfindhal and the Gini indexes indicate similar levels of concentration for several of the variables considered, showing that there is a relatively uniform degree of concentration in the oils and fats productivion activity.

On the other hand, the rate of concentration, which indicates the relative participation for the biggest companies in the market, shows a significant degree of concentration around the three main companies (RC_3)

Table 8. **CONCENTRATION INDEXES FOR OILS AND FATS PRODUCTION**

VARIABLE / INDEX	RAW MATERIALS ABSORPTION						INSTALLED CAPACITY				
	PRODUCTION	COTTON SEED	SOYBEAN	RAW SOYBEAN OIL	SEMI-PROCESSED FISH OIL	RAW PALM OIL	MECHANICAL EXTRACTION	VEGETABLE OIL STORAGE	NEUTRALIZATION	HIDROGENATION	DEODORIZATION
H_{max}	1	1	1	1	1	1	1	1	1	1	1
H	0.18	0 22	0.25	0.16	0.18	0 22	0.20	0.14	0.17	0.18	0.16
$H_{min.}$	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0 09
$G_{max.}$	1	1	1	1	1	1	1	1	1	1	1
G	2.96	2.73	2.42	3.02	2.81	2.43	2.79	2.92	3.32	2.79	3.13
$G_{min.}$	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32
RC_3	0.67	0.65	0.70	0.62	0.66	0.72	0.63	0.50	0.36	0.64	0.58
RC_7	0.88	0.92	0.96	0.84	0.77	0.99	0.88	0.71	0.61	0.77	0.80

H : Herfindahl index $= \sum_{i=1}^{n} \left(\frac{X_i}{X}\right)^2$

H_{max} : Highest concentration for the Herfindahl index $= 1$

$H_{min.}$: Minimal concentration for the Herfindahl index $= \frac{1}{n}$

G_{max} : Highest concentration for the Gini index $= 1$

G : Gini index $= \sum_{i=1}^{n} \sqrt{\frac{(X_i)}{X}}$

G_{min} : Minimal concentration for the Gini index $= \sum_{i=1}^{n} \sqrt{\frac{1}{n}}$

RC_m : Concentration rate $= \sum_{i=1}^{m} X_i \Big/ \sum_{i=1}^{n} X_i$

Where :

X_i is the level of the relevant variable

X = corresponding industrial total

n = number of companies

m = number of "bigger" companies

SOURCE Own elaboration

-COPSA, PACOCHA and PERU PACIFICO- which becomes extremely high when the three great integrations, encompassing seven companies (RC_7), that control the oils and fats market[6/] are considered.

There are multiple barriers that prevent the entry of new companies into the oils and fats markets, some of them are given below:

(a) Tariff and tariff-related restrictions to the import of refined oils.

(b) High levels of installed capacity at the manufacturing companies allow them to meet changes in demand as they eventually arise.

(c) The high level of required investment, combined with difficult access to the market of borrowed funds and the existence of tied credits with the consolidated companies in the market.

(d) The availability for the big conglomerates of marketing structures and nation-wide distributor companies minimizes their efforts for the sale of oils and fats.

(e) The oils and fats market shows restricted access to information, particularly with reference to production processes, technical formulations and technological innovations.

As can be seen from the above, it is evident that the Peruvian oils and fats market lacks the necessary mobility to dynamically profit from the inherent advantages of a competitive process. It clearly shows oligopolistic characteristics: a small number of horizontally and vertically integrated companies, high levels of concentration, high benefits and the existence of multiple barriers to the entry of new companies.

6/ See chapter 2.

The situation mentioned above shows a relative degree of stability in the provision of national and imported grains and imported raw oils, because of the intervention of ENCI which proportionally regulates the volume and price of these products among the different oil companies.

3.2 The presence of transnational corporations and its effect upon the oils and fats industry

Transnational corporations are present in the Peruvian oils and fats market. Table 9 shows a financial analysis of the transnational company as compared with two representative national companies, using several indicators. It can be seen that - except for the total depreciation - there are no significant relative differences in critical accounts such as publicity and foreign purchases, when taking into account that the foreign company should have higher indexes in royalties and research for example.

There is no evidence of rents or quasi-rents[7/] from foreign-owned assets of the managerial or technological type.

It should be noted that in some instances the technological initiative has been on the side of the two national companies even though they still have relations with the foreign companies to which they were formerly linked and who give them specific technical assistance.[8/] On the other hand the national raw materials supply strategy through the establishment of palm oil settlement projects in the tropical forest is being carried out by a local private capital company and the State.

7/ Defined as the returns derived from the exclusive use of a comparative advantage. For example, a given technology level or the exploitation of higher-productivity land.

8/ It can be seen that many times national companies take advantage of the foreign capitals economy of scale, particularly in terms of technology and technical assistance, marketing strategies, production planning and control, and market estimation and evaluation.

Table 9. Comparative characteristics for three representative oils and fats companies (thousands of Soles at 1981 prices)

Item	Transnational corporation	First national company	Second national company
I. Financial accounts			
Social capital	4,773,896	4,599,896	2,685,524
Assets	17,667,846	21,187,990	13,168,693
Liabilities	3,084,426	11,624,968	6,855,168
Capital	9,789,721	9,549,319	4,382,313
Purchases	18,794,007	14,763,548	12,460,381
in the country	17,248,817	12,872,950	10,440,150
Foreign	1,545,190	1,890,598	2,020,231
Publicity	594,529	1,299,348	348,086
Royalties	38,253	388,090	...
Taxes	904,139	1,189,301	551,738
Term depreciation	476,010	569,890	362,440
Accumulated depreciation	15,397,952	4,665,353	2,780,988
Sales	31,585,650	26,067,958	17,533,909
Term earnings	4,592,090	1,766,753	2,973,689
Dividends paid	1,093,664	509,928	...
Fixed assets	22,955,951	11,869,120	4,790,517
Personnel	752	1,016	517
National	752	1,014	517
Foreign	...	2	...
Research	41,595	15,310	...
Itintec	41,595	15,310	...
In-house	...	...	...
II Financial ratios	per cent	per cent	per cent
Publicity/sales	2	5	2
Total depreciation/ capital stock	322	101	104
Royalties/sales	0.1	1.5	-
Investment/sales	0.1	0.1	-
Foreign purchases/sales	5	7.8	12
Taxes/sales	3	4	3

Note: 1981 Exchange Rate: S/./$US 422.32.

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

3.3 Human health and the consumption of compound oils

The relation existing between the consumption of oils and fats and anomalies such as arteriosclerosis and cardiovascular disease, so prevalent world-wide, makes health a relevant topic for the industry. Particularly, the effects of medical advice influence global demand for oils and fats - and therefore production - through consumer preferences.

In general, this phenomenon is reflected in the almost universal preference for vegetable-origin oils and fats.

The economic problem behind this medical discussion centers around the marginal benefit obtained by lowering the consumption of marine-origin fats and oils, in terms of reduced cardiovascular risks, as compared to the cost of a deterioration in the consumer food basket, expressed through lower nutritional levels for the population, which is under-nourished for the most part. In this case, because of the reduced life-expectancy of the Peruvian population,[9/] and the low mortality due to cardiovascular disease, the expected benefit does not seem to compensate the high social cost of reducing already low nutritional indexes.

Table 10 shows the effect on consumer prices of the end-products and on the imports and exports of raw oils if fish oil were to be eliminated from the formulae of edible oils and fats. It can be seen that price increases of 11 per cent, 36 per cent and 17 per cent would result for oil, lard and margarines, while imports would rise 200 per cent because of the increased requirements of soybean and palm oil. This simulation shows the importance of doing deep research on the allowable limits of fish oil in the end-products. The economic benefits expected from establishing adequate formulae largely exceed the cost of the research.

9/ Life expectancy was fifty-five years in 1977-78, and fifty-seven years in 1981-82. (From: "Posibilidades y Limitaciones del Desarrollo Peruano"; Felipe Ortiz de Zevallos, Apoyo S.A. Lima, 1983).

Table 10. Comparative costs evaluation in the formulation of oils (thousands of $US)

	Situation with SMFO[a/]	Situation without SMFO	Difference (per cent)
Price per metric ton			
Oils	1.57	1.75	11
Lard	0.89	1.21	36
Margarine	1.33	1.56	17
Raw oils imports	49,685	148,731	199
Raw oils exports	-	30,944	-
Net (imports-exports)	49,685	117,787	137

a/ SMFO: semi-refined fish oil.

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

3.4 The nature of the fishing resources

The instability of marine resources appears to be the most critical factor in the supply of raw oil. In this respect, the pronounced cycles of abundance and scarcity of the fishing industry affect both the composition of the oils and fats product lines in the market - vegetable and compound - and the level of imports of raw oils and oleaginous grains. This, in turn, shows the dependence and vulnerability of the industry to the fluctuation of prices in the international market for raw oils.

The divergence between private and social costs is a critical factor in the fishing industry, since marine resources are considered as common goods. The fact that all economic agents able to fish -once they satisfy certain legal requirements as fishing licenses for example- have the same rights over

the capture of fish has a negative impact by depredation of the resource and causing its instability, as recommendations made by IMARPE are generally ignored.

From a social point of view, the future costs of excessive fishing which reduces the fish stock and limits the size of future catches should be added to the present costs of the catch. Establishing fishing restrictions is not very effective in practical terms, particularly when these restrictions are imposed at a time when the species is already rare, or when it is not practical to fish.

What is rational for fishermen, i.e., to produce each of them whatever an alternative occupation would generate, implies an over-exploitation of the resource and a future cost for society, stemming from unassigned fishing rights, which are considered as a common good. The economic solution to this problem could come from assigning rights in such a way that a level of social efficiency is attained, that is the point where the fisherman adds to his private cost the social cost that his capture policies imply. In this case, the State would be the one called upon to impose this right with the aim of avoiding the depredation of the resource.

4. THE PROGRAMME

The programming of the development of the production and consumption system starts with the definition of alternative development strategies based upon identifying and implementing a set of options, be they technological, economic, institutional or other, for each of the components of the system. There will be a varying number of alternative development strategies as the options complement and/or substitute each other.

For the oils and fats system the options for each component have been chosen according to the following criteria:

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

4.1 Programming strategy

Based upon the criteria mentioned above, a number of options have been identified and brought into context which have resulted in the definition of two alternative strategies for the development of the oils and fats production and consumption system.

The two strategies defined, together with their implications are presented below.

(a) Projection of the existing system. This strategy is based on the hypothesis that no planning of the system is undertaken. In this way, things will stay the way they are now and the system will reproduce without changes.

(b) Alternative system. In this case the strategy is to integrate fully in the system the options shown in table 11. This alternative system is shown graphically in the base scheme of figure 9; the stronger linkages between the national productive components can be clearly seen as proof of the integrated development nature of this alternative strategy.

Table 12 shows the agricultural potential of the oleaginous raw materials. By comparing tables 11 and 12, it can be seen that there is a correspondence between the oleaginous production potential of the country and the selected alternatives.

4.2 Programming the consumption

For both strategies it was necessary to set up a consumption goal. For this, it is first required to disaggregate the population in two groups, the well-nourished and the malnourished. The latter is defined as the group of families whose average per capita food consumption represents less than 90 per cent of the recommended level for the family both in calories and nutrients while the first would be the group that covers 90 per cent or more of the recommended levels. The nutritional gap between the two groups is shown in table 13.

As a second step, it is necessary to instrumentalize the system's end-products with the objective of reducing the nutritional gaps through policy measures that result in the increase of the per capita consumption for these end-products.

From the above, it becomes necessary to analyze the nutritional contribution to the diet from each of these end-products, both in terms of calories and proteins. The results can be seen in table 14.

Analyzing table 14 a proposal is made to programme the goods in the system in such a way that they cover 10 per cent of the nutritional gap, which means a greater per capita consumption of the goods.

Table 11. Options incorporated to the implementation strategy for the alternative system

Oils and fats subsystem	Poultry subsystem	Rice subsystem	Cotton subsystem	Fishmeal subsystem	Milk subsystem	Meals subsystem
- Increment of soybean production. - Increment of tarwi production. - Increment of palm production - Introduction of palm oil fractioning - Elaboration of raw oils from: Rice bran Corn germ - Horizontal integration of cotton ginning. - Horizontal integration of foreign purchases of industrial supplies. - Palm-kernel oil elaboration. - Soybean flour production for consumption.	- Increasing yellow corn production to keep a 30% share of the total supply. - Degerminating yellow corn at balanced foods plants.	- Rice bran stabilization equipment.		- Rationalization of installed capacity. - Fishing fleet rationalization. - Oil-free fishmeal production by extracting residual oils.	- Corn meal production - Elaboration of the milk extendor a/	- Barley production - Elaboration of composite flours a/

a/ Specific studies about these options are available from JUNAC: "La Producciún de Harinas Compuestas como Componente de una Pólática Triguera en la Subregiún". Tomo: Perç, PADT-Alimentos, 1984. "Los Extensores de Leche en el Marco de los PADT-Alimentos, una Experiencia dé Transferencia Tecnolúgica" PADT-Alimentos, 1984.

Figure 9. BASE SCHEME BY COMPONENTS FOR THE ALTERNATIVE OILS AND FATS PRODUCTION AND CONSUMPTION SYSTEM

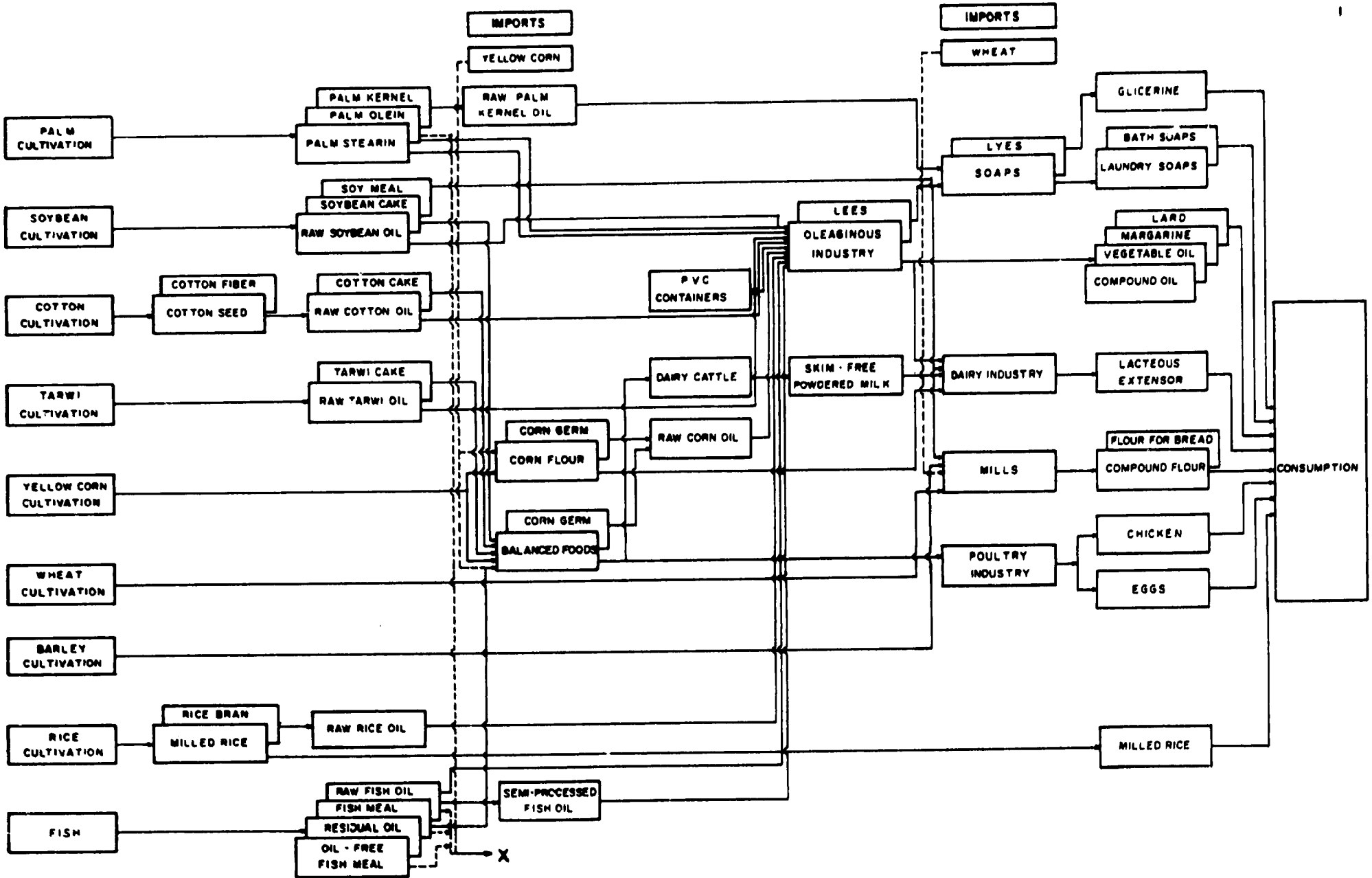


Table 12. Agricultural potential for oleaginous raw materials

Crop	Production hectares 1982	Potential hectares
Scybean	4,460	50,000 a/
Cotton	134,309	300,000 b/
Tarwi	2,000	200,000 c/
Oil palm	10,000	1,000,000 d/
Corn	68,460	280,000 e/
Rice	167,000	400,000 e/

a/ Estimated according to information from INIPA; considering soybean as a rotation crop with rice.

b/ Estimated according to the historical maximum.

c/ Estimated by Juan Reano in his work: "Lupine Production Vis a Vis The Shortage of Oils and Fats in Peru", submitted to the first International Seminary on Lupine Nutritional and Agricultural Aspects, that took place in Lima and Cusco, Peru between April 12 and 21, 1980.

d/ Taken from: Ministry of Agriculture, 1980. "Politica de Precios y Abastecimiento de Productos Oleaginosos".

e/ Estimated by the JUNAC team, on the basis of unpublished data.

Table 13. Estimating the nutritional gaps

Group Average consumption	Well nourished group (1)	Malnourished group (2)	Nutritional gap (1) - (2)
Monthly kilocalories	94,993	44,828	50,165
Monthly protein (gr/kg)	2,619	1,629	990

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

Table 14. Nutritional contribution of the foods in the system to the average monthly diet

	Kilocalories monthly	Per cent	Proteins (gr/kg)	Per cent monthly
Oils and fats	3,557	5.1	...	...
Chicken	1,782	2.6	173	8.2
Eggs	679	0.9	48	2.2
Total goods of the system	6,018	8.6	221	10.4
Average monthly diet	69,763	100.0	2,121	100.0

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

The next step is to define the distribution of this additional consumption among the goods considered. For this, both the amount of calories and proteins and the market prices of the goods have to be taken into account in such a way that the price function for the goods can be minimized. The calory and protein content, together with the coverage of the nutritional gap are included as restrictions. The results of this exercise are presented below:

Table 15. Additional required consumption and its nutritional contribution

Goods	Additional required consumption (Kg/per-capita/year)	Nutritional contribution Kilocalories	Protein (gr)
Oils and fats	6.0	52,104	...
Chicken	4.5	4,860	864
Eggs	2.7	4,104	327
Total	13.2	60,068	1,191
Nutritional gap (10 per cent)		60,204	1,188

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

Based on the previous analysis, it can be seen that there exists a consumption goal for the malnourished group, attempting to close part of the nutritional gap. On the other hand, no change in the relative contribution of the oils and fats and poultry products to nutrition is required for the well-nourished group, since this group already covers its nutritional requirements.

The above implies that the goal for each of the products for the malnourished group would be the additional consumption required to contribute to the closure of the nutritional gap. On the other hand, any consumption increase for the well-nourished group would be the result of the growth in income expected for the next twenty years.

Finally, it is necessary to point out that establishing operative control mechanisms for the oleaginous oligopoly and adequate price levels for each productive component as well as defining the corporate structures to implement the options can only be done if there is agreement between the participating agents.

4.3 Selecting the best alternative

From table 16, "Selecting the best system", it can be concluded that the alternative system (AS) outperforms the present situation projection (PSP) in terms of integrated development: the aggregated value is 22 per cent higher than the PSP one. The advantages of AS from the point of view of integrated development cannot be denied. It gives the best results for a series of variables: foreign currency needs are 63 per cent lower; employment is 54 per cent higher; the use of installed capacity for the extraction of oleaginous grains increases five times. Also, the degree of food security is substantially better because of the reduction of the effect of international market price changes upon the system; the supply of national raw oils is also less affected because of the introduction of raw oils with lower variability in terms of production. For regional development, the distribution of aggregated value between the regions is more equitable, favouring those regions with lower per capita income. Finally, the degree of technological innovation is clearly superior given the introduction of new intermediate and

Table 16. Selecting the best system

Goal/effect	Indicator	System Present (PSP)	System Alternative (AS)	More advantageous system
1. Aggregated value	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

Table 16. Selecting the best system (cont'd)

Goal/effect	Indicator	System				More advantageous system
		Present (PSP)		Alternative (AS)		
	External protection effect:					
	Oils and fats sub-system		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	3.5	
	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

final products among the industrial components and the more advanced technologies introduced in the agricultural production components not made explicit in table 16.

It is obvious that achieving these results requires additional effort, especially in terms of bigger investments for AS than for PSP; viz. 314 million current United States dollars through the whole planning period of twenty-one years. The question is whether it is really expedient to make the investment in the oils and fats system considering the opportunity cost for capital. An answer would require a more detailed evaluation of the surpluses generated - profits plus interests - by each project with respect to the investment through the twenty-one years of the programme. Unfortunately, this information is not available, however, a quick calculation of the difference in the profits plus additional interests generated by AS over the ones for PSP gives $US 115 million in the year twenty one, which is 36.8 per cent of the total investment, and gives an indication of the advantages of the alternative system in terms of capital returns.

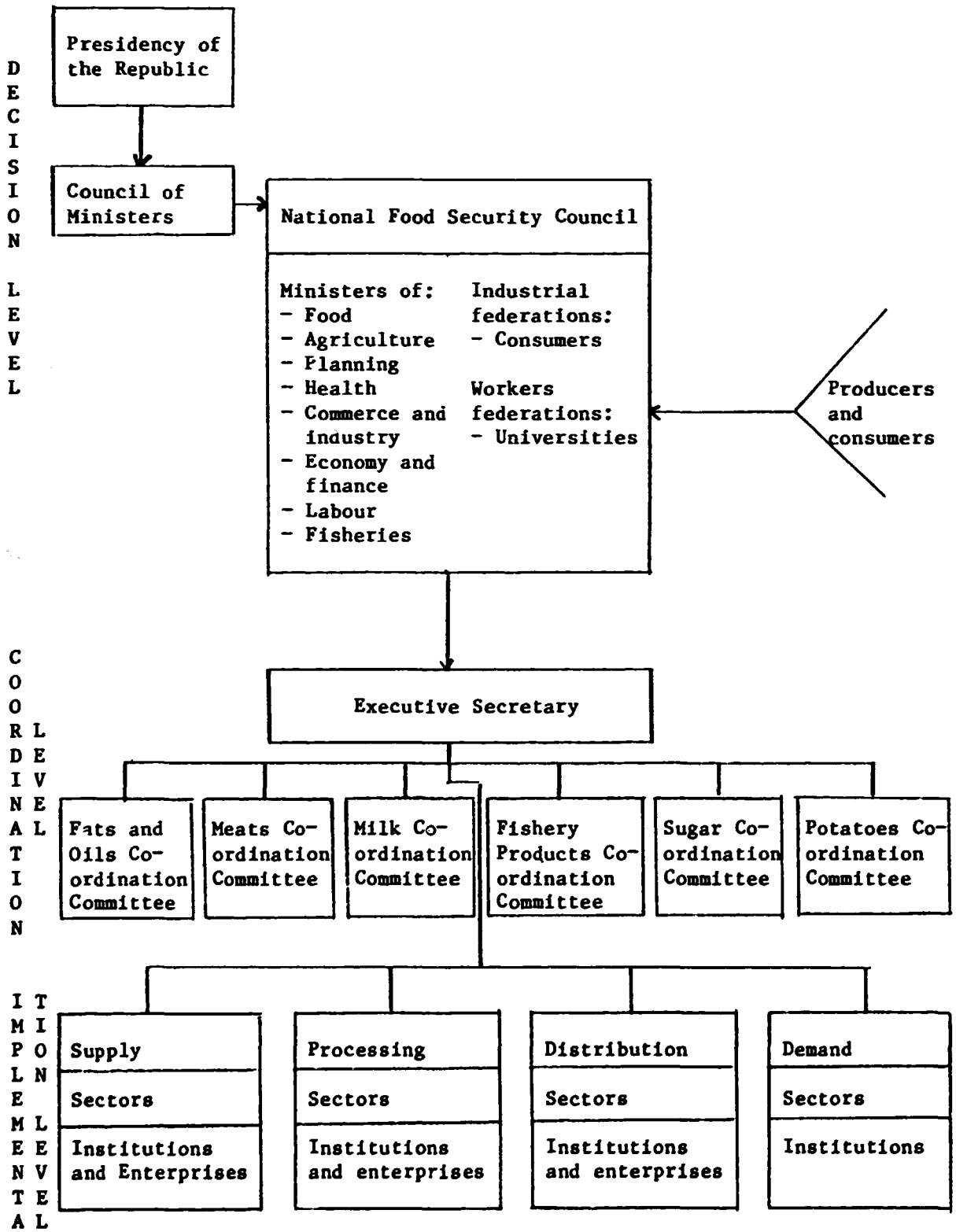
The contribution of each subsystem to the generated results is shown in table 17.

Once the selection of the best strategy for integrated development is made, the necessary mechanisms to succesfully implement a programme for the alternative development of the oils and fats system must still be chosen. Within the Andean Pact Food Security Scheme, national food security systems are being designed to facilitate the implementation of integrated development programmes of priority food systems. The main study includes a proposal for the institutional organization (figure 10), which at present is being followed by the Peruvian Government.

Table 17. General results by development strategy and by subsystem

	Fats and oils	Poultry	Cotton	Fishmeal	Whole powdered milk	Wheat flour	Rice	Total
Present situation projection								
Aggregated value ($US thousands)	283,508	204,879	60,427	85,189	-	39,314	34,047	857,364
Income distribution (per cent)								
-Salaries	5.96	26.85	50.21	32.87	...	8.68	17.4	19.33
-Indirect taxes	9.25	9.52	2.82	11.71	...	9.81	3.2	7.83
-Interests	6.27	3.84	-16.41	14.31	...	3.15	9.9	5.53
-Gross savings	3.38	4.38	0.34	6.33	...	0.4	1.2	3.09
-Profits	48.98	39.22	56.17	24.34	...	54.58	67.8	49.01
-Income tax	26.17	16.18	6.86	10.43	...	23.27	0.5	15.21
Foreign currency Account ($US thousands)	192,558	168,180	-31,512	-73,298	153,886	125,401	17,284	552,499
Employment (workers/year)	5,474	35,307	26,023	8,851	-	1,272	21,387	98,314
Fiscal account ($US thousands)	81,121	84,576	8,572	21,675	3,110	-531	11,840	210,363
Required investment ($US thousands)	TC: 146,916 FC: 26,056 Tot:172,972	TC: 102,262 FC: 79,405 Tot:181,667	TC: 50,193 FC: - Tot:50,193	TC: 50,422 FC:-45,713 Tot: 4,709	...	TC: 11,623 FC: ... Tot:11,623	TC: 269,966 FC: ... Tot:269,966	TC: 631,382 FC: 59,748 Tot:691,130
Technological innovation	...	...	...	...	...	...	...	...
Regional development ($US thousands)								
DIST. VA								
REGION I	36,795	34,448	16,564	49,725		4,999	92,576	253,107
(per cent)	13.1	16.9	27.4	58.4		12.9	50.3	27.9
REGION II	236,379	123,086	18,036	7,166		26,034	...	410,701
(per cent)	84.2	60.6	29.8	8.4		67.0	...	48.7
REGION III	-4,986	26,542	25,656	28,298		6,677	18,957	101,144
(per cent)	-1.8	13.1	42.5	33.2		17.2	10.3	12.0
REGION IV	12,526	5,627	171	...		...	53,742	72,066
(per cent)	4.5	2.8	0.3	...		...	29.2	8.5
REGION V	...	5,110	...	...		369	1,288	6,398
(per cent)	...	2.5	...	...		0.9	0.7	0.8
REGION VI	174	8,428	....	...		771	17,484	17,658
(per cent)	0.1	4.1	...	...		2.0	9.5	2.1
Alternative system								
Aggregated value ($US thousands)	432,779	225,239	60,427	85,549	7,873	50,955	184,047	1,045,819
Income distribution (per cent)								
-Salaries	13.6	29.9	50.2	33.6	16.4	27.8	17.4	22.2
-Indirect taxes	6.3	9.0	2.8	11.7	8.6	4.4	3.2	6.5
-Interests	2.0	2.2	-16.4	11.3	2.9	2.2	9.9	3.1
-Gross savings	4.7	4.0	0.3	6.4	31.8	1.5	1.2	3.9
-Profits	57.6	39.4	56.2	25.9	29.6	56.6	67.8	52.6
-Income tax	15.8	15.6	6.9	11.1	10.8	7.6	0.5	11.7
Foreign currency Account ($US thousands)	50,306	146,124	-31,512	-76,798	2,653	93,904	17,284	201,961
Employment (workers/year)	33,569	49,952	26,023	8,964	1,310	10,626	21,387	151,831
Fiscal account ($US thousands)	89,027	81,664	8,572	23,267	1,794	(4,068)	11,840	212,096
Required investment ($US thousands)	105,749 288,886 394,635	118,057 106,896 224,953	50,163 ... 50,163	46,365 (25,713) 20,652	2,771 3,511 6,282	36,602 4,007 40,609	269,966 4,088 274,054	629,673 379,421 1,011,348
Technological innovation	Kernell oil Tarwi oil Palm stearin Palm olein Rice bran oil	Tarwi cake		Oil-free fishmeal	Milk extender	Composite flours for spaghetti		
Regional development ($US thousands)								
DIST. VA								
REGION I	77,227	38,890	16,564	49,660	342	4,999	92,576	280,253
(per cent)	17.8	17.3	27.4	58.6	4.3	9.8	50.3	26.8
REGION II	223,080	137,538	18,036	7,079	7,302	13,561	...	406,596
(per cent)	51.6	61.1	29.8	8.4	92.8	26.6	...	38.9
REGION III	8,121	27,689	25,656	28,003	68	3,483	18,957	111,977
(per cent)	1.9	12.3	42.5	33.0	0.9	6.8	10.3	10.7
REGION IV	98,016	6,296	171	...	57	2,906	53,742	161,188
(per cent)	22.7	2.8	0.3	...	0.7	5.7	29.2	15.4
REGION V	4,283	5,373	...	...	23	25,572	1,288	36,539
(per cent)	1.0	2.4	...	...	0.3	50.2	0.7	3.5
REGION VI	22,004	9,450	...	...	80	402	17,484	49,420
(per cent)	5.1	4.2	...	...	0.1	0.8	9.5	4.7

Figure 10. Proposal for an institutional organization for implementing the Food Security Scheme



5. THE PROGRAMME PROPOSAL

The assessment of the present situation of the oils and fats system in Peru showed great instability in the national supply of oleaginous raw materials, high overhead costs due to idle capacity in manufacturing plants, and an increasing tendency to import oleaginous raw materials. A set of options for neutralizing and overcoming these negative characteristics of the system was indentified for the oils and fats system to reach the proposed goals (see table 11). The set of options and policies constitute the programme.

When the introduction of these options and others specified in previous chapters was evaluated against the projection of the present system, it was established that the attainment of the proposed goals was possible through the implementation of the development programme for the alternative system.

The central development goal for the programme propcsal is to obtain the highest possible aggregated value by applying the technical and economical alternatives identified, and using primarily national raw materials. A higher aggregated value can be achieved by reducing production costs, increasing production and obtainin better sale prices. The foreign currency level, the employment, the net fiscal account, the use of installed capacity, the degree of technological innovation and the investment are all correlated with an increase in the aggregated value for the oils and fats production and consumption system. Given the framework of this project, it is necessary to add that the achievement of a higher aggregated value must be accompanied by improved indexes of food security. In this manner, the food industry will integrate itself in the nation's food needs and contribute to the subregional Food and Environmental Security Agreement.[10/]

A time span of twenty one years was considered for the programme. This time span was determined on the basis of two considerations. The first one is related to the consumption component. Due to the inelastic characteristic for the end-products of the system, a long period may be necessary to attain the

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10/ Decision 156, Commission of the Cartagena Agreement.

proposed goals. The second one refers to the high investments needed for the backbone of the programme, the cultivation of African palm. These were distributed throughout the 21 year period.

It must be emphasized that the time span of the project can be considerably shortened if the rate of investment is increased. This is especially so in the case of palm. Although the evaluation of the oils and fats system is given for the year twenty-one, positive results are obtained annually from the beginning of the programme.

The programme in terms of production alternatives can also be changed and in this way reduce the implementation period and perhaps the cost of the investments. However, any decision must be the result of a concerted process, which would be made upon the basis of the proposal to be submitted.

It is necessary to mention that the viability of the programme depends upon the internal political environment. In a free market it would be difficult to implement the alternative system, mainly because of the projected decrease in the international price of soybean oil and the fact that national oleaginous raw materials do not react to signals from the market without an active State participation, especially at the short and medium term. Therefore, there is a strong tendency for the present system to reproduce itself in a free market context. On the other hand, it has been found that the Peruvian experience of direct State action has not been satisfactory, especially in economic-financial terms: for example, the public enterprises deficit was 5 per cent of the GNP in 1982. On the other hand, it would be difficult to implement the programme for the alternative system only with the effort and interest of the State. An agreement between the economic agents participating in the integrated development of a production and consumption system would contribute to a successful implementation of the programme that takes into account the national goals and the legitimate interests of the participating agents.

In this respect, MEPS is a tool that decreases the transaction costs of negotiations between economic agents, since it has a numerical experimentation model to quickly determine the effect of a proposed decision upon the participating agents. This gives them the possibility of proposing and introducing changes until consensus is reached through a successive approximation process.

5.1 Characteristics and details of the programme for developing the alternative system

The next tables show the goals and objectives, the policy instruments, the programme design and the time schedule, both at the component level and the aggregated system level.

The basic idea applied for programming the development of the alternative system is the following: to handle in an integral manner a factor matrix that affects the system, integrating general and specific goals with definite strategies. The strategies are made operational through policy instruments available for each case, and through the design of programmes that comprise activities for promotion, training, research, expansion, technical change, rationalization, etc. The next step for setting up the alternative system would be the study and start-up of microeconomic projects, not covered in the present study. This step should be taken once the programme has been agreed upon between the Government and the executing agents.

Tables 18 through 23 show the programme for the integrated development of the proposed system, organized by subsystems. For each subsystem, the goals and objectives, the selective and overall policies the programmes designed as well as the time schedule for each component and the system level are shown.

5.2 Required investment

The required investment for each of the activities in the programme is detailed in table 24.

Table 18. Oils and fats subsystem

	Intermediate goods agriculture (IGA)			Intermediate goods agroindustry (IGA I)		
	Palm cultivation	soybean cultivation	Tarwi cultivation	Palm milling	Soybean milling	Cotton milling
Objectives						
	Expanding the cultivated area rationalization of inefficient agroindustrial units	Expanding the cultivated area and technical change in the process	Expanding the cultivated area and technical change in the process	Establishing a processing capacity that allows for the processing of all the production, through fractioning	Integrating milling into an industrial unit capable of processing other grains	Integrating milling in an industrial unit
Goals						
	54,000 HA 1,094,800 MT	43,000 Ha 112,580 MT	60,000 HA 90,000 MT Yield: from 1,100 Kg/Ha to 1,500 Kg/Ha	135,027 MT of olein 75,917 MT of stearin	20,748 MT of raw oil	20,150 MT of raw oil
Economic instruments						
Taxes	Tax exoneration	Tax exoneration	Tax exoneration			
Prices subsidies		Establishing a refuge price for farmers	Establishing a refuge price for farmers			
Interest rates		Preferential rate at-20% real level	Preferential rate at-20% real level			
Quality regulations						
Programmes						
Promotion						
Training						
Research						
Expansion	Expanding sowed area at a rate of 3,000 Ha/year	Expanding the cultivated area from 6,500 to 43,000 Ha.	Expanding the 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 fractioning for raw palm oil processing	Adapting the extraction plants for tarwi milling and soymeal elaboration	
Horizontal integration				Horizontal integration	Horizontal integration	
Rationalization	Increment of labour productivity and recovery of lands at the public enterprise ENDEPALMA		Increment of labour productivity at the extraction plants of the public enterprise ENDEPALMA			
Time schedule						
Execution installation	Years: 3 - 17	Years: 1 -16	Years: 1 - 21 10, 14 and 18	Years: 1, 6, and 18	Years: 1,12	Year: 1
Production operation	Years: 1 - 2 and 18 - 21	Years: 17 - 21		Years: 2 - 5, 7-9, 11-13, 15-17 and 19-21	Years: 2-11 13-17 and 19-21	Years:2-21

Table 18. Oils and fats subsystem (cont'd)

Intermediate goods agroindustry (IGA I)					Intermediate goods industry (IGI)
Tarwi milling	Semi-processed fish oil	Palm kernel raw oil	Corn raw oil	Rice raw oil	PVC containers
Integrated milling and processing of tarwi.	Regulate production according to the supply of raw materials.	Industrial scale palm-kernel milling.	Integral industrial use of corn germ for the supply of raw oils.	Integral industrial use of rice bran for the supply of raw oils.	Regular production according to the production of refined oils.
14,418 MT of raw oil	110,461 MT	1,065 MT	61,363 MT	10,000 MT	71,424 thousands
	Establishing a top price for semi-processed oil. Maintain subsidies.				
Horizontal integration			Horizontal integration	Horizontal integration	
Extracting raw oil from tarwi grain. Tarwi cake processing plant.		Industrial scale extraction of raw oil from kernels.	Industrial scale extraction of raw oil from corn germ	Industrial scale extraction of raw oil from rice bran.	
		Year: 1	Years: 1-2, 12 and 18	Year: 1	
Year: 1		Years: 2 - 21	Years: 3-11, 13-17 and 19-21	Years:2-21	

Table 18. Oils and fats subsystem (cont'd)

End-products industry (FGI)		Consumption (kg per-capita year)		System
Oils and fats	Soaps	Oils	Fats	
Gradual reduction of raw soybean oil imports, replacing them with national raw oils.	Regular production according to demand Substitute national for imported oils in formulae.	Cover the nutritional gap (malnourished group) by increasing the consumption of oils according to their participation in diets.	Cover the nutritional gap (malnourished group) by increasing the consumption of fats according to their participation in diets.	-Aggregated value -Food security -Foreign currency -Fiscal account -Employment -Regional cevelopment -Income distribution -Technological innovation
Vegetable: 73,053 MT Compound: 164,367 MT Lard: 110,525 MT Margarine: 38,028 MT	Laundry: 25,000 MT Bath: 5,800 MT Total: 7.2	Vegetable: 2.2 Compound: 5.0 Total: 4.6	Lard: 3.4 Margarine: 1.2	
				Ensure a minimum 10% profit rate for each component.
Modify existing technical regulations				
		Promotion Consumption System	Promotion Consumption System	-Oils and Fats Agreement Commitee -Information Publising System
Raw oil processing Training				
Study on level of acceptance of fish oil in humans				Microeconomic evaluation for productive components
Changes in the formulae for oils and fats Years: 1 - 2	Use of raw kernel oil for soaps	Years: 1 - 21	Years: 1 - 21	Year: 1 Years: 2 - 21

Table 19. Poultry subsystem

	IGA	IGA I	FGI		Consumption	System
	Yellow corn	Balanced foods	Chicken	Eggs		
Objectives						
	Expanding cultivated areas	Integral use of yellow corn	Expanding production capacity	Expanding production capacity	Covering the nutritional gap for the malnourished group proportionally to the participation of chicken and eggs in the diet by increasing the consumption of chicken and eggs.	- Aggregated value - Foreign currency - Employment - Fiscal account - Installed capacity - Technological change - Regional development - Income distribution - Food security
Goals						
	310,780 MT 83,096 Ha	1,883,517 MT	468,529 MT	182,734 MT	Chicken: 14.3Kg/pc Eggs: 5.6 Kg/pc	
Exchange rate						
Tariffs		20% CIF for corn A.D. and imported soybean cake				
Credit						
Economic instruments						
Interest rates	Promotional -20% level					
Taxes	Exoneration					
Salaries						
Prices	Refuge price: for a minimum 12% profit					Ensure 12% minimum profit rate for components
Subsidies		For sorghum				
Programmes						
Promotion					Promotion Consumption System	Oils and Fats Agreement Commitee Information Publishing System
Training						
Research						Microeconomic evaluation
Expansion	Reincorporate arable lands		Expand installed capacity	Expand installed capacity		
Technical change		Implement equipment for the degermination of yellow corn				
Rationalization						
Time schedule						
Installation execution	Expansion: year 1	Technical change: year 1	Expansion: year 1	Expansion: year 1	Promotion: year 1	Research and promotion: year 1
Production	Expansion: year 1	Technical change: year 1	Expansion: year 1 year 2	Expansion: year 1		Promotion: year 2

Table 20. Fishmeal subsystem

	IGA		IGA I		System
	Extraction SAEE[a/]	Extraction CHD[b/]	Fishmeal PESCA Peru	Fishmeal Private	
Objectives					
	Rationalizing the fishing fleet and the management services		Rationalization and technical change	Technical change	Aggregated value Foreing currency Employment Fiscal account Installed capacity Technological change Regional development Profitability Food Security
Goals					
	563,954 MT	1,690,377 MT	Conventional: 100,258 MT Oil-free for export: 21,881 MT	Conventional: 331,446 MT	
Economic instruments					
Exchange rate					
Tariffs					Maintain the present structure.
Credit					
Interest rates					
Taxes			Export tax	Export tax	
Salaries					
Prices	Ensure 12% minimum profit rate for components	Ensure 12% minimum profit rate for components			Ensure 12% minimum profit rate for components
Subsidies					
Programmes					
Promotion					Oils and Fats Agreement Commitee. Information Publishing System
Training research					Microeconomic evaluation
Expansion					
Technical change			Adapting fishmeal plants for elaboration of oil-free fishmeal.	Improving the raw material to meal yield.	
Rationalization	Reduction of the fishing fleet by one third.		Resizing of the installed capacity. Reducing sales and managerial costs. Rationalization of labour.		
Time schedule					
Installation execution	Rationalization year 1		Technical change: year 1	Promotion: year 1	Research: Promotion: year 1
Production			Technical change: year 2	Technical change: year 1	Promotion: year 2

a/ Small associated enterprises for extraction.
b/ Direct human consumption.

Table 21. Cotton and rice subsystem

Cotton subsystem			Rice subsystem		
IGA Cotton crop	IGA I Ginning	System	IGA Rice crop	IGA I Rice milling	System
Objectives					
Maintain the present production levels	Maintain the present production levels	Aggregate value Foreing currency Employment Fiscal account Installed capacity Regional development Income distribution Food security Profitability	Maintain the present production levels		Aggregated value Foreign currency Employment Fiscal account Installed capacity Regional development Income distribution Food security Profitability
Goals					
Raw Cotton: 184,000 MT 87,300 Ha	Fiber:60,000 MT Seed:115,000 MT		Raw rice: 1,100,000 MT 209,000 Ha	Milled rice: 847,000 MT Rice bran: 72,000 MT	
Economic instruments					
Exchange rate					
Tariffs					
Credit					
Interest rate	Promotional: -20% level		Promotional: -20% level		
Taxes	Exoneration		Exoneration		
Salaries					
Price subsidies		Ensure a minimum 10% profit rate			Ensure a minimum 10% profit rate
Promotion		Oils and Fats Agreement Commitee Information Publishing System			Oils and Fats Agreement Commitee Information Publishing System
Programmes					
Training					
Research expansion		Microeconomic evaluation			Microeconomic evaluation
Technical change				Implementing equipment for stabilizing rice bran	
Rationalization					
Time schedule					
Installation execution	Promotion: year 1 Research: year 1		Technical change: years 1 through 4	Promotion: year 1 Research: year 1	
Production operation	Promotion: year 2		Technical change: from year 5 on	Promotion: year 2	

Table 22. Composite flours subsystem

	IGA		FGI	
	Cultivation of wheat	Cultivation of barley	Composite flours	System
		Objectives		
	Maintain the present levels of production and cultivated area	Expanding the cultivated area	Replace wheat flour in spaghetti	Aggregated value Foreign currency Employment Fiscal account Use of capacity Technological innovation Regional development Income distribution Food security Profitability
		Goals		
	1,180 MT 983 Ha	138,119 MT 69,060 Ha	486,440 MT	Consumption: 14.8 (Kg/p/c/year)
Exchange rate				
Tariffs			Elimination of duties for imported wheat	
		Economic instruments		
Credit				
Interest rates	Promotional -20% real	Promotional -20% real		
Taxes	Exoneration	Exoneration		
Salaries				
Prices				Ensure for components a minimum 12% profitability rate
Subsidies			To imported wheat	
		Programmes		
Promotion				Consumption Promotion System. Oils and Fats Agreement Commitee. System for Publishing Information.
Training			Train milling personnel in the elaboration of food pastry using composite flours.	
Research				Microeconomic evaluation
Expansion		Expanding the cultivated area		
Technical change			Implement the necessary equipment at the mills to make composite flours for spaghetti	
Rationalization				
		Time schedule		
Installation execution		Expansion: from year 1	Training: year 1 Technical change in year 1	Promotion:year 1 Research: year 1 Consumption promotion from year 1.
Production-operation			Technical change from year 2	Promotion: from year 2.

Table 23. Milk extender subsystem

	ICA I Corn meal	FGI Milk extender	Consumption	System
		Objectives		
	Expanding production capacity	Substituting imported whole powdered milk		Aggregated value Foreing currency Employment Fiscal account Installed capacity Technological change Regional development Income distribution Food security
		Goals		
	9,291 MT	136,399 MT	Extender: 8.3 Kg/year	
		Economic instruments		
Exchange Rate				
Tariffs		Maintain 10% CIF for L.P.D.		
Credit				
Interest rates				
Taxes				
Salaries				
Prices				
Subsidies				Ensure a 12% profit ratio for components
		Programmes		
Promotion			Consumption Promotion System.	Oils and Fats Agreement Commitee. Information Publishing System.
Training				
Research				Microeconomic evaluation
Expansion	Expansion of installed capacity to cover the needs of milk extendor			
Technical changes		Adapting pasteurized milk plants for the elaboration of the milk extendor.		
Rationalization				
		Time schedule		
Installation execution	Expansion: year 1	Technical change: year 1	Promotion: year 1	Promotion:year 1 Research: year 1
Production	Expansion: year 2	Technical change: year 2		Promotion:year 2

It can be seen that the set of agricultural components requires the highest investment, particularly the cultivation of oil palm. The investments in the extraction of raw oil are relatively small, because part of the idle extraction through solvents capacity (soybean mills especially) can be used for corn germ, rice bran and tarwi oil extraction. The investment required for the extraction of residual oils from fishmeal, and the resulting production of oil-free fishmeal does not constitute a real investment, because one of PESCAPERU fishmeal factories that is now idle could be used.

It must be pointed out that table 24 shows only an approximation of the required investment. It is estimated that $US 197.5 million are needed for investments in the programme. One of the goals for the microeconomic evaluation of projects for the productive components is precisely to determine and detail the required investments.

5.3 Financing

The necessary financing includes investment needs and working capital for each productive component.

Financing of the working capital has been estimated using average production cost for each rotation period of the component, multiplied by the increase in production minus the gross savings for each component. Table 25 shows the financing needs for the system's working capital at the year twenty one for each subsystem. As a result it can be seen that the alternative system requires 30 million dollars less for working capital than the present system. Therefore, implementing the programme does not require additional financing for working capital, on the contrary the programme entails savings in this respect.

In conclusion, the financing needs of the programme are confined to the financing of the required investments estimated in the previous section.

Table 24. Required investments[a] ($US thousands), twenty-one year programming[b]

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	1,574
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.

Table 25. Working capital financing

Subsystem	Amount ($US thousands)
Oils and fats	- 41,167
Poultry	15,795
Milk extendor	- 27,580
Composite flours	24,979
Fishmeal	- 4,057
Cotton	-
Rice	-
Total:	- 32,030

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

5.4 Sequence of activities

The sequence of activities for the programme is shown in table 26. The continuous lines indicate the required steps for a given activity, such as studies, assembly, implementation, etc. The dotted lines indicate that the activity is permanently established within the operation of the programme. For example, the supervision and setting up of the programme requires initial contacts, information gatherings, negotiations and a final agreement to create an execution mechanism. Once this is created, its functions become permanent. In the case of agricultural production, the continuous line indicates the beginning of production support until the first crop, the process is being repeated again and again.

Table 26. Sequence of activities

Activities	Years 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
A. PROMOTION	
1. Supervision and Agreement	**----------
2. Information Publishing	**----------
3. Consumption Promotion	**********
B. PRODUCTIVE PROJECTS	
1. Expanding Palm Cultivation	**--**********
2. Expanding Soybean Cultivation	**********
3. Expanding Tarwi Cultivation	**********
4. Expanding Corn Cultivation	**********
5. Expanding Barley Cultivation	**********
6. Palm Fractioning Insta 1	**-----**-----**----------**----------**----------
7. Palm Kernel Raw Oil Install	**----------
8. Adaptation for Oil Extraction from Tarwi and Soymeal elab.	**----------**----------**----------
9. Degerminating Yellow Corn	**----------
10. Corn Raw Oil Elaboration	****----------**----------**----------
11. Rice Bran Stabilization	******----------
12. Rice Bran Oil Elaboration	----------
13. Residual Fish-Oil Extraction	----------
14. Expanding Corn Meal Capacity	----------
15. Cotton Milling Horizontal Integration	----------
16. Milk Extendor Equipment Installation	----------
17. Composite Flour Equipment Installation	----------
18. Expanding Chicken Production	**********
19. Expanding Eggs Production	**********
C. TRAINING	
1. Processing Raw Oils	****
2. Using Composite Flours	**
D. RESEARCH	
1. Evaluating Fish-Oil Effects	****
2. Changing Technical Regulations	****
3. Microeconomic Evaluation	**
4. Designing the Alkaloid removal Plant for Tarwi	**

*****: execution, installation
-----: Production, operation

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

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A programme for the integrated development of the Peruvian oils and fats production/consumption system

		(please check appropriate box) yes	no
(1)	Were the data contained in the study useful?	☐	☐
(2)	Was the analysis sound?	☐	☐
(3)	Was the information provided new?	☐	☐
(4)	Did you agree with the conclusion?	☐	☐
(5)	Did you find the recommendations sound?	☐	☐
(6)	Were the format and style easy to read?	☐	☐
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		If yes, please specify subjects of interest	
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