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**AGRO-FOOD INDUSTRIAL DEVELOPMENT  
IN LATIN AMERICA**

**Sectoral Studies Series  
No.25**

SECTORAL STUDIES BRANCH  
DIVISION FOR INDUSTRIAL STUDIES

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 1986/87.

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Preface

The Sectoral Studies Branch, in co-operation with the Agroindustries Branch of the Division of Industrial Operations, will continue to study the development of the agro-food industry as part of its work programme in 1986/87. Careful preparatory work is required. This study is a review of the agro-food industrial development with special reference to Latin America. Agro-food planning experiences in Latin America and in other regions of the world are discussed as well as possible directions of agro-food industries development in Latin America. The study represents a first step in the activities to be undertaken in 1986/87.

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## 1. INTRODUCTION

As discussions of the world food crisis continue, the role of agro-food industries has taken on a new emphasis. These industries are of interest not just for their potential in generating economic growth, but for their ability to augment food supply. This discussion paper examines both these issues within the context of Latin America although comparisons with other developing regions are made during the discussion.

The special attention paid to Latin America in this study is not accidental. In Latin America both agricultural and agro-food industrial production are important contributors to gross national product and manufacturing value added. In 1970 the share of agriculture in the gross domestic product was 13.8 per cent. This percentage declined to 10.9 per cent in 1980.<sup>1/</sup> The agro-food industries' share in total manufacturing value added was 19.2 per cent in 1970 but dropped to 16.2 per cent in 1980<sup>2/</sup>, the Latin American contribution to the world food processing value added being the highest compared to other developing regions.

Linking agriculture to industry, the agro-food industries have a unique ability to foster rural and industrial development. Latin America's agricultural base and level of industrialization are particularly adapted to industrialized food production. Yet food processing is proceeding in a climate of regional economic stagnation, declining agricultural productivity and an accelerated dependency on imports.

Latin America and the Caribbean have been identified as a region faced with economic contraction and financial crisis. In that region, investment is presently below levels achieved in 1981, social welfare indices (housing, nutrition, education) are down and the external debt has soared. Measures of production, employment, inflation and investment suggest that Latin America's

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<sup>1/</sup> Economic Commission for Latin America, Statistical Yearbook for Latin America, table 54, p. 128.

<sup>2/</sup> See table 3.4.



economy will be facing long term problems.<sup>3/</sup> A deterioration in per capita income occurred in 1983, as well as in the terms of trade of non-oil exporting countries. The average growth in consumer prices which was 47 per cent in 1982 swelled to 68 per cent in 1983. Weighting this rate by population, consumer prices grew by 86 per cent in 1982 and by 130 per cent in 1983.<sup>4/</sup> Falling world prices in agro-food commodities which are extremely important to many Latin American countries<sup>5/</sup> have to a large extent been responsible for the decline in agricultural and agro-food industrial production.

The study starts with a definition and characterization of the agro-food industry followed by an indication of the trends in food production and demand for food in chapters 3 and 4, respectively. Various development lines for the agro-food industry in Latin America are presented in chapter 5 with the emphasis on satisfying the growing demand for food. The importance of national planning for realizing the inherent potential of the agro-food industry is analysed. In chapter 6 experiences in agro-food planning are reviewed and advantages of adopting national policy making tools in the planning process are discussed. Concluding remarks are presented in chapter 7.

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<sup>3/</sup> Enrique Inglesias, A preliminary overview of the Latin American economy during 1983, Santiago, Chile, CEPAL Review, April 1984, pp. 7-38.

<sup>4/</sup> Ibid.

<sup>5/</sup> Enrique Iglesias, A Preliminary Overview of the Latin American Economy during 1983, Santiago, Chile, CEPAL Review, April 1984, p. 25.

## 2. AGRO-FOOD INDUSTRIES

### 2.1 Definition and characteristics

Agro-food industries link agriculture and industry. This connection has special contemporary significance because it is, without further qualification, very much responsible for survival in the future. That is, agro-industry, or in this sense the agro-food industry, may well determine the quantity and quality of food available. The agro-food industry is an economic sector which plays an important role in satisfying a society's food requirements.<sup>6/</sup> What form the agro-food industry takes will influence who has access to food and at what price.

Broadly defined, the agro-food industry includes all activities involved in the production or transformation of agricultural products destined mainly for human or animal consumption. As a system, these economic activities transform agricultural produce and have internal and external implications. Internally, food is diversified and transformed by the industrial activities which take place. Externally, the agro-food industry generates backward and forward linkages and increases the scope of industrial activities.<sup>7/</sup> In addition to industrial transformation, agricultural, commercial and distributional activities may be included within the definition. What activities are actually included varies among countries and for different products. Food industries are often connected to other industries such as those dealing with agricultural machinery, chemicals, fertilizers, packaging material, etc.

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<sup>6/</sup> Yves Roucaud and Yon Bernard "The agro-food industries and rural development", p. 1, topic paper presented at the OECD Symposium, The adjustment and the challenges facing the food industries in the 1980s, Paris, 1982, p. 1.

<sup>7/</sup> Pascal Bye and Alain Mounier, "Croissance agro-industrielle et changement des techniques - stratégie des acteurs et enjeux des techniques", Institut National de la Recherche Agronomique, Institut de Recherche Economique et de Planification, Grenoble, 1980, p. 2.

Within the agro-food industries it is useful to distinguish between two levels of processing: primary and secondary. Primary processing is the first stage, where the raw material is processed into a consumer product or an intermediate food product which is further processed. Homogenous or undifferentiated products like flour or ingredients such as gluten or lactose used in food and non-food industries are the end products of primary processing. The linkage of these industries to agriculture is strong and they are frequently located close to the farm or production area or to a port if the raw produce is imported.

In contrast, secondary processing yields final products which are characteristically more complex and have a high value added component. Inherently more sophisticated, these products may contain food additives, be packaged for competitive selling or be brand products. What fundamentally distinguishes secondary processing is its kinship to other manufacturing industries. This distinction in processing type is evidence of new developments in the agro-food industry.<sup>8/</sup>

## 2.2 Significance of the agro-food industry

Since food production is becoming more and more critical in domestic and international spheres, this analysis will focus on the agro-food industries. Production value within the agro-industrial sector comes mainly from food industries. For example in developing countries, 13.5 per cent of total industrial output comes from the agro-food industry's share, the largest of all 27 industrial branches (at the ISIC three-digit level).<sup>9/</sup>

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<sup>8/</sup> Developed nations are labelling their food industries according to processing type. See the Guía Estadística de la Industria Alimentaria Española, Salón Internacional para la industria alimentaria, Barcelona, PROSEMA, December 1983, where industries are categorized as to whether they perform primary or secondary transformations.

<sup>9/</sup> UNIDO, Industry and development, Global Report, 1985, United Nations, New York, 1985.

Agro-food processing capacities vary across different sectors and in different regions. While agricultural production may be found dispersed throughout the developing regions, agro-industrial production is not. For instance, in Latin America over fifty per cent of the processing is concentrated in just three countries: Argentina, Brazil and Mexico.

It is also helpful to examine economic trends in the developed world which ostensibly influence developing countries. A study of food industries in OECD countries demonstrated that as gross domestic product (GDP) increases, the relative contribution of agro-food industries diminishes. The study further suggested that all countries queried reported that as a percentage of total manufacturing activities, the agro-food industries were declining.<sup>10/</sup>

While it is arguable that the significance of agro-food industries diminishes with increasing industrialization, its present role in developing economies is fundamental. Developed countries now process 80 per cent of their raw food materials; the potential in developing countries is therefore tremendous since only 10 to 20 per cent of their raw food materials is undergoing domestic industrial processing.<sup>11/</sup> It is well to remember that developing countries will also become more active traders in agricultural commodities in the future. Developing countries' share has been low in international trade of agroindustrial products such as in cereals, meat and dairy products, but as table 2.1 shows, developing countries are important contributors to international trade of sugar, vegetable oils and fats, fruit and vegetable preparations and fish preparations.

While the role of the agro-food industries may have the same functions as other sectors (e.g. contribute to the gross national product, create employment, increase exports), these industries are nevertheless specially vital to national development. It is not just their ability to contribute to aggregate production, it is the nature of what they produce. Without them, acceptable levels of food self-sufficiency would not be possible, rural

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<sup>10/</sup> OECD, "OECD Food Industries in the 1980s", Paris, 1982, p. 35.

<sup>11/</sup> UNIDO, Industry in a Changing World, p.267.

Table 2.1 Principal agro-industrial products in international trade in 1984  
(value in current thousand \$US for 1984)

Product	World exports (millions of \$US)	Share of developing countries (percentage)
1. Sugar	5.2	53
2. Meat	11.7	8
3. Milk, butter and cheese	8.4	1
4. Oils and fats		
- vegetable	6.2	40
- animal	1.4	3
5. Animal feeds	7.7	24
6. Alcoholic beverages	7.8	4
7. Fruit and vegetable preparations	7.6	35
8. Meat preparations	2.8	17
9. Flour and cereal preparations	4.3	8
10. Fish preparations	2.5	37
11. Chocolate and sugar confectionery	2.4	11

Source: Computed from UNSO Commodity Trade Statistics, UNIDO, Division for Industrial Studies, Sectoral Studies Branch.

development would lag and dependency would increase. Originally, agro-food industries existed simply to transform surplus agricultural production, particularly in the rural milieu. This transformation served as a market regulator. Due to the process of urbanization, agro-food industries have moved beyond the rural domain. Still, they are more suitable than most other industries for rural development.

### 3. TRENDS IN FOOD PRODUCTION

#### 3.1 Agricultural production

To put agricultural production into perspective, it is helpful to examine some of its determinants. Table 3.1 shows projections for arable land area throughout the world to the year 2000. The increase in arable land area forecast for Latin America is sizable. Nevertheless, projections of arable land are only one side of the coin; another measure of production is acreage harvested (table 3.2). Agricultural land is finite; as time goes on, it is productivity, not acreage, which is the critical variable. During the 1960s, Latin America experienced an average annual growth of 2.64 per cent in area harvested, 4.18 per cent in production and 1.50 per cent in output per hectare. Comparable growth rates for the next decade are telling: a drop to 1.04 per cent for area harvested, 2.35 per cent for production and 1.78 per cent for output per hectare. The trend in Sub-Saharan Africa is equally disheartening, but Asia has shown some positive growth in production and output.

In 1950, the share of agriculture in Latin America's gross domestic product was 19.5 per cent. In 1982, this figure had fallen to 11.3 per cent.<sup>12/</sup> Yet, compared to other regions in the developing world, agricultural production growth rates for Latin America have been among the highest. It is significant, however, to keep in mind the sub-regional differences within Latin America as depicted in table 3.2.

Here a distinction can be made between Central America, Upper South America, and Lower South America. Central America extends from Mexico to Panama (the isthmus connecting the two American continents) and includes nations in the Caribbean. Lower South America includes Argentina, Chile and Uruguay and Upper South America includes the remaining countries. The experience of Upper South America in agricultural production also presents a

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<sup>12/</sup> Economic Commission for Latin America, 1983 Statistical Yearbook for Latin America, table 53, p. 129.

Table 3.1 Arable area, actual and projected (millions of hectares)

	1951-55	1961-65	1971-75	Forecast	
				1985	2000
Industrialized countries	361.2	371.8	400.3	392.2	399.1
Centrally planned countries	384.3	404.5	414.5	417.5	420.0
Developing countries	529.2	607.1	662.0	706.0	723.5
Latin America	93.5	114.0	136.5	155.0	165.0
North Africa/Middle East	78.5	86.3	91.5	92.5	91.0
Other African developing countries	116.0	146.5	160.5	175.0	182.5
South Asia	196.0	200.5	207.5	209.0	207.0
Southeast Asia	22.7	31.6	34.9	39.0	41.0
East Asia	22.5	28.2	31.1	35.5	37.0
<u>World</u>	1,274.7	1,383.4	1,476.8	1,513.7	1,538.6

Source: Report prepared by the Council on Environmental Quality and the Department of State, The global 2000 report to the President, the Technical Report, Vol. 2, Washington, D.C., 1981, p. 97.

Table 3.2 Average annual growth rates of production, area harvested and output per hectare of major crops in developing countries

Region	1962-1972			1972-1982		
	Production	Area harvested	Output per hectare	Production	Area harvested	Output per hectare
Developing countries	2.97	1.29	1.66	2.88	0.84	2.03
Asia	3.14	0.69	2.43	3.24	0.79	2.43
North Africa/ Middle East	1.71	1.01	0.70	2.58	0.43	2.14
Sub-Saharan Africa	1.91	2.16	-0.24	1.88	1.07	0.80
Latin America	4.18	2.64	1.50	2.85	1.04	1.78
Central America	5.23	1.70	3.48	4.05	0.14	3.91
Upper South America	4.40	3.66	0.71	2.19	1.80	0.38
Lower South America	2.95	1.73	1.20	2.91	0.28	2.62

Source: L.A. Paulino and J.W. Mellor, "The food situation in developing countries", Food Policy, Vol. 9, No. 4, November 1984, p. 283.

picture of stagnation.<sup>13/</sup> In the 1960s, growth in agricultural production averaged 4.4 per cent. Then, in the seventies, in Upper South America the growth rate for agricultural production slid to 2.19 per cent (table 3.2). While the output per hectare improved in the 1970s in Lower South America, a decline was experienced in Upper South America. Diminishing agricultural returns are apparently a fact: in Peru from 1977 to 1980 potato production fell by 12.7 per cent, brown rice by 28.4 per cent, yellow corn by 39.7 per cent, wheat by 35.7 per cent and sorghum by 36.8 per cent to name a few of the significant production declines.<sup>14/</sup> When statistics for Upper South America are merged with results from Lower South America, the aggregated result is more encouraging. Agricultural production and area harvested have also declined in Central America over the past decade (table 3.2). As a region, the diversity in Latin America is readily apparent and some of its nations have more in common with the developed rather than the developing world.

### 3.2 Food production

For developed and developing countries alike, the rate of growth in food production has been roughly the same (3.1 per cent per year in the 1950s, 2.9 per cent in the 1960s for both and 2.7 per cent for developed and 1.7 per cent for developing countries in the early 1970s).<sup>15/</sup> The domestic output of some developing countries, such as Pakistan and Brazil, has dramatically climbed<sup>16/</sup> and the participation of developing countries in food production world-wide has increased overall.<sup>17/</sup>

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<sup>13/</sup> L. Paulino and J. Mellor, "The Food Situation in Developing Countries", Food Policy, 9, No.4, Nov. 1984, p. 297.

<sup>14/</sup> Manuel Lajo Lazo "Food Supply in Peru", Food Policy, Vol. 9, No.1, February 1984, p. 69.

<sup>15/</sup> G.P. Bhattacharjee, "Population, food and agricultural development, a medium term view", Food Policy, May 1976, pp. 179-191.

<sup>16/</sup> G.E. Schuck, "The World Food Situation", presented at the meeting of the Allied Social Sciences Association, New York, 27-30 December 1982.

<sup>17/</sup> UNIDO, Industry in a Changing World, 1983.



Agricultural production is the primary explanatory variable in food production. Tables 3.3 (a) and 3.3 (b) show that growth in food production is strongly correlated with growth in agricultural production. When differences emerge in agricultural production in Latin America's sub-regions, they are reflected in each sub-region's output of food. Taken as a whole, the image of Latin America as an agricultural producer, as a food producer and finally in terms of net food dependency is quite different from the picture of the individual sub-regions previously discussed.

Table 3.3 (a) supplies information about recent food production results. Using 1970 as a base year (production = 100) world-wide food production has risen to 129 in the year 1981. The index for Latin America has risen to 146 in 1981, which makes it the fastest growing developing region in food production in the world during this period. Latin America also earns the highest index value for total agricultural production, shown in part (b) of table 3.3.

Presently, the aggregate contribution of developing countries is estimated to be 3.3 per cent of the total world gross agro-food output.<sup>18/</sup> While the contribution of developing countries is forecast to increase, this increase should be analysed in terms of its per capita effect. Figures 3.1 and 3.2 contrast total food production and per capita food production. Even though agricultural production has risen, implying an increase in food production, it has not kept pace with population growth in the developing world. Latin American countries will be producing more but the per capita effect will result in supply shortfalls.

FAO estimates that the required growth rates from 1980 to the year 2000 in Latin America for food production should be 60 per cent for wheat, 64 per cent for rice and 46 per cent for cereals and a high of 70 per cent for industry overall.<sup>19/</sup> In view of the expected growth of population, the relative reduction in food production is particularly alarming.

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<sup>18/</sup> UNIDO, Industry in a changing world, 1983, p. 254.

<sup>19/</sup> S.A.R.T., "Documentos Base del Simposio Problemas y Perspectivas del Desarrollo Agroindustrial en America Latina", in El Desarrollo Agroindustrial: Problemas y Perspectivas en America Latina, 1981.

Table 3.3 (a) Index numbers of food production, by regions, 1974-82  
1974-76 = 100

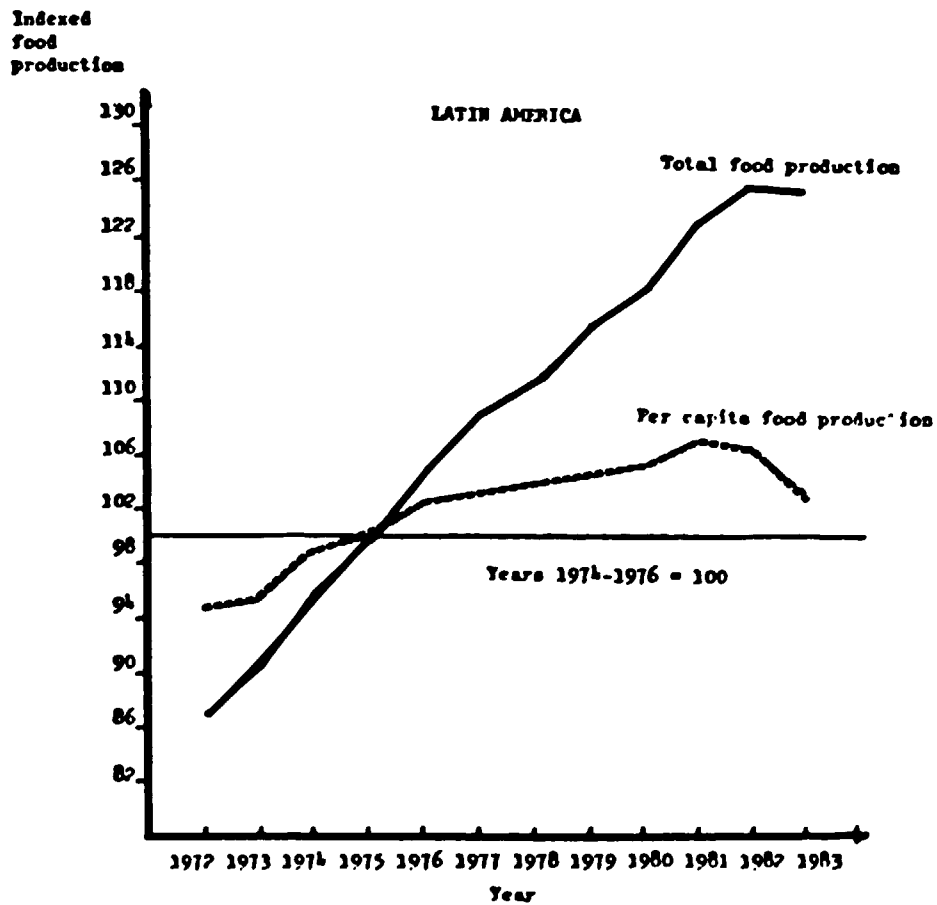
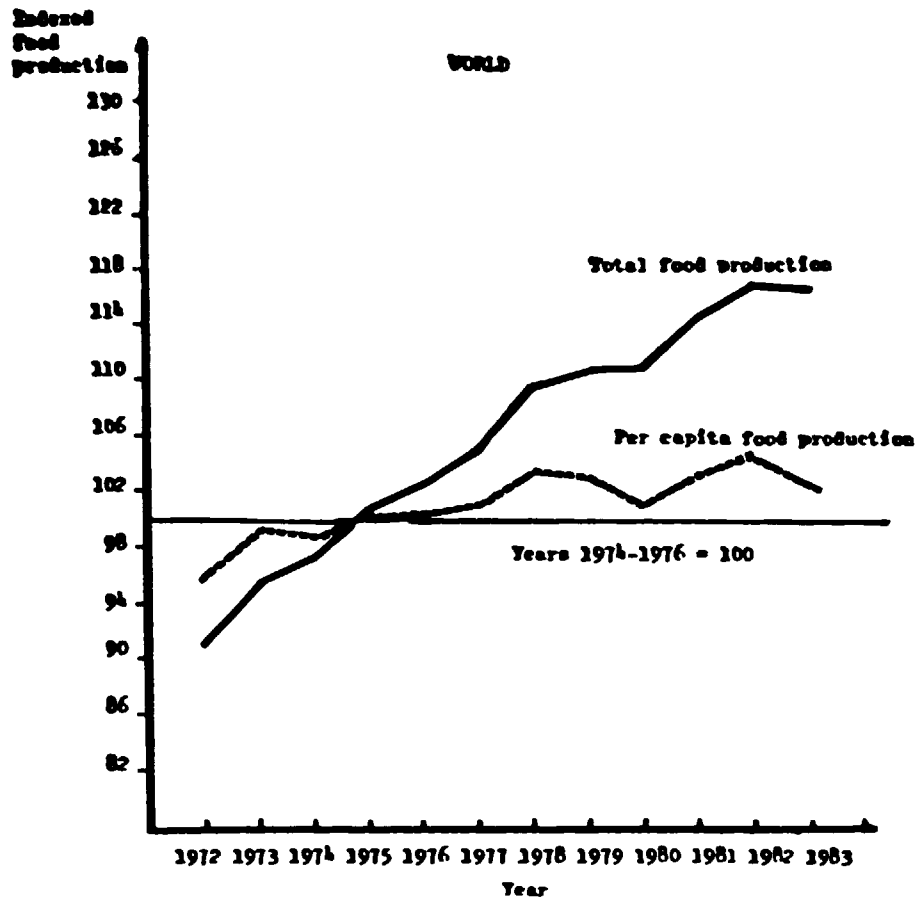
Regions	1974	1975	1976	1977	1978	1979	1980	1981	1982
World	97	100	102	105	109	110	111	114	117
Developed market economies	98	101	101	105	107	110	109	114	116
Developing market economies	95	101	104	107	112	112	116	121	122
Africa	98	100	102	101	104	106	110	111	116
Latin America	96	99	105	108	112	115	118	123	126
Near East	94	100	106	104	108	112	114	118	120
Far East	93	103	104	111	116	113	118	125	125
Centrally planned economies	99	99	103	103	111	109	107	108	113

Table 3.3 (b) Index numbers of total agricultural production, by regions, 1974-82, 1974-76 = 100

Regions	1974	1975	1976	1977	1978	1979	1980	1981	1982
World	98	100	102	105	109	110	110	114	116
Developed market economies	98	101	101	105	106	110	109	114	115
Developing market economies	96	101	103	107	111	112	115	120	121
Africa	98	100	102	101	104	105	109	111	115
Latin America	99	100	102	108	112	115	116	123	123
Near East	95	99	105	104	108	110	112	115	117
Far East	94	103	103	111	116	113	117	124	124
Centrally planned economies	99	99	102	103	110	109	107	108	113

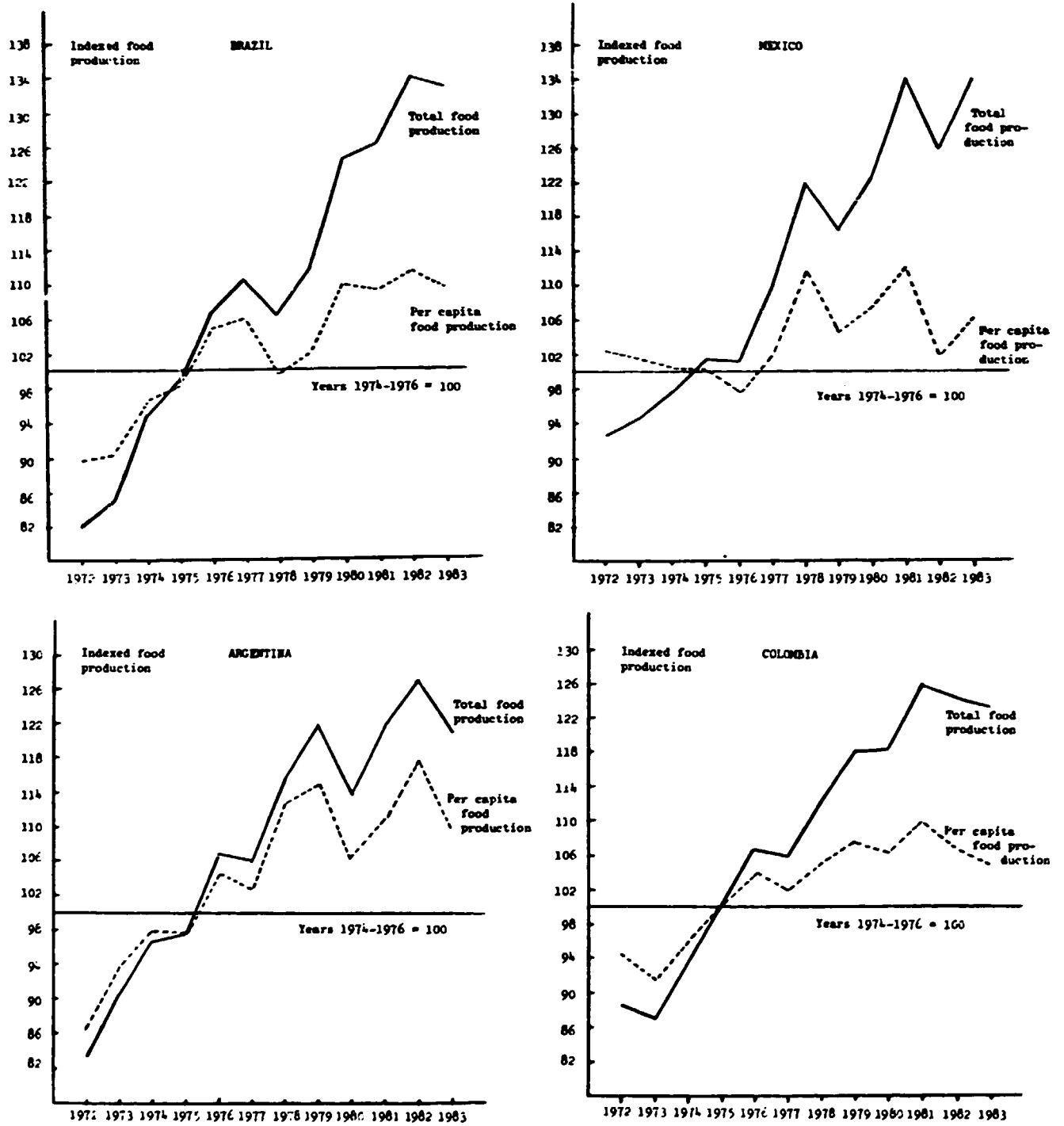
Source: United Nations, 1982 Statistical Yearbook, New York, 1984, p. 17.

Figure 3.1 Total and per capita food production: the world and Latin America



Source: Based on FAO Production Yearbook 1983, Vol. 37.

Figure 3.2 Total and per capita food production: Brazil, Mexico, Argentina and Colombia



Source: Based on FAO Production Yearbook 1983, Vol. 37

### 3.3 The agro-food industry as a manufacturing activity

There are several points to take into account concerning the development of the agro-food industry in Latin America. The first is that agriculture, as a class of economic activity, has become less important.<sup>20/</sup> The second point is that, while agriculture may be on the decline, relative to agriculture the agro-food industrial sector is advancing. The value of agricultural products is thus being partially supplanted by the value of agro-food industrial products.

The agro-food industry in Latin America is an important contributor to total manufacturing value added. Table 3.4 shows that for all developed and developing regions, the share of food processing value added in total manufacturing value added, has declined. While food processing may be declining relative to other sectors, it still represents in Latin America a relatively high percentage of the total manufacturing value added and its contribution to the world food processing industry has remained the highest of the developing regions, as illustrated in table 3.5.

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<sup>20/</sup> For Latin America as a whole, between the years 1950 and 1955, the average annual growth rate for agriculture was 4 per cent; in 1980 it was 2.7 per cent and in 1982 it had dropped to 0.2 per cent. Economic Commission for Latin America, 1983 Statistical Yearbook for Latin America, table 52, p. 128.

Table 3.4 Share of food and beverages processing industry, in regional manufacturing activity, value added (in per cent)

Year	Developed market economies <sup>a/</sup>	Developing Asia <sup>b/</sup>	Developing Africa <sup>c/</sup>	Latin America <sup>d/</sup>	Developing countries <sup>e/</sup>
1963	12.5	16.8	34.3	20.1	22.1
1964	12.1	16.8	32.9	19.9	21.4
1965	11.9	16.3	30.7	20.1	20.3
1966	12.1	16.4	30.8	19.6	20.2
1967	12.4	15.5	31.4	19.6	20.3
1968	12.0	14.9	31.4	19.1	19.9
1969	11.5	15.1	30.3	18.9	19.6
1970	11.3	15.6	30.2	19.2	19.7
1971	11.4	15.4	30.5	17.7	19.4
1972	11.2	14.9	29.5	17.2	18.7
1973	10.8	14.7	26.9	16.5	17.4
1974	10.8	14.1	24.8	16.3	16.4
1975	11.4	13.7	24.5	16.8	16.5
1976	11.4	14.0	24.0	16.9	16.6
1977	11.6	14.0	23.6	17.0	16.6
1978	11.7	13.9	25.3	16.8	17.0
1979	11.6	14.1	25.9	16.4	17.3
1980	11.7	14.0	25.6	16.2	17.1
1981	12.1	14.1	29.9	17.2	18.6

<sup>a/</sup> Includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Federal Republic of Germany, Greece, Ireland, Israel, Italy, Japan, The Netherlands, New Zealand, Norway, Portugal, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States and Yugoslavia.

<sup>b/</sup> Includes Burma, Sri Lanka, Cyprus, India, Indonesia, Iran, Republic of Korea, Malaysia, Philippines, Singapore, Syria and Turkey.

<sup>c/</sup> Includes Algeria, Zaire, Ghana, Ivory Coast, Kenya, Morocco, Mozambique, Nigeria, Zimbabwe, Tunisia, Uganda, Egypt, United Republic of Tanzania and Zambia.

<sup>d/</sup> Includes Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Panama, Paraguay, Peru, Uruguay, Dominican Republic and Honduras.

<sup>e/</sup> Includes all countries defined under <sup>b/</sup>, <sup>c/</sup> and <sup>d/</sup>.

Source: "A statistical review of the world industrial situation", UNIDO/IS.506; data on Latin America from UNIDO data base.

Table 3.5 Food, share of regions in the world<sup>a/</sup> food processing industry (value added)

Year	Developed economies	Latin America	Africa (developing)	West Asia (developing)	South and East Asia (developing)
1970	86.3	7.9	1.9	0.5	3.4
1975	86.2	9.3	1.3	1.1	2.1
1980	84.8	8.6	1.7	0.8	4.1
1981	84.3	8.6	1.7	0.8	4.6

<sup>a/</sup> Excluding China.

Source: "A statistical review of the world industrial situation 1983", UNIDO/IS.433 and "A statistical review of the world industrial situation 1984", UNIDO/IS.506.

#### 4. DEMAND FOR FOOD

##### 4.1 Growth in demand

It is not difficult to understand why food production is expected to increase. The increase in the demand for food is shown in table 4.1 which shows the recent history of food consumption in developing countries. In a ten year period, the relative percentage increase for Latin America (35 per cent) did not vary from the average for all developing countries (35 per cent).

Table 4.1 Average staple food consumption in developing countries

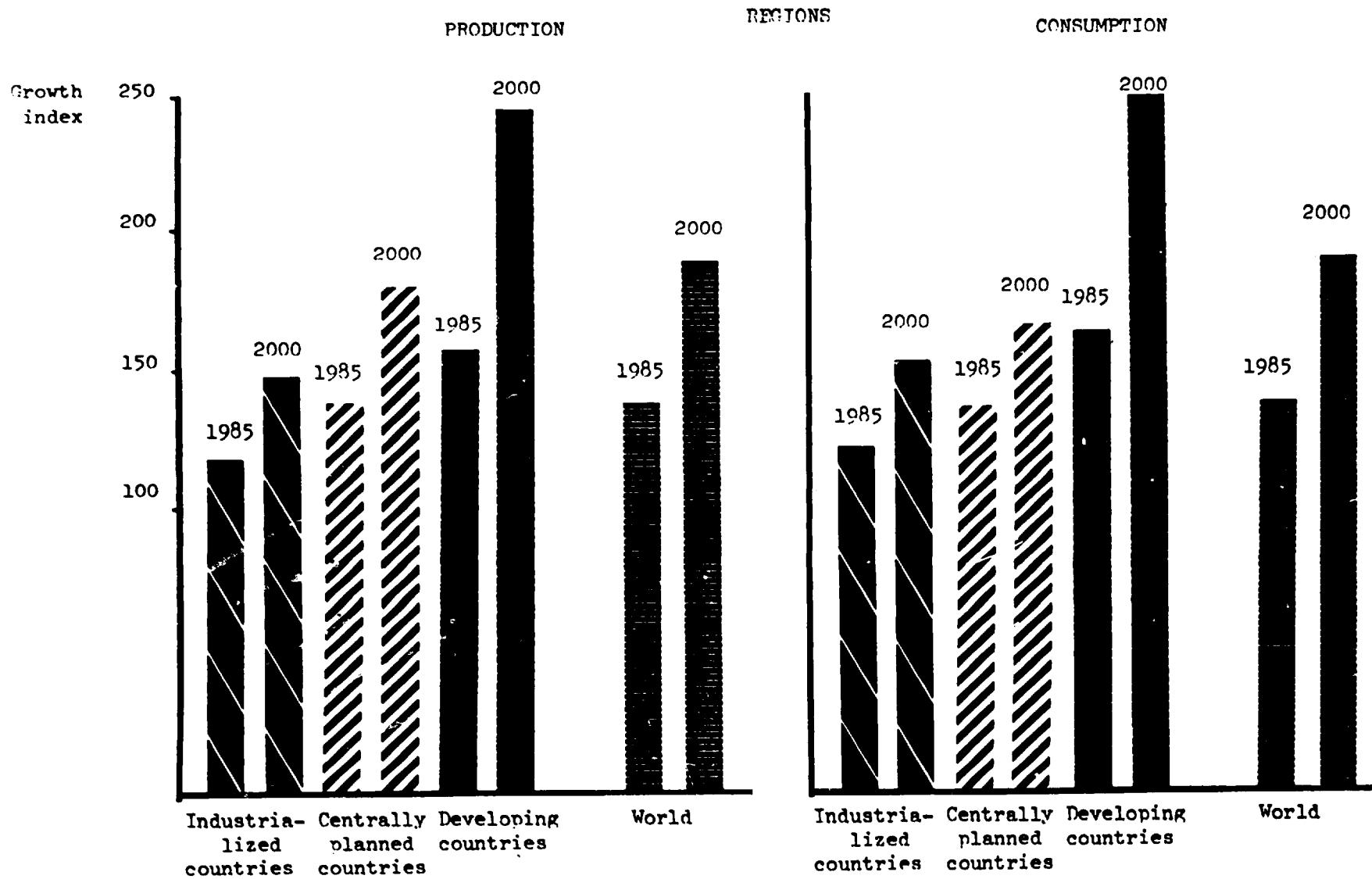
Region	1967-69 average (tons x 10 <sup>6</sup> )	1977-79 average (tons x 10 <sup>6</sup> )	Relative increase (per cent)
Developing countries	378.3	511.1	35
Asia	197.8	267.3	35
Middle East/ North Africa	53.0	77.3	46
Sub-Saharan Africa	52.7	65.6	24
Latin America	74.8	100.9	35
Central America	20.2	30.5	51
Upper South America	41.2	55.0	33
Lower South America	13.3	15.4	16

Source: L.A. Paulino and J. Mellor, "The food situation in developing countries", Food Policy, Vol. 9, No. 4, November 1984, p. 294.

With both production and consumption rising at the present time, it is important to consider what the forecast will be. Figures 4.1 and 4.2 show how food production and consumption are expected to grow. The forecast shown here was prepared in connection with a study on the year 2000.<sup>21/</sup> Figure 4.1

<sup>21/</sup> Report prepared by the Council of Environmental Quality and the Department of State, documentation on the Government's Global Sectoral Models: The Government's "Global Model", The Global 2000 Report to the President, Vol. 3, Washington, D.C., April 1981.

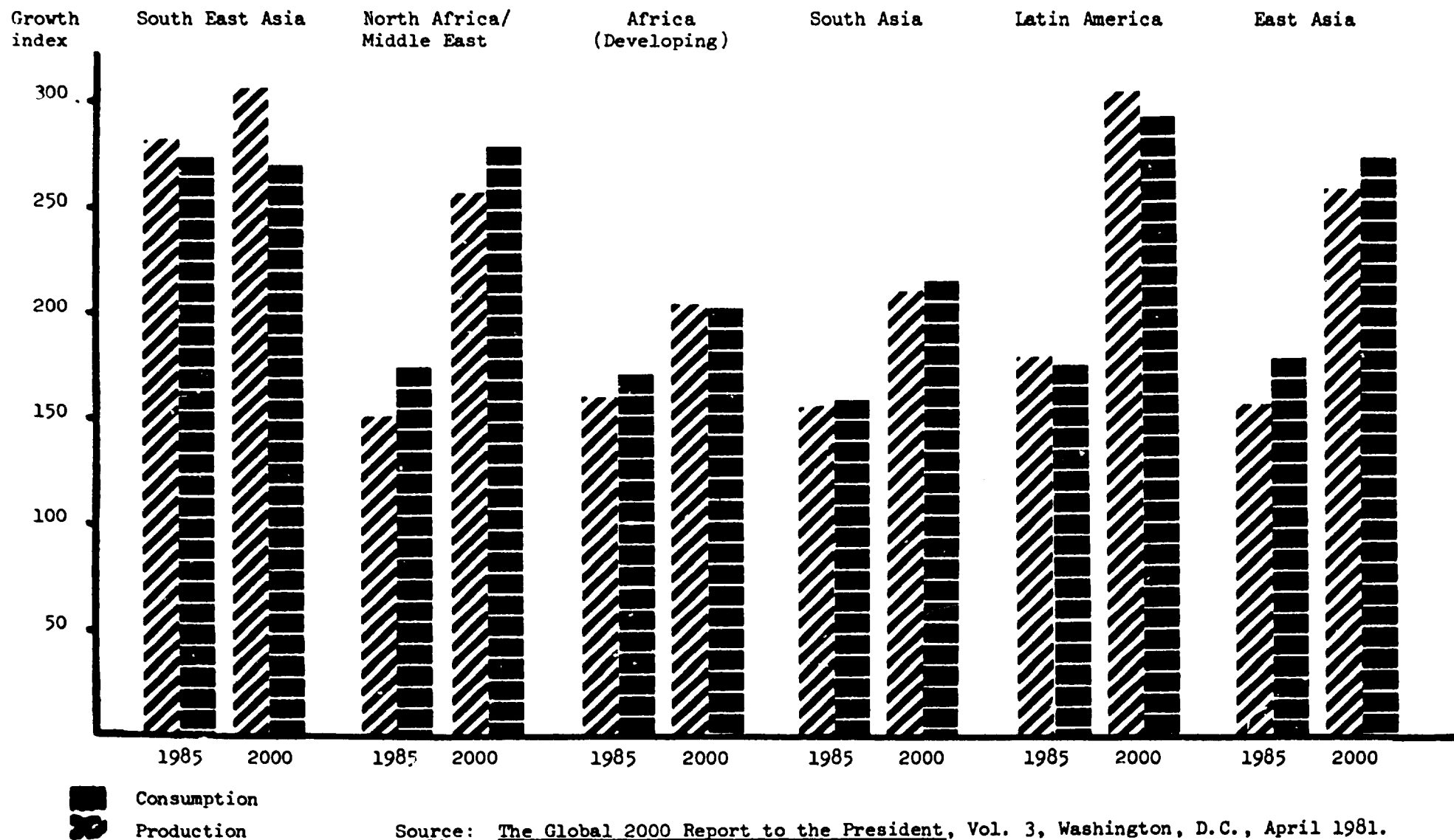
Figure 4.1 Estimates of total food production and consumption (index years 1969-1971 = 100)



Source: The Global 2000 Report to the President, Vol. 3, Washington, D.C., April 1981.



Figure 4.2 Estimates of total food production and consumption (index years 1969-1971 = 100)  
Developing regions



shows, as expected, the developing world experiencing the most significant growth in both food production and consumption. According to the indexed projections, shown in figure 4.2, the two regions which will grow the most in food production will be Southeast Asia and Latin America. Relative to present consumption levels, however, food consumption in Latin America will also grow at a rapid pace.

Demand for food in Latin America is two tiered: food demanded by low income groups and food demanded by middle and high income groups. For low income groups it is staple products which will be demanded. As seen in table 4.2 on Colombia, some of the biggest projected increases in demand are expected in food products which are staples.

The demand for food in Latin America is often fulfilled through imports of raw materials to be processed by the local industry. For instance, record levels for all food imports in Peru were reached in 1980: over US\$ 100 million to import milk, US\$ 334 million for rice and 900 thousand tons of wheat were imported, costing US\$ 200 million, 99.7 per cent of the wheat for milling was imported, 76 per cent of the milk, 45 per cent of the corn, 99 per cent of the soya and 72 per cent of the barley for breweries.<sup>22/</sup>

The following conclusions can be drawn from this information. In recent years, Latin America experienced a relative slowdown in both economic activity and food production. In spite of this trend, Latin America and the developing world are expected to become more significant contributors to total world food production (figures 4.1 and 4.2). Nevertheless, the demand for food has continued to grow unabated. In Latin America the growth in food consumption is projected to be significant (having experienced during the 1970s an increase which was one of the largest in the world).

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<sup>22/</sup> M.L. Lazo, "Food Supply in Peru", Food Policy, Vol. 9, No. 1, February, 1984, pp. 68-82.

Table 4.2 Colombia: projected demand for select food items to the year 2000

Product/year	Demand (thousand of metric tons)			Increase (in per cent) 1980-2000
	1980	1990	2000	
Cocoa	35	49	69	97
Bananas	2,200	3,000	4,300	95
Cassava	2,100	2,900	4,100	95
Beans	85	114	160	88
Maize	930	1,300	1,800	93
Breads	988	1,390	1,940	96
Citrus fruits	245	340	480	95
Beef	600	840	1,170	95
Milk	2,400	3,400	4,700	95
Eggs	145	205	290	100
Chicken	81	114	160	97
Honey	3	4	5	66

Source: E. Hoyos, "Cadesoc, un modelo agroindustrial para mejorar el abastecimiento y reducir los precios de los alimentos tradicionales (Colombia)", in Alimentos Complementarios de Alto Valor Nutritivo y Relativo Bajo Costo, FAO, Oficina Regional de la FAO para Americana Latina y el Caribe, Santiago, 1983, p. 67.

#### 4.2 Growth in the demand for processed foods

A steady and continuous growth in population accelerated Latin America's demand for food and because the growth was largely urban, it accelerated the region's demand for industrialized food, e.g. agro-food products. Not always adjacent to farming areas, food had to be processed and then delivered to the expanding urban population. Table 4.3 demonstrates the scale of urbanization unique to Latin America.

Rising per capita incomes together with Latin America's ubiquitous urbanization have changed the character of demand, viz. consumers are more likely to buy a pre-cooked corn flour rather than raw corn. Figure 4.3 illustrates the relationship between processed food consumed and per capita gross domestic product. Work patterns and labour force composition (viz. more women employed), the availability of fast foods and susceptibility to marketing have also influenced the consumer's food choice. While traditional eating habits may prevail in parts of Asia and Africa, consumers in Latin

Table 4.3 Latin America: growth of the urban population

(a) Urban population (thousands of persons)

1950	1960	1970	1980	1985	Forecast 2000
67,707	106,909	162,891	236,507	279,675	421,335

(b) Percentage increase in urban population

1950-1960	1960-1970	1970-1980	1980-1985	1985-2000
58	52	45	18	78

(c) Urban population as a percentage of total population

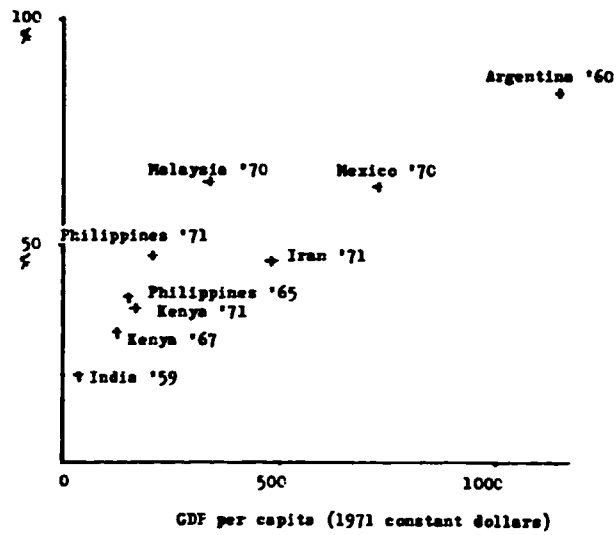
1950	1960	1970	1980	1985	2000
41.05	49.31	57.40	65.31	68.85	76.61

Source: Estimates and projections of urban, rural and city populations 1950-2025, the 1982 assessment, United Nations, New York, 1985.

America have been quick to demand processed foods of the international varieties. Urban consumers may purchase from the grocery shelves or even market stalls a wide range of imported and brand foods, not to mention a multiplicity of ready-to-eat or fast foods.

Although food demand is differentiated by high income and low income consumers, more processed foods will be purchased. Industrialized foods consumed by the majority of the population in the Andean Pact countries (and notably the lower income groups) include cereals, processed milk products, oil and meat products. In contrast to the varied diet of his wealthier countryman, the average Latin American is choosing from a limited range of

Figure 4.3 Percentage of processed food in total food consumption



Source: C. Baron, "Technological choice and transfer in food processing in developing countries: an overview", in C. Baron, Technology, Employment and Basic Needs in Food Processing in Developing Countries, Oxford, Pergamon Press, 1980, p. 19. GDP figures come from the UN Yearbook of National Accounts Statistics, Vol. III, 1973, United Nations, New York.

processed food products.<sup>23/</sup> In spite of the fact that this diet may be limited in variety, it is still composed of an increasing number of processed food products. Particularly for satisfying the growing urbanized, albeit low income, demand for food, processed food products are critical. Improved distribution networks in the cities compensate for distance from the farms and also facilitate the sale of industrialized food.

As swelling urban populations continue to exert pressure on existing food supplies, it becomes more important to meet that demand with food which may be stockpiled and is immediately available.

#### 4.3 Changing character of demand

Food demand, for all income groups, has ostensibly been influenced by the introduction of new technologies. Additionally, one impetus for growth in the agro-food industries has been consumer demand for modern processed foods and brand name products. Due to its more urbanized population, brand name food products are more common today in Latin America than in Africa or Asia.<sup>24/</sup> For instance, in Mexico alone, where a few large transnational corporations dominate the food processing sector, the number of food processing patents has jumped from 43 in 1957 to 217 in 1970 and trademark registration grew from 507 in 1957 to 788 in 1970.<sup>25/</sup> Still, the demand for branded agro-food industrial products is mainly characteristic of Latin America's middle and higher income groups. Trends in observed food consumption in OECD and CMEA countries may be applicable to higher income and urbanized group food consumption in Latin America. Recent developments in OECD (Organization for Economic Co-operation and Development) countries should be noted:<sup>26/</sup>

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<sup>23/</sup> Grupo de Política Tecnológica, PADT Alimentos, El Sector de Alimentos Infantiles en la Subregión Andina, Junta del Acuerdo de Cartagena, Lima, 1983.

<sup>24/</sup> UNIDO, Industry in a changing world, 1983.

<sup>25/</sup> S. Lanfranco, "Technology, trade and transnational corporations in the food processing sector of Mexico: a case study", UNCTAD, Trade and Development Board, Committee on Transfer of Technology, 1982.

<sup>26/</sup> OECD Food Industries in the 1980s, OECD, Paris, 1983.

- (a) Income is no longer a constraint to caloric consumption;
- (b) There will be an increase in the consumption of meat products and alcohol;
- (c) Utility from food will be derived from convenience, variety, quality, novelty and nutritional characteristics;
- (d) Food products may not necessarily be less expensive but will cater to very specific customer requirements.

Forecasts for demand in the CMEA (Council for Mutual Economic Assistance) countries should also be noted:<sup>27/</sup>

- (a) An overall per capita decrease in the consumption of cereals and potatoes;
- (b) No increase in the consumption of sugar;
- (c) A replacement of vegetable oil for fat in the diet;
- (d) Increased consumption of improved quality meat products, milk products and eggs, fruit and vegetables;
- (e) An increase in the consumption of processed food products;
- (f) Satisfaction of national food requirements by purchasing commodities for sale on the international market.

#### 4.4 Satisfying demand

Food demand will soar as Latin America's urban as well as populations in other developing regions put pressure on producers to increase their output. How will this demand be met? Although the green revolution was at one time hailed as the answer, in many regions the limits to productivity are being reached.<sup>28/</sup> Since the demand for food is not simply one of magnitude, but is one of character, it is important to recognize that only certain types of food will meet this new growing demand. Both for urban dwellers and hard-to-reach village residents, processed foods will become more important.

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<sup>27/</sup> Todor Popov, The General Situation and Main Tendencies of Food and Agricultural Development in the European CMEA Member Countries (1960-1975 and up to 1980), IIASA, Laxenburg, Austria, October 1978.

<sup>28/</sup> Refer to table 3.2, showing productivity data by region.

An important issue to consider is how the growing demand will result in a food deficit. The recent history of importation confirms the reality of food deficits (table 4.4 shows trends in exports, imports and net trade of basic food staples in developing countries). To meet accelerating food demand, Latin America has shifted from a position of being a net exporter in the 1960s to that of a net importer. Note the subregional disparity in Latin America. Both Central America and Upper South America have experienced a deteriorating net trade position in recent years. In contrast, Lower South America not only has a positive net trade position in basic food staples, but its position has improved over time.

The increase in cereal (wheat, coarse grains and rice) imports in Latin America between the years 1970 and 1980 was 13 per cent.<sup>29/</sup> The increase in cereals imports, illustrated in table 4.5, shows that increased imports in Latin America also means increased dependency. A graphic depiction of this trend is found in figure 4.4. Growth in imports and consumption of wheat have far exceeded the growth in production in Colombia, Ecuador, Peru and Bolivia. We find that the forecast is equally bleak for the rest of the developing world. FAO, in the study "Agriculture toward 2000", forecasts for a group of ninety developing countries that by the year 2000 net cereal imports would be 81 million tons.<sup>30/</sup> Importation increases in other important commodities were also forecast.

It is well known that increased importation does not guarantee an elimination of hunger, because of e.g. distribution problems and political difficulties. There are other adverse aspects related to dependency upon imported food. Imported food must be paid for. Even if it is used for food processing which in turn may generate export revenues, the net result may be unimpressive, if not burdensome. A reliance on imported food puts an unhealthy pressure on the balance of payments and increases foreign exchange requirements. The situation over the past few years has been one of aggravated dependency. To examine this issue, gross food imports have been weighed against total export revenues in table 4.6. The resulting ratio can be considered as one measure of dependency.

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29/ FAO Outlook, 1981, Statistical supplement, Rome, January, 1982.

30/ FAO, Agriculture Toward 2000, Rome, 1981, p. 50. This forecast is based on the more optimistic of the two scenarios presented.



Table 4.4 Trends in exports and imports of basic food staples in developing countries

Region	1968-70 average (tons x 10 <sup>6</sup> )			1978-80 average (tons x 10 <sup>6</sup> )			Relative change (per cent)
	Exports	Imports	Net trade	Exports	Imports	Net trade	Net Trade
Developing countries	24.58	33.57	-9.00	31.62	67.93	-36.31	303
Asia	6.66	16.55	-9.88	12.07	19.75	-7.68	-22
North Africa/ Middle East	2.11	6.26	-4.15	2.22	21.25	-19.03	359
Sub-Saharan Africa	2.85	2.58	0.26	1.01	7.07	-6.06	...
Latin America	12.95	8.18	4.77	16.33	19.87	-3.54	...
Central America	1.47	2.51	-1.05	0.86	7.43	-6.57	526
Upper South America	2.09	4.95	-2.86	1.11	10.97	-9.86	245
Lower South America	9.40	0.72	8.68	14.36	1.47	12.90	49

Source: L.A. Paulino and J.W. Mellor, "The food situation in developing countries", Food Policy, Vol. 9, No. 4, November 1984, p. 296.

Table 4.5 Latin America: Coefficients of cereal dependency<sup>a/</sup>

	1959-1961	1969-1971	1978-1980
Brazil	11.8	8.6	18.0
Mexico	0.1	2.3	19.9
Andean countries <sup>b/</sup>	22.1	28.3	36.4
Central America <sup>c/</sup>	12.6	13.3	19.5

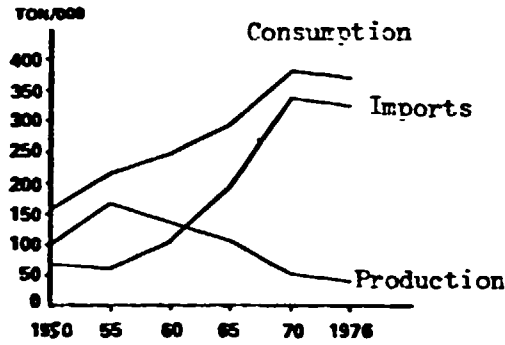
<sup>a/</sup> These coefficients correspond to the percentage of imported cereals over total (internal) production plus imported cereals.

<sup>b/</sup> Includes: Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru and Venezuela.

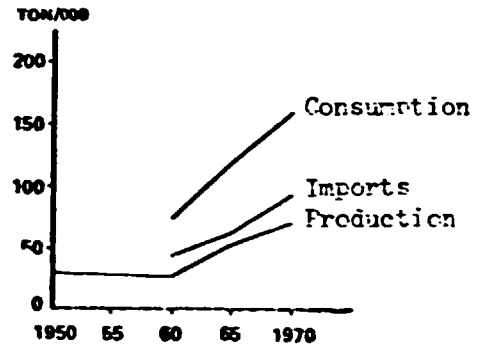
<sup>c/</sup> Includes: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

Source: PREDESAL, FAO data base, Yearbook of Production Statistics, Yearbook of Commercial Statistics, various years.

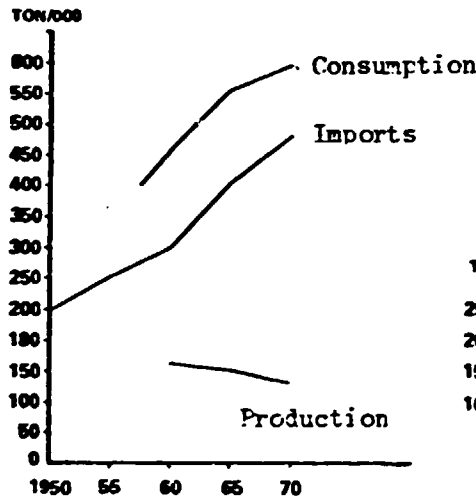
Figure 4.4 Consumption, production and imports of wheat in Colombia, Ecuador, Peru and Bolivia (in thousands of metric tons per year)



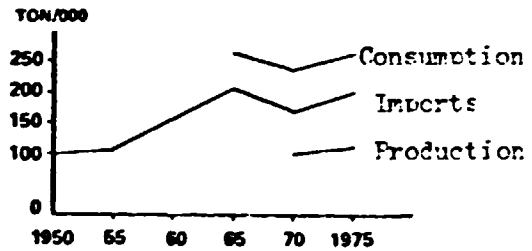
COLOMBIA



ECUADOR



PERU



BOLIVIA

Source : Valderrama Mario: "Efecto de las Exportaciones norteamericanas de trigo en Bolivia, Perú, Ecuador y Colombia". Rústica de Estudios Rurales Latinoamericanos. Mayo - Agosto 1979.

Table 4.6 Food demand: ratio of gross food imports to total export revenues  
(a sampling of countries)

Country	1965/67	1970/72	1975/77	Maximum for the period
<b>Asia</b>				
Bangladesh	...	...	67.0	104.9 (1975)
Sri Lanka	36.9	40.4	39.4	57.4 (1975)
India	40.2	12.7	19.4	43.4 (1967)
Indonesia	7.6	14.9	7.6	18.5 (1970)
Philippines	10.4	8.6	6.0	12.9 (1965)
<b>North Africa/ Middle East</b>				
Somalia	...	24.4	52.1	67.0 (1977)
Egypt	...	19.3	34.1	46.0 (1975)
Jordan	...	43.7	19.2	47.5 (1972)
Syria	...	25.4	16.7	34.3 (1971)
<b>Sub-Saharan Africa</b>				
Mali	...	21.0	27.9	112.7 (1974)
Senegal	...	21.2	17.1	33.5 (1973)
Upper Volta	...	11.1	13.8	23.5 (1974)
Tanzania	...	7.1	13.5	29.3 (1974)
<b>Latin America</b>				
Haiti	16.9	15.1	29.8	33.9 (1979)
Bolivia	15.4	13.9	11.6	17.2 (1965)
Peru	...	8.4	14.5	18.3 (1975)
Chile	8.4	11.8	11.7	24.1 (1974)
Brazil	11.6	6.2	5.7	13.5 (1967)

Source: A. Valdes, "Food security: a stabilization problem for developing countries", International Food Policy Research Institute, prepared for the 7th World Congress of the International Economics Association, September 5-9, 1983, Madrid.

In the short run, exchange rates may be volatile and food imports will swell national deficits. Price instability and the irregularities of the market (and particularly irregularities in market operations such as the grain trading houses) can also have negative effects for import dependent countries. If, as an alternative, Latin American countries resort to food aid, the food aid itself can have a distorting effect. Frequently the unit cost of a food aid item distributed through government channels can be more expensive for the receiving country than a locally produced food distributed through the usual commercial channels.<sup>31/</sup> Imported food has frequently been a disincentive to domestic production as has food aid.

Some importation may be required, but an effort should be made to satisfy demand with local production. The key to satisfying the demand for food could be in a national solution which includes an agro-industrial component.<sup>32/</sup> Local production can be maximized by processing the food: preserving food harvested in a good year for a bad year, stretching available nutrients and proteins with industrial processes and processing food to maximize distribution in urban and remote rural areas. In a world-wide study of agro-food industries, an assessment was made of the growth potential for selected industries in developing and developed countries. For such products as milk, meat, cereal, oil and fish, a very large margin of growth is forecast for the developing countries.<sup>33/</sup> Table 4.7 illustrates the dramatic growth forecast in agro-industries production in the developing countries. The following chapters examine the possibilities of meeting this challenge by better management and planning of agro-food industries in Latin America.

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<sup>31/</sup> JUNAC, PADT-Alimentos, Lima, Peru, 1981, "Memorias del Primer Seminario Taller sobre Programas de Complementación Alimentaria del Grupo Materno Infantil de la Subregión Andina", Bogota, Colombia, 1-5 diciembre 1980.

<sup>32/</sup> E. Clay, et. al., Food policy issues in low-income countries, Washington D.C., The World Bank, 1981.

<sup>33/</sup> UNIDO, Centre International d'Etudes Industrielles, "Projet d'étude mondiale des agro-industries", 1977, pp. 120-121.

Table 4.7 Forecast production in agro-food industries

Production	1985		2000	
	World	Developing Countries	World	Developing Countries
Agricultural production (in millions of 1970 US\$)	630	315	1100	680
Agro-industrial production (in millions of 1975 US\$)	500	95	930	300

Source: UNIDO, Centre International d'Etudes Industrielles, "Projet d'étude mondiale des agro-industries", 1977, pp. 120-121. Based on estimates originally from the Tropical Products Institute, London.

## 5. DEVELOPMENT OF THE AGRO-FOOD INDUSTRY IN LATIN AMERICA

Change in the agro-food industry has been a response to the changes that are taking place in the demand for processed food. Depending upon the form that the industry takes, the technology utilized and the food types produced, the agro-food industry in Latin America could be made more responsive to:

- Meeting the demand for processed foods on the mass market;
- Producing new processed products with higher nutritional value and lower prices;
- Strengthening the linkages to other industries and services.

In order to realize the industry's potential in meeting the domestic requirements and contributing to the general economic growth of the country, structural and technological adjustments may be necessary. What is important in this context is to answer questions such as: what products are desirable for which consumer groups, how can they be made available in a most efficient way and by whom. The appropriate use of technology available is linked to the choice of product, efficiency of production and the type of industrial enterprise applying it. The sections below examine structural and technological changes in agro-food industries with a view to assess their present impact and potential in Latin America.

### 5.1 Industrial structure and product characteristics

Structurally, agro-food industries have undergone a series of changes. Originally, the form of agro-food industries was determined by the agricultural base. Now, in Latin America, agricultural production is slowly beginning to be oriented to the requirements of the food processing industries.<sup>34/</sup> Agro-industries, by transforming raw produce, function as market regulators. In the rural domain, they serve as important distributors of food.

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<sup>34/</sup> "First global study on the food processing industry, UNIDO, First Consultation on the Food Processing Industry, The Hague, 1981.

Structural adjustments which have evolved industry-wide are also apparent in the agro-food industry. They are based on changes which have arisen in labour, raw materials, capital, technology and the political climate, the nature of the product and marketing techniques. As the scale of a given agro-food industry increases, there is a tendency for more upstream and downstream connections to be made.

The reasons for the growth of the average size of the agro-food firm are numerous: to adopt and experiment with new technologies, to become mechanized, to advertise and to accelerate sales. Large scale operations have sometimes led to nation-wide undertakings. Companies, in order to rationalize industrial processes more completely, have not only adopted new technologies, but have consolidated control over numerous operations (agricultural production, raw material acquisition, packaging, distribution, retailing). There has been a significant degree of integration in the agriculture sector, which has also grown in scale.

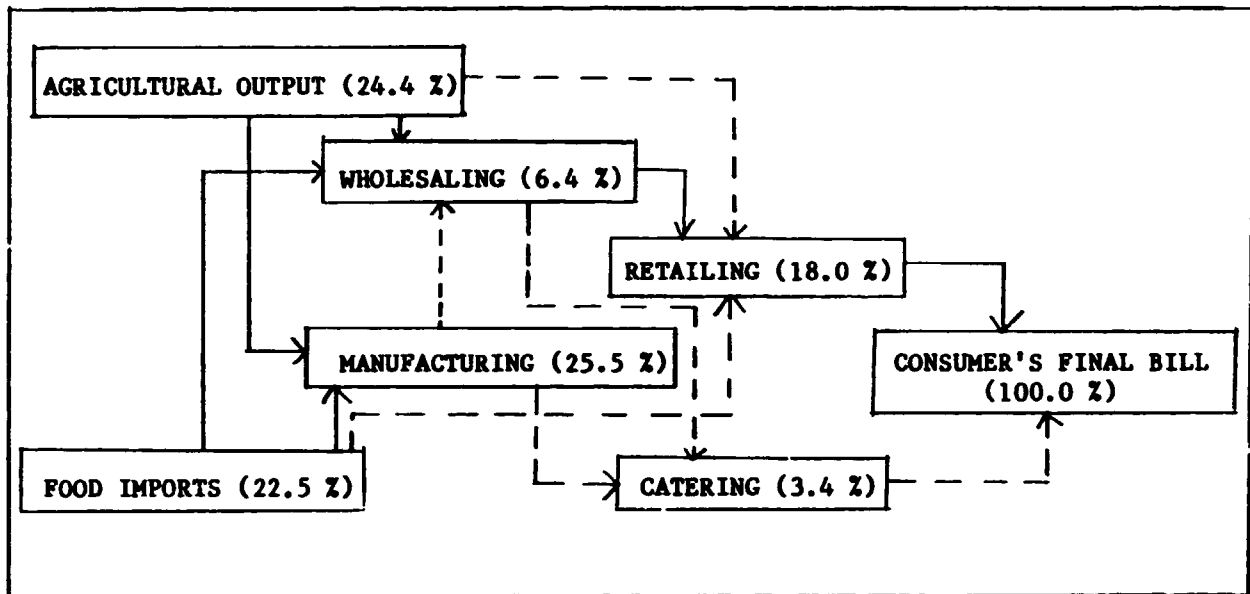
An example of component costs in a typical processed food chain, as shown in figure 5.1, illustrates the new structure of the agro-food industries where the distributional and retailing costs outweigh the cost of agricultural inputs in the product's final value.

In Latin America small producers are still in the majority. For instance, large food industries represent 3.5 per cent, small and medium size industries represent 8.0 per cent and cottage type or micro-sized represent 88.4 per cent of the total number of industries. To analyse this further, it turns out that while large companies comprise 3.5 per cent of the total in number, they earned 85 per cent of total food processing income. In contrast, the micro companies took in a mere 2.8 per cent of the income.<sup>35/</sup> Since the reality for much of Latin America is that small scale industries are prevalent, it is important to consider (a) if a transition to larger companies should be made and (b) how that transition can best be facilitated.

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<sup>35/</sup> R. Resende, "Current situation of agro-industry development in the Latin American region". Report of a study mission to Brazil, Colombia, Ecuador, Guyana, Peru, Trinidad and Tobago, UNIDO, 1985.

Figure 5.1 Component costs in a typical processed food chain



—————> Strong link  
- - - - -> Weak link

Source: Adopted from table I in J.A. Burns "Changes in the relations between food processing and agricultural production, food distribution and consumption", OECD, Paris, 1982.



Many of the features of the agro-food industry, as it is found today, are a consequence of international control: vertical and horizontal integration, advertising, brand name products, foreign investment and control, product diversification, firm growth through mergers and acquisitions. The international food company is likely to be also engaged in non-food activities as well, such as fertilizers, land development and shipping.

Latin America has been particularly attractive to foreign food-processing investors and enterprises. Figure 5.2 graphically depicts how proportionately more foreign agro-food enterprises are operating in Latin America than in other developing regions.<sup>36/</sup>

Agro-food industries have been internationalized to a large degree and this has contributed to both an increase in foreign trade and competition. Industrial structures have become more international and it is often the foreign concern which determines prices and policies for the local plant. A much needed element of governmental control is missing.

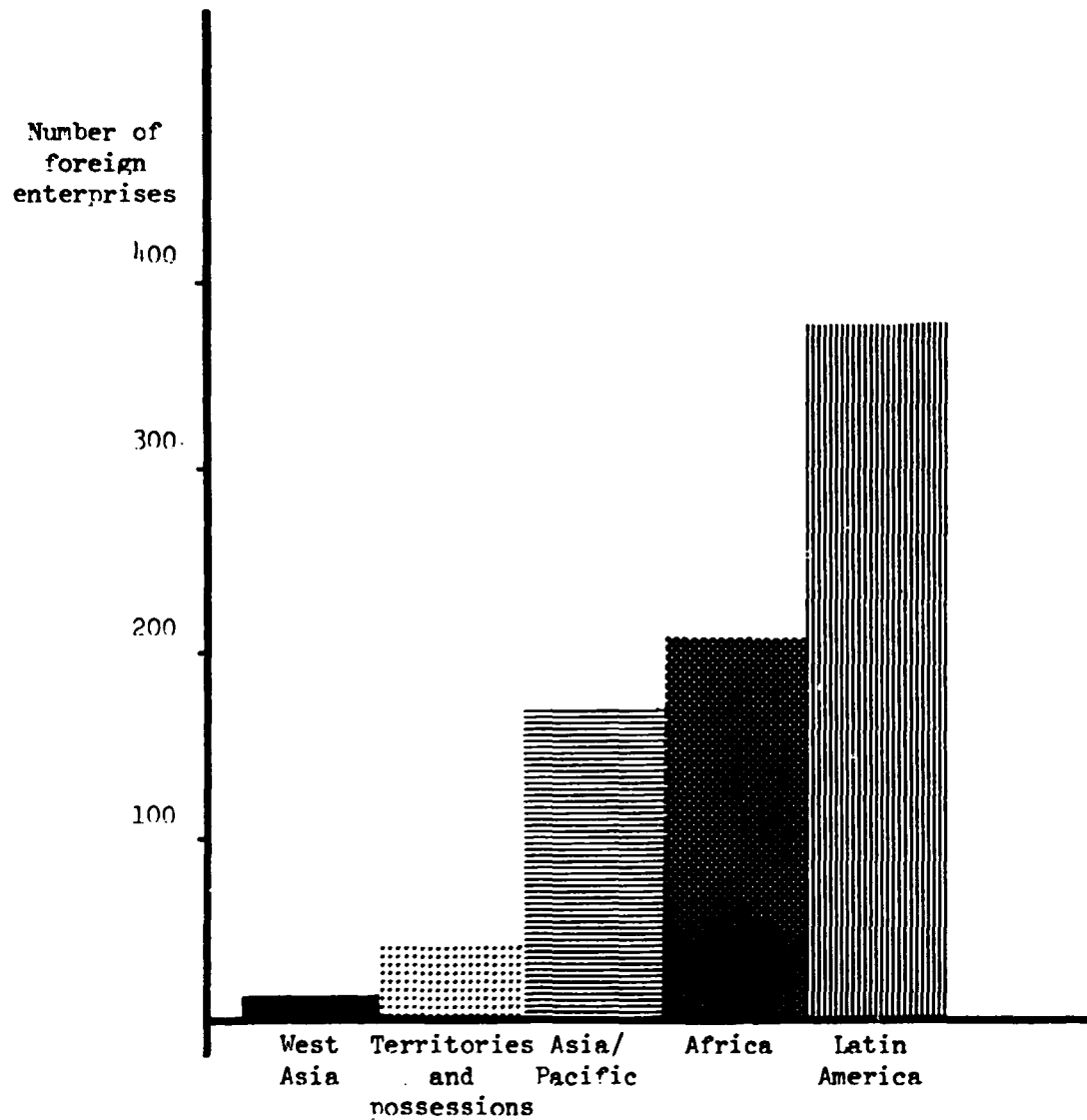
Large companies, may it be regional multinationals or transnationals, having the ability of integrating and consolidating their operations efficiently, are in a strong position to diversity their product range. This advantage could be directed more towards production for domestic mass markets with emphasis on staple and generic foods. However, this should not be done at the cost of inflating the price of a food product.

For example, in Venezuela, both locally owned and foreign agro-food industries are producing the same product: infant cereals. However, the local company is producing the cereal at a unit cost of \$US 1.26 per kilogramm while the foreign concern's unit cost is \$US 5.78 per kilogramm. Figure 5.3 shows the differences in the production costs structure for the two industry types in Venezuela. The local company's costs are significantly lower for all

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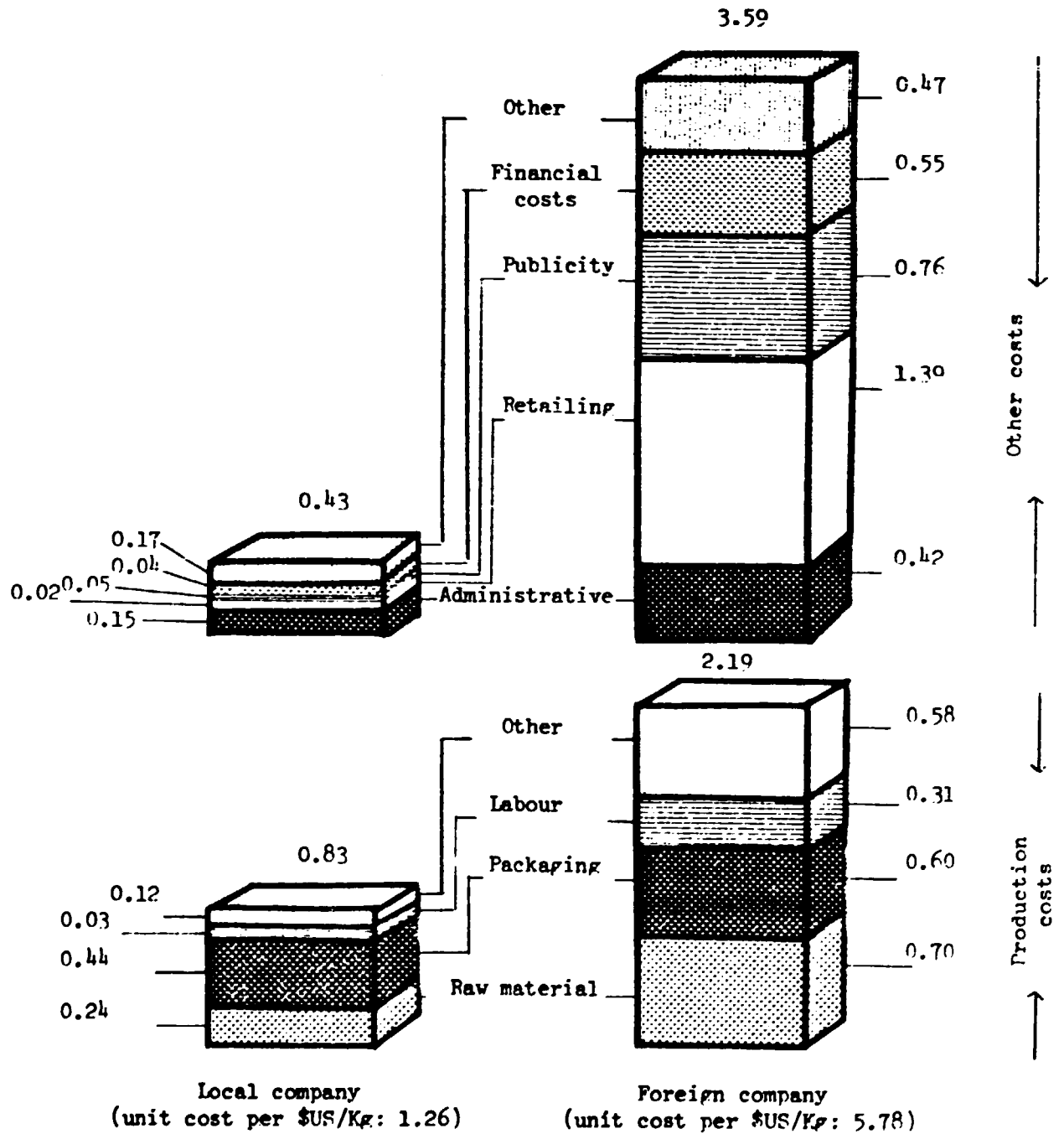
<sup>36/</sup> While transnational agro-food industries are actively engaged in production in the developing world, three quarters of food industry foreign investments still remain in Europe, North America, Australia, New Zealand and South Africa. United Nations Centre on Transnational Corporations, "Transnational corporations in food and beverage processing, New York, 1981, p. 11.

Figure 5.2 Regional distribution of developing country food-processing affiliates of principal firms based in developed market economies, 1976



Source: United Nations Centre on Transnational Corporations, Transnational corporations in food and beverage processing, New York, 1981, p. 15.

Figure 5.3 Comparison of component cost of infant cereal: local and foreign companies, Venezuela, 1980 (\$US/Kg)



Source: Junta del Acuerdo de Cartagena, PADT-Alimentos, "El sector de alimentos infantiles en la subregion Andina", Lima, Peru, 1983, p. 69.

factors of production. What stands out, however, is how much lower publicity and retailing costs are for the national company. The higher overhead costs borne by the foreign company are characteristic of the larger international food processing firms. The existence of two contrasting agro-food industries does not have to be mutually exclusive. Each may address a different market, attending to different consumption requirements.

There are some examples in countries such as Peru and Colombia, where transnationals have been able to produce a product such as oat flakes which was geared to the domestic lower income market. Some foreign companies, while orienting production to export markets, as in the vegetable oils and fats industry, have produced spillover effects where the host country also purchases, at a reasonable cost, the processed commodity. Similarly, there is considerable potential for multinational processors, i.e. concerns financed by a mix of Latin American investors but operating in strictly one country to supply new processed products which meet domestic consumption requirements as well as producing for export markets.

Locally owned (government or private) companies could be encouraged to produce processed foods with higher nutritional value and lower prices. Regional co-operation in this respect could be fruitful. A regional effort in the Andean Pact countries, for example, resulted in a system of extending milk products using the installed capacity both in production and distribution.<sup>37/</sup> This type of co-operation between national producers could result in the establishment of multi-national sub-regional enterprise. A multi-national enterprise would benefit from economies of scale in production, research and management. Technology transfer and innovations in processing technology would be also better facilitated by the new structure.

The industrialization and commercialization of food has resulted in a new type of food product: the generic brand. In the midst of sometimes fierce product competition, the generic brand has emerged. This type of product is

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<sup>37/</sup> Junta de Acuerdo de Cartagena, Los extensores de consumo de leche en el marco de los PADT alimentos, Grupo de Política Tecnológica, Lima, 1983.

usually identical or marginally inferior to the branded food product, but always lacks a fancy or well designed package and a well known name. Generic foods have a bright future in spite of this because what they lack in either packaging or product quality, they compensate for in price. Usually, they are produced and distributed by the retailing chain. Since retailers in Latin America are gaining control of not just distribution networks but production as well, it is likely that generic brands will be widely introduced. Particularly for lower income populations, the generic food product will be a heavy counterweight to the more expensive commercial brand.

Branded food products, in contrast, have a significantly higher value added and processing component. Advertising and promotion have stimulated demand. For both the transnational and smaller sized agro-food industry, good prospects exist in Latin America for the branded food product. As table 5.1 illustrates, the growth in developing countries for branded food products is expected to be substantial. In Latin America (e.g. such countries as Argentina, Mexico and Brazil) nearly 50 per cent of the processed food is now of the branded variety.<sup>38/</sup> This, in part, explains the importance of ensuring successful agro-food industrial development: the growth in branded foods and their role in stimulating Latin America's food economy.

Catering is a service industry which is one additional outlet for the products of the agro-food industry. Large-scale catering undertaken by private and public companies should be encouraged. The increase in catering in Latin America is related to the need for convenience foods; higher incomes, the increased employment of women and the shrinking size of the average household have all been factors in the rise of catering. As societies become more heavily industrialized, there appears to be an increased need for catering.

Latin America has begun to adopt many of the forms of catering found in developed countries: restaurants on every corner in Mexico City, fast food hamburger chains in Brazil, schools serving meals in Colombia. School

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<sup>38/</sup> United Nations Centre on Transnational Corporations, "Transnational corporations in food and beverage processing", New York, 1981.

**Table 5.1 Growth prospects of food industries in developing countries  
(compound annual growth, 1975-1990)<sup>a/</sup>**

	Domestic staple foods	Domestic branded foods	Export foods
Low growth ( 2.3 per cent/year and under)	Butter (1.4)* All fish (2.0)	Wine (-0.3)* Distilled spirits (-1.2)*	Canned fish (2.1)* Bananas (1.2-3.4)
Moderate growth (2.4-4.8 per cent/year)	Beef (4.2) Sheep (3.6) All milk (3.7) Cheese (4.6)* Other fruit (3.9) Vegetables (3.9) Pulses (3.1) Roots, tubers (3.0) Rice (2.7-3.2) Oil crushing (4.5)	Concentrated milks (4.6)* Canned vegetables (2.8) Pasta (4.1) Soft drinks (4.1)*	Beef (export) (1.6-4.9) Citrus fruit (3.0-4.2) Canned fruit (3.2) Sugar (2.0-4.3) Coffee (2.6-3.7) Cocoa (2.5-3.1) Tea (2.6-3.3) Vegetable oils (export) (3.9)
High growth ( 4.8 per cent/year and greater)	Poultry (7.5) Pork (5.0) Fresh fish (10.4)* Dried fish (8.1)* Wheat milling (6.1) Animal feed (11.1)	Dried milk (8.1)* Concentrated juices (6.5) Jams (8.9) Baking, crackers (12.5)  Margarine (8.2)* Confectionery (5.5)* Malt (18.5)* Beer (8.5)* Coffee extract (4.8)*	Cocoa grinding (7.2)

<sup>a/</sup> Growth projections are expressed as compound annual rates 1974-1976 to 1990. Historic (1963-1975) growth rates (indicated by asterisk) are given where projections are not available. More than one projection is given where the major sources differ in their estimates.

**Source:** United Nations Centre on Transnational Corporations. Transnational Corporations in Food and Beverage Processing, New York, 1981, p. 100.

feeding programmes in Latin America are cost-efficient examples of institutional catering because they depend upon industrialized food products.<sup>39/</sup> In fact, many new food products have been designed specifically for catering establishments. The cost of serving an individual decreases as the number served rises so that the total cost of feeding can be reduced through different forms of institutional catering. Catering can also help to ensure that basic nutritional requirements are being met. New foods, the offspring of the agro-food industry, are a prerequisite to the viability of catering.

Catering is more than a string of fast food outlets; school feeding programmes, lunches at the workplace and mother and child food aid schemes are all forms of catering which relate to food security. The provision of these services in particular must be at a low cost. Large scale food preparation and distribution can provide nutritious foods to large groups of people at a low cost.

#### 5.2 Technology and cost of processed foods

The assumption is frequently made that processing and industrialization increase the price of food. While the ownership or organization of a company may lead to the production of costly foods, there is evidence that industrialization can actually reduce the price of foods. One recent study made of food production in Colombia showed that the prices of eggs, chicken, lard and rice actually decreased over time due to industrialization and integrated production.<sup>40/</sup> In figures 5.4 (a) and (b) the movement of prices for four different food products in Colombia is shown. Two products, chicken and eggs, whose production was industrialized, experienced a dramatic decline in prices. Here industrialization did not just contain prices, it reduced food costs.

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<sup>39/</sup> Grupo de Política Tecnológica, PADT - alimentos, "Propuesta para racionalización de programas de complementación alimentaria a escolares uso de raciones", Junta del Acuerdo de Cartagena, Lima, Peru, 1983.

<sup>40/</sup> A.I. Borda and A.S. Uribe, "Apuntes sobre el sector agrícola en Colombia", Alvaro Iregui Borda, Asesorías Industriales y Agrícolas, Bogotá, Colombia, 1981.

Figure 5.4 (a) Root crops in Colombia: prices 1953-1980

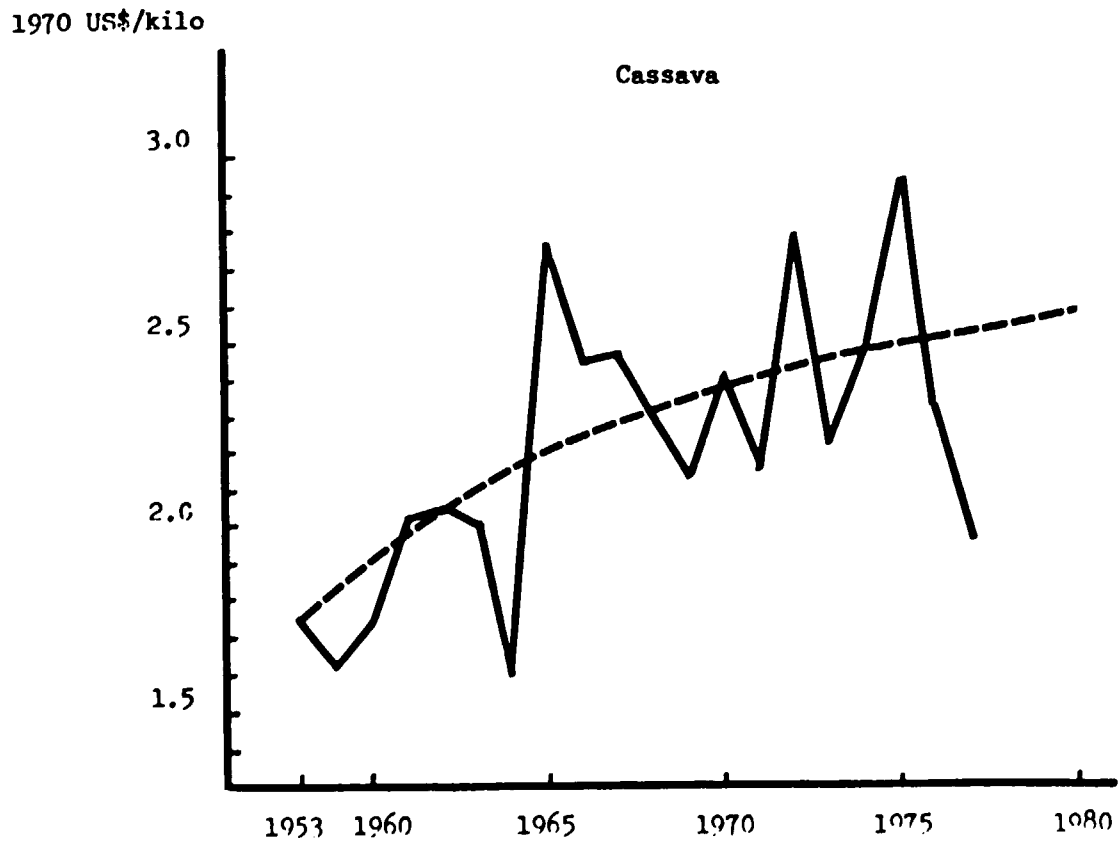
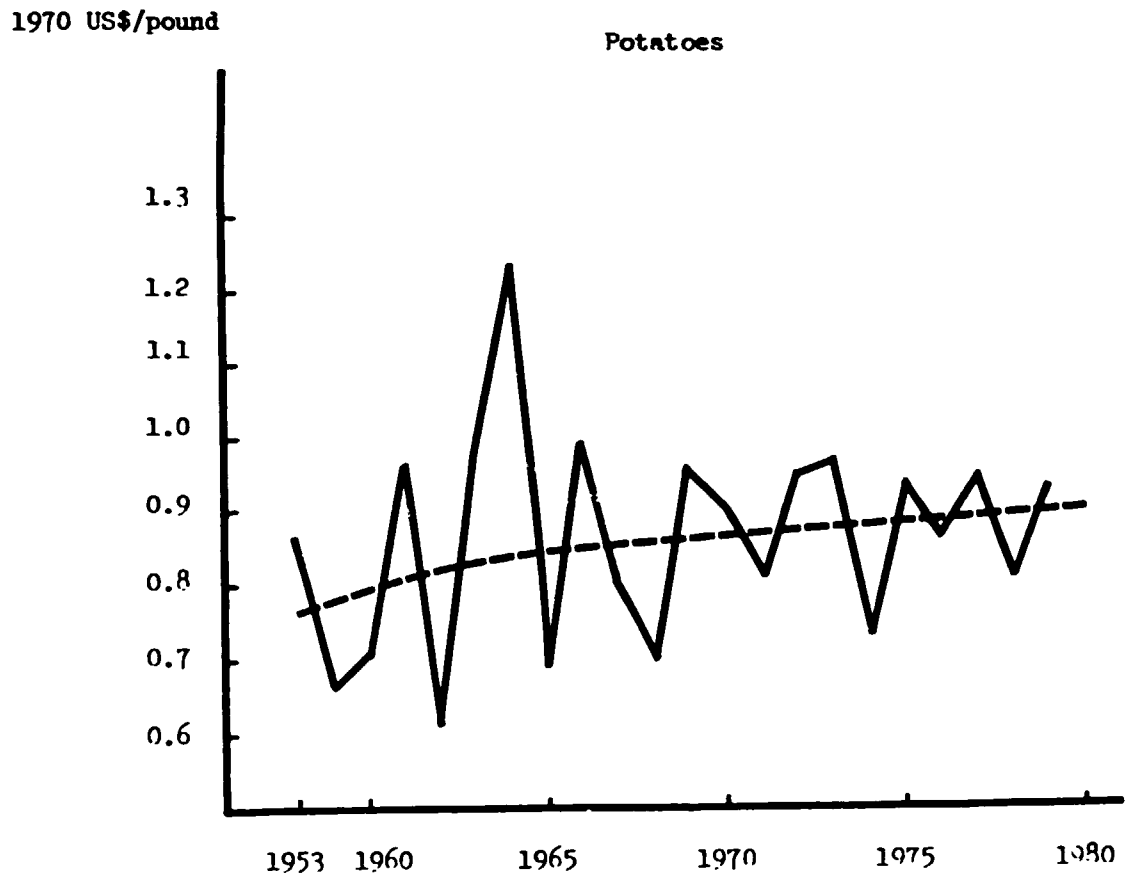
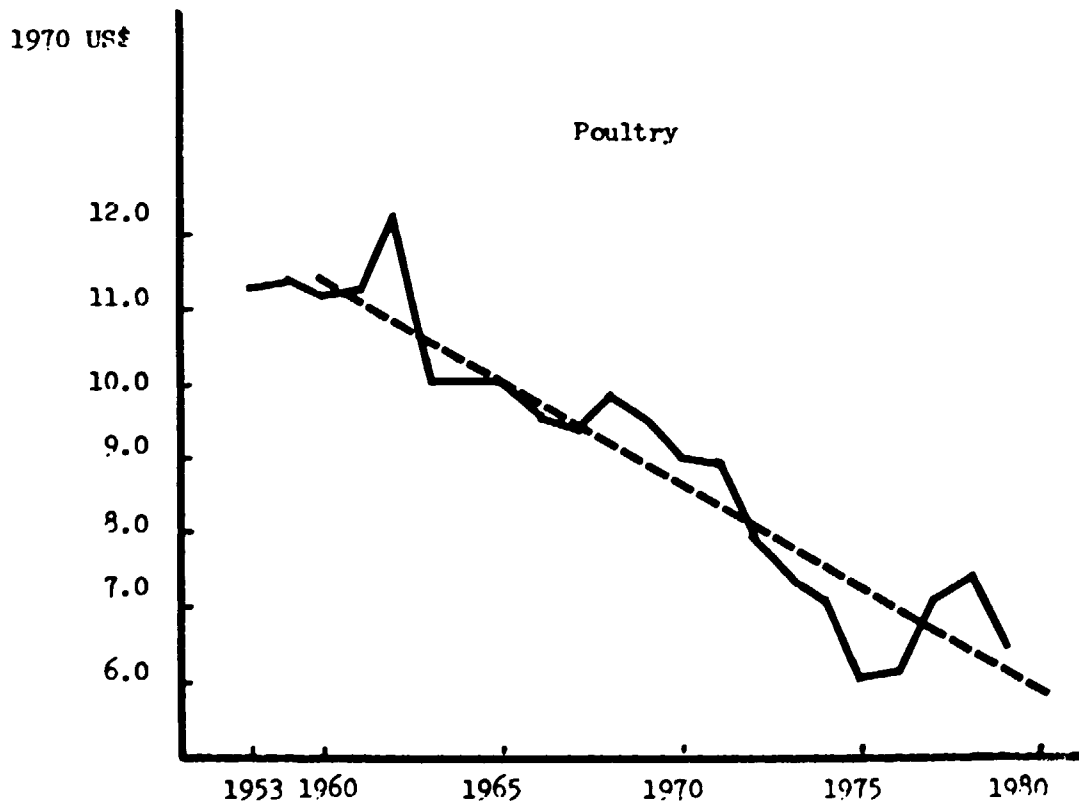
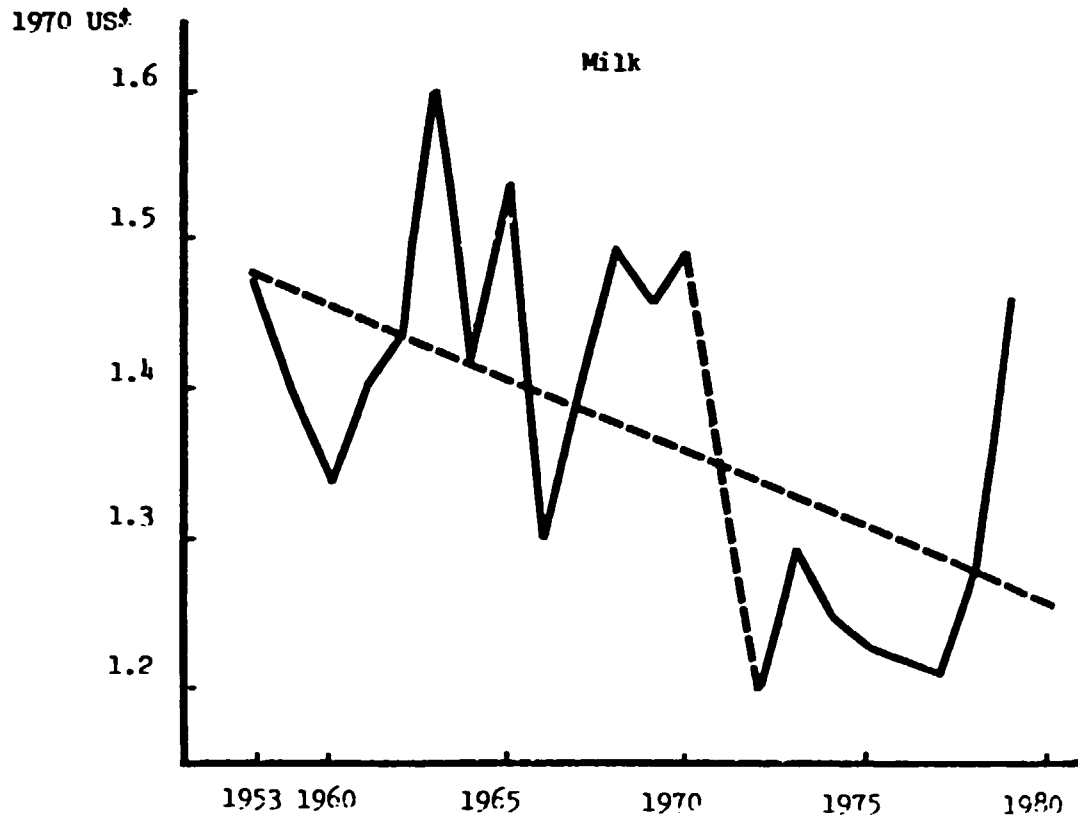




Figure 5.4 (b) Animal proteins in Colombia: prices 1953-1980



Source: A.I. Borda and A.S. Uribe, "Apuntes sobre el sector agrícola en Colombia", Alvaro Iregui Borda, Asesorías Industriales y Agrícolas, Bogotá, Colombia, 1981.

Part of the structural changes which have occurred in the agro-food industry have been due to technological changes which have taken place. Technological changes, like structural, are reflective of industry-wide trends and international influences. Today, new techniques in agro-food production emanate more from technological innovations in biology or chemistry than in the genre of the food industry itself.<sup>41/</sup> Non-food industries, such as the chemical, computer and industrial machinery, have been the main source for technological change in the agro-food industry. Technological advances such as heat processing, dehydration, ionizing radiation, controlled atmosphere storage and freezing and chilling have been a boon to catering as well as to industrial production. New technologies are being employed daily and in some instances producers are turning to appropriate technologies.

One example of a new technological trend in processing is the breakdown of the primary food product into a basic element which is then reconstituted into a more complex product. The trend in food reconstruction may result in an increase in the quantity of a food product as well as an overall improvement in product quality.

Another new food technology innovation is that of inexpensive packaging material that is impermeable to moisture and oxygen and permits the food to be easily sterilized. Now, intermediate moisture foods are being produced, food analogs, high protein meat substitutes, supplements with amino acids and vitamins and carbohydrates and fats derived from basic ingredients and/or microorganisms are among the new products of the agro-food industry. Examples of innovative biotechnology in food processing include some of the following:

- (a) Improved techniques for handling and storage of materials;
- (b) New forms of packaging;
- (c) Improved techniques for processing foods (heated, frozen, vacuum packed, electrically processed, dehydrated, pasteurized, new bio-chemical processes);

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<sup>41/</sup> Pascal Bye and Alain Mounier, Croissance Agro-Industrielle et Changement des Techniques, Institut National de la Recherche Agronomique, Grenoble, 1980.

- (d) Semi-finished processing techniques (extraction, filtration, centrifugation, etc.);
- (e) Low energy production.

Linked to management, innovative technology in the agro-food industry may be one of the critical factors in improving productivity, designing new foods and, specifically, feeding more people. Efficiency concerns have been the impetus for the adoption of new technologies, capital intensive production and for the implementation of structural changes. Capital intensive technologies are often adopted in the agro-food industry because they enhance efficiency overall and also efficiency in labour with production in Latin America being more capital intensive than in Asia or Africa. For example, while agro-food industrial production is 50 per cent greater in Brazil than in India, employment in this sector in Brazil is 20 per cent of that in India.<sup>42/</sup>

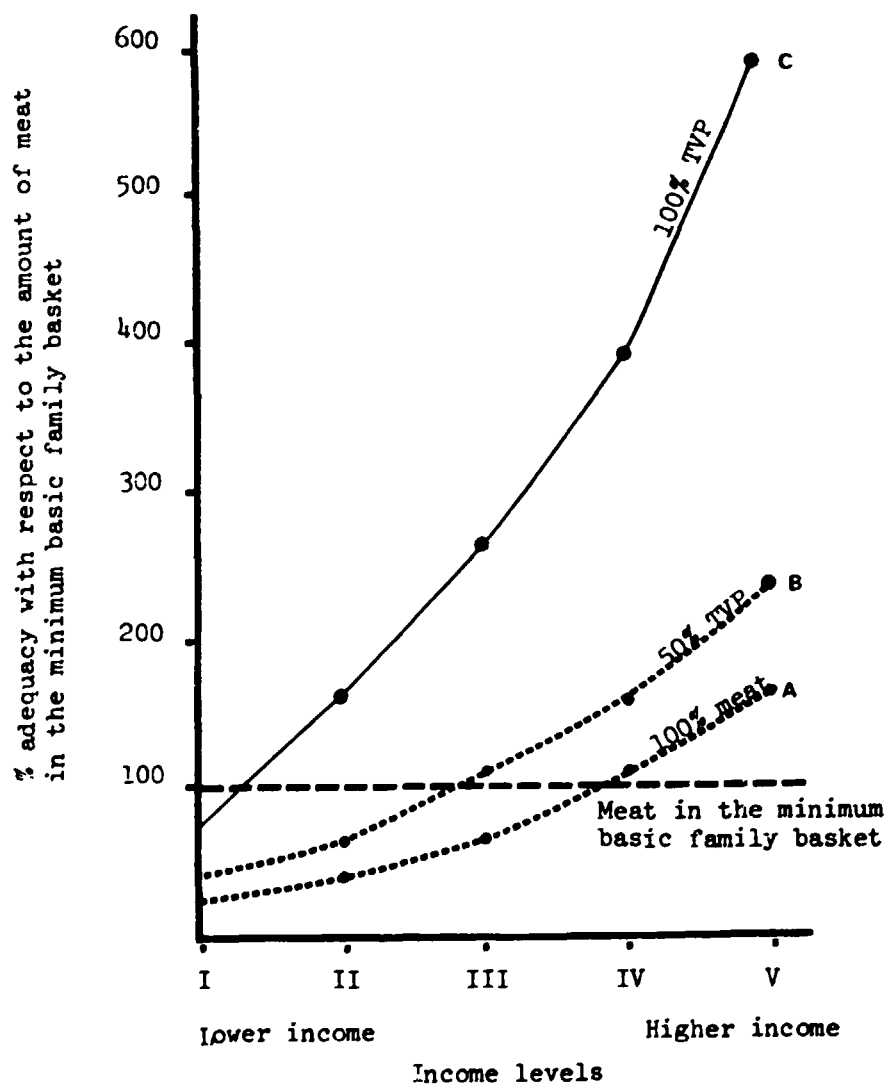
The problem of providing lower cost, nutritious food to large numbers of people is unquestionably being solved through the use of efficient processing technologies. It is well known that soybeans are an inexpensive source of high quality protein. Brazil and Colombia as well as other countries have begun to process the soybean to produce such foods as texturized vegetable proteins and soya flours for mass consumption.

The issue of introducing low cost soya based foods is not a simple one. For example, local prices for wheat, milk and other commodities may be artificially low due to subsidies. This may diminish the attractiveness of newly introduced processed soya products. However, as shown in figure 5.5, for different income groups in Colombia only a minimal amount of meat may be purchased within the budget constraint (curve A of figure 5.5). When a family satisfies 50 per cent of its protein needs using texturized vegetable protein (TVP), it is able to fulfil requirements at a lower price (curve B). The dramatic rise in protein consumption becomes even more apparent when families across all income levels are able to satisfy protein requirements from texturized vegetable protein as a complete substitute for meat (curve C). In other words, protein adequacy (100 per cent on the graph) is achieved at lower incomes when TVP is added to the diet.

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<sup>42/</sup> UNIDO, Industry in a Changing World, p. 288, 1981.

Figure 5.5 The effect of substituting texturized vegetable protein (TVP) for meat across different income levels in Colombia



Source: T. Salazar de Buckle, "Restrictions on using soya proteins in foods in Latin America and in the world", The American Oil Chemist Society, March 1981, p. 435

Meat and texturized vegetable protein are not fully interchangeable and the latter is not always readily available. The point is, however, that processing has an important role to play in satisfying nutritional requirements at a lower price.

A number of Latin American countries carry out complementary feeding programmes which depend upon imported milk. Consequently, different avenues of food processing have been examined with the goal of reducing import dependency in mind. One project under the auspices of the National Nutrition Programme in Chile was initiated to produce a milk substitute - a higher fat content milk. As a consequence of innovations in food processing, a new milk extender product based on a mixture of cereals, soya protein, a small percentage of milk, a vitamin-mineral mixture and flavourings was produced. The Chileans were able to carry out production in conventional milk plants and the product's nutritional value was equivalent to 70 per cent of that of powdered milk.<sup>43/</sup>

The milk extender innovation was of interest to those Andean Pact countries where there are significant deficits in milk production and a low level of capacity utilization in milk processing plants. The technology for producing milk extenders was transferred to the Andean Pact countries. Milk extenders can not only satisfy large scale nutritional and protein requirements; they can actually reduce costs. In table 5.2 the cost of milk extender as a percentage of total milk cost is shown and the cost advantage is apparent.

While the lowering of cost is certainly an important criterion in the selection of a processed food, its acceptability is equally important. Proponents of new processed foods, based on such commodities as soya, must consider whether people will find the food appealing. With this in mind, it

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<sup>43/</sup> E. Yañez, Programas Nacionales de Alimentos (Chile), in Oficina Regional de la FAO para America Latina y el Caribe, Alimentos Complementarios de Alto Valor Nutritivo y Relativo Bajo Costo, Santiago, Chile, 1983, pp. 50-58.

is interesting to note that milk extenders found high acceptance in the Andean Pact countries. Under one programme, which introduced a milk extender called CHICOLAC in Bolivia, (acceptability tests were also run in Colombia, Ecuador, Peru and Venezuela), acceptability was greater than 90 per cent in all cases. As with any new food, processed or non-processed, the acceptance factor and the product's marketability are critical.

Table 5.2 Comparison of costs: milk extenders and milk<sup>a/</sup>

Country of production	Milk extender cost as a percentage of milk cost
Bolivia	65.7
Colombia	67.2
Ecuador	73.5
Peru	75.0

<sup>a/</sup> The percentages shown are for milk extenders flavoured with vanilla.

Source: Junta del Acuerdo de Cartagena, Grupo de Política Tecnológica "Los extensores del consumo de leche en el marco de los PADT - alimentos", Lima, Peru, 1983.

## 6. AGRO-FOOD PLANNING

Consumer demand in Latin America has become increasingly tuned to the wide range of choices available: imported food products, brand goods, staples, generic brands and even catered services. While the application of technology and automation have enhanced efficiency and product choice, they have suffered their own setbacks. In addition to Latin America's import dependencies, technology and automation may also increase the sensitivity of the agro-food industry to another critical variable: management. More control, planning and programming is needed. The possibilities inherent in agro-food industrial production are dependent upon prescriptive policies and a programme which can effectively plan, manage and control the sector.

The planning and deliberate programming of agro-food industries at the national level in Latin America has already begun. These nascent efforts are noteworthy since in the past plans were normally made for agriculture and the industrial component was considered incidental. Therefore, it is useful to review the current planning efforts which are presently underway in Latin America and some of the approaches which have been adopted elsewhere.

### 6.1 National food programmes

Some Latin American countries, such as the ones in the Andean Pact, are undertaking efforts to programme agro-food industries in connection with food security schemes.<sup>44/</sup> Adequate planning of agro-food industries within food security schemes could contribute to diminish dependence on imports, diminish excess industrial capacity, control food price inflation and produce exports more profitably.

#### Peru

Within the Andean Pact food security system, a food security plan in Peru was devised based on both the development of selected agro-food industrial lines and agro-food products with high nutritional value. The system, known

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<sup>44/</sup> The main objective of the Andean Pact Food Security Scheme being to secure adequate nutritional levels for different income population groups by improving food availability and purchasing power.

as the National Food Plan (Plan Alimentario Nacional - PAN) joins together policies, programmes, projects and activities which relate production and consumption in the agricultural, fishery and food sectors. The system includes the following unique features:

- It identifies the economic policies which will result from the adoption of the PAN;
- It specifies investment requirements and financial mechanisms;
- It establishes product committees (for rice, milk products, etc.) which are responsible for ensuring that these food groups are produced according to standards.

Other aspects of Peru's plan include a well delineated organizational structure for achieving food security by planning food, agriculture and fisheries, health, industry and commerce, finance and labour.<sup>45/</sup> Programmed agro-food industrial activity in Peru will enhance and complement Peru's agriculture schemes.

#### Brazil

In terms of its national economy, Brazil has given priority to agriculture and agro-industrial development. A pricing policy (minimum prices for producers, special pricing for individual products, export incentives) and a credit policy (incentives for mechanization and expansion of credit) were introduced. A variety of Brazilian institutes undertook activities designed to promote agro-industries: the National Bank for Co-operative Credit (BNCC), the Brazilian Storage Company (CIBRAZEM), the Brazilian Foodstuffs Company (COBAL), National Supplies Directorate (SUNAB) and several others. Development banks at the state and regional level have offered financing and credit to entrepreneurs in the agro-food industry. A few of the special programmes which have been established are FUNDECE (Fund for the Democratization of Business Capital), FUNDIPRA (Fund for Developing the Industrialization of Agricultural and Fishery Products) and FIPEME (Programme for the Financing of Small and Medium Scale Enterprises).

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<sup>45/</sup> P.V. Dubois et al., "El propuesta de un plan alimentario nacional: el caso Peruano", Junta del Acuerdo de Cartagena, Lima, 1984.



The importance of industrialized foods in meeting food demand has been recognized in Brazil. Within the framework of one programme, the Legiao Brasileira de Assistencia, the following processed foods are being produced for a children's feeding programme: corn flour, bean flour, texturized soy protein, soybean oil, condiments, sucrose, soybean extract and cornstarch.<sup>46/</sup> It is believed that industrialized foods are critical in this programme because they meet mass consumption needs and satisfy nutritional requirements.

### Mexico

Financed in part by oil revenue receipts, the government of Mexico established the Sistema Alimentario Mexicano (SAM) which linked production of food to the demand of the neediest segments of the population. SAM was an example of a national plan designed to balance food supply and demand. SAM was discontinued for several reasons: its costs were higher than initially anticipated, certain technological innovations (i.e. in seeds) were unsatisfactory, there was insufficient time for the state owned enterprises to make needed structural changes and presidential support became uncertain.

Many elements of the discontinued SAM are now being incorporated into the present administration's National Food Programme (PRONAL)<sup>47/</sup> Since many of SAM's characteristics can be found in PRONAL, it is interesting to examine SAM as an instrument of national planning which recognized the connections between agriculture and industry. Under SAM Mexican industrial development was supported in part by the modernization of the agricultural sector, the containment of wages and the maintenance of low food prices for urban workers<sup>48/</sup>.

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<sup>46/</sup> J.E. Dutra de Oliveira and J.S. Marchini, "La Experiencia Brasileira en la Desarrollo de Alimentos de Alto Valor Nutritivo para la Alimentacion Infantil", in A. Bacigalupo and O. Linn, Alimentos Complementarios de Alto Valor Nutritivo y Relativo Bajo Costo, Oficina Regional de la FAO para America Latina y El Caribe, Santiago, 1983, pp. 91-94.

<sup>47/</sup> J.E. Austin and G. Estera, "SAM is dead - long live SAM", in Food Policy, May 1985, pp. 123-136.

<sup>48/</sup> L. Hall and T. Price "Price policies and the SAM", in Food Policy, November 1982, pp. 302-314.

Broadly, the goals of SAM were to increase agricultural production and productivity, streamline food delivery systems for the urban and rural poor and improve nutrition among vulnerable target groups. It was a thoroughly comprehensive approach because it not only analyzed domestic consumption and nutritional requirements, it also took into account the international supply situation. Some of the many components which SAM sought to analyze were aggregate consumption and production, agricultural production, agro-industry, income distribution, food systems (e.g. grains, oils, fish), technology and institutional and legal issues.

The resulting analysis of the above factors enabled Mexico's planners to delineate a "canasta básica" - an adequate diet which took into account a consumer's eating habits, income, costs and human and domestic resources. Separate production systems were devised for oils and fats, basic grains, fish and proteins which would result in foods yielding complementary calories.

While the new programme, PRONAL, has adopted many of SAM's organizational characteristics and objectives, it is stronger with regard to its governing body. The National Food Commission, which administers PRONAL, is comprised of members of key ministries (such as the Treasury, Planning and Budgeting, Commerce and Industrial Development, Agriculture and Hydraulic Resources, Health and Fishing). Rather than installing a super ministry or relying on those who are not active and potent in government to control PRONAL, Secretaries of key government departments administer PRONAL.

The continuation of much of SAM's agenda under PRONAL is an encouraging example of how national planning for food security is beginning to programme the agro-industrial component.

#### Colombia

Another instance of programming for food security and the agro-food industry has been undertaken by the Ministry of Agriculture in Colombia (again within the framework of the Andean Pact Food Security Scheme). The Programme for Integrated Rural Development within the Ministry has articulated a food and nutrition plan, "The National Plan for Nutrition and Food Security". The

first step in the planning was to identify key foods which would become priority production items. The next step was to determine how the neediest segments of the population would become the recipients of this food. To select the qualifying agro-food products, the following criteria were used:<sup>49/</sup>

- (a) Household consumption;
- (b) Per capita consumption;
- (c) Consumption as a percentage of total purchased;
- (d) Food as a percentage of all expenses;
- (e) Contribution of product to total calories consumed;
- (f) Contribution of product to total protein intake;
- (g) Contribution of product in terms of calories and nutrients;
- (h) Characteristics of the product measured by different economic variables.

Using these criteria, the government in Colombia identified groups of primary and then secondary foods. In total, 34 food products were considered important in the basket of foods consumed by Colombians. The primary group included milk, beef, rice, corn and beans and the secondary group was comprised of potatoes, breads and vegetable oils. From this identification, Colombia's planners moved on to determine how institutions and human, financial and natural resources could be mobilized to produce these products. To facilitate this, existing limitations in agriculture and industry, the procurement of all types of raw materials, utilization of plant capacity, technological capabilities, marketing of products, foreign competition and local production vs. imports were also identified. Other barriers were analyzed: inadequate government incentives and financial credit, the incidence of low productivity and problems arising from erratic international pricing.

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<sup>49/</sup> Ministerio de Agricultura, Selección Preliminar de Alimentos de Interés Nacional Taller Intersectoral de Nutrición y Seguridad Alimentaria, Bogotá 1984.

## 6.2 Integrated development

Integrated development is another strategy which has been applied to agro-food industries. This planning concept at sector level involves identification and management of factors and inter-relationships at the production, processing and marketing stage in order to achieve given development objectives. The extent of integration which can be horizontal, vertical or a combination of both will depend upon the complexity of a given sector, government policy objectives and means used to achieve those objectives.

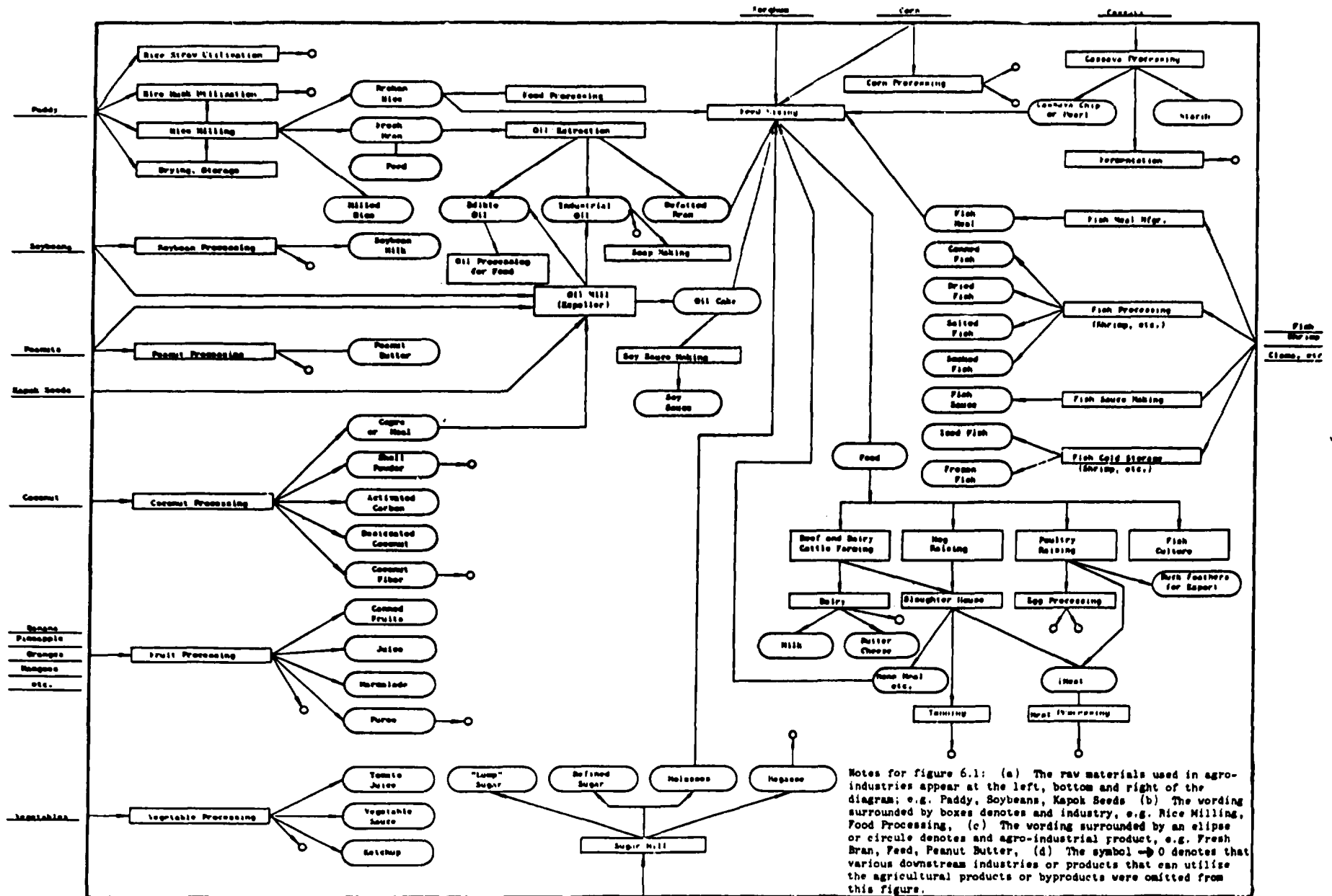
Whether the agro-food industry is small scale or a transnational, a producer of export products or staple foods, it can adopt integrated development strategies to improve production and enhance efficiency.

The numerous inter-relationships which exist in the agro-food industry are illustrated in figure 6.1. Integrated development can make the most of these connections to guarantee food security as well as encourage the industry's development. Some of the many objectives which can be enumerated for the agro-food industry are:

- Improved integration of agriculture and processing;
- Increased and improved use of technology;
- Activation of small scale processors and their utilization of locally produced inputs;
- Expansion of local markets;
- Encourage co-operatives and agro-industrial complexes;
- Connect different processing functions to enhance production efficiency.

Examples of three integrated planning approaches varying in the extent of integration are described below. The palm oil industry in Malaysia is an example of vertical integration in the production of palm oil. The Peruvian example provides for integration of the whole oil and fats sector. The agro-industrial complex in Yugoslavia is an example of integration of several sectors of the agro-industries.

Figure 6.1 Inter-relationship of agro-industries



Notes for figure 6.1: (a) The raw materials used in agro-industries appear at the left, bottom and right of the diagram; e.g. Paddy, Soybeans, Kapok Seeds. (b) The wording surrounded by boxes denotes an industry, e.g. Rice Milling, Food Processing. (c) The wording surrounded by an ellipse or circle denotes an agro-industrial product, e.g. Fresh Bran, Feed, Peanut Butter. (d) The symbol =O denotes that various downstream industries or products that can utilize the agricultural products or byproducts were omitted from this figure.

The palm oil industry in Malaysia

Integrated development for just one product line was achieved in Malaysia. The government of Malaysia, through a series of financial incentives and by encouraging vertical integration, was able to assist the development of the palm oil industry. There has been a surge in the production of palm oil (1,045,975 tons in 1974 to 3,400,000 tons in 1984) and this growth is largely due to a policy of deliberate planning and programming<sup>50/</sup>. In Malaysia, experiments were done in oil palm breeding to ascertain which variety would yield more oil. Yields were also improved by co-operation between researchers and field staff. The Government worked together with the Malaysian Plantation Industry to create these entities:

- The Palm Oil Refiners Association of Malaysia (serves as an impetus to local industry and helps to increase sales);
- The Palm Oil Research Institute of Malaysia (undertakes research and development, engages in overseas technical and commercial ventures);
- The Palm Oil Licensing and Registration Authority (regulates, co-ordinates and promotes all activities relating to the supply, sale, purchase, distribution, storage, export and import of palm oil and palm oil products).

The activities of the latter two organizations are paid for by the palm oil producers in Malaysia. The government recognized the domestic importance of the palm oil industry as well as its potential for export. There was a significant regional market (Asia) which could be exploited and the world market was also growing. Downstream processing in the form of palm oil derivatives was mutually encouraged by the Malaysian government and the three national palm oil organizations.

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<sup>50/</sup> D.B. Bek-Nielsen, "The growth of the Malaysian palm oil industry in relation to international trade in edible oils and fats", prepared for The Second Consultation on the Food-Processing Industry, Copenhagen, October 1984.

The oils and fats production/consumption system in Peru

An example of how integrated development as a planning concept can be applied in one agro-food industry is demonstrated in a recent study on the oils and fats industry in Peru.<sup>51/</sup> The study illustrates in a quantitative fashion the advantages of integrated development with the help of a methodology for assessing and programming food production/consumption systems.<sup>52/</sup> The methodology allows for a quantitative assessment, management and programming of all factors included in the production, processing and marketing matrix, the linkages between the factors and the interdependence between micro- and macro-economic aspects. The main output of the study is a programme proposal for the integrated development of the Peruvian oils and fats system. 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 (see table 6.1). Its feasibility is verified through simulations and evaluations of alternatives to the projected development trends in the present oils and fats system. The alternative system proposes an increase in the number of linkages in order to make the oils and fats industrial system more efficient: value added will increase by 22 per cent, employment will rise by 54 per cent and utilization of installed capacity will improve from 16 per cent to 86 per cent. Moreover, there will be additional advantages with respect to regional development, reducing the detrimental effects of changes in international prices and promoting the introduction of technological innovation.

At present, the Peruvian Government is considering this proposal in the context of their food security scheme. It will be also used as a pilot case by the other four Andean Pact countries in planning and programming basic food industries within their food security schemes.

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<sup>51/</sup> "A programme for the integrated development of the Peruvian oils and fats production/consumption system", UNIDO/IS.569, Sectoral Studies Series No. 19, October 1985.

<sup>52/</sup> The methodology originated in the Andean Pact Secretariat (JUNAC) and was further developed by JUNAC in co-operation with UNIDO.

Table 6.1 Development programme for the oils and fats subsystem in Peru

	Intermediate goods agriculture (IGA)			Intermediate goods agroindustry (IGA I)		
	Palm cultivation	soybean cultivation	Tarwi cultivation	Palm milling	Soybean milling	Cotton milling
<b>Objectives</b>						
	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
<b>Goals</b>						
	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
<b>Economic instruments</b>						
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						
<b>Programmes</b>						
Promotion				Horizontal integration	Horizontal integration	
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	
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			
<b>Time schedule</b>						
Execution	Years: 3 - 17	Years: 1 - 16	Years: 1 - 21	Years: 1, 6, and 18	Years: 1, 12	Year: 1
Installation			10, 14 and 18			
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 and 13-17 and 19-21	Years: 2-21

Source: UNIDO, "A programme for the integrated development of the Peruvian oils and fats production/consumption system", Sectoral Studies Series No. 19, UNIDO/IS.569, October 1985.



Agro-industrial complex in Yugoslavia

The agro-industrial complex is an example of advanced integrated development planning. During the 1960s and 1970s well integrated agro-industrial complexes were introduced into the CMEA countries. Rather than resulting in increased domestic food prices, the price of food was actually contained.<sup>53/</sup> One example is the agro-industrial combine "Beograd" in Yugoslavia, which by 1970 incorporated 87 per cent of sugar processing, 60 per cent of slaughtering, 70 per cent of the edible oil industry, 60 per cent of the starchy products industry and 36 per cent of capacity in fruit and vegetable processing.

Integrated agro-food industrial development in Yugoslavia did not come about instantaneously; it was carried out over several years with continuous planning and programming. Figure 6.2 shows an organizational chart of the Beograd combine which eventually joined together forty separate enterprises.<sup>54/</sup> Combine Beograd became the largest agro-industrial complex in Yugoslavia and one of the largest enterprises in the country as well. Combine Beograd is a complex business system which attempts to co-ordinate the following functions:

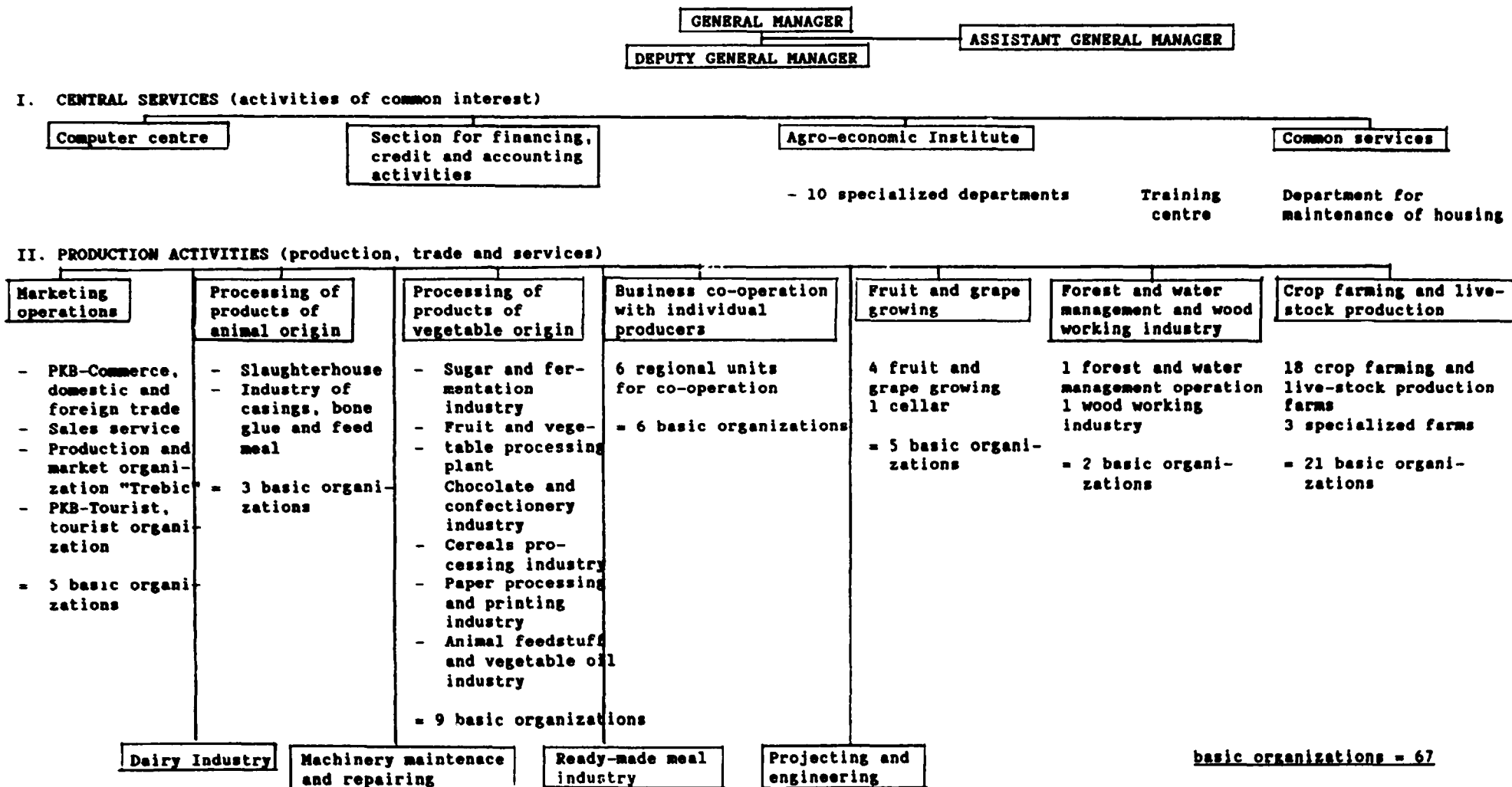
- (a) Scientific research;
- (b) Current planning, long-term planning, operational analysis;
- (c) Investment;
- (d) Account keeping and financial relations;
- (e) Computer processing of data;
- (f) Personnel matters;
- (g) Management issues;
- (h) Legal issues;

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<sup>53/</sup> T. Popov, The General Situation and Main Tendencies in Food and Agricultural Development in the European CMEA Member Countries (1960-1975 and up to 1980), Laxenburg, Austria, IIASA, 1978.

<sup>54/</sup> B. Mrvaljevic, "Growth of agro-industrial complex in Yugoslavia", Belgrade, Institute for Scientific Researches of Agricultural Combine Beograd "Agroekonomik", Department for Economics and Development, Belgrade, 1976, p. 4.

Figure 6.2 Organizational chart of the agricultural combine "Beograd"



**Note:** Basic organizations are constituted of several units depending on the nature of their activity, region and other conditions.

**Source:** "Types of agro-industries", UNIDO/ITD.348, August 1975.

- (i) Market, tourism, catering, advertising;
- (j) Land tenure matters;
- (k) Housing construction and maintenance;
- (l) Occupational safety, fire prevention, safeguards, national defense.

In Yugoslavia, the ability to co-operate, rationalize and maximize the use of technology, capital and human resources improved agricultural output as well as industrial. The organizational structure of a complex, as propitious as it may be, is not a sufficient condition for efficient processing. An accommodating legal and institutional framework is also required in order for the complex to successfully operate.

### 6.3 Institutional framework and policy-making tool

If Latin American countries explicitly make agro-food industrial development their priority, this would involve more than articulation of a policy. It would require that an institution, committee or board be given responsibility for planning and overseeing the development of the sector.

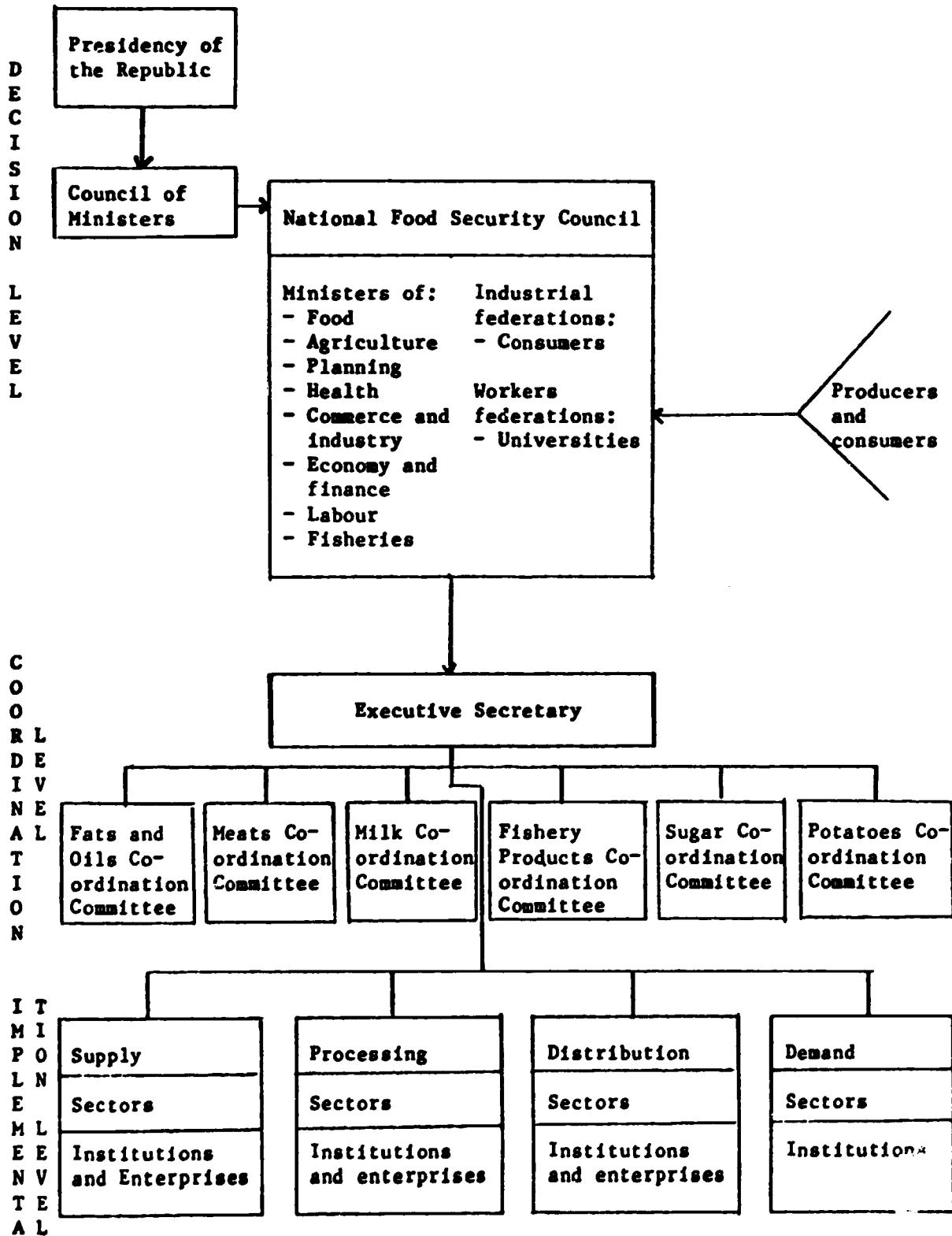
It should be added here that those given the responsibility to evaluate agro-food industrial programmes must be empowered to act. As can be seen with the successor to SAM, PRONAL, it is the involvement of an agency with influence that guarantees successful policy implementation. The controlling institution or administrators must be well positioned within the government.

Figure 6.3, taken from the study on integrated development of the Peruvian oils and fats production/consumption system, gives an example of institutional organization for planning, implementation and monitoring of the food security scheme.<sup>55/</sup> This organizational proposal is at present being followed by the Peruvian Government.

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<sup>55/</sup> "A programme for the integrated development of the Peruvian oils and fats production/consumption system", UNIDO/IS.569, Sectoral Studies Series No. 19, October 1985.

Figure 6.3 Proposal for an institutional organization for implementing the food security scheme



Source: UNIDO, "A programme for the integrated development of the Peruvian oils and fats production/consumption system", Sectoral Studies Series No. 19, UNIDO/IS.569, October 1985.

While institutional support is of course fundamental, a further requirement is that an evaluative policy making tool be employed. This tool would have the ability to simulate development options as well as monitor the effects of a given development policy. Therefore, while institutional support is a prerequisite, so is the ability of the administrators to effectively programme and assess development. The information produced through the application of an improved policy making tool will be useful not only to government planners, but also to planners in private enterprise.

An appropriate planning tool should be able to overcome shortcomings generally found in conventional planning approaches by having the following characteristics:

- The tool should allow for micro and macro assessment of the feasibility of a given project or set of projects, thus improving conventional planning methods in which development programmes are generally formulated with a macro-economic approach with reference to national economic policies but with a micro-economic approach when specific projects are formulated and evaluated.
- The tool should, whenever possible, permit the immediate comparison between different technical or economic options and support policies of a given programme, thereby facilitating decision making.
- The tool should measure the sectoral interdependence within a given programme, thus facilitating the analysis of integrated development and the quantitative evaluation of different options for both vertical and horizontal integration.

This tool will help specific industries or sectors in establishing production targets which are attainable and compatible with national requirements. On the national level, a planned and programmed agro-food industry could lead to increased output and more efficient use of resources, diminished dependence, a healthier food industry and last but not least, food security.

The first step is to identify objectives or goals of agro-food industrial development. A recent study made by UNIDO on agroindustrial development in the Latin American region enumerated some of them:<sup>56/</sup>

- To be a determinant in agricultural production;
- To contribute to increasing total domestic food supplies;
- To generate rural employment;
- To promote the economic growth of the community;
- To reduce post-harvest losses and volumes to be transported;
- To reduce the importation of food;
- To contribute to improving nutrition;
- To produce food products which are safe for consumption;
- To reduce raw material acquisition costs by facilitating direct connections between farmers and processors;
- To be self-sufficient in terms of energy (fuel) requirements.

To formulate an agro-food industrial policy, basic demand and supply factors must be analyzed. The next step is to identify the significant problems - the areas of need and future requirements. Consumer priorities, economic and agricultural characteristics of demand will influence the food products which are found in a country. An analysis of supply, the whole range of inputs and the distinguishing features of the agro-food industry, will then be made. Questions such as what are the existing resources and what are the constraints will be asked.

Projections of future demand and supply will stem from this analysis. Refining objectives by delineating the specifics, e.g. what products should have priority for production, how this should be accomplished, how to distribute the processed food products to the targeted population groups and how to encourage integration where benefits can be reaped, is the next step. From this alternative plans of actions can be postulated.

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<sup>56/</sup> R. Resende, "Report of a study mission to Brazil, Colombia, El Salvador, Guyana, Peru, Trinidad and Tobago: current situation of agroindustry development in the Latin American region", UNIDO, 1985.

At this point, any one of the following questions might be answered:

- Should an industrial line adopt a new technological process?
- Should an industrial line reduce its imports and rely on local, albeit possibly irregular, supplies?
- Can a new branded food be marketed locally?
- Can a new reconstituted food substitute for a favoured staple item?
- Can two or more separate agro-food industrial processes be united in a single complex?
- What should the form of government monitoring or even intervention be in a specific industrial line or system?

All questions must be answered in light of evaluative criteria which relate to domestic food security, industrial efficiency, profitability and other requirements formulated by the country. It is important that the analysis be quantitative so that a comprehensive evaluation of investments, resources and even policy directions can be made.

From this analysis, actual programme formulation, forms of intervention and policy making will be possible.<sup>57/</sup> Every specific industrial modification, adaptation within the sector and change in international control and trade will be integrated into a national development plan. If no plan exists, changes can be introduced at the appropriate industrial or ministerial level. Finally, all new programmes which arise from the application of this analytical policy making tool must be evaluated: a follow-up is necessary. An ongoing evaluation of the agro-food industry will enable required adjustments to take place in a timely fashion.

In summary, human and financial attributes of demand are analyzed. The ability of the agro-food industry to supply food is established. Both objectives and the operating constraints are identified.

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<sup>57/</sup> An example of a programme proposal for a sub-system of the food sector is given in table 6.1.

## 7. CONCLUSION

In the international context, Latin America's role in supplying processed food to meet the growing world demand will increase. Increased processing of food will also help to satisfy Latin America's own internal food requirements. The past experience of the region in industrialized food production can be transferred to other developing regions. At the same time, Latin America is ripe for the application of new models of agro-food industrial development such as the agro-food complex, horizontal and vertical integration and sectoral and national programming. The state of industrial development in the Latin American countries is such that national intersectoral planning and policy making is possible.

Many Latin American governments have adopted national agriculture plans and programmes. The relationships between the different agents of the agro-industrial system, the farmers, food processors, distributors and consumers, are however changing. The trend in several countries is presently toward mechanization and large scale operations in both agriculture and the agro-food industry, foreign control and a broader concentration on export production. To accommodate this, Latin American governments have financed port and storage facilities and subsidized numerous infrastructure requirements. In addition, some countries have adopted concessionary tariff schemes which have facilitated international investments and the importation of raw materials. If governments are subsidizing, even indirectly, agro-food industrial activity, they have to consider also a more careful planning so as to maximize the profits of their investments and to meeting the domestic demand optimally.

Many nations view the agro-food industry as an awkward appendage of agriculture, rather than as a full scale industry in its own right. The importance of viewing the agro-food industry within the framework of a total industrialization policy should not be underemphasized. Policies appropriate for the agro-food industry require a multi-sectoral approach. Suitable policies should be far-reaching enough as to cover agricultural, trade, social, environmental, regional and rural development, nutrition, public health and employment issues. Macroeconomic policies will touch on national



economic concerns such as the level and character of industrialization. For the agro-food industry a government policy making tool which will assist and enhance the sector's development, balancing competing interests, is needed. The impact of planning has so far mainly been limited to large companies concerned with exports. Numerous agro-food industrial projects have been implemented in Latin America but as a rule either under a laissez-faire approach or in ignorance of the central issue of malnutrition and hunger in the countries concerned.

A combination of technological and economic policies and planning is what is required. Proper planning and programming would facilitate national food security as well as strengthen the agro-food industry. A successful development of the agro-food industry in Latin America, which is an industrialized and urbanized region, could serve as an example for other developing regions.

## SOMMAIRE

L'étude passe en revue le développement agro-alimentaire en se rapportant spécialement à celui de l'Amérique Latine. Elle situe la portée économique des industries agro-alimentaires pour les pays latino-américains et les autres pays en développement; elle décrit les tendances récentes qui se sont manifestées dans la production et la demande alimentaires et trace le rôle possible des industries agro-alimentaires dans la satisfaction d'une demande croissante.

Plusieurs voies de développement des industries agro-alimentaires en Amérique Latine sont proposées qui mettent en relief la satisfaction d'une demande interne croissante et examinent les aspects industriels reliés à la technologie et à la structure qui influent sur le coût des aliments fabriqués.

L'importance d'un plan sectoriel pour réaliser une industrie agro-alimentaire optimale est ensuite analysée. Des cas de planification agro-alimentaire sont passés en revue de même que les avantages présentés par l'adoption de méthodes de planification au niveau national et dans ce but.

Le rapport conclut que le rôle de l'Amérique Latine ira en s'accroissant dans la satisfaction d'une demande alimentaire mondiale accrue et que les industries agro-alimentaires sont appelées à prendre de plus en plus d'importance pour répondre aux besoins régionaux, à condition qu'une planification soignée soit entreprise dans le cadre d'une politique générale d'industrialisation.

L'Amérique Latine est mûre pour l'introduction de nouveaux modèles de développement agro-alimentaire. Même si les gouvernements ont adopté des plans et des programmes nationaux d'agriculture, ils se sont peu concentrés sur le caractère unique que revêt l'industrie agro-alimentaire.

Il est possible de réussir un développement agro-alimentaire en Amérique Latine qui soit industrialisé et urbanisé et qui serve de modèle à d'autres régions en développement.

EXTRACTO

El estudio presenta una revisión analítica del desarrollo agroindustrial alimentario con especial referencia a Latinoamérica. El estudio discute el significado económico de las industrias agro-alimentarias en Latinoamérica y en otras regiones en desarrollo, las tendencias recientes en la demanda y producción de alimentos y el papel potencial de las agroindustrias de alimentos en la satisfacción de la creciente demanda por alimentos.

Se presentan varias líneas de desarrollo para las agroindustrias de alimentos en Latinoamérica, con énfasis en la satisfacción de la demanda interna. Se analizan también aspectos tecnológicos y de estructura industrial y su efecto sobre el costo de alimentos procesados.

El estudio discute la importancia de aplicar el concepto de planeamiento sectorial para lograr desarrollar el verdadero potencial de la agroindustria alimentaria en Latinoamérica. Se describen experiencias de planeamiento y se destaca la importancia de aplicar instrumentos de planeación a nivel nacional.

El informe concluye que el papel de Latinoamérica en el abastecimiento de alimentos procesados a nivel mundial va a crecer, que la importancia de la industria agro-alimentaria en el suministro de alimentos en la región será también mayor. Será necesario, sin embargo, promover su desarrollo aplicando conceptos y políticas de industrialización global.

Latinoamérica presenta terreno apropiado para aplicar nuevos modelos de desarrollo agroindustrial. A pesar de que los gobiernos latinoamericanos han adoptado planes y programas agrícolas a nivel nacional, pocos han concentrado esfuerzos en la agroindustria alimentaria.

El desarrollo exitoso de la agroindustria alimentaria en Latinoamérica es posible y puede servir de modelo a otras regiones en desarrollo.

For the guidance of our publications programme in order to assist in our publication activities, we would appreciate your completing the questionnaire below and returning it to UNIDO, Division for Industrial Studies, D-2119, P.O. Box 300, A-1400 Vienna, Austria

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