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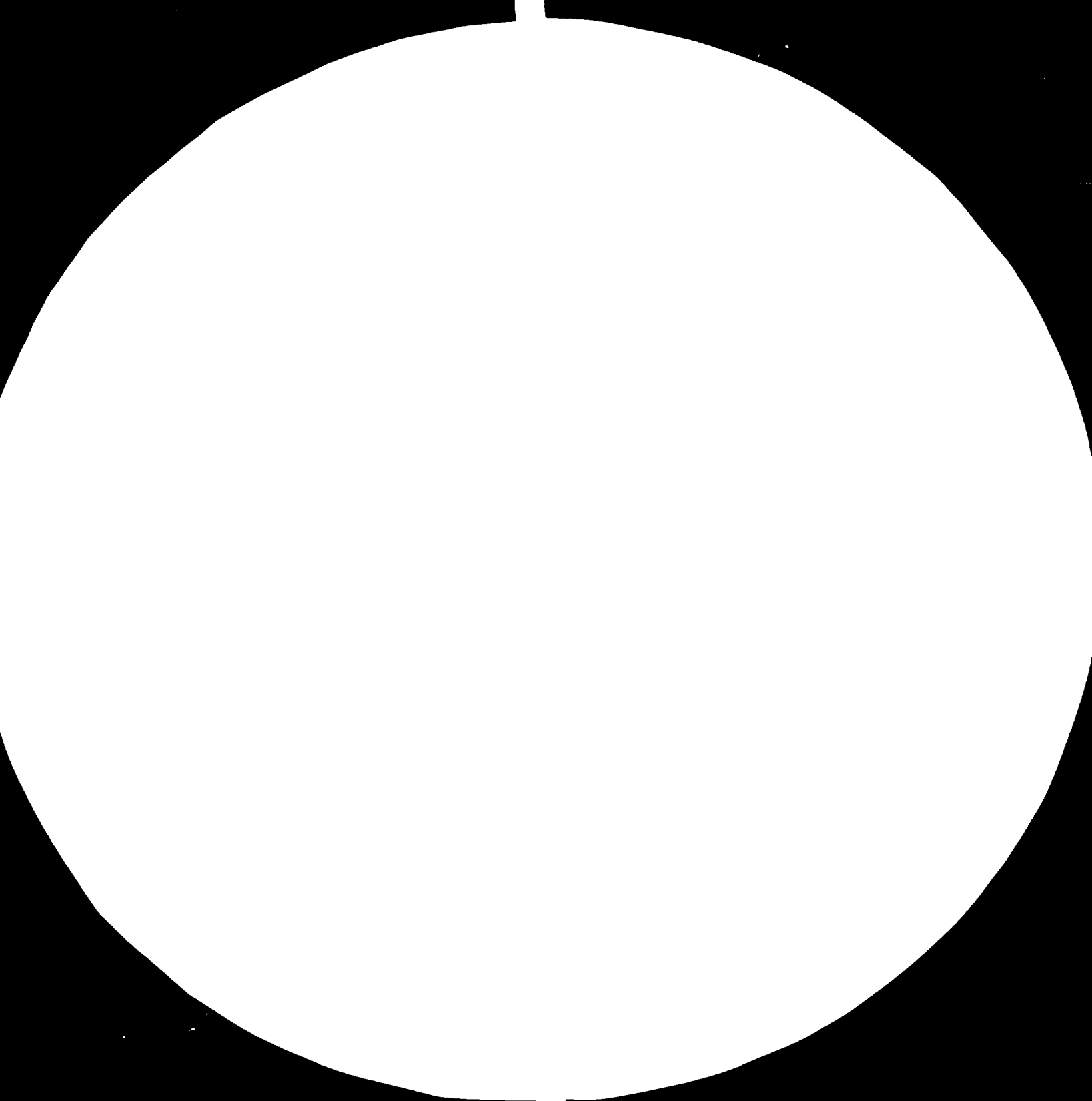
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POLICIES AND MEASURES FOR DOMESTIC
INDUSTRIAL PROCESSING OF RAW
MATERIALS IN DEVELOPING COUNTRIES

prepared by

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INTRODUCTION

Since the UNIDO II in Lima came up with a plan of action suggesting that the share of developing countries in the world industrial output should reach 25 per cent by the year 2000, progress has been much slower than foreseen.

Actually the developing countries' share of world industrial output, measured as value-added in world manufacturing is a little more than ten per cent - 1981 10.3 per cent - a share which has been almost stagnant since the mid-seventies.

The reasons for this stagnation are several, and shall not be discussed here. It is, however, obvious, that a serious restraint on the process of industrialization of the developing countries is the economic recession in the industrialized countries - the most import market for the developing countries - together with a certain resistance towards a changed division of labour in the global economy. This resistance can be traced back to individual countries, product organizations, labour unions etc. and demonstrates that in order to create a successful and harmonious industrialization of the world, an extensive international dialogue is required to ensure a maximization of benefits to all countries, and at the same time a minimization of costs.

The low degree of industrialization in the developing countries underlines the difficult process of development, foreseeable for the eighties and nineties. Nearly 80 per cent of the global population is estimated to live in the developing countries

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in the year 2000 and at the same time only ten per cent of the global manufacture value-added is coming from the same group of countries. Therefore a pattern of industrialization has to be promoted, which gives a higher proportion of manufacturing value-added in the developing countries, without at the same time disrupting the world markets.

As the developing countries have a relatively high share of raw materials, a higher value-added to these raw materials is one of the promising possibilities of promoting industrialization in the developing countries in the coming decades. Such a strategy of industrialization will at the same time also give opportunities to cover the more basic needs of a fast expanding population. It is also a strategy which can create a balanced development in the individual country.

One of the explanations why the developing countries, as a group, have not been able to increase their share of world industrial output during the last years, could be that too many countries have been neglecting the more fundamental processes of industrialization - and especially, have not taken into account the heavy impact that food and agro-based productional processing has on the economic development of almost all countries. Of course, also other basic raw materials such as minerals and energy are important factors of development. However, this paper attaches the greatest importance to the agro-based industrialization.

Experience in the process of industrialization in the industrialized countries as well as in the developing countries shows that agro-industry is the cornerstone of the economic development in almost all countries. One can select any country and see that the first process of industrialization has been based on fundamental needs such as food, transportation, health service and equipment for everyday life.

Since the first phases of industrial development in the individual country there has been a further division of labour and new needs have developed.

However, much of the industrial activity is still based on activity to fulfil the basic need for food, water, hygiene, transportation and housing. In a highly industrialized country a large part of the manufacturing sector is still centered on the food system.

Importance of the raw material industrial complex

The traditional division of statistics is into primary, secondary and tertiary sectors, and divided further according to the UN International Standard Industrial Classification of all Economic Activities.

This type of industrial registration, however, makes it impossible to form a picture of the importance of all the activities connected with raw material producing, processing, transportation and trade sectors, as these economic activities are registered separately in the different statistics.

To which extent, however, can the future industrialization in the developing countries be based on mining, food and forestry? The answer should be - to a very large extent. Many of the developed countries have expanded their activities on raw materials from developing countries. The reason for this pattern has been near-location to the most important markets. With the high labour costs in the industrialized world, one possibility is to create a new division of labour in the field of raw materials.

The aim of this paper is to show what is available of basic raw materials for industrial processing in the developing countries. Basic raw materials include minerals, agricultural raw materials, agricultural plant production for consumption, livestock production, fishery and forestry.

The aim is further to discuss the trend in the processing of these raw materials - and why processing to a certain extent does take place. Finally to discuss what is required in order to process raw materials in the developing countries.

In relation to the last two points it should be stressed that constraints on the process of industrialization in the individual countries can be traced back to lack of infrastructure, capital, energy, know-how, markets, legislation, political instability, economic conditions and all together lack of international competitiveness.

The formulation of industrial development policies for the raw material sector requires that the structure of the sector and the interactions between the individual stages in the raw material, food, and agro-based sector are well known.

Framework of the paper

The production and further processing of raw materials are taking place in a system of many actors, including activities for supplying inputs to the raw material producer, transportation, storage, processing and marketing.

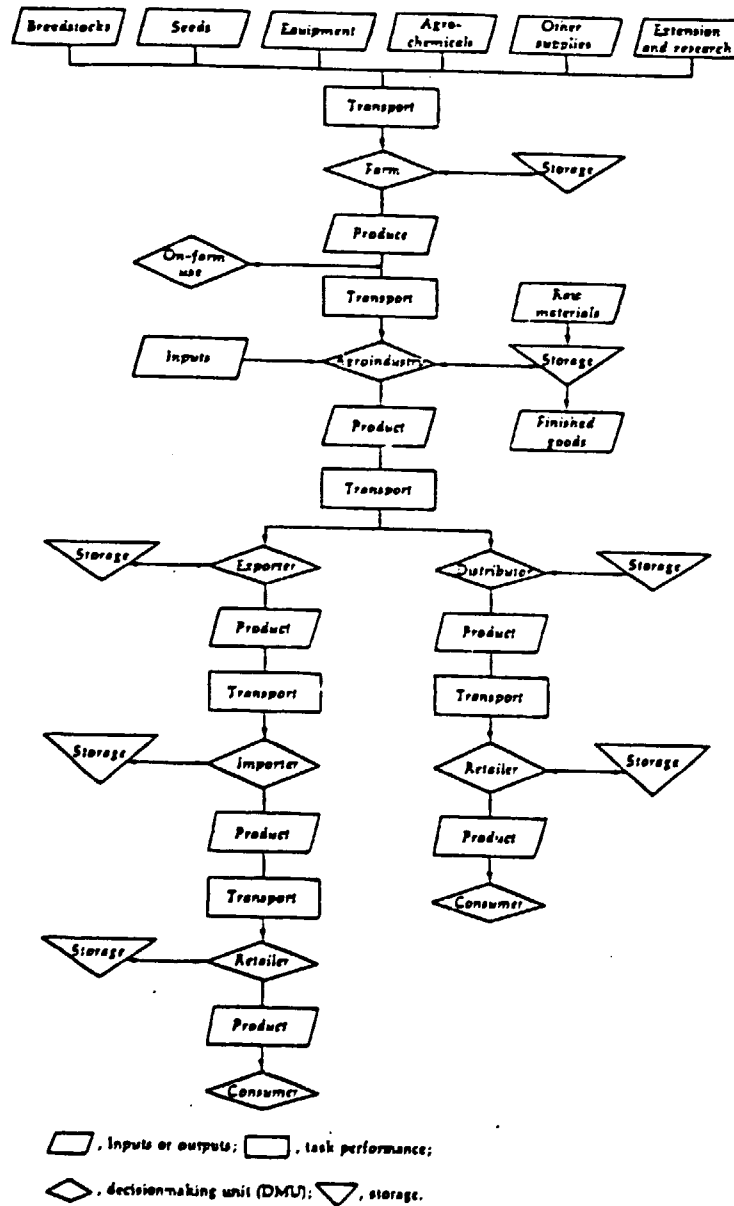
All the activities of the raw material industrial complex can be seen as links in a chain, the link being as follows:

Primary producer
 First stage processing
 Second stage processing
 Further processing
 Marketing
 Final consumption

In this chain individuals and institutions are involved in production, processing, transportation, storage, financing, marketing and many other activities, which together form the raw material industrial complex.

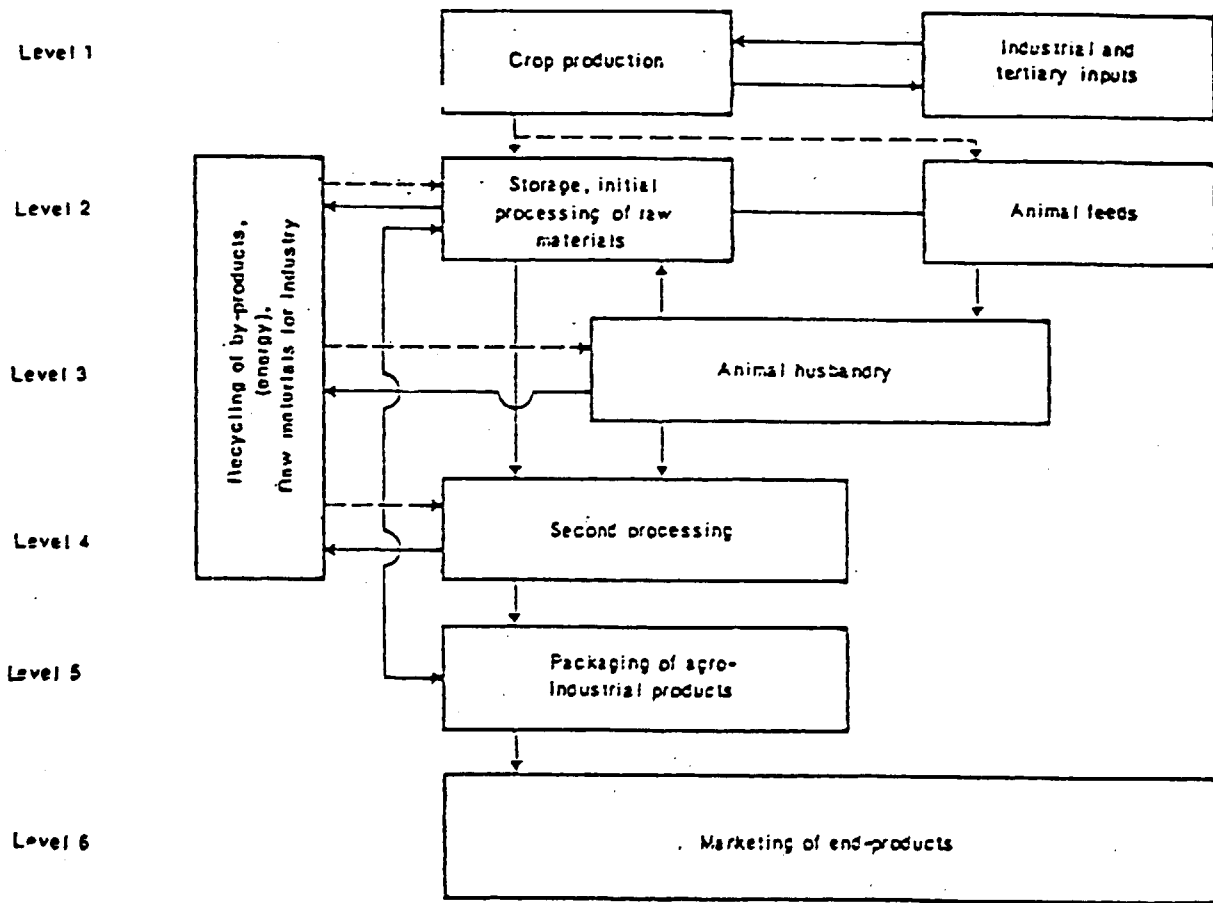
One important part of this system is the food and agribusiness system. The structure and problems of processing raw materials can be seen in relation to a more formalised model for this system, which is shown in Figure I, a flow chart of the total agribusiness system. Figure II illustrates the complex of the agro-in-

Figure I: Flow Chart for Agroindustry



Source: James E. Austin, Agroindustrial Project Analyses, Economic Development Institute, IBDR 1981

Figure II: OVERALL STRUCTURE OF AGRO-INDUSTRIAL PROCESSES



Source : Adapted from UNIDO secretariat, *integrated agro-industries contribution and the present world food shortage*, ID/WG.171/2, Vienna, 1974 (distribution limited).

Here from OECD, Food Industry, Paris 1979.

stry, and shows the overall structure of agro-industrial processes.

With a few modifications the same framework can be used for discussion of mineral and forestry processing.

The following structure of the paper is based on the shown framework where

Raw material producer
Processing activities
Markets

are seen as interdependent activities.

A successful industrialization on the basis of raw materials requires that a harmonious interaction between the different parts of the system is created, be it a single investment project or a total national system.

It must be underlined that the following paper will discuss the raw material processing problems for the developing countries as a group and show some main tendencies and problems within a limited number of pages and within limited time.

The paper is therefore general in nature, based on available statistics and without discussion of different theories on industrialization on the basis of raw materials.

As the problems of industrialization for many countries, both industrialized and developing countries seem to be of a different nature compared with previous decades, a picture of the real world is found to be the most fruitful starting point for a discussion of the industrialization in the developing countries.

I. INDUSTRIAL RAW MATERIAL SUPPLY

A. A factor of development

Production of raw materials is the first step in the raw material industrial complex and is at the same time the most important activity in the developing countries measured by the number of people living on this basic industry.

The production of minerals, food and agricultural products, fishery and forestry forms the basis of the activities of nearly two billion people in the world as a whole. For the developing countries alone the figures are close to 1700-1800 million people, living on agriculture, fishing and forestry. These figures do not include processing, transportation or other activities in relation to raw materials.

How large quantities of raw materials will be available for consumption, export or processing in the developing countries in the beginning of the eighties? Has there been a growing trend in the production of raw materials, and will there be a possibility of faster or slower growth in the different flows of raw materials during the next decades? This will be discussed in the following pages under the headings: non-renewable resources and renewable resources. Concerning non-renewable resources especially the production of minerals will be discussed, even if the total production for mining and quarrying is shown. As for renewable resources, the production of agricultural raw materials, livestock, fishery and forestry will be discussed.

B. Availability of non-renewable resources

Mining and quarrying

The total activity within the sector has been expanding during the seventies, but at different growth rates for the different types of non-renewable resources.

In 1978 the value of world non-renewable resources was 479 billion dollars. Fuels accounted for 87.05 per cent, metal minerals

for 9.32 per cent and non-metal minerals for 3.63 per cent.

The development in production and employment for the main groupings within mining and quarrying is shown in the Annex.

The developing countries' share of world reserves of coal, oil and minerals varies to a very large extent. For almost all categories of non-renewable resources, the distribution among the developing countries is very unequal. The reserves and production are concentrated in a few countries within specific regions.

The total employment in the mining and quarrying sector is very low compared to the total labour force in the developing countries. The highest rate of employment in mining and quarrying is for instance found in China with 3.8 million employed in those sectors and India with 0.8 million. In the rest of the developing countries only 0.6 million people are employed in mining and quarrying.

The growth in employment in mining and quarrying has been rather limited due to capital-intensive technologies in most countries. As the latest technology is normally used, growth in labour productivity is rather high.

Minerals

The growth rates for production of minerals and employment in this sector from 1968 to 1979 show that total employment has fallen, whereas production has gone up. The aggregated figures (annual growth rates) for the world, for market developing economies and for Asia illustrate this for the period 1968-1979.

	<u>Production (%)</u>	<u>Employment (%)</u>
World	1.4	- 0.3
Developing market economies	1.8	- 0.4
Asia (excl. Japan and Israel)	1.3	- 0.6

The explanation of this low rate of employment is that exploitation and production of minerals are taking place in large-scale establishments, owned by the State or multinational firms.

Expanding mining without at the same time having a higher value-added in processing thus has a limited direct development effect on employment.

The development in the production of minerals is shown in table 1. The growth rate of production from 1970 to 1981 is shown together with production in 1981. Further the most important countries for production and reserves are shown.

From the table it is easily seen how concentrated the mineral production is.

Seen from the point of view of export-earning several countries, especially in Africa and Latin America, are very dependent on mineral exports. Thus they are very sensitive to fluctuations in prices and demand on the world market.

In the following Asian and African countries mineral earnings contribute greatly to the foreign exchange reserves: New Caledonia, Zambia, Maritania, Zaire and New Guinea. In Latin America Chile, Bolivia, Jamaica and Guyana have among others very important export reserves.

The prospects for mineral production in the developing countries seem to indicate that there is a possibility for a further increase in the production in the individual countries as the reserves are far from being exhausted. The trend of this future production depends on the future market potential for the individual minerals and on the stability of the different countries as raw material suppliers.

It is difficult to know how the future production of minerals shall take place in order to contribute most to the domestic industrial development in the individual countries. A dialogue is needed to discuss the relevant strategies of development.

Table 1: Production and reserves for some major minerals.

	Quantity 1981 10 ⁶ tons	Growth rate 1970 - 1981 annual %	Major producer countries (1979 share of world per cent)	Developing Share *	Major reserves countries (1975 share of world per cent)	Developing Share *
Bauxite	88.1	4.09	Australia(31), Guinea(14), Jamaica (13) USSR(7), Suriname(5), Guyana(4)	36	Guinea(33.9), Australia(18.6), Brazil(10.3) Jamaica(6.2), India(5.8), Guiane(4.1), Cameroon 4.1)	64
Chromite	9.25	4.73	South Africa(35), USSR(25), Albania(1), Philippines(6), Zimbabwe(6), Turkey(5)	28	South Africa(74.1), Rhodesia(22.2), USSR(0.6), Finland(0.6), India(0.4), Brazil(0.3), Madagascar(0.3)	23
Cobalt	.031	2.73	Zaire(53), Zambia(11), USSR(6) Cuba(6), Australia(5)	70	Zaire(30.3), New Caledonia(18.8), USSR(13.9), Philippines(12.8), Zambia(7.7), Cuba(7.3)	77
Copper	8.3	2.73	US(18), USSR(14), Chile(13), Canada(8), Zambia(7), Peru(5)	25	USA(18.5), Chile(18.5), USSR(7.9), Peru(7.0), Canada(.8), Zambia(6.4)	31
Iron ore	864000	1.09	USSR(27), Brazil(11), Australia(10) US(10), China(8), Canada(7), India(4)	23	USSR(30.2), Brazil(17.5), Canada(11.7), Australia(11.5), India(5.8)	29
Lead	3.475	0.00	USSR(15), US(14), Australia(11), Canada(9), Peru (5)	5	USA(20.8), Australia(13.8), USSR(13.2), Canada(9.5), South Africa(4.1)	0
Manganese Ore	23.6	2.01	USSR(39), South Africa(20), Gabon(9) Brazil(9), India(7), Australia(6), China(6)	29	South Africa(45.0), USSR(37.5), Australia(8.0), Gabon(5.0), Brazil(2.2)	7
Molybdenum	.1015	2.60	US(63), Chile(13), Canada(11), USSR(10), China(2)	15	USA(38.4), Chile(27.8), Canada(8.1), USSR(6.6), China(6.0)	34
Phosphate Rock	145.8	0.01	US(30), USSR(21), Morocco(15) China(4), Tunisia(3), Togo(2)	24		
Potash	27.4	-	Canada(28), USSR(26), GDR(13), FRG(10), US(9)	0		
Tin	.237	0.01	Malaysia(27), Thailand(14), Indonesia(12) Bolivia(12), USSR(8), China(7)	72	Indonesia(23.6), China(14.8), Thailand(11.8), Bolivia(9.7), Malaysia(8.2), USSR(6.1), Brazil(5.9)	74
Tungsten	.0491	0.54	China(28), USSR(19), Bolivia(7), US(6), Rep. of Korea(6), Australia(5)	41	China(46.9), Canada(12.1), USSR(10.6), USSR(10.6), Korea Dem. Rep(5.6), USA(5.4), Australia(2.7)	52

* Only larger developing countries' share of large producing and reserves countries

Source: See list of references.

C. Production of renewable raw-materials

Production of raw materials from agriculture, forestry and fishing is by far the most important source of raw materials for further industrial processing in the developing countries.

In 1981 there were 2,056 million people in the world living on agriculture, including fishery and forestry. The number of people has been increasing during the last years. In 1970 the total agricultural population was 1,923 million people. The economically active population in agriculture has been growing too.

Table 2 shows that more than 90 per cent of the world's agricultural population is living in the developing countries. The figures indicate clearly the low productivity in the agricultural sector in most developing countries and illustrate the high potential for gains in productivity in the agricultural sector. The trend towards urban growth in most countries is explosive and therefore the need for rural industrialization should be quite clear from those rough figures.

Table 2 . The developing countries' share of total population, agricultural population and economically active population in 1981

	<u>World</u>	<u>Developing Countries</u>	<u>%</u>
	Million	Million	
Total population	4513	3335	74
Agricultural population	2055	1916	93
Total economically active population	1855	1306	70
Economically active population in agriculture	829	763	92
Per cent of economically active population in agriculture	44.7	58.4	-

Source: FAO, Production Yearbook

The global population is expected to reach more than 6 billion by the year 2000 and the labour force to grow 2-3 per cent annually. Therefore we are facing enormous problems concerning the development of the food system.

The total amount of agricultural raw materials produced in developed countries has been augmented during the seventies. With 1969-71 = 100, the total food production has grown as follows:

	<u>World</u>	<u>Developing countries</u>	<u>Developed countries</u>
1971	103	103	103
1973	108	107	108
1975	114	116	112
1977	119	123	116
1979	125	131	120
1981	129	139	121

Source: FAO, Food Outlook, 1982. Statistical Supplement
p. 4, Rome, March 1983.

The figures show that there has been a certain growth in food production for the developing countries as a whole.

The total production of food and agricultural raw materials has shown different tendencies in the different countries. With indices of total food production, 1969-71 = 100, the production for Asia in 1981 is 137, for Africa 125, for Central America 139, and for South America 147.

In Asia, Thailand and the Philippines have been rather successful in expanding their food production. The Asian developing market economies have had an annual growth in cereal production from 1972-81 of 3.5 per cent and the centrally planned economies 3.2 per cent compared to the global growth rate of 2.6 per cent.

In Africa almost the whole area south of Sahara has had problems achieving sufficient growth rates in food production.

The most expansive agricultural country in Latin America has been Brazil, which has developed a wide variety of different agricultural productions.

The volume of agricultural production, which enters the food and agrobusiness system, can be obtained from the FAO statistics. From these statistics the growth rate during the seventies can be seen as well as the total volume of the individual cultural products for consumption, further processing and export. These figures are included in the Annex.

The main grouping of plant production in developing countries is:

- Cereals (wheat, rice, paddy, barley, maize, millet and sorghum)
- Root crops (cassava, potatoes)
- Pulses
- Citrus fruit, bananas, apples
- Vegetable oil and fat (soybeans, groundnuts in shell, sunflower seed, rapeseed, cottonseed)
- Sugar
- Coffee, cocoa, tea
- Cotton, jute, sisal
- Tobacco

The growth rates have been quite different for the different countries and regions due to differences in applied technology, climatic conditions etc.

The size of the farms or plants in this first stage of the agribusiness system varies very much depending on the country and the type of production. Cash crops for export are produced in very large quantities in many countries by private, public or cooperative enterprises.

The future plant production is estimated to show continued growth in most countries, due to better strains, management, utilization of fertilizers etc. The production potential for many crops is very high in the developing countries compared to the yield in the developed countries. It is not possible to mention each individual plant production, but the cereal production should by the year 2000 be close to 2000 million tons to ensure the same level of nutrition as now.

The coming years might see keener competition between coarse grain and bread grain as more countries want to expand their livestock production.

Livestock

To achieve a better nutrition, many countries have given higher priority to livestock production during the last years. This should prevent too large an importation of high value-added products.

For many countries, especially the poultry and pork production can cause a fast growth rate. It takes much longer time to expand beef production.

FAO has in "the Agriculture toward 2000" given some estimates of the growth rates for the different livestock industries as shown in the following table. The figures are probably too optimistic, but do show the trends and changed structures in this sector.

Table 3:
Production growth rate 1980 - 2000 (per cent per year)

	Africa	Far East	Latin America	Near East	Developing countries
Cattle and Buffalo meat	3,9	4,5	4,2	4,3	4,2
Sheep and Goat meat	4,5	3,6	3,8	2,0	3,6
Pigmeat	6,8	5,4	4,4	4,2	5,0
Poultry	8,1	8,8	5,2	10,1	7,5
Eggs	7,3	6,3	4,9	8,6	6,2
Cattle and Buffalo milk	4,3	3,6	3,8	3,3	3,7
Aqualic organisms ¹⁾	1,8	1,9	1,1	2,7	1,7

1) production growth rate 1975 - 2000.

Fishery

As opposed to most other resources fish is a "free commodity" i.e. nobody owns it until it is caught - provided it is caught in territorial waters. Unlike e.g. agriculture there are no direct expenses connected with the production with the exception of fish farming. In most developing countries fishing, and especially off-shore fishing, is only slightly developed, which can also be seen from the slow introduction of modern technology.

The development of fishing in many developing countries can also on the long view be impeded by the country's geographical placing, as the plankton-production around the equator is less than it is in the more temperate zones. This is due to the fact that the rays of the sun as well as the temperature are high all the year round, making the energy flow equally high. Thus it is not possible to create a reserve of plankton at certain times of the year.

Examinations have further shown that tropical sea water is generally poor in phosphates and nitrogen at the surface of the sea, where organic life is to be found.

The table below shows the catches over a 5-year period. As it appears there is a steady small increase in the annual catches.

Table 4: Fishery products: world catches of aquatic organisms ¹⁾

Million tons	1977-79 average	%	1980	%	1981	%
World	70,1		72,3		75,1	
Developing Countries	32,7	47	34,2	47	36,2	48
Latin America	8,5	26	9,6	28	10,5	29
Africa	3,4	15	3,2	9	3,3	9
Near East	0,8	2	1,0	3	1,0	3
Far East (incl. Asian CPE)	20,0	61	20,0	58	21,1	58
Developed countries	37,4	53	38,1	55	38,9	52

1) Excluding cetaceans and seaweeds

Source: FAO

It can be seen from the table that the increased catches during the last years are mainly due to larger catches in the developing countries as a whole, and particularly Latin America is on its way up after a heavy decrease in the catches at the beginning of the seventies.

Thus the developing countries are close to catching nearly half of the total amount of fish, but in spite of increased catches, the developing countries are still net importers of fish.

There are still possibilities of extending the global fishery. This can be done partly by better management in connection with already used species of fish, partly by better exploitation of less wellknown species of fish and by developing the catchings of shellfish.

Generally it is expected, however, that the total increase in the production during the next years will hardly be able to

keep step with the increase expected in the overall demand, due to a continued increase in the world population. Thus the catches will only increase by approx. 1 per cent compared with a growth of population of approx. 2 per cent (FAO).

Forestry

Even though wood is a renewable resource, the gestation period for most types of wood is from 20 years for the quickest growing species and upwards, which is longer than for most other renewable commodities.

Today the developing countries, which account for about 79 per cent of the world population, consume approximately half of the total wood consumption. The majority of this consumption is accounted for by fuel wood and the rate will probably continue to grow.

Table 5: Forestry production

	World	Developing	Developed
Production/annual rate of change	1971-1981	Million m ³	
	1981	1981	1981
Fuel wood	1759/ 2,8	1514/ 2,7	245/ 3,4
Indust. Roundwood	1359/ 0,7	315/ 4,7	1069/-0,1
Sawlogs coniferous	562/-0,1	65/ 6,2	497/-0,6
Sawlogs non conif.	242/ 1,3	134/ 3,1	107/-0,3
Sawnwood conif.	308/-0,5	29/ 3,5	278/-0,8
Sawnwood non conif.	108/ 1,2	51/ 6,2	56/-1,3
Wood based panels	97/ 2,5	17/14,0	83/ 1,8
	million tons		
Wood pulp	125/ 2,3	16/ -	114/ -
Paper	175/ 3,5	22/10,0	153/ 2,8

Source: FAO

For more than two decades there was an increase in roundwood as well as in sawwood production, but in the last couple of years there has been a stagnation or even a small fall in the production and trade caused by the current recession in the developed world's construction industry.

According to the statistics South America, Africa and Asia account for about 50 per cent of the world forest areas, but approximately for 75 per cent of the world's hardwood forest. In spite of that the three continents only produce 15, 25 and 40 per cent respectively of the world hardwood log .

According to FAO the area covered with tropical forests is decreasing. This is partly due to clearing for permanent agricultural purposes and shifting cultivation, partly because the forest depletion is insufficient. On the other hand the removal of the tree cover often results in soil erosion, siltation and at last desatification.

A larger part of the world's forest resources has, however, not yet been estimated and consequently statistics on this matter must be treated with some caution.

Even though tropical forest areas are decreasing, the world supplies of wood, according to FAO, are sufficient to meet the demand for at least the rest of this century, but the amount of hardwood on the world market is likely to fall as more immediate forests are cut down because of agricultural land uses - in fact some countries in Asia will soon have had most of their original forests cut down - and because hardwood producing countries will continue to increase their investments in processing facilities.

In addition many of the developing countries will still need additional supplies of industrial wood production for domestic demands, but if the price of logs is going to rise it is expected to affect substitutions such as aluminium or plastic.

This chapter has shown that there will be a growing volume of raw materials for processing in the developing countries in the

next decades. The reserves of minerals will not be exhausted for the next decades to come. Food and other agrobased raw materials may be showing a growing volume of plant production, livestock and of fish.

The future growth rate for production in the individual countries will probably vary to a very high extent according to different policies and links to the markets.

The resource base from the primary sector holds out promising prospects for further food and agrobased processing. For minerals and forestry the prospects are more dim.

II. INDUSTRIALIZATION ON THE BASIS OF DOMESTICALLY PRODUCED RAW MATERIALS

A. The basic problem of industrial development

Even if the raw material producing sector is important for employment and export, the further processing sector, as described in our model, is relatively weak in the developing countries as a group. Countries can be found which have expanded fast in the process of development, but as a rule there is still much to be done in the field of processing of raw materials in the developing countries.

Industrialization on the basis of domestically produced raw materials seems to be the most natural way of raising income and employment in the developing countries. With an expected annual growth rate in the labour force of 2-3 per cent, the total labour force in the developing countries will more than double in the last two decades of the century. To employ all those in activities oriented towards export earnings seems an illusion. The most natural way of finding meaningful employment is a further processing on the basis of domestically produced raw materials for domestic use. At the same time rural and regional development plans could be used to get a balanced economic development in the country and to secure sufficient food for the populations.

How to promote the future industrialization of the developing countries on the basis of raw materials has not yet been tackled in many papers. Should the pattern be based on the most advanced technology, or should more labour-intensive technologies be utilized? Should the firms be small-scale, large-scale or medium-scale? Should a further industrialization be carried out on by-products from raw materials etc.?

Even if the future problems in the raw material sector have not been discussed much, some more fundamental considerations could be formulated.

The most important is that there always must be a high degree of harmony between the different levels in our agribusiness - or raw material processing model described in the introduction.

Another important rule is that as soon as a processing activity is giving a value-added, it ought to be integrated in the development of the country.

An important factor to consider in the future development of the raw material processing in developing countries is that the industrialized markets for many products are reaching a saturation point. The growth in demand for many food items in the OECD-area is estimated to be low in the coming years.

It is also a fact that industrialization is a very slow process, where second and third stage processing is built on first stage processing. This long-term industrialization requires management, education and creation of industrial traditions - traditions which are either imported or based on those of the local craftsmen.

Many investments in the processing of raw materials have not met the expectations during the last years, partly owing to the high complexity of the raw material processing sector, including the processing of minerals, food and agro-based raw materials and forestry, partly to lack of harmony between the individual elements in the raw material system and agribusiness system.

The processing in the developing countries is carried out by multinational firms, public enterprises, co-operatives and private firms. These different enterprises act at different levels before and after the processing, dependent on whether the processing is taking place to fulfil the demand from export markets or from the domestic markets. Too often the processing is discussed from the point of view of international trade.

Many minerals are processed for export only and by a few countries. Some tropical products like coffee, cocoa, tea, and

bananas and some food stuffs like tapioka are also processed for export only.

Normally the domestic market is the most important market for the raw materials produced in the agricultural and food sector.

Of course the size of the market plays an important role for the pattern of industrialization. Some of the most populous countries can promote an industrialization on the basis of the home market, and in that case the processing of raw materials are domestic market oriented. Others have chosen an export oriented strategy of development, which permits them to get high export-earnings.

If the processing of raw materials has to fulfil national political goals such as

- regional and rural development
- increased employment
- increased industrial growth
- increased exports

it should be clear that dilemmas could arise for most countries in a raw material-based industrialization.

This has been stressed in earlier UNIDO papers and can be seen from the experience of different industrial projects within the raw material processing sector.

In the agroindustrial sector, too many failures have occurred by regarding the processing sectors as an industrial activity, which had to process a surplus of agricultural raw materials. Often the investments have not been regarded as part of the total agribusiness-system.

It is essential to find out whether there is a market for the goods or where it could possibly be created. When this is done, the next step is to decide about starting processing activities.

There is, however, an interaction between the different steps in the agribusiness system - as there are in mineral processing.

The size of the market is decisive of the scale of the industrial operations. One has, however, to consider the short, medium and long term aspects to be sure that the profitability is competitive in relation to other activities. Experience shows that too many investments have been too large for the project in question. Many food processing plants are thus operating below a profitable utilisation of capacity due to too ambitious projects.

B. Processing of minerals

The further processing of minerals, the basic metal industry, and the machinery and the equipment, has been expanding at a relatively high growth rate during the seventies, as shown in table 6 . The three stages can be seen as first, second and third stage processing.

The fast growth rate has taken place in a relatively small sector in most countries, as can be seen from the table. A more detailed picture of the total mineral processing sector in the developing countries has been given in earlier UNIDO-publications. A few comments should be given on the principal development of the mineral processing industry in the developing countries.

The mineral processing sector is to a large extent dominated by multinational firms in the exploitation of raw materials and the first stages of processing. In order to expand the further processing, the developing countries have to get access to the most profitable markets, which are the industrialised countries or the newly industrialising developing countries. The distribution channels are normally dominated by big companies, and a form of co-operation between the individual country and the international and transnational company has to be established.

In order to develop the mineral processing industry in a developing country in first, second or third stage processing a transfer of technology is required. Most of the technology used

Table 6 . Weight and annual growth for metal ore mining, basic metal industrial and metal products machinery and equipment.

	ISIC 230		ISIC 37		ISIC 38	
	Metal ore mining Annual Percentage	Growth	Basic Metal Industry Annual Percentage	Growth	Metal products Machinery & Equipemnt Annual Percentage	Growth
Developing Market Economies	2.1	1.8	3.3	6.8	11.4	9.6
Developed Countries	0.9	- 0.2	6.6	1.6	33.7	3.8
Central Planned Economies	0.9	3.9	7.1	5.0	34.5	10
World	1.1	1.4	6.2	2.9	30.5	5.8

Source: Statistical Yearbook of Industrial Statistics.

in the mineral processing field, is worked out by the trans-national companies.

It is difficult for most countries to expand that part of the mineral industrial complex owing to lack of markets, and capital-intensive technology. A new plant therefore has to operate in an optimal manner, from the very first. As the products in this sector are highly specialized, and as the raw materials are concentrated in a few countries and regions within these countries, the export quota is high, the effect of a development on the individual country is very often limited. The sector is working without problems of any seasonal or climatic kind.

Evaluation of new projects in the mineral processing industry has to involve the possibilities for using by-products for further processing. Earlier studies made by UNIDO show that profitability of a new project could be reached with a higher degree of supplementary utilisation of by-products.

C. Food and agro-based processing

Food and agro-based processing is an important element in the industrial development of most developing countries - on national as well as on regional levels.

The food industry in the developing countries consists of different processing sectors such as cereal processing industries, oil and fat industries, dairy industries, fishery industries, fruit and vegetable industries, meat industries, sugar and related industries, alcoholic beverages industries and several other industries. These industries are an important element in the manufacturing sector in most developing countries. In regard to employment and output the food industry accounts for up to a fifth of total employment and approx. a fourth of total output.

These figures for the developing countries underestimate the importance of the food system. The less commercialised part of the food system taking place in villages and smaller urban areas are thus not included.

Table 7:

Output, value added, persons employed and markets of food-processing and beverage industry, summary by economic regions, 1975

Economic group and region	Number of countries	Population (Millions)	Food and beverage industries			Total sales processed food a/ (Millions of dollars)	Per capita processed food sales b/		
			Value output (Millions of dollars)	Value added (Millions of dollars)	Persons employed (Thousands)		Total population (Dollars)	Urban population (Dollars)	
Developed market economies	27	758.9	370 222	112 402	8 234	13 653	301 061	503	563
Western Europe	15	289.4	159 063	51 461	3 540	14 537	160 927	556	606
North America	2	236.3	141 232	39 604	1 069	21 190	143 047	609	620
Japan	1	111.6	35 985	10 979	1 513	7 256	30 323	343	402
Other developed market economies	9	121.6	41 942	10 358	1 312	7 095	30 764	310	442
Centrally planned economies	7	360.5	222 879	57 595	4 419	13 033	*	*	*
Developing countries c/	95	1 809.6	93 934	26 026	9 734	2 673	90 794	48	116
By income groups:									
Low	32	1 147.0	19 735	3 625	5 430	667	19 607	17	53
Middle	40	461.7	29 299	9 163	2 540	3 607	26 732	48	112
High	23	200.0	44 900	13 230	1 764	7 504	44 315	150	252
By region:									
Latin America	26	314.2	51 546	15 430	2 310	6 656	47 096	152	244
Africa	43	381.2	11 570	3 289	1 059	3 105	12 305	32	108
West Asia	10	79.1	5 017	1 260	202	4 460	5 511	70	172
Asia and Pacific	16	1 111.5	25 000	6 047	6 075	995	25 082	23	56
World total d/	129	3 009.0	695 035	196 023	22 307	8 756	675 734	224	390

Source: United Nations Centre on Transnational Corporations, based on: (a) information supplied by United Nations Statistical Office; (b) Food and Agriculture Organization Production Yearbook, 1977, vol. 31; (c) World Bank, 1978 World Bank Atlas; and (d) Yearbook of International Trade Statistics, 1977 (United Nations publication, Sales No. E.78.XVII.11).

Note: * Directly comparable data not available.

a/ Value of processed food net of food-industry exports and imports of food products for households.

b/ Total sales divided by total population and urban population respectively.

c/ Developing countries are grouped according to World Bank estimates of 1975 GNP per capita. "Low-income countries" include those with less than \$250 per capita GNP. "Middle income countries" include those with from \$250 to \$1,000 per capita GNP. "Higher income countries" include those countries classified as developing countries by the United Nations with per capita GNP above \$1,000. (See tables I-2, I-3, I-4.)

d/ Excluding China and centrally planned economies of Asia.

The food industry in the developing countries varies much from sector to sector in regard to distribution on export sale and sale for the domestic market. Compared to the developed countries where a very high percentage of the farm production goes through some sort of processing before being distributed to the final consumer. The percentage in most developing countries is between 10 and 20 per cent. In Denmark this percentage is 90-100 per cent. The following table shows the main figures for the global food industry.

During the seventies the fastest growth has taken place in the developing countries. The figures below indicate this fact. The growth rates are stated annually from 1968-1979 for food, beverages and tobacco.

	Production(%)	Employment(%)
World	3.8	2.6
Centrally planned economies	4.5	1.1
Developing market economies	5.2	5.3
Market economies	3.4	3.0

Source: United Nations, Industrial Statistics

The complexity of the sector, the type of plant and the involvement of the transnational companies in the different industry groups are indicated in a survey. It is seen that processing for the domestic market of staple food is taking place within small-scale traditional production units, the processing of branded foods for the domestic market in medium-scale modern plants, and the export-oriented food industries are operating in large-scale and modern plants.

In expanding the food processing activities in the developing countries the individual country faces a dilemma between

- (1) A further processing of raw materials in the rural districts and

Table 8: Principal types of plants, growth projections and transnational corporation activities in developing country food-processing industries

Industry group/ market orientation	Type of plant			Industry growth projec- tions <u>a/</u>	Extent of TNC involvement, mid-1970s <u>b/</u>
	Small- scale tradi- tional	Medium- scale modern	Large- scale modern		
<u>Domestic staple foods</u>					
Meat (fresh slaughter)	X			M	L
Poultry	X		X	E	H
Dairy (fresh, cheese)	X	X		M	L
Fish (fresh, dried)	X			H	L
Fruits, vegetables (fresh)	X			M	L
Pulses, roots	X			M	O
Wheat milling	X		X	H	M
Bakery	X			E	L
Corn milling (dry)	X		X	..	L
Rice milling	X			M	O
Vegetable oils (crude)	X		X	M	M
Animal feeds		X	X	E	H
Sugar milling (non-centrifugal)	X			M	O
Beer (local)	X			..	O
<u>Domestic branded foods</u>					
Processed meat		X		..	L
Dairy (processed, ice cream)		X		M/H <u>c/</u>	H
Fruits, vegetables (canned)		X		M	H
Biscuits		X		H	M
Breakfast foods		X		..	M
Refined oils, margarine		X		H	H
Soft drinks (syrup)			X	M <u>a/</u>	H
Soft drinks (bottling)		X		M <u>a/</u>	M
Confectionery		X		H	H
Beer		X		H	M
Wines, spirits			X	L	L
Coffee (extract)		X		H	H
Tea		X	X	M	H

Table 8 continued.

Industry group/ market orientation	Type of plant			Industry growth projec- tions <u>a/</u>	Extent of TNC involvement, mid-1970s <u>b/</u>
	Small- scale tradi- tional	Medium- scale modern	Large scale modern		
<u>Export food industries</u>					
Beef (chilled, canned)			X	M	L
Fish (speciality)	X		X	M	H
Bananas			X	L	H
Fruit (canned)			X	M	H
Vegetable oil (crude, refined)			X	M	H
Fruit, vegetables (fresh)			X	M	L
Sugar (raw, refined)			X	M	L
Coffee (roasting)	X		X	M	L
(extract)			X	H	M
Cocoa (grinding)			X	H	H
Tea			X	M	H

Source: Estimates by the United Nations Centre on Transnational Corporations, based on reports of the Food and Agriculture Organization of the United Nations, World Bank and national studies.

a/ See table 7 and technical annex III. Symbols: L = low, or less than population growth projection (2.3 per cent per year); M = medium, or 2.4-4.6 per cent per year; H = high, or more than 4.6 per cent per year.

b/ See chapter II above. Symbols: 0 = no identified transnational corporations involvement; L = minor transnational corporation involvement; M = moderate transnational corporation involvement; H = substantial transnational corporation involvement.

c/ Concentrated milk, moderate future growth; dried milk products, high future growth.

d/ Historic growth moderate, but industry estimates indicate high future growth.

- (2) the establishment of such food systems that the fast growing urban centres can be supplied regularly with food of high quality.

Often it will be difficult to turn these two strategies into one harmonious national food strategy, and supplementary export or import can be the result.

The problems that will arise in regard to technology and size of plants will also be different for the two strategies.

In the former case small-scale plants of a similar type could be used in villages and smaller rural districts for production of traditional products, while in the latter case large-scale production seems convenient.

In expanding the food processing sectors one has to check a good many critical questions to be sure that the individual project is feasible. Firstly, identification of the potential consumers is needed, to find out why they would like to buy the product and secondly there is a need for identifying potential competitors. In that connection it is necessary to find out what the institutional frame of the market is. Price policies have to be formulated and distribution channels built up. The market infrastructure is in many countries weak as distances between the rural production areas and the urban consumption areas cause difficulties, as many products are perishable.

Before selecting the production technology for the processing unit, one has to be sure of the raw material volume. Will it be possible to get sufficient raw materials during the whole year to obtain sufficient profitability of the investment? Are the farmers willing to produce the crop and are there alternative uses for the raw materials.

Will the chosen technology make it possible to achieve a high product quality? Can machines and repairs be kept in sufficient

order? All these questions and many more have to be answered positively to be sure that the project forms the basis for further industrialization.

Especially for food and agricultural products a well functioning system from the producer till the final consumer is important. In too many countries and too many productions post-harvest losses and losses in storage and transportation seem to be too high, the absence of infrastructure being the rule.

Forestry

Until the middle of the sixties the developing countries' domestic processing of tropical log for export was very small. This is due to a number of factors which are still valid for some of the countries. The lack of capital and qualified workers for the development of an effective wood-based industry is one of the reasons, another one is sales security for the processed products to the importing countries. Added to this a number of the developing countries are still selling non-processed products owing to lack of foreign currencies.

The tendency in the development of the developing countries' wood-based industries is, however, to try to take over a larger part of the processing. Apart from the added work possibilities, this is also of importance to the export as converting logs to sawwood and plywood reduces the weight and volume of the raw material by approx. 50%, resulting in lower freight costs, which often accounts for up to 50% of the delivered price of tropical timber on overseas markets.

As an instance of growth in wood-processing industries in the developing countries, SEALPA (Southeast Asian Lumber Producers Association) can be mentioned, a union of ASEAN countries made in the attempt to regulate production and trade to obtain better prices from the importing countries. However, partly owing to the strong Japanese monopsony in order to protect their own processing industry, and partly to a large balance of payments deficit, especially in Indonesia and the Phillipines, SEALPA's

success has only been limited.

In an attempt to protect their own wood-processing industry the EEC, USA and Australia impose high tariffs on imported processed tropical wood.

When evaluating the development of the developing countries' wood-processing industries, it should be noted that the opportunity costs of the investments are often high, and will divert resources from other uses, where the return is more direct and often quicker. This is due especially to the fact that many tropical countries lack basic infrastructures and industrial bases. Added to this, the management in the forest industries in many developing countries is insufficient, which results in poor utilization of the production capacity. Among the reasons for the poor utilization of capacity are the nature of forest land ownership, which is often communal, provincial or tribal, periodical shortage of logs, low labour productivity, due to bottlenecks in the production or bad educated and trained labour and managers.

Although the total employment in forestry and wood-processing industries only accounts for a small part of the total working-force, it is often of great importance to local income and employment. The forest industries often have to be situated in areas near the forest, owing to the comparatively high cost of transporting unprocessed sawlogs to the sawmill.

III. COMMON FEATURES AND PROBLEMS OF THE RAW MATERIAL PROCESSING SECTORS

The structure of the raw material processing industrial complex in the developing countries has been briefly discussed in chapters I and II. The discussion seems to reveal some common features in the process of industrialization.

A fundamental problem for the developing countries concerning industrial development in the next decades is that a market is needed for a continued processing of raw-materials. The historical markets for most raw materials have been the western industrialised countries. During the last years also the newly industrialising countries have become markets. With a growing capacity in the raw-material producing sector in the the developing countries and with a trend towards a slower expansion of the markets in the industrialised countries concerning many goods, it seems difficult to expand the traditional markets and to make proposals for economic development. This is the case for minerals as well as the food and agro-based industry.

Many raw material exporting countries concentrate their export on a few export articles and have had difficulties in expanding their own processing sectores. These countries are very sensitive to external changes and changes in the trade pattern.

Two tendencies have characterised the raw material producing sector during the last decades. One tendency has been for bigger firms, transnational companies, public enterprises or cooperatives to be raw material producers and to exploit the resource base of mines, big plantations and farms. The most modern technology has been used, and the production technology has been capital-intensive. This type of raw material production is isolated from the local or regional development of the society in many countries. The production of raw materials could be for export or for the bigger urban centres.

The other type of raw material production is based on many small producers. They can be fully independent and can work together in cooperatives, organised for common sale, or sell the production via international or national trading companies. A case in point is Denmark, where small independent farmers have formed their own cooperatives for production and international trade and gained important market shares.

One problem of expanding the raw material production is to create a sufficiently efficient infrastructure for the raw material flows through the whole system. The pattern of competition varies for minerals, agro-based industry and forestry. In minerals and forestry big firms dominate the whole system. In food and agro-based processing the pattern is far more complicated as bigger and smaller firms are both found.

It is a characteristic feature of the agribusiness system that small producers and cooperatives are dominating the raw material production and the first stages of processing whereas the transnational companies are dominating the last stages of processing, the marketing and distribution system.

The common features of minerals, food and agrobased raw materials and forestry are illustrated in figure III, incl. raw material production, the different stages of processing and marketing.

Figure III: Some characteristics of the raw material processing complex.

	Raw material producers	Processing	Futher Processing and Marketing
Minerals.	<ul style="list-style-type: none"> - TNC dominating - capital intensive -high export quota - low multiplier effect. 	<ul style="list-style-type: none"> - TNC dominating - capital intensive - large scale production - R&D intensive 	<ul style="list-style-type: none"> - Hard competition - TNC dominating
Food-and agrobased processing	<ul style="list-style-type: none"> - Many producers - Labour intensive - high multiplier effect 	<ul style="list-style-type: none"> - perishable goods - all scales of production - storage problems 	<ul style="list-style-type: none"> - TNC dominationg
Forestry	<ul style="list-style-type: none"> - Long regeneration period - low multiplier effect 	<ul style="list-style-type: none"> - Many uses - taking place in industrialised countries 	<ul style="list-style-type: none"> - TNC dominating

IV. MEASURES FOR PROMOTING PROCESSING INDUSTRIAL DEVELOPMENT

It has been proved that there is still a growing volume of raw materials for processing in the developing countries - and that the volume for the next decades is expected to grow at a relatively high rate.

The question is therefore how the developing countries can promote industrial development via national or international policies. International policies should not be included in this discussion, but a continued international dialogue to create a high degree of stability on the international raw material markets is an important element in this process of industrialization.

The domestic policies can roughly be divided into four strategies for future industrial development

- (1) Import - substitution strategies
- (2) Export promotion strategies
- (3) Integrated internal industrialization strategies
- (4) Strategies for centrally planned economies

Besides these strategies, strategies for more basic needs as stated in the introduction could be a feasible solution to the further industrialization of many developing countries. A few large developing countries are having a relatively high share of the total industrial production namely the New Industrialised Countries (NIC). Most other countries have a rather weak industrial development and little industrial tradition.

The objectives for each country's economic and social development are many. Increased employment, increased income, a more equal income distribution, balanced economic growth, reduced inflation, better nutrition and education, higher housing standards and better medical care.

The policies for promoting the development of industrialization have to fulfil the same goals.

A high rate of industrialisation can be achieved by a general economic policy and by providing the framework for the future development within which the entrepreneur, private, public or semipublic, can operate. The measures used in this form of policy are fiscal policies, monetary policies, labour market policies, foreign trade policies and policies directed towards the infrastructure. In this type of industrial policy, it is very important to incorporate a competition policy. The individual product and factor markets are normally characterised by a few dominating firms, monopoly or some type of oligopoly.

The most important policy for promoting industrial development is perhaps the educational policy! General education supplemented with special schools for different industries, craftsmen etc. Experience has shown that this type of policy is efficient and can promote the process of industrialization in the long run. To achieve fast results in the process of industrialisation special courses in management, investment and project-analysis as carried out by international and national bodies, could be most helpful.

A more specific industrial policy could also be introduced where the public or semipublic element is more predominant and where the planning of the future development is incorporated. This type of policy includes the earlier mentioned elements, but more public decisions are taken concerning the investment patterns resource allocation.

Selection of policy must be seen in relation to the actual position of each country. Links to the international economy, earlier industrial traditions, unemployment and level of industrialization could be decisive for the selection of policy.

These general remarks on measures in the industrial policy demonstrate that each country has to formulate its own policy based on the exact situation of the country in question.

The formulation of policies often means some form of compromise between the different groups.

Import substitution strategies

Several developing countries have a certain import of raw materials, food and minerals. For this group of countries, policies promoting domestic production and processing seem most realistic. A restrictive trade policy with tariffs on import and incentives to start up local productions are means which could be used successfully. Especially in the case of agrobased products, this type of policy could have a strong influence on the local industrial activity. The strategy for import substitution could be used in countries where a fast rise in import of consumer goods is recorded. It includes policies to promote internal industrial production of the goods. In the case of many food items, veterinary capacity, lack of high quality raw materials could mean a final processing of imported semi-processed raw materials. Milkpowder and other ingredients for the food industry could be possibilities. This type of import substitution could be supported by joint ventures.

As the main stress in production or raw materials is on food and agrobased products, import substitution strategies could be supported by national food strategies. For most developing countries more formal food strategies have been worked out. Such strategies must be seen as important elements in the future process of industrialization for the countries where shortage of food is an important problem.

Strategies for import substitution as well as export promotion could give serious international reactions and should therefore be worked out in accordance with the GATT-rules.

Export-oriented industrialization

This type of policy and strategy is for countries with surplus of raw material production. From FAO estimates it can be seen that many countries have an export potential. The situation

on the world market for raw materials and food items, however, requires a rather effective support to be given in order to keep up with the traditional suppliers, who have intensified the export promotion arrangements during the last years. Export-oriented industrialisation based on raw materials can only be used for a small part of the developing countries as the world market has a limited size.

It ought to be mentioned that protecting and subsidizing the country's own industry can result in inefficient industries with lack of international competitiveness.

Integrated Industrialisation Strategies

The philosophy of this type of industrialisation is based on an industrial structure consisting of interrelated industries, producing consumer goods as well as equipment. Such a type of industrialisation is to a high extent based on a closed economy and could only be feasible for the large countries, which are well supplied with resources and have a high capacity in the field of research and development.

This type of industrialisation needs a very strong governmental intervention on almost all levels of production and processing.

Strategies for centrally planned industrialisation

The industrial development in centrally planned developing countries is normally centred on a combination of reallocation of resources and growth. The incentives to promote industrialisation include among other things state-owned or semi-public plants at the different stages of the industrial complex, price policies and long term planning.

In some countries with this type of industrial development they have been able to solve some of the problems concerning basic needs - China is a case in point.

Industrialisation based on raw materials and rural development

Even if different elements from the previous strategies can be useful for the future industrial strategies, most developing countries are dependent on the primary sector. Most of the people are living in rural districts, urban centres are becoming overcrowded, there is a shortage of food, and a rise in the demand for more processed food. The countries' industrial policy has therefore to be based on the fundamental needs of the population. A further processing of their own raw materials and a development of the employment opportunities in the rural districts could be a successful strategy. This type of industrialisation strategy is rather difficult and requires strong governmental involvement in education and in the creation of co-operatives or other bodies to ensure that processing activities and possibilities are available in all local areas. Small-scale production and processing units are here necessary.

Policies to promote a further processing of minerals in the developing countries.

A further processing of minerals in the developing countries to keep a higher share of the value-added in the country, requires some special policies according to the structure of the industry, dominated by transnational companies and characterized by lack of technological know-how.

A form of co-operation between the transnational companies and the country in order to transfer technology seems necessary. Too radical policies on this matter have not given any positive results in very many countries in earlier decades.

Seen from a raw producer's point of view, it is important to know the price-formulation at the different stages of production and processing to be able to keep a fair share of value-added in the country. This requires a policy to get insight into the accounting procedure and international capital flows.

Measures

The mineral processing developing countries are heavily dependent on other parties. These parties include the transnational corporations, the governments of mineral importing countries, and international institutions, both public and commercial, who finance the mineral processing sectors. There are contradictory interests among these parties and each one will typically pursue his own distinct objectives. Especially the mineral processing developing countries are dependent on transnational corporations because of their dominant role in mineral processing industries.

The transnational corporations supply capital, infrastructure, technically and highly skilled labour, besides the market for the output. Often the transnational corporations own several firms in the processing industries.

As long as a mineral processing developing country is heavily dependent on other parties, it will be in a relatively weak bargaining position.

Policies for developing the food and agro-industrial complex

An important element in the industrialisation process is to develop well functioning food systems. As the infrastructure of the system in many countries is weak, policies concerning storage and transportation are needed to reduce post harvest losses and to keep the channels of distribution between producer and consumer intact.

Many investment projects have not met the expectations of the food and agribusiness system, perhaps due to prior understanding of the interaction between the parties to the system, or to desire to process surplus production from the market for fresh products.

Important specific policies for creating a well functioning food and agribusiness system are better education of the farmers and fishermen, a practical location of processing units to avoid postharvest losses, building up of distribution channels with

storage facilities, quality control and stabilisation of demand via food and nutrition policies.

V. CONCLUSION

This paper has illustrated the possibilities for future industrialisation in developing countries based on domestically produced raw materials.

The survey indicates clearly that the process of industrialisation for most developing countries has to be based on the food and agro-industrial complex. Minerals are concentrated in few countries and the production and processing are characterised by large-scale operations.

When promoting future industrial development on the basis of domestically produced raw materials, it is important to keep in mind that the industrialised markets for many products will only show a moderate growth. This means that export markets in other developing countries will become important and for many countries the domestic market will be still more important.

The creation of a successful industrialisation on the basis of domestically produced raw materials requires measures within a broad range of policies. It must be stressed that such policies ought to support a harmonious interaction between the different parts of the raw material industrial complex. Further processing is a process requiring rising levels of technology. Education and parallel import of technology could be means of speeding up the process.

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ANNEX TO
POLICIES AND MEASURES FOR DOMESTIC
INDUSTRIAL PROCESSING OF RAW
MATERIALS IN DEVELOPING COUNTRIES

This appendix includes three tables which give some basic information about the processing on the basis of domestically produced raw materials.

In the first table the actual production of raw materials from agriculture, livestock, fishery and forestry products is shown for the year 1980 for the world, and for the main regions of developing countries, as Africa developing, Latin America, near East developing, far East developing and Asian centrally planned economies. The figures are 1000 metric tons.

For the single groups of raw material production the annual growth rate from 1971-80 is further shown. The source is FAO, the State of food and agriculture, Rome 1982, page 118-125.

Table 2. shows the annual growth rate for mining and quarrying from 1968-1979, the development for the main sectors, coal mining, crude petroleum and natural gas, metal ore mining, other mining and for the total mining and quarrying. The growth rate for as well production as employment is shown. It can be seen that for metal ore mining there has been a reduction in employment. The source of this table is Industrial Yearbook from United Nations.

Table 3. shows the growth rates for food, beverages and tobacco, wood products and furniture, paper and paper products. It should be noted that the growth rates for developing market economies for as well production as employment has been relatively high. The table is based on UN, Industrial Statistics.

Table I. Volume of production of major Agricultural, Fishery and Forest products.

	1990	ANNUAL RATE OF CHANGE 1971-80 PERCENT		1990	ANNUAL RATE OF CHANGE 1971-80 PERCENT		1990	ANNUAL RATE OF CHANGE 1971-80 PERCENT
WORLD			AFRICA DEVELOPING			LATIN AMERICA		
AGRICULTURAL PRODUCTS			AGRICULTURAL PRODUCTS			AGRICULTURAL PRODUCTS		
TOTAL CEREALS	1366200	2.57	TOTAL CEREALS	48210	-0.38	TOTAL CEREALS	67807	2.95
WHEAT	444800	2.91	WHEAT	3722	1.53	WHEAT	14762	2.73
RICE PADDY	306155	2.75	RICE PADDY	3725	1.96	RICE PADDY	16371	4.56
BARLEY	161816	2.26	BARLEY	1182	2.7	BARLEY	1203	1.13
MAIZE	300900	3.22	MAIZE	1212	2.2	MAIZE	44011	1.47
MILLET AND SORGHUM	65709	1.92	MILLET AND SORGHUM	18376	1.29	MILLET AND SORGHUM	9664	5.24
ROOT CROPS	486120	-24	ROOT CROPS	81550	2.14	ROOT CROPS	44280	-0.88
POTATOES	226882	-79	POTATOES	3056	4.56	POTATOES	10373	2.33
CASSAVA	126492	2.75	CASSAVA	46489	2.20	CASSAVA	30406	-1.44
TOTAL PULSES	47130	-37	TOTAL PULSES	4568	1.36	TOTAL PULSES	4692	-0.6
CITRUS FRUIT	58180	3.29	CITRUS FRUIT	2574	1.61	CITRUS FRUIT	16894	6.67
BANANAS	39417	2.44	BANANAS	4125	2.07	BANANAS	19017	-9.7
APPLES	34999	3.04	APPLES	70	5.13	APPLES	1562	7.45
VEGETABLE OILS-OIL EQUIV	214879	3.46	VEGETABLE OILS-OIL EQUIV	11404	-0.75	VEGETABLE OILS-OIL EQUIV	30518	10.22
SOYBEANS	82987	7.17	SOYBEANS	192	11.44	SOYBEANS	10807	32.26
GROUNDNUTS IN SHELL	12523	-36	GROUNDNUTS IN SHELL	3901	-1.68	GROUNDNUTS IN SHELL	1063	-2.38
SUNFLOWER SEED	15264	4.30	SUNFLOWER SEED	143	11.77	SUNFLOWER SEED	1781	7.09
RAPESSEED	10826	4.82	RAPESSEED	22	-5.9	RAPESSEED	98	2.55
COTTONSEED	78480	2.16	COTTONSEED	935	-1.03	COTTONSEED	22015	1.28
COPRA	4711	2.18	COPRA	170	1.63	COPRA	252	-1.6
PALM KERNELS	1819	4.38	PALM KERNELS	725	-0.30	PALM KERNELS	349	2.79
SUGAR (CENTRIFUGAL, RAW)	84177	2.55	SUGAR (CENTRIFUGAL, RAW)	3622	2.95	SUGAR (CENTRIFUGAL, RAW)	26039	-2.00
COFFEE GREEN	4756	-48	COFFEE GREEN	1167	-1.64	COFFEE GREEN	2866	-5.8
COCOA BEANS	1650	-71	COCOA BEANS	103	-1.25	COCOA BEANS	56	6.61
TEA	1070	3.97	TEA	184	5.18	TEA	52	1.00
COTTON LINT	34202	-65	COTTON LINT	509	-7.2	COTTON LINT	1621	1.92
JUTE AND SIMILAR FIBRES	3908	2.68	JUTE AND SIMILAR FIBRES	220	-2.75	JUTE AND SIMILAR FIBRES	79	1.10
SISAL	495	-5.62	SISAL	220	-2.71	SISAL	263	-3.70
TOBACCO	5129	1.68	TOBACCO	275	6.54	TOBACCO	738	6.38
NATURAL RUBBER	3814	2.65	NATURAL RUBBER	206	-1.37	NATURAL RUBBER	31	1.39
TOTAL MEAT	140618	3.02	TOTAL MEAT	4604	2.77	TOTAL MEAT	14421	6.15
TOTAL MILK	449381	1.82	TOTAL MILK	7823	2.08	TOTAL MILK	32617	3.27
TOTAL EGGS	22697	2.74	TOTAL EGGS	613	5.13	TOTAL EGGS	2847	5.58
WOOL GREASY	2813	-10	WOOL GREASY	64	.74	WOOL GREASY	327	-0.6
FISHERY PRODUCTS 1/			FISHERY PRODUCTS 1/			FISHERY PRODUCTS 1/		
FRESHWATER + DIADROMOUS	8040	1.27	FRESHWATER + DIADROMOUS	1421	1.77	FRESHWATER + DIADROMOUS	306	6.10
MARINE FISH	18274	1.4	MARINE FISH	1368	-1.66	MARINE FISH	8703	-0.55
CRUSTACEANS + CEPHALOP	952	5.45	CRUSTACEANS + CEPHALOP	66	9.53	CRUSTACEANS + CEPHALOP	561	3.76
AQUATIC ANIMALS	952	2.74	AQUATIC ANIMALS	1	-7.76	AQUATIC ANIMALS	50	-95.04
AQUATIC PLANTS	181	2.68	AQUATIC PLANTS	5	-1.10	AQUATIC PLANTS	132	1.61
TOTAL	3133	5.59	TOTAL	321	7.31	TOTAL	1074	6.49
FOREST PRODUCTS 2/			FOREST PRODUCTS 2/			FOREST PRODUCTS 2/		
SAWLOGS CONIFEROUS	600259	1.11	SAWLOGS CONIFEROUS	1223	2.01	SAWLOGS CONIFEROUS	26080	6.21
SAWLOGS NONCONIFEROUS	241223	1.30	SAWLOGS NONCONIFEROUS	19335	1.78	SAWLOGS NONCONIFEROUS	29358	3.96
PULWOOD-PARTICLES	341361	-67	PULWOOD-PARTICLES	2216	7.32	PULWOOD-PARTICLES	17178	9.25
FUELWOOD	1543483	1.93	FUELWOOD	315335	2.83	FUELWOOD	253330	2.56
SAWNWOOD CONIFEROUS	322445	-77	SAWNWOOD CONIFEROUS	459	2.40	SAWNWOOD CONIFEROUS	11096	5.45
SAWNWOOD NONCONIFEROUS	182944	-34	SAWNWOOD NONCONIFEROUS	5486	2.97	SAWNWOOD NONCONIFEROUS	12584	7.43
WOOD-BASED PANELS	101974	2.95	WOOD-BASED PANELS	325	2.11	WOOD-BASED PANELS	194	11.42
PULP FOR PAPER	122170	2.83	PULP FOR PAPER	321	7.31	PULP FOR PAPER	509	11.22
PAPER-PAPERBOARD	174166	2.95	PAPER-PAPERBOARD	321	7.31	PAPER-PAPERBOARD	7149	6.21

1/ Nominal catch (live weight) excluding Whales

2/ Except for pulp for paper and paperboard, all forest products in thousand cubic metres.

Table I. continued. Volume of production of major Agricultural, Fishery and Forest products.

	1980	ANNUAL RATE OF CHANGE 1971-80 PERCENT		1980	ANNUAL RATE OF CHANGE 1971-80 PERCENT
NEAR EAST DEVELOPING			NEAR EAST DEVELOPING		
AGRICULTURAL PRODUCTS			AGRICULTURAL PRODUCTS		
TOTAL CEREALS	54249	3.18	TOTAL CEREALS	271357	3.49
WHEAT	31399	3.99	WHEAT	54745	6.49
RICE PADDY	4322	.65	RICE PADDY	15101	2.37
BARLEY	9282	4.04	BARLEY	9212	1.52
MAIZE	5630	3.33	MAIZE	42525	4.69
MILLET AND SORGHUM	4284	1.39	MILLET AND SORGHUM	14170	1.07
ROOT CROPS	6582	3.44	ROOT CROPS	113351	.92
POTATOES	6151	3.82	POTATOES	14974	2.36
CASSAVA	122	-1.74	CASSAVA	7324	10.93
TOTAL PULSES	1836	1.09	TOTAL PULSES	14264	2.79
CITRUS FRUIT	3733	3.88	CITRUS FRUIT	1497	1.98
BANANAS	305	1.33	BANANAS	1059	1.34
APPLES	1908	6.86	APPLES	3680	4.98
VEGETABLE OILS, OIL SEEDS	6297	1.16	VEGETABLE OILS, OIL SEEDS	74983	1.37
SOYBEANS	201	35.06	SOYBEANS	10394	.08
GROUNDNUTS IN SHELL	913	8.22	GROUNDNUTS IN SHELL	3464	.48
SUNFLOWER SEED	781	2.33	SUNFLOWER SEED	930	31.67
RAPESEED	50	33.54	RAPESEED	5478	.39
COTTONSEED	2184	-3.87	COTTONSEED	527	5.27
COPRA	2041	.72	COPRA	48	3.14
SUGAR (CENTRIFUGAL, RAW)	5	-1.02	SUGAR (CENTRIFUGAL, RAW)	3807	2.73
COFFEE GREEN	119	16.32	COFFEE GREEN	18	8.74
TEA	1337	-2.43	TEA	350	5.74
COTTON LINT	14	-2.59	COTTON LINT	2713	.39
JUTE AND SIMILAR FIBRES	209	3.67	JUTE AND SIMILAR FIBRES	1192	7.57
TOBACCO	3491	4.25	Sisal	6	.59
TOTAL MILK	1462	3.08	TOBACCO	792	.35
TOTAL EGGS	602	8.58	NATURAL RUBBER	149	13.49
WOOL GREASY	182	2.51	TOTAL MEAT	23963	4.98
FISHERY PRODUCTS 1/			TOTAL MILK	7418	4.73
FRESHWATER - DIADROMOUS	149	2.74	TOTAL EGGS	4974	3.65
MARINE FISH	809	4.33	WOOL GREASY	197	2.99
CRUST. MOLLUS. CEPHALOP.	26	-2.18	FISHERY PRODUCTS 2/		
AQUATIC ANIMALS	7	-7.17	FRESHWATER - DIADROMOUS	1504	2.35
AQUATIC PLANTS	2	-80.66	MARINE FISH	5197	2.72
FOREST PRODUCTS 2/			CRUST. MOLLUS. CEPHALOP.	1231	7.50
SAWLOGS CONIFEROUS	5329	4.87	AQUATIC ANIMALS	14	-7.02
SAWLOGS NONCONIFEROUS	1831	-3.43	AQUATIC PLANTS	1556	8.64
PULWOOD-PARTICLES	1031	.41	FOREST PRODUCTS 2/		
FUELWOOD	5162	-4.1	SAWLOGS CONIFEROUS	23744	4.85
SAMWOOD CONIFEROUS	2468	4.41	SAWLOGS NONCONIFEROUS	15308	5.21
SAMWOOD NONCONIFEROUS	1126	11.82	PULWOOD-PARTICLES	5313	8.44
WOOD-BASED PANELS	822	11.82	FUELWOOD	27964	2.08
PULP FOR PAPER	287	1.46	SAMWOOD CONIFEROUS	14016	3.79
PAPER-PAPERBOARD	133	5.48	SAMWOOD NONCONIFEROUS	9386	3.00
			WOOD-BASED PANELS	2980	5.21
			PULP FOR PAPER	2364	7.06
			PAPER-PAPERBOARD	8974	8.72

1/ Nominal catch (live weight) excluding Whales

2/ Except for pulp for paper and paperboard, all forest products are expressed in thousand cubic metres.

TABLE 2.

Annual Growth Rate of Production and
Employment, Mining and Quarrying
1968-1979

	Coal Mining	Crude Petroleum and Natural gas	Metal Ore Mining	Other Mining	Total
<u>PRODUCTION</u>					
Developing Market Economies	3.7	3.5	1.8	4.8	3.0
Caribbean, Central and South America	6.2	2.2	3.1	4.8	2.5
Asia, excl. Israel and Japan	3.2	4.2	1.3	6.8	3.7
World	.9	3.8	1.4	4.0	2.9
<u>EMPLOYMENT</u>					
Developing Market Economies	1.3	3.4	-0.3		1.7
Caribbean, Central and South America		3.7			
Asia, excl. Israel and Japan	1.3	1.7	-0.6		2.0
World	-0.8	3.0	-0.3		0.2

Source: Yearbook of Industrial Statistics, 1980 Edition

TABLE 3.

Growth of selected Industries 1968-80.

Annual per cent growth

	Food, beverage and tobacco		Wood products and furniture		Paper and paper-products	
	production	employment	production	employment	production	employment
World	3.8	2.6	3.2	1.8	3.5	0.9
Centrally planed economies	4.5	1.1	5.5	0.4	5.4	1.2
Market economies	3.4	3.0	2.7	2.2	3.3	0.9
Developing Market economies	5.2	5.3	4.4	4.8	5.8	6.1
North America	3.3	-0.2	2.0	0.8	3.0	0.2
Caribbean, Central-and South America	4.2	4.2	4.0	—	5.4	4.5
Asia	5.0	4.6	0.6	3.4	4.8	2.4
Asia excluding Israel and Japan	6.6	5.6	4.3	4.8	5.8	7.1
Europe	3.2	0.1	3.5	-0.1	2.8	-0.8

Source: Industrial statistics.

