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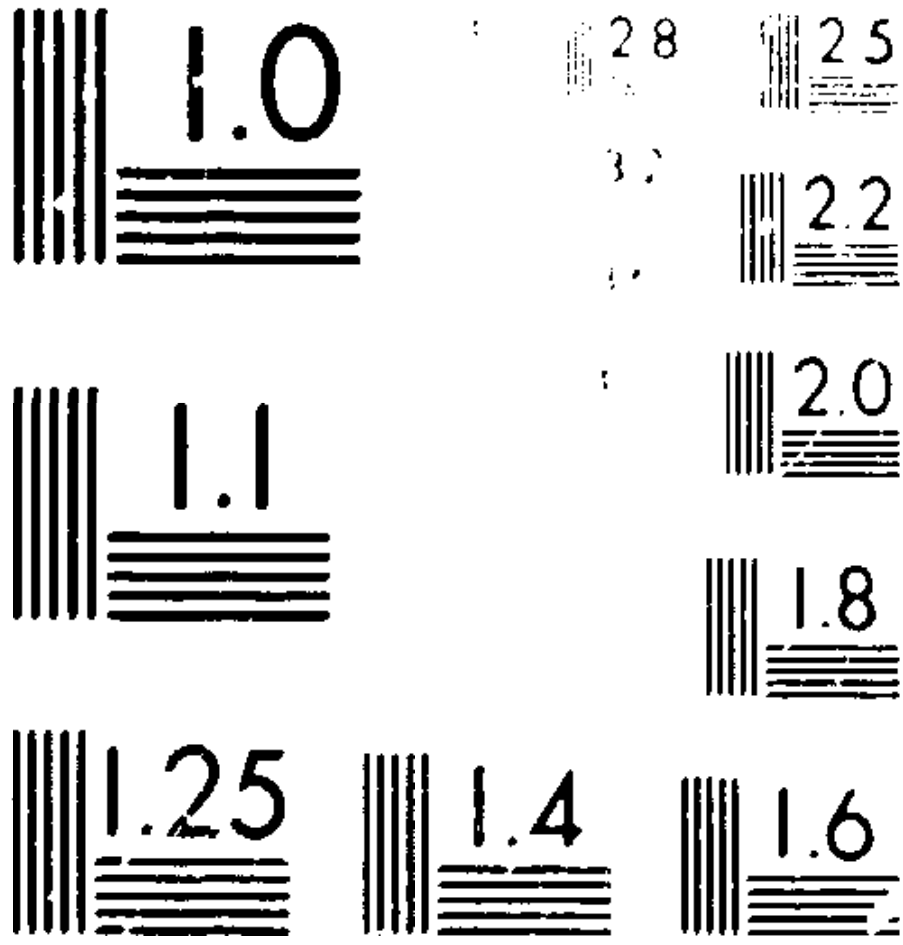
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FIRST GLOBAL STUDY ON THE FOOD-PROCESSING INDUSTRY *

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I. THE FOOD-PROCESSING INDUSTRIES: CURRENT SITUATION AND PROSPECTIVE ASPECTS

The food-processing industries bind together a very large number of manufacturing activities concerned with processing, preparing and packaging raw materials of plant, livestock and fishery origin for human food and animal feed.

The most complete readily available statistics on the food-processing industries with a very wide international country-by-country coverage are those published by the United Nations.[1/] These data fall under the heading "Manufacture of Food, Beverage and Tobacco," a division of the United Nations International Standard Industrial Classification of All Economic Activities (ISIC), major groups 311, 312 and 313. There are, thus, ten groups of food manufacturers,[2/] four under beverage industries[3/] and one group covers animal feed.

[1/] Yearbook of Industrial Statistics, 1978 (United Nations Publication, Sales No. E.10. XVII.10) New York, 1980.

[2/] They are as follows: slaughtering, preparing and preserving meat; manufacture of dairy products; canning and preserving of fruits and vegetables; canning, preserving and processing of fish, crustacea and similar foods; manufacture of vegetable and animal oils and fats; grain mill products; manufacture of bakery products; sugar factories and refineries; manufacture of cocoa, chocolate and sugar confectioneries; and manufacture of food products not elsewhere classified. The latter includes, inter alia, eggs, spices and coffee-processed products.

[3/] They are as follows: distilling, rectifying and blending spirits; wine industries; malt liquers and malt; and soft drinks and carbonated water industries.

It is to be stressed that this is a "classification of kinds of economic activities and not a classification of goods...."[4] Hence, the statistical data obtained from its application may in some cases be under-representative of the utilization of individual primary food products, or may not permit the ready and easy breaking down by individual processes or products within groups. In the present study, maximum use is made of this data, and especially the estimates of the size and geographic distribution of the global food-processing industry. It is recognized, however, that while the data published in the Yearbook of Industrial Statistics are the most extensive and comprehensive estimates available, substantial gaps exist in the present statistical material. In fact, as noted in a recent United Nations study,[5] "there are no reliable estimates of the value of world output, value added, etc. for food-processing industries at levels most useful for this study, e.g., meat processing, wheat milling, etc., even though such data are available for many industrialized and some developing countries."

In future work it would therefore be desirable to be able to obtain data permitting to identify and quantify better than at present, inter alia, the size of the industry, the types of processes it employs and its inputs, i.e., plant, livestock and fishery food products, and the outputs it supplies. These and other aspects, e.g., packaging, should be considered so that developments could be monitored and expected needs of countries more carefully identified.

A. Current situation

With an estimated world value added of $US 227.5 billion in 1978[6] and a labour force of 26.6 million, the food-processing industries hold a very important part in many developed and developing countries' overall industrial base,

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[4] International Standard Industrial Classification of All Economic Activities (United Nations publication, Sales No. E.68.XVII.8) Series M.4, Rev.2, New York, 1968.

[5] United Nations Centre on Transnational Corporations, "Transnational Corporations in Food and Beverage Processing," United Nations, New York, 1981, p.3 .

[6] In 1977 the estimated world output of processed food and beverages (obtained updating the 1975 data provided by the United Nations Centre on Transnational Corporations, ibid., p. 5 and Technical Annex I) was $US 741 billion.

and economy as a whole, as illustrated in Table 1.[7]

In fact, although the size of the industry in absolute terms varies widely from country to country, i.e., depending on the basic agricultural resources available and the diversification achieved in national industrial production, in practically all cases food manufacturing is a leading industrial sector. Thus, as stressed by an OECD study, "in seven industrialized countries, including the United Kingdom of Great Britain and Northern Ireland and the United States of America, the sector's contribution to the value of industrial production was greater in 1978 than in the case of industries belonging to the transport equipment sector that is nonetheless of prime importance in the majority of OECD member countries."[8]

Admittedly the relative importance of food processing diminishes with industrialization, but in several countries the food-processing industries have yet considerable potential for growth both in relative importance and in absolute size. This is particularly the case of most developing countries where for several decades to come food-processing industries are likely to remain the largest single industrial sector.[9] In fact, the food and beverage industry, though declining relatively, remains a key sector in all countries, as shown by the ratio of the value added by it to that added in total manufacturing.[10] On the 1973-1977 average, as indicated in Table 2, 10 per cent of the global value added by all manufacturing activities in the developed

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[7] These data should be interpreted as indicating only orders of magnitude and directions of change since in some cases they are not strictly comparable between countries and the comparisons may be influenced by the years chosen in so far as there are cyclical and year-to-year fluctuations in the variables.

[8] Organization for Economic Co-operation and Development, Impact of Multinational Enterprises on National Scientific and Technical Capacities, Food Industry, Paris, 1979, p. 32.

[9] E.A. Asselbergs, Situation and Prospects of the World Food-Processing Industry, Food and Agriculture Organization, Rome, 1972, p. 33.

[10] As generally reported in United Nations industrial statistics, value added can be defined as the current value of gross output less the cost of materials, fuels and other supplies consumed, services purchases and work contracted out, evaluated at approximate factor cost or market prices.

Table 1- The world food processing industry

Area	Value added [c] (10^9 $US) 1970	Value added [c] (10^9 $US) 1978	Share within manufacturing industries in 1970 and 1978 (Percentage) 1970	Share within manufacturing industries in 1970 and 1978 (Percentage) 1978	Employment [c] (Thousands of workers) 1970	Employment [c] (Thousands of workers) 1977	Average annual growth rate of value added (Percentage) 1970 - 1978
World	167.5	227.5	13	13	22,230.2	26,587.3	4.0
Market economy developed countries	103.2	133.2	12	10	8,631.7	8,717.2	3.7
Developing countries [a]	23.5	35.8	23	22	9,350.1	13,214.9	6.2
Africa	1.2	2.6	24	25	860.6	1,149.3	11.7
Latin America	13.1	17.9	21	19	1,878.9	2,546.4	4.6
Asia [b]	9.2	15.3	25	22	6,610.6	9,519.2	7.5
Centrally planned countries	40.8	58.5	16	13	4,248.4	4,655.2	4.6

Source: Calculated from figures in the United Nations, Yearbook of Industrial Statistics, Vol. I., 1978, New York, 1980 and other data supplied by the United Nations Statistical Office, New York.

[a] Market economy countries only

[b] Excluding Israel and Japan

[c] World totals do not consider China and the other Asian centrally planned developing economies.

Table 2. Value added in agriculture, manufacturing and food processing, 1961-1965 and 1973-1977

Groups of countries	Years	Value added (billion 1975 US dollars)			Growth rates: A. Total; B. Annual (Percentage)			Ratios	
		Agriculture	Manufacturing	Food and beverages	Agriculture	Manufacturing	Food and beverages	Food/ Agriculture	Food/ Manufacturing
Market economy countries	1961-1965	158.8	726.2	88.5	A. 120.0	173.0	154.0	0.557	0.122
	1973-1977	290.5	1,254.9	137.1	B. 1.5	4.7	3.7	0.720	0.109
Centrally planned economies	1961-1965	108.4	145.7	26.0	A. 119.0	266.0	194.0	0.240	0.178
	1973-1977	129.3	387.8	50.6	B. 1.5	8.5	5.7	0.391	0.130
Developing countries									
Higher income	1961-1965	24.9	37.2	6.9	A. 147.0	213.0	168.0	0.277	0.185
	1973-1977	36.8	79.2	11.6	B. 3.2	6.5	4.4	0.315	0.146
Medium income	1961-1965	32.1	17.6	5.1	A. 151.0	213.0	174.0	0.159	0.290
	1973-1977	48.5	37.5	8.9	B. 3.5	6.5	4.7	0.183	0.237
Lower income	1961-1965	40.6	13.5	1.6	A. 131.0	126.0	150.0	0.039	0.119
	1973-1977	53.1	17.0	2.4	B. 2.3	1.9	3.4	0.045	0.141
All developing countries	1961-1965	97.5	68.3	13.5	A. 142.0	196.0	170.0	0.138	0.198
	1973-1977	138.4	133.6	23.0	B. 3.0	5.8	4.5	0.166	0.172

Source: The Data Base of the Regional and Country Studies Branch, Division for Industrial Studies, UNIDO.

Note: The data in the table understate the share of the developing countries and overstate slightly that of the developed countries because the number of the former countries not supplying statistical data is larger than that of the latter. But the relative order of magnitude of developing industry in the world total is not likely to change appreciably even if the data were adjusted. The non-reporting developing countries are mostly very low-income countries and their contribution to the world food industry is small. The sample includes sixty developing countries and should be considered as fairly representative.

market economy countries[11] originated in the food and beverage sector. In the centrally planned economy countries[12] it was slightly higher (13 per cent). In a sample of 60 developing countries[13] for which industrial value added figures are available, it varied greatly from one income sub-group to another; for the group as a whole it was 22 per cent. In Africa it was very high, amounting to 25 per cent, thus occupying a large share of the tiny all-manufacturing sector.

In the developing countries as a whole and particularly in the poorest among them, food processing—though with some exceptions—has remained at low levels and has seriously lagged behind that of the developed countries. A salient feature of the mentioned sample of 60 developing countries is, in fact, the small value added in food processing. Another salient feature is the food-processing industry's stagnation at a dismally low level in the poorest developing countries, i.e., the group of countries representing the largest share of the world's population.[14]

The food-processing industry is, thus, geographically maldistributed. In 1978, as indicated in Table 1, developed market (58 per cent) and centrally planned economies (26 per cent) economies taken together had more than 84 per cent of world food and beverage processing. The 60 developing countries included in the sample accounted, instead, for about 16 per cent only of the aggregate value added in food and beverage processing. Therefore, as indicated in Table 3, the first positions in the ranking by country

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[11] Australia; Austria; Belgium; Canada; Denmark; Finland; France; Germany, Federal Republic of; Greece; Ireland; Israel; Italy; Japan; Luxembourg; Malta, Mauritius; Netherlands; New Zealand; Norway; Portugal; South Africa; Spain; Sweden; Switzerland; United Kingdon of Great Britain and Northern Ireland and the United States of America.

[12] Bulgaria; Czechoslovakia; German Democratic Republic; Hungary; Poland; Romania; and the Union of Soviet Socialist Republics.

[13] Latin America (Argentina, Barbados, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Trinidad and Tobago, Uruguay, Venesuela); Africa (Algeria, Angola, Central African Republic, Congo, Egypt, Ethiopia, Ghana, Ivory Coast, Kenya, Madagascar, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, Sudan, Tunisia, Uganda, United Republic of Cameroon, United Republic of Tansania, Zaire, Zimbabwe and Zambia); South Asia (Burma, Cyprus, Democratic Kampuchea, India, Indonesia, Iran, Iraq, Pakistan, Philippines, Saudi Arabia, Singapore, Sri Lanka, Syria, Thailand and Turkey); East Asia (Republic of Korea); Oceania (Fiji).

[14] This dismal finding is partly explained with the small growth rate of agricultural production that amounted to 2.3 per cent per year (in terms of gross output), for which per head food production declined. However, at the same time, food processing increased slightly (3.4 per cent per year) probably because of increased imports and increased services demanded by the growing urban sector.

Table 3. Share of major producers in the world food processing industry - value added

(1977)

Country	Percentage
United States of America	23.
USSR	17.5
Japan	7.2
France	6.2
Germany, Federal Republic of	5.8
United Kingdom	4.6
German Democratic Republic	2.7
Canada	2.4
Brazil	2.3
Italy	2.2
Netherlands	1.4
Spain	1.4
Mexico	1.3
Australia	1.3
Belgium	1.2
Bulgaria	1.1
Switzerland	1.0

Source: Regional and Country Studies Branch Data Base, UNIDO.

in the growth of value added in food manufacturing in 1968-1977 are held by the market economy countries and, to a lesser extent, by the centrally-planned economies. In particular, as of 1977, the world's largest producers--see Table 3--were, in order of magnitude, the United States of America (23.9 per cent of total value added in food processing), the Union of Soviet Socialist Republics (17.5 per cent), Japan (7.2 per cent) France (6.2 per cent), the Federal Republic of Germany (5.8 per cent), the United Kingdom of Great Britain and Northern Ireland (4.6 per cent), the German Democratic Republic (2.7 per cent), Canada (2.4 per cent), Brazil (2.3 per cent), Italy (2.2 per cent), the Netherlands (1.4 per cent), Spain (1.4 per cent), Mexico (1.3 per cent), Australia (1.3 per cent), Belgium (1.2 per cent), Bulgaria (1.1 per cent), and Switzerland (1 per cent). Together, these countries accounted for 83.5 per cent of the total. Among these countries the emergence of Brazil has been the most spectacular.

1. Production

These general trends in production conceal wide differences in the performances of individual countries and sub-sectors. In order to better identify these variations, data was compiled for production in physical units (thousand metric tons) over the period 1970-1977 and more recent years, wherever possible. Thus, among major meat products (pork, poultry, beef and veal), the bulk of the output appears concentrated in a very few countries (Argentina, Brazil, China, the Union of Soviet Socialist Republics and the United States of America). The meat-processing industry is chiefly important for pork, which is the raw material for the manufacture of bacon, ham, sausages and lard.[15] This industry represents more than 9 million tons of products a year,[16] with high growth rates (see Table 4). The share of the developing countries is only about 10 per cent in this sector, but the prospects are not negligible in countries where no religious or other injunctions limit the consumption of these products, because of the extensive possibilities for raising pigs and the good processing coefficient of pork, which makes it possible to produce at relatively low cost. Canned meat is also chiefly the product of the industrialized coun-

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[15] Lard is classified in the fats industry. Production of lard was 3.9 million tons in 1977.

[16] Since figures for the United States of America were not available, the production of pork-butchery products (ham, etc.) and sausages is greatly underestimated.

Table 4. Principal branches of the world food-processing industry

Branch	Production (thousands of tons) 1970	1977	Average Annual Growth Rate (percentage) 1970-1977	Share of Developing countries (percentage) 1970	1977
Meat processing					
Bacon, ham, etc.	1 425	1 549	1.0	3.3 a/	3.8
Sausages b/	2 758	4 109	5.8	29.4	30.3
Lard	3 627	3 941	1.1	20.8	28.5
Meat preserves	1 705	2 113	2.9	5.7	5.5
Dairy products c/					
Cheese	8 407	10 484	2.7	30	14
Butter	5 949	6 972	2.0	21	22
Condensed Milk	4 618	4 591	-0.1	14.5	18
Dried Milk	3 851	5 725	5.1	5	7
Cereals					
Wheat flour	121 424	130 444	1.0	20	18
Macaroni and noodle products	5 956	7 316	2.9	12	16
Bread d/	48 293	50 979	0.7	n.a.	n.a.
Biscuits e/ f/	3 888	4 900	3.4	16	20
Oilseeds c/					
Palm kernels	1 309	1 542	2.4	100	100
Coconuts	25 844	34 649	4.3	100	100
Sesame seeds	2 196	1 974	-1.5	100	100
Castor beans	807	921	1.9	92	92
Groundnuts	16 887	18 877	1.6	90	88
Safflower seeds	885 g/	1 101	3.2	70 g/	75
Cotton seeds	21 768	24 396	1.6	60	59
Rape seeds	6 673	10 186	6.2	46	35
			4.2		
Soyabeans	53 024	80 232	6.1	32	35
Olives	7 493	9 345	3.2	20	27
Sunflower	9 902	12 705	3.6	18	19

Table 4. Principal branches of the world food-processing industry, continued

Branch	Production (thousands of tons) 1970	1977	Average Annual Growth Rate (percentage) 1970-1977	Share of Developing countries (percentage) 1970	1977
Fishery Products					
Fresh, refrigerated and frozen fish	6 470	8 130	3.3	3 h/	10
Dried, salted and smoked fish	3 150	3 240	0.4	38	34
Frozen and dried crustaceans	730	1 140	6.6	46	52
Canned fish and crustaceans	3 790	4 570	2.7	13	14
Oils and Fats	1 250	1 100	-1.8	29	20
Meals	5 540	4 440	-3.1	49	28
Fruit and vegetable processing					
Jams b/	1 506	1 643	1.3	9.2	17.0
Concentrated fruit and vegetable juices b/	992	n.a.	n.a.	n.a.	n.a.
Canned fruit	5 123	5 088	-0.1	9.0	10.0
Canned vegetables	11 253	14 137	3.3	2.6	3.6
Deep frozen vegetables h/	2 873	4 380	6.1	n.a.	n.a.
Sugar industry					
Raw centrifugal sugar	71 292	86 960	2.9	54	55
Refined sugar	47 654	57 060	2.6	25	27
Chocolate industry c/	3 758	4 770	3.5	n.a.	n.a.
Coffee and coffee products c/					
Coffee extracts, essence and concentrates	193	288	5.8	35	36

Table 4. Principal branches of the world food-processing industry, continued

Branch	Production (thousands of tons) 1970	1977	Average Annual Growth Rate (percentage) 1970-1977	Share of Developing countries (percentage) 1970	1977
Beverage industry					
Wine	30 500	28 641	-0.8	13	12
Beer	64 310	79 461	3.1	12	15
Malt	5 864	8 397	5.3	..	..
Distilled alcoholic beverages j/	4 097	5 400	4.0	21	27
Soft drinks j/	27 158	37 060	4.5	29	30
Mineral water j/	9 074	12 730	5.0	9	6

Sources: Calculated from figures in United Nations, Yearbook of Industrial Statistics 1977, Vol. 1 and 2, Yearbook of Industrial Statistics 1978, Vol. 1, Food and Agriculture Organization of the United Nations, FAO Production Yearbook 1972, Vol. 26, FAO Trade Yearbook 1975, Vol. 29, FAO Trade Yearbook 1978, Vol. 32, FAO Production Yearbook 1978, Vol. 32, FAO Yearbook of Fishery Statistics 1977, Vol. 45

a/ Partly estimates.
b/ Figures exclude the United States of America and several other major countries.
c/ Figures are for the years 1970 and 1978.
d/ Figures for the United States of America, France and several other countries are not available.
e/ Figures for the Unites States of America are not available.
f/ Estimate for Japan.
g/ Figures refer to 1971.
h/ Very approximate estimates.
i/ No reliable data are available.
j/ Partially available data, figures for major producer countries are missing.

tries, because the share of the developing countries in production is only about 5.5 per cent. Livestock slaughtering and meat packing and distribution is carried out under uneconomic and unsanitary conditions in the poorest regions of most of the more advanced as well as most of the poorest developing countries. This results in the incomplete utilization of the edible parts of the animal carcass and offalls and in the loss of a large part of the by-products. However, the food-processing meat industry of the Latin American region produces about 20 per cent of the world's trade in beef; in addition, there is also much processing into corned beef and other meat products mostly for export purposes.[17]

The major processed dairy products—aside from pasteurized milk (for which no figures are available)—are cheese, butter, condensed and dried milk as described in Table 4. In spite of some reasonably successful programmes in India, Kenya, Mexico and Nigeria, in most other developing countries the situation for milk supplies is poor and getting worse. There are several reasons. The serious drought in the Sahel region of Africa and flooding in Bangladesh affected these areas. The major deterrents, however, have been the direct effect of government policies, e.g., making prices unattractive to investors, and the indirect effect of the rise in fuel costs. Thus, also because of the low yield per farm, the cost of setting up a milk assembly for processing and distribution is very high. To process the milk to dry powder form during surplus or high production periods and to store for reconstituting in low production periods requires large capital investments. Similarly, the marketing of safe milk for consumers requires many supporting services—processing plants storage facilities and outlets—because of the rapid deterioration of milk in warm climates.[18] Where the distances between the areas of production and distribution centres is great, collection points with cooling units, refrigerated transport and pasteurizing plants are required. These are all high in capital costs that are too great to be borne by the many small producers. Hence, while a large portion of the milk (which

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[17] A. Valdès and G. Nores, Growth Potential of the Beef Sector in Latin America: Survey of Issues and Policies, International Food Policy Research Institute, Washington, D.C., 1978, p.

[18] R.E. McDowell, "State of the Dairy Industry in Warm Climates of Less Developed Countries," World Agriculture, Paris, January 1981, p. 11-12.

could be available) is unavailable milk and milk products are relative luxuries in developing countries.[19]

A new type of dairy industry is, however, emerging in the developing countries. This involves the local production of re-constituted evaporated milk using imports of skim milk powder and butter oil. These are reconstituted together, homogenized, canned and sterilized. The product, when properly prepared, is quite indistinguishable from that made by evaporating liquid milk. A considerable advantage of the use of separated milk powder over whole milk powder is that it has a much better storage life and does not need cold storage conditions. In Ghana, for example, the very large market for evaporated milk is now supplied in this way. Thus, although there are still heavy imports of evaporated milk in the developing countries, this is an area where the development of the food-processing industry might be considerable. Another possibility is the production of "vegetable milks" prepared from vegetable fats (coconut oil, for example) and proteins (soya, groundnuts),[20] emulsifiers and stabilisers. Milk and eggs are also increasingly being replaced by vegetable protein and lactoserum in the industrialized countries for making bread, pastry and chocolate, because these products have better properties than conventional products for the industry.

Among the main sub-sectors of the cereals industry, wheat flour (see Table 4) is one of the most important food products in terms of basic needs satisfaction and in total volume. About 130 million metric tons were produced in 1977 (about half of this by Italy, the Union of Soviet Socialist Republics and the United States of America), but this was only 7.4 per cent greater than 1970 production. In comparison world population grew 14.2 per cent, so that per capita availability of wheat flour has been dropping. Wheat flour is used mainly in bread-making and in other flour confectionery processes. For bread-making, most developing countries have to rely on costly (hard) wheat imports from temperate countries. Flour mills have, therefore, been set up at the ports where the wheat is imported. Bread is an extensive processing industry with both large, automated plants and small bakeries with very little machinery. The need to replace some of the imported flour

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[19] In India, for example, ghee (clarified butter) is twice the price of its substitute based on vegetable oils, vanaspati.

[20] Keith H. Steinkraus, "Guideline for the Production of Soybean Milk and Soybean Curd at the Village Level," Food and Nutrition Bulletin, Vol. 2, No. 2, p. 29.

by non-wheat flours is increasingly recognized by several developing countries. The food-processing potential of secondary cereals (especially of sorghum and millet) is still largely unexplored, although research on this subject has established that it is commercially possible to incorporate into flour for breadmaking (as well as for biscuits, pasta and beer) up to 30 per cent of non-wheat flours.[21/] Although not a cereal, the food processing potential of the cassava tuber is also promising.[22/] For instance, with regard to the production of gari, a carbohydrate staple food that now can be done by special machine.[23/] The development of breadmaking production in the developing countries is subject to the following major constraints: an uncertain supply position, storage problems (because grain stocks are badly attacked by insects and rodent pests), new milling techniques, the marketing against products made (under better conditions) in the developed countries. However, in most cases, the equipment is available locally; heat energy is supplied often by burning wood and the ingredients other than flour—yeast, sugar, salt, edible oils—are available locally or by import. Still in its early stages, with the possible exception of the Latin American regions, is the production of secondary products, e.g., starch, corn oil, corn syrups, glucose, now becoming increasingly important for the food-processing industry as well as for the chemical industry. In this respect, rather than exporting "cassava chips" for processing abroad, there is, for example, scope for the production of starch from dried cassava tubers.

Among cereals in the developing world, rice milling is probably the largest single food processing industry, especially for the vast populations of Eastern Asia where most of the huge output of rice is produced. The products of milling are typically about half the original paddy weight as whole

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21/ G.R. Howat, Global Preparatory Meeting for a Consultation on the Food-Processing Industry, UNIDO/EX.60, Vienna, 8-12 January 1979, p. 30.

22/ Known also as manioc, mandioca, yuca and tapioca in various parts of the world.

23/ Gari is exclusively a West African foodstuff. It is estimated that more than 70 per cent of Nigeria's annual output of cassava is processed into gari, which ranks as the most important staple food in parts of the country, contributing in some southern and coastal districts an estimated 60 per cent of the people's total daily intake of calories. Cristopher G. Baron (edited by), Technology Employment and Basic Needs In Food Processing In Developing Countries, Pergamon Press, 1980, p.101.

kernels, 10-20 per cent as broken kernels, 10 per cent as bran,[24] and the remaining 25 per cent or so as husk. Further processing of milled rice can lead to the manufacture of rice starch. This has various food uses and normally the broken grains are used in its manufacture. A more recent development is the use of broken rice grains for treatment to produce liquid glucose syrups. Some of this processing is done in the rice-producing countries, but a lot of broken rice is exported to Japan for this purpose. The development of the rice-processing industry by the multi-stage mills[25] and for secondary products (such as glucose syrups) faces the following major constraints: (1) lack of entrepreneurs willing and able to purchase the mills and install them, (2) an uncertain supply situation, because farmers are unwilling to carry paddy to distant mills, (3) high energy consumption, although some heat energy can subsequently be obtained from the hulls, (4) difficulty in matching some types of multi-stage mills for the HYV rice because of the shape of the grain.

The oilseeds and oilseed products sector has already attained the Lima target of 25 per cent of world production located in developing countries. The aim, therefore, is to expand their share as much as possible—up to 50 per cent of world output should derive from developing countries by 2000—according to some predictions. There are many varieties of oilseed, and many products that can be manufactured from them. The dominant oilseed, however, is soyabean, which in 1970 and 1978 accounted for 30 per cent and 35 per cent of total oilseed production by volume. Other items of importance include coconuts, cottonseed, groundnuts, sunflower and rape seed (see Table 4). The processing of oilseeds gives two types of products: vegetable oils and fats, and oilmeal. Soyabean again dominates oils and fats, with 22 per cent of total volume in 1978; and also oilcakes and meals with 64 per cent in

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[24] Rice bran is potentially highly nutritious, containing both the oily germ and varying proportions of the vitamin containing seed-coating, but it needs further treatment to be of value as a human foodstuff. At present much of it is used as animal feed, though the oil is extracted to some extent in Japan and the United States of America. It is estimated that the rice-bran oil could contribute more than 5 kilograms of edible oil annually to the diet of each of the world's rice-eaters. But if the processing of the bran does not take place immediately after its separation, the oil is rapidly degraded due to the activity of enzymes present in the bran.

[25] With the introduction of multi-stage mills, it is possible to obtain a yield from paddy up to 70 per cent. In addition they separate the bran and the hulls, which can be used for heat energy in the mill.

in 1978. The scope for more extensive and intensive processing of oilseeds in developing countries is considerable, largely due to the fact that developing countries themselves can provide most of the increase in anticipated demand as well as supply. The major issue of importance for the production of oilseeds are: the high degree of geographical concentration; the dominance of soyabean; an increasing substitution between vegetable oils. Soyabean is a typical case of high geographical concentration, because the United States of America is by far the dominant producer (62 per cent of the total production in 1978). Similarly, Canada is the world's leading producer of rapeseed, India of groundnuts, Malaysia of palm oil, the Philippines of copra, the Union of Soviet Socialist Republics of sunflower seed, and the USSR, the United States and China of cottonseed. The dominance of the world's leading producers is, however, increasingly challenged. Argentina and Brazil, in particular, have made great efforts to erode the near monopoly held by the United States in the field of soyabeans. Thus, by 1978, Argentina and Brazil have increased the developing countries' stake in soyabean-oil production to 21.1 per cent (in respect of 1.5 per cent only in the mid-1960s). Moreover, their diversification efforts have not stopped here. By planting many hectares to sunflower, these two countries plan to attack the other quasi-monopoly held by the centrally planned economies, that produce two-thirds of all sunflower oil in 1978. Meanwhile, the Ivory Coast is straining to catch up with the big producers of palm oil(Malaysia and Indonesia) and of copra (Philippines). The oil palm—which yields two types of oil, palm oil (from the fleshy part of the fruit) and palm-kernel oil—is, in fact, very profitable and gives the highest oil yield per hectare. In this respect, the dominance of soyabean oil is also challenged by the expansion of the palm oil industry in Malaysia, which now contributes more than 10 per cent of the world's edible oil market. In fact, the olein fraction obtained with new technological processes, which fractionate the palm oil into the solid portion, stearin, and the liquid portion, olein, has recently been introduced in U.S. margarines in larger quantities and has become a close substitute for soya bean oil for use in margarine and cooking oil.[26/] Modern technology thus enables manufacturers to substitute one oil for another, and the demand for a particular oil can be affected, since it is inevitable that manufacturers will select the cheapest and most readily available oil for using in blended product. This is a par-

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[26/] M. Varnakulasingam, Study on the Fats and Oils Situation in Malaysia, UNIDO/APCC/C.3/80, 25 September 1980, p. 22.

ticular problem for many of the developing countries because of the concentration of a single product on which the oil-seed economy is based and the limitation of their stock and storage capacities to keep reserves against rapid changes i the prices of various oils.

The manufacture of oilcakes represents the world's major source of industrial protein for the animal-feed industry. The pattern of oilcake production reflects that of oilseeds with soyabean largely dominant in the global supply position with its low oil, high cake content compared with most other oilseeds. The bulk of the remaining production is accounted for by cottonseed, groundnuts, rapeseed, sunflowerseed and copra. Linseed, palm kernel, sesameseed and safflowerseed are of relatively minor importance. Developing countries produce only 27 per cent of world oilcake supplies (in "actual" terms).[27/] This compares with respective figures for the developed countries of 49 per cent and for the centrally planned countries of 24 per cent. These figures emphasize not only the role of factors converting oilseeds to oilcakes, but also the flow of oilseeds from developing countries for crushing mainly in developed countries. However, although the United States is still dominant (44 per cent of the world total in 1977), Brazil has also succeeded in raising considerably its share (13 per cent of the world total in 1977) of world production. It is thus these two countries that largely influence the trends within country groupings of world oilcake production. Although developing countries already process a high proportion of their oilseed production, there remains enormous scope for expansion, especially through improvement of oilseed processing methods that would not only increase oil-extraction rates, but would also improve the quality of the oilcakes produced. For example, oilcakes with a high residual oil content have poor keeping qualities, can have an adverse effect upon livestock performance and represent a waste of often much needed vegetable oil. A very high percentage of developing countries could, in particular, benefit from improved techniques. This

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27/ The level of oilcake production is estimated by taking into account as far as possible the crushing and extraction rates "actually" attained and also makes allowance for any export/import of oilseeds available for crushing. In addition, this calculation makes allowance for oilseed/cake stock changes and estimates tend therefore to be more representative of the output of domestic oilseed crushing industries.

need not necessarily be associated with more sophisticated processing techniques. Modern mechanical and chemical processing methods are now surprisingly widespread, but they are often associated with lower productivity parameters than in developed countries. The reasons for this situation are many but can be summarized by saying that the emphasis in development programmes (often funded by international aid programmes) has tended to be on the establishment of an industry per se without sufficient thought or sufficient resources being allocated to ensuring the continuation of the operational aspects of the industry. The result is that industries in many developing countries are often characterized by underutilized capacity or a relatively poor level performance. The specific reasons often relate to the scarcity of managerial or technical expertise, a lack of working capital for spare parts, etc., and eventually an inability to finance the replacement of aging equipment. A change of emphasis in development programmes towards the improvement or upgrading of existing processing facilities could have a major impact on the oilseed processing industry in many developing countries by both increasing absolute output and the quality of the end products.

Although production data for world fisheries are incomplete and do not agree well,[28] it is estimated that about 70 per cent of the world fish catch (70 million tons) goes to the industry. Of that total 23 million tons (47 per cent) were used in 1977 (see Table 4) for the manufacture of frozen fish, canned fish, and dried or smoked products; the remainder went to the meals or fats industry. Large-scale fishing of the oceans is virtually confined to the developed countries, especially Japan and the USSR, which employ sophisticated and expensive technology in their long-range fishing fleets. Important exceptions include some developing countries, e.g., the Republic of Korea increasingly equipped with processing large tonnage facilities. Over the period 1970-1977, with the exception of frozen fish and crustaceans, the share of developing countries has markedly decreased, especially for the meals and fats industry (mainly because of the much reduced anchoveta catches in Chile and Peru). However, the principle of 200 mile exclusive economic zones (EEZs), established by the United Nations Conference on the Law of the Sea, will provide new opportunities for coastal states to develop fish

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[28] The difference between the United Nations figures and those of FAO are as much as 1:2.

resources, gain more control over the income generated by the fish industry and respond to the urgent need for conservation, e.g., by way of joint ventures with foreign collaboration in deep sea fishing, as well as in further processing. This is particularly important in certain areas (the deep sea area around the Indian coast, West Africa, etc.), with large and rich fishing grounds, and in certain sub-sectors, e.g., tropical tuna, where developing countries claim a greater share of the fishing industry.[29] Fish farming, using lakes and ponds with locally available technology,[30] can also provide a valuable additional source for the development of fish processing in the developing countries, especially if pilot projects—intended as part of integrated schemes—are successful.

Divided into several segments, fruit and vegetables are another important field of food-processing. The United States of America and most of the other developed countries are by far the largest producers especially in the processing of vegetables that increased more rapidly than that of fruits. A few developing countries, have, however, rapidly emerged. Thus, in the fruit sector, the output of frozen concentrated orange juice, which is the main processed item and is produced in developing countries, mostly in Brazil, reached 460,000 tons in 1979/1980, overtaking Florida as the largest world producing area. Similarly, the processing of other fruit are expected to continue their expanding trend. This is particularly the case of canned pineapple (especially in the Philippines and in Thailand), of frozen strawberries (especially in Mexico), as well as of delicious and rich in nutrients fruit juices made of pineapples, oranges, guavas, lime, papaws, mangoes, etc. The processing industry has been most successful in supplying products for the domestic market requiring the least packaging, e.g., banana and guava pastes, or in supplying concentrates for export, e.g., oranges, where again the cost of packaging is a small percentage of product value. It has been least successful in the export of processed fruits in consumer size packaging. In fact, the availability and cost of appropriate packaging is the major single obstacle

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[29] Ann Scott, "The Third World Reclaims Tuna," South, December 1980, p.

[30] Sani D. Macabalang, "How to Multiply Your Profits by Raising Fish in Captivity," Small Industry Journal, Institute for Small-scale Industries, University of the Philippines, October/December 1980, p.

preventing the fruit and vegetable industry from taking off to its full potential in the developing countries. The crucial importance of this cost item to the industry's development is due to the fact that retail-size packaging costs—metal cans, labels and cardboard boxes—make up between 40 and 50 per cent of the ex-factory costs; then, they are more important than raw material input prices in determining the competitiveness of a country's fruit-processing industry.[31] Fruit input costs are another obstacle in the way of a modern fruit-processing sector in the developing countries. Owing to the low yields per hectare fruit input costs are often too high by international standards and in some cases the price paid by plants for the fresh product input is considered unremunerative by farmers. This is, of course, a problem not limited to fruit and vegetable processing, but related to the general conditions of production in developing countries.[32] A further important obstacle is the high cost of transport in general, both inland and for exports. Finally, there is a compromise to be studied in each case between the fraction of production that can be marketed fresh and the fraction that will be processed, particularly from the point of view of energy (transport, storage and packing). The developing countries' share in the world sugar industry in 1977 was 55 per cent for raw centrifugal sugar, and 27 per cent for refined sugar. The latter figure may be explained by two factors: the consumption of raw sugar in many developing countries and the import of raw sugar for refining in industrialized countries without beet-growing areas. In fact, refining takes place mostly in importing countries, while the extraction of raw sugar is concentrated near the centres of production of cane or beet. International sugar price fluctuations have had an impact on processing capacity expansion, the high world market prices of 1974-1975 generating a widespread effort to expand production

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[31] OECD Development Centre, Tropical Fruit-Processing Industries, Paris, 1976, pps. 199-200.

[32] The industry's chief problem is undoubtedly relations with agriculture, which must be extremely close because of the great delicacy and perishability of the products. It is essential that the factory has its own production area. The farmers associated with the factory must be carefully managed and must grow varieties that are suitable for the processing their products will undergo. This is particularly important for the fruit industry because of the interval that elapses between the planting of an orchard and the time it starts producing.

and processing. However, as a result of low prices and unfavourable market prospects since August 1976, expansion plans have been reviewed and projects for new mills cancelled or altered. In addition to a tendency towards increased self-sufficiency in the developed countries, demand for imports is falling because of increasing concern in medical and political quarters in the OECD countries about nutritional imbalances resulting from excessive consumption of refined sugar. Hidden consumption of sugar in soft drinks, biscuits, confectionery and pastry products is today receiving much publicity. Another factor potentially limiting sugar processing is the increasing competition from other sweeteners, especially high fructose corn syrup.[33/] Since the fiscal year 1977/1978, sugar consumption in the United States of America has declined largely because of the inroads of this sweetener into the sugar market. It has to be stressed, moreover, that sugar factories are genuine heavy industries that many countries in the developing world are unable to acquire at present. Research on limiting the size of these complexes is in progress and the methods envisaged include the following: a return to plants having a capacity of 800 to 1,200 tons of cane a day (the prevailing levels during the Second World War), while at the same time benefiting by the achievements of modern technology and the design of mini-sugar works that promote the development of traditional Indian technology with even lower capacities (approximately 600 tons of cane a day). Another line of research consists in making better use of the molasses by-product of sugar production. This by-product contains non-crystallizable sugar that can be consumed by cattle or converted into alcohol. It is also possible to use them for the cultivation of protein-rich micro-organism to serve as animal or human (as in the case of Cuba) food or capable of secreting metabolites that are of value in the chemical and pharmaceutical industry. Moreover, recent work shows that it is possible to extract non-crystallizable sugar by means of ion-exchange resins. The result is a liquid sugar that may be used in the same way as the already mentioned corn isoglucose. But this technology is much simpler and more standardized than the one that must be used in the case of corn. Sugar cane, on the other hand, seems to have a potential field of development as an energy crop in the producing countries, i.e., in the production

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[33/] Recently it was announced that fructose syrup is being substituted for sugar in the well-known soft drink Coca-Cola.

of alcohol as a fuel for vehicles in non-oil-producing countries.

Although five developing countries (Ivory Coast, Nigeria, Ghana, Brazil and the United Republic of Cameroon) account for nearly 80 per cent of world production of cocoa beans, the cocoa industry is mainly localized in the consumer countries of developed regions. In recent years, however, some developing countries, e.g., Brazil, Ecuador and the Ivory Coast, have started to process the highest percentage of their production of beans (49 per cent, 33 per cent, and 26 per cent, respectively).

The chocolate industry, which in addition to cocoa, incorporates other raw materials such as sugar and milk, resulted in 1978 in a world production of about 4.8 million tons. The main producing countries are the United States of America, with over 50 per cent of the total production; the Federal Republic of Germany with 406,000 tons; the Netherlands with 150,000 tons; France with 221,000 tons; and Japan with 116,000 tons. The chocolate industry is a highly concentrated business since a few TNCs account for more than 80 per cent of the total turnover. The developing countries' producers of cocoa beans accounted in 1978 for about 6 per cent only of the world chocolate industry. The average annual growth rate, over the period 1970-1978, as indicated in Table 4, is, however, higher in the developing countries than in the market economy developed countries. Similarly, the developing countries' share for intermediate products is much higher (approximately 35 per cent and 12 per cent, respectively, for cocoa butter and cocoa powder). Progress, however, could be even faster if the producers were assured of stable and worthwhile prices—as they have been demanding for so long. It is estimated that in 1978 about 288,000 tons of extracted, essence and concentrated coffee was produced with an average annual growth rate of 5.8 per cent. The share of developing countries in 1978 was 36 per cent. In recent years processors in developing countries such as Brazil and the Ivory Coast have also prepared dehydrated soluble coffee by the heat-drying or freeze-drying (liophilization) process. The manufacture of soluble and freeze-dried coffee is, however, particularly costly and the technology is controlled by a small number of TNCs (in particular Nestlé and General Foods).

Beverages is a very heterogeneous industry. It includes two large categories of products: non-alcoholic beverages (mainly mineral waters and soft drinks, with fruit and vegetable juices being attached to the industry processing these commodities) and alcholic beverages (wine, beer,

distilled beverages). There are no special manufacturing processes for these beverages in the developing countries because the industrial techniques required are the same as in the developed countries. However, the manufacturing of containers and packaging materials raises a number of problems relating to the capacity of bottling and canning lines, which tend to grow and become more complex, and to product presentation. If the domestic market is limited, the profitability of packaging and canning units may be reduced. There is, thus, a need in developing countries for the manufacturing of alternative containers and packaging materials, e.g., plastic crates suitable for containing soft drinks and beer.[34] Another major problem, in addition to the development of quality-control mechanisms, is the ability of using raw materials substitutes. In this respect, in many developing countries there is a thriving soft-drink industry[35] -- at present dominated by franchise-holders and based on costly import concentrates, which, especially in fruit-producing countries, could manufacture and preserve fruit extracts and concentrates as substitutes for imported raw material concentrates and as more economic bases for competitor products of the developed countries.

Equally important to the beverage sector of many developing countries is the enhancing, vis-à-vis imported products, of a wide variety of locally produced (hygienic) infusions[36], e.g., vervain in Morocco, mate in Argentina, orange tree blossoms in Algeria and Morocco, hibiscus in the Sudan and in Thailand, mullein in Egypt, rose petals in Morocco and in Pakistan, which are highly recommended not only for their taste but also for their considerable nutritional value.

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[34] UNIDO, The Development of Soft and Alcoholic Drinks Production in Iraq, ID/WG.328/6, 21 November 1980, p. 6.

[35] For instance, the Egyptian soft-drink market is worth an estimated $US 182 million per year and accounts for 24 per cent of the total Middle East market. World Drinks Reports, 12 November 1980.

[36] Hygienic infusions should be distinguished from what the trade calls medicinal infusions, although clear distinctions are difficult to make. The term "hygienic infusion" is generally used for the flavour natural drink that is considered part of a healthy diet and is mainly marketed through general food outlets. International Trade Centre UNCTAD/Gatt, "A study of the market for herbal/medicinal plant infusions in France and the Federal Republic of Germany," Geneva, October 1980, pp. 1-2.

2. Foreign trade

Table 5 provides world trade in processed food products, within world market economies and for 29 major sub-sectors.[37] World processed food imports in 1977 amounted to $US 72.7 billion, of which the developing countries imported $US 16 billion and the developed countries $US 56.6 billion. World processed food exports in 1977 amounted to $US 71.4 billion, of which the developing countries exported $US 23 billion and the developed market economies $US 48.3 billion. The bulk of the world processed food trade (respectively 77.9 per cent of total imports and 67.7 per cent of total exports) is, thus, directed towards the developed market economies. The share of developing countries' imports over the period 1970-1977 has increased considerably both in absolute value (from $US 4.2 billion to $US 16 billion) and in relative terms (from 17.8 per cent to 22.1 per cent). The increase of processed food imports appears concentrated in Asia (with $US 8.3 billion in 1977) and in Africa (with $US 4.4 billion in 1977), while the share of Latin America's imports decreased (4.2 per cent in 1977 as against 4.7 per cent in 1970). In 1978, the developing countries accounted for almost 90 per cent of total world imports of wheat flour. The developing countries also absorbed a rather high share of dry milk and cream and of evaporated milk, condensed milk and cream imports (55 per cent and 34 per cent, respectively in 1978). This situation is particularly disquieting because cereals provide by far the largest caloric intake in the diets of developing countries. As for milk products, the upsurge of imports has been due to several circumstances: the influence of nutritional theories favouring animal protein intake, the concentration of population in cities and the existence of a class of well-to-do consumers who could afford milk. The possibility of increasing local milk supplies by "toning" fat-rich buffalo milk with powder surpluses in exporting countries at concessional terms must also be borne in mind.

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[37] All food commodities entering international trade have undergone at least "first-stage"processing. This does not qualify them as "processed products," a term that is applied to products that have undergone further stages of processing. This is the reason why in this document the emphasis is on the development of trade in twenty-nine major sub-sectors of the world market economies. Because of the heterogeneity of food products and of the processed employed, the dividing line between "unprocessed" and "processed" products is arbitrary. Lack of perfect correspondence among the various statistical classifications and national tariff nomenclatures also contributes to the difficulty experienced in applying consistent criteria in compiling statistics differentiating between products at different stages of processing.

Table 5

World Market economies : Development of trade in processed food products[a/]

	Imports				Average annual growth rate (%)	Exports				Average annual growth rate (%)
	1970		1977			1970		1977		
	Value (million US$)	Share (%)	Value (million US$)	Share (%)		Value (million US$)	Share (%)	Value (million US$)	Share (%)	
Developed market economies	19,745.1	82.2	56,631.1	77.9	16.2	15,420.8	67.6	48,384.0	67.7	17.7
Developing market economies	4,263.9	17.8	16,098.3	22.1	20.9	7,385.8	32.4	23,040.4	32.3	17.6
Africa	1,094.4	4.6	4,465.3	6.1	22.2	1,794.5	7.9	4,607.1	6.5	14.4
Asia	1,964.8	8.2	8,309.9	11.4	22.9	1,874.9	8.2	7,984.8	11.2	23.0
Latin America	1,140.7	4.7	3,042.3	4.2	15.0	3,618.9	15.9	10,150.4	14.2	15.9
Oceania	64.0	0.3	280.8	0.4	23.5	97.5	0.4	298.1	0.4	17.3
World market economies	24,009.0	100.0	72,729.4	100.0	17.2	22,806.6	100.0	71,424.4	100.0	17.7

Source: Calculated from figures in the United Nations, Yearbook of International Trade Statistics, editions 1974 and 1978, Vol. 2, New York, 1979.

a/ The following processed food items have been included for the calculation of trade in processed food products:

011 Meat fresh, chilled, frozen
012 Meat dried, salted, smoked
013 Meat tinned, nes or prepared
022 Milk and cream
023 Butter
024 Cheese and curd
031 Fish fresh, simply preserved
032 Fish, etc., tinned, prepared
046 Wheat, etc., meal or flour
047 Meal and flour non-wheat
048 Cereal, etc., preparations
052 Dried fruit
053 Fruit preserved, prepared
055 Vegetables, etc., preserved, prepared
061 Sugar and honey
062 Sugar preparations non-chocolate
072 Cocoa
073 Chocolate and products
074 Tea and mate
075 Spices
081 Animal feeding stuff
091 Margarine, shortening
099 Food preparations, nes
111 Non-alcoholic beverages
112 Alcoholic beverages
411 Animal oils and fats
421 Fixed vegetable oils, soft
422 Fixed vegetable oils, non-soft
431 Processed animal vegetable oils, etc.

The share of developing countries' exports over the period 1970-1977 is stagnant and even slightly decreasing. Developing countries' exports, however, rose in absolute value from $US 7.4 billion to $US 23 billion over the same period of time. The importance of processed food exports appears concentrated in Latin America (with over $US 10 billion) and Asia (whose share in total exports appear substantially on the rise). Africa, instead, accounts both for a considerable decline in the share of total exports (6.5 per cent as against 7.9 per cent between 1970-1977) and the most moderate average annual growth rate (14.4 per cent as against 23 per cent of Asia and 16 per cent of Latin America). A product-by-product analysis shows that among developing countries' food exports in 1977, three products, namely, butter; wheat etc. meal or flour; fixed vegetable oils (non-soft), maintained roughly their share ($\geq$ 0.4 per cent) within total world processed food exports as compared to 1970, while 14 products, meat fresh, chilled, frozen (11.8 per cent of total exports), meat dried, salted, smoked (1.1 per cent), meat tinned n.e.s. or prepared (24.7 per cent), milk and cream (2.2 per cent), meal and flour non wheat (12.6 per cent), sugar and honey (64.8 per cent), cocoa (80.5 per cent), tea and mate (87.7 per cent), spices (85.8 per cent), animal feeding stuff (39.2 per cent), food preparations n.e.s. (8.6 per cent), non-alcoholic beverages (5.1 per cent), animal oils and fats (3.7 per cent), alcoholic beverages (6.2 per cent) showed a decrease and 12 products showed an increasing share in total world market economies' processed food exports. The 12 products with an increasing share were: dried fruit (47.7 per cent of total exports), simply preserved fish (38.5 per cent), fixed vegetable oils (34.4 per cent), fruit preserved and prepared (30 per cent), tinned and prepared fish (23.5 per cent), preserved and prepared vegetables (19.1 per cent), processed animal vegetable oils (17 per cent), chocolate products (16.3 per cent), margarine (10.9 per cent), sugar preparations (10.2 per cent), cheese and curd (1.9 per cent) and cereal preparations (8.3 per cent). The developing countries, moreover, almost completely dominate the world [illegible] of spices, tropical beverages and fruits. On the other hand, the developed countries have a quasi monopoly in livestock products, especially milk products and some meats (e.g. pigmeat mostly traded among developed countries). For all other commodities there is some degree of competition between the two groups of countries. For most of them the developed countries have a

Table 6. Developing countries: Selected processed food products with an increasing share in total world market economies' processed food exports in 1977 as compared to 1970

SITC	Product	World market economies' exports		Developing countries' share	
		1970	1977	1970	1977
		(million US dollars)		(percentage)	
024	Cheese and curd	700.4	2,486.5	0.8	1.9
032	Fish, etc., tinned, prepared	552.6	1,510.0	13.7	23.6
048	Cereal, etc., preparations	541.0	1,993.4	5.8	8.3
052	Dried fruit	233.2	676.2	40.2	47.7
053	Fruit, preserved, prepared	814.5	2,302.7	25.5	30.0
055	Vegetables, etc., preserved, prepared	548.3	1,819.4	14.2	19.1
062	Sugar preparations, non-chocolate	174.8	610.4	7.4	10.2
073	Chocolate and products	277.1	1,213.6	2.1	16.3
091	Margarine, shortening	167.0	520.5	7.6	10.9
421	Fixed vegetable oils, soft	811.5	2,742.3	27.4	34.4
431	Processed animal vegetable oils, etc.	219.6	739.6	12.5	17.0
031	Fish, fresh, simply preserved	1,568.8	6,095.1	26.5	38.5

Source: Calculated from figures in the United Nations, Yearbook of International Trade Statistics, 1974 and 1978 editions, Vol. 2, New York, 1975 & 1979.

Table 7. Imports of cereal and dairy products

Products	World				Average annual growth rate	Share of developing countries			
	Quantity Thousand tons		Value Million US dol.		(Percentage)	Quantity (Percentage)		Value (Percentage)	
	1970	1978	1970	1978	1970-1978	1970	1978	1970	1978
All cereals	112 117	187 731	8 537	29 983	6.7	37	42	42	46
Wheat flour	4 416	6 249	439	1 459	4.4	88	89	87	88
Preparations a/	...	...	554	2 410	n.a.	...	...	35	33
Milk and cream, fresh	403	1 916	49	504	21.5	26	5	39	15
Milk and cream, dry	1 352	2 391	532	2 229	7.4	46	50	55	55
Milk and cream, evaporated, condensed	654	842	228	737	3.2	71	72	70	74
Butter	896	1 056	666	2 343	2.1	22	33	16	25
Cheese and curd	778	1 219	755	3 137	5.8	10	17	8	12

Source: Calculated from figures in United Nations, Yearbook of International Trade Statistics 1978, Vol. 2, New York, 1979, and from figures in Food and Agriculture Organization of the United Nations, FAO Trade Yearbooks 1975, 1978, 1979, Vol. 29, 32, 33, Rome.

Note: a/ Cereal-based preparations, SITC-048, market economy countries only.

larger share of the market. Several developed countries, though not depending heavily on food exports, are in fact large exporters. For commodities such as wheat, coarse grain, dairy products, beef and veal, lamb and mutton, Australia, Canada, New Zealand and the United States of America are traditionally large suppliers to the international markets.

If, as a whole, the developing countries have seen their relative trading position grow worse with regard to other countries, there also exists among them a large variety of situations and disparities.

First of all, the degree of self-sufficiency, which can be measured by the ratio of net balance of exchanges/production (index I_1: see Table 8), shows that the food dependency of several developing countries is critical and will still grow worse if serious measures are not taken to change the structure of production and of foreign trade. Thus, Table 8, where forty-five sample countries have been divided into three groups according to their almost degree of self-sufficiency or on whether their exports or imports are dominating in foreign trade, indicates a relative importance of imports and weaknesses in export structure.

It can be noticed that for "importing countries, the imports are dangerously concentrated on key products (cereals, dairy products). The same exists for "exporting" countries, where exports, limited in most cases to tropical products (sugar, cacao), show a poor diversification. In the case of exporting countries, Argentina is the unique case of a country displaying a rather weak index of export concentration, thus revealing a fairly wide variety of exported products.

Secondly, the degree of sensitiveness of developing countries with respect to world market--measured by the ratio Max (Export: Import):(Production)--underlines their vulnerability to the fluctuations of international markets. In the case of importing countries, Algeria, for example, which imports more than half its food consumption, or Indonesia, now first world importer of rice, shows that even in optimistic industrialization prospects, a situation of food dependency may develop if adequate measures are not taken. For the exporting countries such as the Ivory Coast or Senegal, which unlike Argentina do not possess a wide variety of exports, this dependency on the fluctuations of international markets makes the situation even more precarious, stressing once again the need for greater diversification of their processed products.

Table 8. Grouping of a sample of forty-five developing countries into "exporters," "balanced" and "importers"

Country	Year (1)	Production (2)	Imports (3)	Exports	Apparent Consumption	I1 (4)	I2 (5)	Hm (6)	Hx (6)	Major import (7)	Next import (7)	Major export (7)	Next export (7)
Importers:													
Hong Kong	1977	436.3	1061	271.4	1225.9	-1.81	2.43	0.087	0.383	Fish (20)	Meat (18.1)	Fish (48.4)	Fr.+ Veg.(25.2)
Kuwait	1976	167.5	289.7		455.4	-1.72	1.72	0.117		Dairy (20)	Meat (18.3)		
Liberia	1975	16.2	36.76	9.95	43.01	-1.46	2.27	0.282	0.387	Cereals (45.8)	Sugar (11.2)	Cocoa (44.5)	Oils + Fats (27.4)
Iraq	1975	432.2	579.2	41.4	970.0	-1.24	1.34	0.285	1.000	Sugar (43.5)	Cereals (15.3)	Fr.+Veg.(100.0)	
Jordan	1977	93.71	140.5	28.3	205.3	-1.20	1.50	0.075	0.202	Cereals (20.5)	Dairy (16.1)	Animal Feed(29.2)	Fr. + Veg. (23.3)
Nigeria	1976	573.2	634.5	395.9	811.8	-0.42	1.11	0.110	0.979	Sugar (20.1)	Fish (19.3)	Cocoa (98.5)	Oils + Fats (1.5)
Central African Rep.	1976	19.25	8.1	0.1	27.25	-0.42	0.42	0.282	0.695	Cereals (42.2)	Beverages(19.2)	Cocoa (74.4)	Animal Feed (25.6)
Singapore	1977	568.7	833.9	622.2	780.4	-0.37	1.47	0.066	0.172	Oil + Fats (23.6)	Cocoa (14.2)	Oils + Fats(31.3)	Cocoa (16.7)
Syria	1977	453.9	170.5	33.96	590.44	-0.30	0.38	0.215	0.830	Dairy (30.9)	Sugar (22.3)	Fr.+ Veg.(87.9)	Cocoa (5.4)
Somalia	1975	28.5	16.79	8.86	36.43	-0.28	0.59	0.277	0.739	Cereals (35.4)	Oil + Fats(27.9)	Meat (79.1)	Fish (20.8)
Indonesia	1977	1243	901.9	633.4	1511.5	-0.21	0.73	0.691	0.315	Cereals (77.2)	Sugar (11.8)	Cocoa (32.9)	Oils + Fats (30.5)
Bangladesh	1977	182.6	88.2	54.0	216.8	-0.19	0.48	0.338	0.551	Oil + Fats (37.6)	Cereals (35.3)	Cocoa (59.7)	Fish (33.6)
Papua New Guinea	1976	126.2	93.65	72.18	147.67	-0.17	0.74	0.101	0.494	Cereals (29.1)	Meat (25.2)	Cocoa (57.7)	Oils + Fats (24.3)

Table 8. Grouping of a sample of forty-five developing countries into "exporters," balanced" and "importers," continued

Country	Year (1)	Production (2)	Imports (3)	Exports (3)	Apparent consumption	I1 (4)	I2 (5)	Hm (6)	Hx (6)	Major import (7)	Next import (7)	Major export (7)	Next export (7)
Balanced:													
Cyprus	1977	126.2	57.80	43.40	140.60	-0.11	0.46	0.050	0.463	Animal feed (19.7)	Meat (13.3)	Beverages (58.1)	Fruit + veg.(20.
Venezuela	1976	3,676.0	333.30	41.87	3,967.43	-0.08	0.09	0.154	1.000	Oils + fats (24.6)	Beverages (19.8)	Cocoa (100.0)	
Trinidad + Tobago	1975	223.2	100.50	92.02	231.68	-0.04	0.45	0.095	0.790	Cereals (21.7)	Dairy (20.0)	Sugar (84.7)	Cocoa (7.3)
Tunisia	1977	443.8	125.70	119.50	450.00	-0.01	0.28	0.224	0.367	Sugar (33.7)	Dairy (21.6)	Oils + fats (50.7)	Fruit + veg.(1
Colombia	1976	2,629.0	116.00	119.80	2,625.20	0.001	0.05	0.258	0.193	Oils + fats (41.9)	Cocoa (14.7)	Sugar (26.9)	Meat (18.7)
Honduras	1975	210.0	31.50	42.17	199.33	0.05	0.20	0.236	0.344	Cereals (38.2)	Dairy (16.5)	Meat (43.7)	Fish (21.1)
Panama	1976	352.2	59.45	80.55	331.10	0.06	0.23	0.095	0.373	Oils + fats (19.2)	Fruit + veg.(16.8)	Fish (44.4)	Sugar (13.1)
India	1977	7,422.0	811.90	1,283.00	6,950.90	0.06	0.17	0.830	0.412	Oils + fats (87.8)	Dairy (7.3)	Cocoa (53.8)	Animal feed (17.
Burma	1975	1,103.0	17.60	92.20	1,028.40	0.07	0.08	0.562	0.735	Oils + fats (61.6)	Dairy (31.1)	Cereals (80.2)	Fruit + veg.(11.
Mexico	1976	4,430.0	136.60	478.80	4,087.80	0.08	0.10	0.289	0.270	Dairy (38.6)	Oils + fats(21.8)	Fish (40.1)	Fruit + veg.(2).
Madagascar[a]	1975	111.9	48.93	57.69	103.14	0.08	0.52	0.460	0.277	Cereals (57.7)	Oils + fats (20.4)	Sugar (39.7)	Oils + fats (23.
Pakistan	1976	720.6	262.80	324.90	658.50	0.09	0.45	0.503	0.731	Oils + fats (58.0)	Cocoa (26.7)	Cereals (80.2)	Fish (11.2)
Uruguay	1975	885.2	25.39	112.60	798.29	0.10	0.13	0.526	0.660	Oils + fats (54.2)	Cocoa (39.0)	Meat (75.5)	Oils + fats (6.5)
Peru	1977	1,756.0	113.10	330.70	1,538.40	0.12	0.19	0.329	0.493	Oils + fats (41.3)	Dairy (29.7)	Animal feed (55.9)	Sugar (26.6)
Kenya	1977	1,134.0	54.22	243.30	1,009.92	0.15	0.20	0.440	0.623	Oils + fats (56.7)	Sugar (17.0)	Cocoa (71.6)	Fruit + veg.(15.8)
Republic of Korea	1977	3,994.0	260.40	872.90	3,381.50	0.15	0.22	0.450	0.717	Sugar (50.4)	Oils + fats (32.9)	Fish (79.4)	Fruit + veg. (8.3)

a/ Excludes exports of spices of 101.3.

Table 8. Grouping of a sample of forty-five developing countries into "exporters," "balanced" and "importers," continued

Country	Year (1)	Production (2)	Imports (3)	Exports (3)	Apparent Consumption (3)	I1 (4)	I2 (5)	Hm (6)	Hx (6)	Major import (7)	Next import (7)	Major export (7)	Next export (7)
Exporters:													
Ecuador	1976	665.5	37.7	161.5	541.7	0.19	0.24	0.396	0.545	Oils + Fats(52.3)	Misc. (12.1)	Cocoa (60.0)	Fish (26.3)
Costa Rica	1975	348.0	36.6	105.8	278.8	0.20	0.30	0.099	0.385	Cereals (19.5)	An. Fd. (16.5)	Sugar (46.6)	Meat (31.2)
Dominican Republic	1977	1294	73.7	344.8	1022.9	0.21	0.27	0.243	0.613	Oils + Fats(3[illegible].0)	Fish (19.0)	Sugar (67.3)	Cocoa (28.2)
El Salvador	1975	293.6	42.04	110.5	225.14	0.23	0.38	0.120	0.714	Dairy (20.0)	Cereals (19.8)	Sugar (79.2)	Fish (9.5)
Ethiopia	1975	148.5	10.98	46.63	112.85	0.24	0.31	0.162	0.555	Cereals (25.6)	Dairy (19.5)	Fr.+Veg. (66.4)	An. Fd. (11.5)
Guatemala	1975	494.9	33.88	167.2	361.58	0.27	0.34	0.244	0.636	Cereals (39.4)	Fr.+Veg. (15.3)	Sugar (73.2)	Meat (12.7)
Nicaragua	1976	459.6	23.60	150.7	332.5	0.28	0.33	0.156	0.288	Misc. (27.7)	Cereals (20.3)	Sugar (38.8)	Meat (26.9)
Barbados	1975	46.41	45.9	60.5	31.8	0.31	1.30	0.092	0.822	Meat (24.3)	Cereals (19.1)	Sugar (87.3)	Beverages (5.5)
Philippines	1977	2920	245.6	1138	2027.6	0.31	0.39	0.206	0.430	Dairy (33.3)	An. Fd. (21.4)	Sugar (42.0)	Oils+Fats (36.4)
Fiji	1977	205.3	54.49	128.0	131.79	0.36	0.62	0.102	0.753	Fish (21.1)	Cereals (17.8)	Sugar (82.0)	Fish (7.8)
Senegal	1975	418.3	100.7	225.3	293.7	0.37	0.54	0.287	0.561	Sugar (36.3)	Cereals (31.2)	Oils+Fats (65.3)	An. Fd. (17.6)
Malawi	1975	83.88	15.39	62.14	37.13	0.56	0.74	0.178	0.464	Cereals (33.5)	Dairy (15.5)	Cocoa (46.6)	Sugar (41.3)
Ivory Coast	1976	544.8	128.0	459.2	213.6	0.61	0.89	0.146	0.711	Fish (22.9)	Dairy (22.7)	Cocoa (79.1)	Fr.+Veg. (7.1)
Mauritius	1975	315.8	60.03	260.0	115.83	0.63	0.82	0.041	0.972	Cereals (32.7)	Dairy (15.6)	Sugar (98.0)	Cocoa (1.1)
Argentina	1977	1659	51.8	1964.2	- 253.4	1.15	1.19	0.438	0.194	Cocoa (54.3)	Fr.+Veg. (20.1)	Meat (32.6)	Oils+Fats (18.2)

Table 8. Grouping of a sample of forty-five developing countries into "exporter", "balanced" and "importers" (cont'd)

Notes: (1) The data quoted are those available for the most recent year.

(2) The production figures are an aggregation of ISIC 311/2 and 313 as reported in the Yearbook of Industrial Statistics, vol. 1, United Nations, New York, and appearing on the data base of the Regional Studies Branch, Division of International Studies.

(3) The trade figures are drawn from the Yearbook of International Trade Statistics, Vol. 1, United Nations, New York, and comprise the following SITC 01 (meat and meat preparations), SITC 0" (dairy products and eggs), SITC 03 (fish and fish preparations), SITC 0422, 046, 047, 048 (processed cereals); SITC 052, 053, 0542, 055 (preserved or prepared fruits and vegetables); SITC 06 (sugar, sugar preparations and honey); SITC 07 less 0711 (coffee, tea, cocoa and spices and manufactures thereof less coffee, green or roasted); SITC 08 (animal feed, excl. unmilled cereals); SITC 09 (miscellaneous food preparations), SITC 11 (beverages); SITC 4 (animal and vegetable oils and fats).

(4) I_1: **(Exports-Imports)/Production**

It is utilised in the grouping of countries into "exporters", "importers" and "balanced" as follows:

$I_1 < -0.15$ - **The country is an "importer"**

$-0.15 < I_1 < 0.15$ - **The country is "balanced"**

$I_1 > 0.15$ - **The country is an "exporter"**

As is evident, this is a subjective classification relating a country's trade to its local production.

(5) I_2 Max. (Imports; exports)/Production
Used in evaluating the extent to which a country's food processing industry is sensitive to the world market

Table 8. Grouping of a sample of forty-five developing countries into "exporter", "balanced" and "importers" (cont'd)

(6) Hx (H_m):

$$H = \frac{\sqrt{\sum_{i=1}^{N} \left(\frac{Xi}{T}\right)^2} - \sqrt{1/N}}{1 - \sqrt{1/N}}$$

where: X_i = The value of exports (imports) of sector i

N = The number of sectors into which the products have been classified (11)

T = The total value of exports (imports)

This is the Hirschmann index normalized to produce values ranging from 0 to 1. The index is a measure of the degree of concentration (near 1) or diversification (near 0) in exports or imports. The index discriminates more sharply in the higher range than in the lower range.

(7) Major or next export (import)
The major exporting (importing) sectors are shown followed by their percentage share in exports (imports).

3. **Consumption**

Regarding the overall level of food consumption, the most important observation is the increasing internationalization of consumption patterns, although national and regional "eating habits" are still relevant. This tendency, in particular, is evidenced by the substantial growth in developed countries of "American-style" processed food (frozen foods, hamburgers, sodas, ketchup, cookies, etc.) and by the diffusion in the growing urban centres of most developing countries of a pattern of consumption increasingly based (by way of an imitation process centred on higher social prestige) on rice-wheat meat.[38] Such an interpenetration of the world patterns of consumption is all the more serious in that it initiates and supports a basic tendency to devaluate traditional foods and to encourage a consumption style that may prove inappropriate and even dangerous when generalized into the developing countries. In fact, the diffusion of the "American consumption model" leads to the justification of an associated production system, that is of an agro-industrial model based on mass production, often manufacturing highly processed "junk food," (such as candy, gum and soft drinks) with expensive technologies,[39] that invariably displace inexpensive, labour-intensive technologies in favour of imported, labour-saving machinery.

Such a model cannot be transposed to developing countries basically because of its high energetic requirements[40] and also because it cannot match a completely different problematic, e.g., demographic explosion, underemployment of the agricultural population, specific ecological conditions. Indeed, the production models of developed countries consists in maximizing the productivity of agricultural manpower by massively using intermediate inputs and mechanical equipment, disregarding raw material outputs and energy consumption. For most

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[38] Riz Amer, "Jeune Afrique," no. 1017, 15 July 1981, p. 74-75. "The Modern Way," New Internationalist, No. 99, May 1981, pps. 12-13.

[39] The investment cost per job can exceed $US 100,000 (beverages, oil mills, cereal processing, sugar, soluble coffee) and even reach $US 300,000 (cereal storage). Modern agro-industries are, therefore, heavy industries. UNIDO, "Draft World-wide Study on Agro-Industries: 1975-2000," Vienna, 1977, p. 10. See also A. Revel and Ch. Ribaud, "Les Etats-Unis et La Strategie Alimentaire Mondiale," Calman-Levy, 1981, pps. 260-262.

[40] D. Pimentel estimated that in order to feed the population of India (600 million inhabitants) with 3,000 calories per day per person, the food-processing industries alone would require more energy than the whole country consumes at present. See D. Pimentel, "Food Production and the Energy Crisis," Revue Science, Vol. 182, 2 November 1973.

developing countries, instead, the problem is to produce the necessary quantity and quality of food calories, while taking into account two main factors: the uncontrolled demographic growth and the limited arable soil. Therefore, the agro-food production has to be conceived in terms of persons to be fed by hectare at a certain nutritional level, using local resources in the best way possible (ecological and agricultural system and especially manpower), limiting external resources and inputs, especially non-renewable energies. The challenge facing the food policy-makers in developing countries consists in achieving the maximum productivity of the food chain, especially in terms of energy contents, in order to increase the number of people fed by hectare. In this respect, in addition to intensifying land productivity and making better use of agricultural manpower, there are different ways and solutions to increase the energy production along the food chain: (1) to upgrade the quality of protein in major cereal crops, so as to improve their nutritional value; in some crops such as maize and sorghum, the quality of protein can be enhanced genetically by manipulation of known mutant genes, while in other crops the search for such mutant genes is still under way;[41] (2) to replace, at least partially, wheat with other materials ("composite flour programmes"), which, in addition to reduce considerably import expenditure, can boost the development of industrially pre-packaged sorghum and mill meals;[42] (3) to substitute the traditional meat chain with protein-producing plants (especially leguminous crops with their own inbuilt bacteria fertilizing systems) or economical animal production (aviculture, pigs fed with plant waste, rabbit and game, etc.) stressing, with mass-media campaigns (especially oriented to persuade urbanized consumers) the "superior" quality of foods made with local resources;[43] (4) to draw production and consumption physically closer, thus limiting transportation costs; (5) to cut down undesirable losses in stocking, transportation and processing; (6) to use renewable local energies (e.g., solar energy and biomass). In general, the attainment of such a target

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[41] The International Crops Research Institute for the semi-arid tropics (ICRISAT) with headquarters in Hyderabad, India, is, for instance, doing useful work to improve the genetic and nutritional quality of sorghum and pearl millet. R. Jambunathan, "Improvement of the Nutritional Quality of Sorghum and Pearl Millet," UN University World Hunger Programme, Food and Nutrition Bulletin, Vol. 2, No. 1, January 1980, p. 11.

[42] R.D. Forrest and G. Yaciuk, "Sorghum Milling: A New Agro-Industry for Botswana," study submitted to the Seminar on Small and Medium-scale Agro-Industries and Rural Development, Royal Tropical Institute, Amsterdam, 13-14 November, 1980.

[43] For example, Ghana's National Rabbit Project seems to be successful in providing meat for Ghanaians.

calls for a redefinition of food-processing models, bearing low energy profiles, and rehabilitating basic, indigenous, low-cost food crops, provided that their productivity are substantially improved.[44] Appropriate food technologies should be conceived in such a context. In fact, there are numerous implications for the development of food-processing industries: better balance between manpower and equipment; maximum use of raw materials and their processing only as far as the substantial food demand is met (nutritional needs, packaging and agro-display); use, if possible, of renewable local energies; implementation of small-scale projects, reduction of transport and stock losses; recycling of waste, etc.

The criticism addressed to the "American model" is not supposed to be a refusal. The contribution and role of the developed countries (including the United States of America), through technologies and firms, remain essential in any case. However, one primary rule seems to apply: a large diversity of policies and means of production, especially for the food-processing industries, stands as counterpart to the diversity of needs and demands. In this way, while even the developed countries can take advantage of the potential of promising staples in the diets of developing countries, it might be possible to orient the offer/demand dialectic and consider each homogeneous segment of demand. Thus, in the case of the demand of a poor rural population, several elements (e.g., the social and religious traditions, the lack of consumption or distribution networks, the local eating habits, the non-existence of a qualified "industrial" manpower) point toward food policies centred on modernizing and revalorizing the agriculture of self-subsistence as well as on optimizing the utilization of local plants, animal and energy resources, the improvement of local technologies, the building up of small stocking units, a processing adapted to the needs and capacities of the local populations. On the other hand, the growing urbanization largely justifies a production model based on modern technologies, large-scale productions made possible by masses

[44] Thus, for example, major international research centres in the developing countries are giving priority to the improvement of methods of processing cassava—a main staple food product with an annual world production estimated at over 105 million tons in 1975, nearly all of which is grown in developing countries--which can be used to produce a range of enriched, convenient foods (such as "gari" and "fufu" in West Africa, and "farina de manioca" in Central and South America). Bede N. Okigbo, "Nutritional Implications of Projects giving Priority to the Production of Staples of Low Nutritive Quality: The Case for Cassava in the Humid Tropics of West Africa," United Nations University World Hunger Programme, Food and Nutrition Bulletin, Vol. 2, No. 4, October 1980, p. 8.

of consumers living in cities, by a modern system of distribution or by imported goods made desirable by a sensitive interest in Western consumption goods; this being done on certain conditions, namely, for example, that the imported products be adapted to the nutritional needs of the population, that none be substituted to traditional ones or devalorize these, that the useless added value be limited, either in packaging and in sophistication, and that the local manpower network and strong national integration be always considered and respected. Thus, a principle of "combined strategies" emerges as particularly valid for the development of fodd-processing industries and based on both the factual internal food demand and a good linkage with other elements of the agro-production system. Such a principle justifies the diversity of the actors and of the modes of transfer of technology, emphasizing the key role to be played by national institutions and authorities. These are indeed the only ones that can conduct an extensive analysis of the food demand, that can determine the objectives to be assigned, that can decide on the combined strategies and that can carry out a qualitative adjustment between the food offer and demand (redistribution of revenues and social policies; price policies connected with agricultural, food and imported products; aid to local new industries that create employment; development of subsistence agriculture, and access to credit for small processing units; information and training of the populations on nutrition; undertaking of research and technical assistance; control of diffusion of developed countries' influences, etc.).

4. Strategies of the actors

The food-processing and manufacturing industries display a wide range of organizational types and sizes. They include the specialized craftsmen-butchers, bakers and confectioners-involved in both small-scale and specialized production and retailing as well as the regional, national and international companies, often producing a wide range of food and non-food products. In this sector both private, co-operative and public forms of ownership exist.[45] The movement of concentration has led to the establishment of vast agro-industrial groups that have an international dimension and exercise a powerful influence on the world food system. These transnational agro-food companies (TNCs) have the following characteristics:

1. very large economic and financial potential,
2. diversified activity within the group (agriculture, industries, services),
3. many overseas plants distributed throughout the world, and
4. sophisticated organization and management, with substantial use of information science and very long-term planning.

The 100 leading firms produce, according to some estimates, 40 per cent of world food industry output.[46] For nearly 30 years the growth of the TNCs has benefited from an extremely favourable economic situation with the following features: a strengthening of agricultural policies focusing on agricultural mass production (increase in production and productivity, achievement of uniformity of products, relative reduction in the prices of agricultural commodities, growing intervention by producers and public authorities in the organization of production and of markets), a rapid increase in the purchasing power of consumers, a concentration of demand for foodstuffs, and an opening up of international markets.

With the domination of trade routes [47] and the elaborate use of advertising techniques, it has, therefore, been possible for TNCs to maximize

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[45] UNIDO, "Draft World-wide Study on Agro-Industries: 1975-2000," a sectoral study prepared by the International Centre for Industrial Studies, UNIDO/ICIS.65, 12 December 1977, p. 41.

[46] OECD, Committee for Agriculture, Food Policy, General Report, Paris, 1980, p. 28.

[47] D. Morgan, Merchants of Grain, Viking Press, New York, 1979, p. 234.

profit at world level.[48] In the last few years, however, the economic context has undergone profound changes involving:

1. an increase in agricultural production costs leading to pressure on the prices of agricultural products,
2. a slow-down in financial transfers in favour of agriculture,
3. a weak increase in purchasing power and a slump in food demand,
4. an increase in threats of anti-trust actions,[49]
5. an increase in competition on international markets, whereas the strategy of the TNCs does not coincide with those applied by: (a) the major international brokers (who continue to rely primarily on trade in unprocessed agricultural commodities); (b) the major capital goods suppliers (Alfa Laval, Bulher, Fives-Cail, FMC), which more and more enter international markets at the request of developing countries (c) a growing number of "outsiders", e.g., the giant Japanese trading houses, instruments of their country's foreign policy; Philip Brothers, a firm specializing in the sale of a wide variety of industrial raw materials, etc;[50] and of "independents," e.g., the Italian groups Ferruzzi and Parmalat, the Hamburg grain firm Alfred C. Toepfer, etc; (d) the major petroleum and chemical companies, which can be expected to attempt massive entry into the agricultural production sector to fill their own needs for raw materials.[50']

48/ D.K. Fieldhouse, Unilever Overseas, The Anatomy of a Multinational 1895-1965. Croom Helm, London, 1978. (Probably the best case study available today of the way a multinational company operates in the Third World).

49/ In November 1980, a Federal Trade Commission judge in Washington, D.C., ordered Beatrice Foods Company to divest itself of Tropicana Products, Inc., the world's largest chilled orange juice processor (with about 30 per cent of U.S. sales) because of its acquisition in 1978 created an illegal anti-competitive concentration in the orange juice business.

50/ Mitsubishi and Mitsui alone have a turnover of over 30 billion dollars, Ph. Brothers a turnover of over 10 billion dollars.

50'/ "New Agri-Energy Conglomerate: Occidental Petroleum and Iowa Beef," Olsen's Agribusiness Report, Vol. 2, No. 11, May 1981.

In the developing world, moreover, the effort to achieve a degree of self-sufficiency and the poor track record of large scale agro-industrial projects[51] has led a number of countries to rethink their attitude toward large food companies,[52] notably with the political determination of ensuring national ownership or control of food and raw material production as well as with the determination of seeking long-term agreements to enforce comprehensive industrial development programmes. The UN agencies, furthermore, are fostering the adoption of new international codes, which can place sharp curbs on how foods can be marketed.[53] In fact, as emphasized by a study of the UN Centre on Transnational Corporations,[54] TNCs' operations appear to have fostered import dependent processing and impeded improvements in indigenous staple food production and marketing, while their "get rich quick" attitude and their reluctance to adjust to local conditions have often led management to make disastrous decisions.

A growing number of TNCs do not seem capable of responding to these fundamental changes in the world as well as to adjust to local specific factors at work in developing countries (especially the weakness of purchasing power of the masses, and the poor co-ordination between agricultural production and food processing, which compels companies to commit themselves to agricultural production and, therefore, to lose their mobility). Thus, for example, in some cases CARGILL—the world's largest grain company—operates in a more expensive way than its competitors, which may adopt more flexible approaches, i.e., recourse to rented logistic installations rather than to owned silos,

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[51] Sarah Potts Voll, A Plough in Field Arable, Western Agribusiness in Third World Agriculture, University Press of New England, Hanover, New Hampshire, 1980, p. 80 and pps. 138-139. See also R. Strohl, "Farming Failures: The Fate of Large-scale Agribusiness in Iran," Agribusiness Worldwide, April/May 1980; F. Crown, "White Elephant Tales: Venezuela's Cassava-processing Plants," Agribusiness Worldwide, December/January 1981.

[52] Thus, one of the objectives of the SAM (Sistema Alimentario Mexicano) is to give preference to development of nationaly-owned industries in those branches that produce food basket items, mainly controlled by transnational interests. The SAM: Objectives and Strategy, Simposio: Problemas Y Perspectivas del desarrollo agroindustrial en America Latina, Mexico, D.F., 29 September-October 1980, p. 50.

[53] "Baby Foods in the Third World, New Code Could Curb Marketing," The Financial Times, 15 December 1980.

[54] Transnational Corporations in Food and Beverage Processing, United Nations, op. cit., p. 106.

ships and wagons). In fact, while the era of conglomerates seems over,[55] the large industrial groups--more and more afflicted by a lack of entrepreneurial dynamism[56]--appear ill-suited to meet the challenges of the diversity of agricultural production conditions as well as of the conditions regarding distribution, the low incomes and the technical and industrial infrastructure existing in the developing countries.[57]

To avoid bearing severe losses,[58] the large food companies are now finding ways to:

1. reduce their "dependence" on developing countries and, faced with stagnation in Europe, to emphasize the potential (owing to its stability and size) of the U.S. market,[59]
2. limit risks by reinforcing their strongest sectors,
3. expand recently acquired non-food enterprises, such as eye care, skin care, cosmetics, pharmaceuticals, as well as tighten their links with the final market (notably the catering) and the distribution system (notably the wholesale trade),[60]
4. move to non-food areas, rethinking their relationships with the upstream and downstream sides of the food industry, e.g., shift towards the production of intermediate goods with an increasing

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55/ La fin de l'ère des conglomerats, "Le Monde, 23 December 1980.

56/ "Les firms geants vont-elles mourir faute d'esprit d'entreprise?," Entretien avec Vijay Jolly professeur au CEI, Journal de Genève, 17 November 1980.

57/ Pascal Byé, "Analysis of the problem and outline of a survey among large international food companies" (working paper), Grenoble, February 1980, p. 2.

58/ In 1980, Nestlè, the second largest world food company, suffered a serious operating loss in Argentina. Earnings decline were reported in the same year by several other large food companies.

Massey Ferguson, the world's largest tractor manufacturer, collapsed and Sasetru, one of the most powerful forces in the Argentinian market in general foodstuffs and supplies, was declared bankrupt on 5 February 1981.

59/ "A new recipe at Nestlè that mixes in planning," Business Week, 2 February 1981.

60/ G. Ghersi, V. Bontosoglou, M. Padilla, R.L. Rastoin, M. Allata, Les cents premiers groupes agro-industriels mondiaux, extrait, Institut Agronomique Mediterranéen de Montepellier, September 1980, p.15.

interpenetration of capital in the chemical and agro-food sector.

These new orientations—though bringing in new sophisticated threats (especially with the development of competitive substitutes)[61]—offer developing countries the opportunity of choosing new partners that, differently from the TNCs, appear to be more suitable to the conditions prevailing in the Third World in terms of labour intensity, scale of operation, and valorization of local food resources. We refer, in particular, to the international activities of:

1. small- and medium-scale manufacturing firms (export oriented, disposing of absolute technological novelties, acquired by own experience, research and development) which, differently from the TNCs (striving after monolith stature), have consciously opted to stay small.[62] Believers in industry co-operation, they are often pooling their knowledge of food processing in an organization of owner-managed firms (such as, for instance, in Denmark the DAFOMA Group and the Export Group Association) or in a consortium (such as, in Italy, the "Consorzio Iniziative Oltremare," CIO) working in similar or complementary fields. This gives them invaluable versatility on world markets, while retaining their small size that enables them to relate to a factory owner on a level not understood by most of the corporate giants.[63]

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[61] In 1974 production of high fructose syrup—liquid-only sweetener developed by the Americans and the Japanese--in the United States of America was 250,000 tons. In 1980 this figure had jumped to 2 million tons and projected production in 1984 in 4 million tons. If a way of crystalizing this sucrose substitute is found, it will cause havoc in traditional sugar markets.

[62] H.S.A. Olivier,"Relationship Between Transnationals and Independent Rural Agro-industries," paper submitted to the Seminar on Agro-Industries, Amsterdam, November 1980, p. 2.

[63] "The Spirited Optimism of the Small Processor," Processed Prepared Food, No. 1, Vol. 150, 1981.

2. the well-established co-operatives of the developed and of some developing countries, which, operating on the basis of solidarity criteria (mutual co-operation and self-help)[64] can provide better conditions for technical aid, financial support, establishment of joint ventures in the field of production, marketing, or extension work.[65]

An example in this respect is the installation of poultry complexes within the framework of agreements between certain African nations and French agricultural co-operatives that should allow the local production of chickens at a lower price than that of imported frozen chickens and at half the current market price of those in the main towns. Considering the increase of exchange rates and freight for the chicken imports, the country will thus be kept protected from rises on the world market. Thanks to a rational use of locally produced food products (maize, groundnuts, milling by-products), the poultry complexes should permit urban population to be supplied with animal proteins at a lower price, all this while favouring the economic independence of the country in relation to food products and economizing currency on the balance of payments for foreign trade.

In other fields, co-operatives are helping developing countries install and manage agricultural-industrial equipment:

1. thus, the installation of cold storage warehouses permitting these countries to develop their local production of perishable products (fish, meat, vegetables) by limiting the deterioration risks and by constituting some safety stocks in the zones of heavy population concentration to buffer the periods of surpluses and shortage.
2. or the installation of cattle feed plants that would allow the countries to revalorize raw materials (maize, groundnuts, sugar cane), to develop stock raising, to protect themselves against breaks in stock supply and price rises of imported raw materials and, lastly, to economize currency.

A further case, extending the previous one, is that of feedlots. The zones of the Sahel and the Savannah are an important reservoir of beef cattle and

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[64] International Co-operative Alliance, Co-operatives and the Poor, report of an experts' consultation, Co-operative College Loughborough, 5-8 July 1977, p. 33.

[65] A. Goldberg and R.C. McGinity, Agribusiness Management for Development, Ballinger Publishing Co., Cambridge, Massachusetts, 1979.

sheep. These areas are currently under-used.

Intensive fattening units allow a better valorization of cattle by using the sub-products of the agricultural industry. The sector of intensive stock raising is tied in with industries of animal feed production and with slaughter-houses with cold storage chambers. Such a plan can be carried on in numerous countries by using existing potentialities in a more rational manner. Certain examples have already shown that it was possible to produce meat in agricultural-industrial zones close to those of urban population at a price lower than that of the market and competitive with imported meat sold locally.[66/]

[66/] E. Rouch, Ph. Ducroquet, Report on Equipment Goods, International Co-operative Trade Conference, BECA (Bureau Economique du Comité Agricole), Paris, 1980, p. 11.

B. Prospective aspects

1. A systems analysis approach

The food-processing industries are part of an interdependent and dynamic network of specialized activities (agricultural activity, processing elements, up-stream industries such as chemistry and capital goods, transportation and distribution infrastructures) concerned with the production-exchange-and consumption of food. The existence of a chain of articulated "circuits" ("food systems")--through which food is circulated, with varying amounts of storage and processing on the way--is not peculiar to the food sector of developed countries, where more specialized activities reinforce interdependence links; it is also an intrinsic reality of developing countries in which constraints are stronger, resources limited, and the needs enormous and urgent. In such conditions, an understanding of the food-processing industries requires an understanding of the characteristics and functioning of the food systems, including the ways in which food systems are affected by changes in the ecological environment, social milieu, political power, social forces, dominating actors and, finally, the needs and objectives of the food demand.

Ignoring or underestimating the multiple interdependencies that exist between the activities of a food system may easily lead to: (1) a lack of cohesion between the real features of agricultural production and the necessary qualities required for an input into the processing activity (qualities, gauge, quantities, regularity of supplies); (2) the overlooking of the primary role of storage facilities versus first processing of agricultural goods, thus entailing quantitative losses or bottlenecks that reduce the productivity of the installations; (3) the introduction of structural transformation of the environment (through, for instance, the setting up of food complexes of high capacity that require sophisticated technology) which may risk destroying the existing social and ecological balance; (4) exaggerated priority to food-processing exporting activities, which may deprive the local population of its basic foods; (5) the setting up of manufacturing units that do not fit into consumption practices to realistic nutritional needs, to the undernourished populations' level of income, to the diverse food needs of consumers in rural areas and city outskirts, etc.; (6) the establishment of food-processing production units that, owing to exaggerated search for lower costs and competitive markets, under-pay farmers for their agricultural goods, keeping them away from economic and social progress.

Thus, although it is difficult to grasp and analyze the complex reality of multiple interdependencies, a systems analysis approach is needed to understand the structural and functional reality of national food systems[67], with the view of implementing an effective integrated development (of the food production, processing, marketing and distribution chain) as well as to lay the basis for a world-wide global food system (designed in the direction of increased productivity, resource protection, efficiency, and compatibility with the evolving social,technical, and economic elements of each nation),

2. Major trends observed in the evolution of food-processing complexes in industrialized countries

Doubtless with the exception of the United States, where the concentration of industrial production is of longer standing, it can be seen that the development of the food industry is still influenced by the nature of the agricultural systems upon which it is based.

The process of internationalization has, however, played an important part in certain types of production (products of secondary processing, for example) or certain countries (e.g. the United Kingdom, the Netherlands). The economic growth recorded in most of the industrialized countries in the course of 30 years has led to a slow shift of the food industries from the areas of agricultural production to the areas of urban consumption.

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[67] The study of national food systems is a complex task that requires extensive and varied work of methodological quality, mostly because of the relations between the different elements of the system; the natural heterogeneity of the food production; the imperious taking into account of national, regional and even local characteristics; the need to integrate the purely techno-economic study of production with social and political data. In this respect, there are numerous works already published or in preparation. For example, one can mention the modelization works of the national or world food systems, such as the MOIRA model (Model of International Relations in Agriculture, North Holland, 1976); the "Food and Agriculture" programme of IIASA in Laxenburg, Austria, which deals with one of the top themes of research, presently conducted by that organization; some international organizations such as FAO or the OECD Development Centre, which at present conducts various research on the theme "Ability for Developing Countries to Satisfy Their Food Needs," giving particular attention to the food demand in some well-determined countries.

Industrial concentration has gone hand in hand with this shift. It cannot be strictly attributed to the general spread of a movement towards transformation of food-processing techniques. In fact, the food processing industry is still characterized by a juxtaposition of production units differing widely in size and importance, whose collective growth dynamics are attributable more to their upstream (supply of agricultural products) or downstream relations than to the application of their own production processes.

The prospects opened up to the food-processing industry (internationalization of markets, diversification of production) seem to suggest that intra-agricultural ties will be strengthened under the auspices of the large industrial groups specialized in secondary food processing.

Until 1970, the food-processing industry developed at a more rapid pace than food demand. The broadening of its field of activity towards agriculture (e.g. take-over of the processing operations performed by farms, development of the animal feed industry) and distribution (e.g. gradual takeover of the processing operations performed by the retail trade, development of ranges of ready-to-cook products) was the most salient feature. Its relations with agriculture became closer. The rigid integration governing the launching of new lines of production (poultry and pig rearing, dairy farming or plant cropping) gave way to a general shift towards quasi-integration. The food industry appeared more and more as the compulsory market for agricultural production. This phenomenon was doubtless less clearcut in plant-crop production (cereals in particular), which continued to maintain direct links with international markets. The shift towards internationalization then spread to other products and paralleled the shift affecting firms and techniques.

A decline in growth rates and the development of the economic crisis began to affect the food industry in the 1970s. Even if it seemed, on the whole, to resist these influences better than industrial activities as a whole, the food industry simultaneously suffered a drop in its average profit rates and an accentuation in the disparities in profit rates among the various food-industry branches. Concentration was intensified, in particular, in two areas, namely, primary processing, i.e. all activities in contact with agricultural production and the international markets for unprocessed commodities, and new products.

Since the 1970s, the following developments have been gaining impetus in the agro-food processing complexes of industrialized countries:

- The value-added generated by the food-processing industries now tends to be greater than that generated by agricultural production.
- Industrial concentration is continuing and gradually separating food processing plants from their agricultural and rural environment. The dependence of agriculture on the food industry is growing in step with the increase in the share of agricultural produce processed.
- Production techniques, hitherto based on a priority search for economies of scale, are being transformed under the double impact of diversification of agro-food production and of a decompartmentalization of the food industry itself (new techniques, new equipment, new agents).
- The shift towards internationalization is spreading in the commodity markets to semi-processed goods. The substitutability of agricultural commodities is growing (e.g. substitutions between maize and cassava). The internationalization of techniques is taking place, inter alia, as a result of the industrial redeployment policies implemented by the capital goods firms.

- The prospects open to the food-processing industry are no longer limited to food. This industry is based on the processing of commodities of renewable origin, using biotechnological processes that are able to satisfy basic immediate (food) and future (energy) needs. The agro-food industries are affected by new technical and commercial strategies.

Underlying all these developments are three trends that may become more pronounced during the 1980s:

- One trend reflects the strategies aimed at strengthening relations with agriculture, and is the continuation of a long-standing development. It covers the phenomena of integration of agriculture into the the food industry, international trade in unprocessed agricultural commodities and the concentration of food-production units specialized in primary processing. It is based on savings (economies of scale) realized through the establishment of large-scale mass-production units, but does not, strictly speaking, entail a change in food-industry techniques.
- A second trend derives from the strategies for the diversification of food production. It is characterized by a strengthening of secondary processing industries, an on-going review of the processing techniques in use, and goes hand in hand with a decompartmentalization of the food industry as well as a growing influence of non-food firms on the development of the complex.
- A third trend is characterized by the diffusion of new products shaped not to the requirements of public needs, but to the requirements of corporate groups' growth.

These trends find expression in the developing countries through phenomena of internationalization.

3. Major trends observed in the development of food-processing complexes in the developing countries

The increase in food demand and the obligation to satisfy "essential needs", the consequences of the economic and energy crisis and the decline in profit rates in the food industries in the industrialized countries, the power conferred by the "food weapon" and as a concomitant the striving for agricultural self-sufficiency, are factors determining the directions in which the food processing industry will move in future.

For the moment, this industry is marked by three phenomena:

- Low income, which is a determinant of food demand and limits it to certain basic commodities;
- The phenomenon of urbanization, which leads to a gradual change in the range of food products and thereby to a dissociation of agricultural production, on the one hand, from food production, on the other;
- Dependence on food, as regards both the companies and the food-processing techniques used.

The food-processing industry in most developing countries continues to be dominated by primary processing activities, the products of which are appropriate to a low-income final demand.

The industry is relatively well developed in the following areas: grain milling, fat processing, sugar refining and slaughtering and primary processing of meat.

This global trend, however, conceals profound disparities and obscures an internal growth dynamic based on a gradual change in the food consumption pattern. The role played by the food industries in the homogenization of consumption patterns seems to be expanding, and is based on the growing share claimed by solvent urban demand in the markets of the developing countries. It is a result of this demand that the food processing industry is diversifying in the following fields: the beverage industry (brewing, distilling, non-alcoholic beverages), the meat and poultry processing industries, the dairy industry, the confectionary and chocolate industry and the canning industry. This role is also based on the priority assigned in some countries to the export of unprocessed agricultural commodities (soya beans, cotton, oil seeds, fruits, cassava, etc.), processed or semi-processed products (oil, sugar, oil cake, preserves, butcher's meat) to industrialized or semi-industrialized countries.

These shifts produce a number of consequences which affect the development of national agro-food complexes:

a. The dissociation between agricultural production and food processing is growing. Furthermore, since the food processing industries have a tendency to locate near the consumer markets and away from the areas of

production of difficulties connected with transport, its increasing cost and the perishable nature of inputs play a part in accentuating this phenomenon.

The dissociation can be either partial, thus excluding from the agro-food circuit only traditional forms of agricultural production (small multi-crop farms) and relying totally on concentrated agriculture, which can reduce the food industry's production costs; or it can be total, where it appears preferable to rely on imports of unprocessed or semi-processed commodities (substitution of bread-grain crops for local products; dairy products, meat, etc.) rather than to make use of domestic agricultural production.[68] There is thus a close correlation between industrial and agricultural concentration on the one hand and industrial concentration and food dependence on the other.

b. The dissociation among food production units is the most conspicuous phenomenon. This observation needs to be related to the fact that the urban food "production-consumption" pattern at first developed parallel to the rural food "production-consumption" pattern, but then supplanted it.

In the first phase, one can observe a juxtaposition of industrial or artisanal apparatuses with no trade or complementary relations amongst themselves. The differences observed between the apparatuses concern their dimension more than the techniques used. A strengthening of the large processing units is to be observed, in particular in the basic commodities (sugar, flour, meat, oil) needed to supply urban markets and in export products (canned foods, processed meat). The production of these large units is increasingly competing with that of smaller production units situated in rural[69] or urban areas (secondary processing). In the second phase, the food industry is characterized by the superimposition of industrial apparatuses belonging to primary processing on the one hand and to secondary processing on the other. Their respective growth depends essentially on that of relatively compartmentalized markets: consumption influenced by the low incomes of the most disadvantaged social

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[68] The economic importance of this as regards production and employment is, however, essential in most developing countries.

[69] These units seasonally process the surplus production of small and medium-sized farms.

classes or by the price level for agricultural products obtaining on the international markets in the case of the former; consumption influenced by the evolution in the incomes of the most advantaged social classes in the case of the latter. There are few or no exchanges of products except in cases where an artisanal sector carrying out both processing and distribution makes possible a gradual change in dietary habits (bread and biscuit-making, pasta, cutting and distribution of meat, collection and bottling of milk).

In the semi-industrialized countries and in fast-growth areas, the development of the secondary processing food industries takes place more often by a direct linkage with agricultural production[70] or the implementation of policies for the import of semi-processed goods than by a strengthening of relations within the agricultural sector.

c. National capital goods industries are not always in step with the development of food processing industry demand in respect of machinery.

One should, however, distinguish among three particular cases reflecting the options and policies adopted with a view to satisfying basic food requirements.

- The food industry is predominantly artisanal. It consists of small processing units located near the areas of agricultural production or food consumption. It is characterized by artisanal methods of production. It employs a plentiful work-force. The techniques employed are transpositions of agricultural or artisanal techniques. The production operations are primarily based on physical processes (crushing, grinding, hulling) or on fermentation (preservation of liquids and meats). The equipment consists mainly of simple small mechanical devices comparable to certain products of the agricultural machine industry (fixed assets) and of hollow-ware (vats, storage facilities, boilers). A national toolmaking and light mechanical industry meets this demand in countries where an agricultural machine industry specialized in the manufacture of tools and simple machinery already exists.[71]

The introduction of motorization (versatile engine) can, however, increasingly favour the import of engine-linked machines and hinder the expansion of the national industry.

70/ Through integration contracts (contract farming as in the case of poultry farming, brewing, dairy farming and pig breeding) or quasi-integrative practiques.

71/ Colombia, Thailand, Philippines, India, Pakistan, Senegal, Sri Lanka.

- The food processing industry remains traditional but the increase in food demand (domestic or foreign) leads to a rapid increase in the size of production units. The on-going change in the techniques used (adoption of continuous-operation processes) and the displacement and concentration of industry confront the national capital goods industry with greater and greater difficulties in meeting domestic demand. The development of turn-key plant construction in primary food processing (sugar mills, flour mills, slaughterhouses, canneries) often deprives this industry of an important market while in most semi-industrialized countries the national metal-working and mechanical engineering industries meet this demand, or are able to do so (industrial hollow-ware, mechanical apparatus for processing solids or liquids, storage and refrigeration units, apparatus for handling and distribution). The capital goods industry for food processing equipment grows less rapidly than the primary processing food industry.

- The food industry responds primarily to an urban demand revolving around the products of secondary processing. It diversifies according to the consumption patterns of the industrialized countries. The reference size is less important than the techniques employed. The proportion of total installation costs accounted for by mechanical equipment tends to decline.

4. Development of food technologies

Food-processing techniques have not developed at the same pace for the various production operations. A tentative inventory of these developments can be made so as to assess their impact on the organization of industrial production:

a. Innovations in storage and handling

Techniques have not developed much on the whole. Until recently, there had been: an increase in storage capacities, mechanization of handling and a general spread of cold-storage warehouses. Currently, the introduction of new techniques owes less to mechanical engineering than to chemical engineering (preservation in inert gases, for example), biological engineering (control of the biological properties of the products to be stored, storage of semi-processed goods) and the introduction of automated and electronic equipment in the control and regulation of storage conditions.

This progress has, however, made possible the general spread of storage and bulk transport processes (beverages, fats and all constituents or ingredients that can be reduced to liquid form).

The predominant trend is towards savings achieved by setting up large-scale units. Yet the dispersion of agricultural production units and the low concentration of the distribution apparatus may favour a second wave of innovations linked to changes in packing and packaging technology (packaging machines on the farm) and to the diversification of refrigeration industry products (milk tanks).

b. Innovations in packing and retail packaging[72/]

The main innovations in the past 20 years have primarily concerned the utilization of new materials (aluminium and plastics in the form of film and hollow shapes). These new materials often combine a commonplace raw material (cardboard, aluminium, tin) and a new material (polyethilene film, cellulose film) to meet new requirements in respect of food processing or distribution: combination of aluminium and plastic in a laminated film for semi-preserves; cardboard/aluminium combination for deep-frozen products; cardboard/polypropylene hybrids for microwave-treated products, polyethylene/waxed carton combination for "tetra-pak" containers.

The linkage with innovations developed in food processing itself is important for all new forms of packing.

It is much less clearcut in the case of traditional materials (glass, paper, cardboard) which continue to be used in retail packaging operations. In this latter field, the essential feature of innovation has been the increase in the technical capacity of packaging machines. Automatic and multipurpose operation (packing, printing, gluing) is becoming widespread in this equipment, which accounts for a growing proportion of the investments made by secondary processing industries.

72/ "In packing, a certain quantity of products, packaged or otherwise, is brought together for protection and for handling in the primary/secondary processing or secondary processing/distribution circuits.... Packing implies the notion of wholesale trade. By contrast to packing, packaging applies to quantities corresponding to the unitary purchase by the consumer." OECD, Impact of multinational enterprises on national scientific and technical capacities, Op.cit., p. 326.

c. Innovations relating to the processing of food products proper

Innovation has been progresing in two directions: improvement of traditional food technology (cold, heat, vacuum, treatment with electricity); and the general spread of continuous processes.

The improvement of traditional techniques is based on one single principle: the use of heat or cold for different lengths of time or in different combination of heat, cold and vacuum makes it possible to develop new processes which save processing time and water and improve the organoleptic qualities of the products.

Along these lines, innovations in the following fields should be mentioned:[73] appertization (pasteurization of liquid foods, sterilization), dehydration (steam-injection processes, processes using spraying, lyophilization), refrigeration techniques (refrigeration, freezing, deep-freezing (semi-continuous, non-continuous, quick-freezing, liquefied gas)).

Mention should also be made of irradiation techniques, which will be playing an important role in storage processes, and the use of microwaves, whose industrial applications, originally limited to thawing, are being extended (drying, cooking of meat products).

The general spread of continuous processes is closely linked to the utilization of the above-mentioned techniques, and also to the improvement of separation techniques (ultrafiltration of milk, for example).

They already have important applications in the following lines of production: butter-making; cheese making; pasta; biscuit-making; drying; deep-freezing of ready-cooked meals, meats and fish; brewing; sugar milling; and malt production.

If continuous processes are to undergo significant development, a better mastery of physical and chemical phenomena and doubtless also the development of a new range of products[74] will be required.

73/ The general spread of these processes is, however, closely linked to the development of energy prices. Because of the costs, they can currently be applied only to food products with high value-added.

74/ "Exaggerating, we can say that we do not know what is going on in the non-continuous system, nor can we define the result we want to achieve. In this situation, it is very difficult to call into question the traditional method of production. We observe, particularly in connexion with the transition from non-continuous to continuous operations, that the quality of the product is not exactly the same. A long process of adjustment will therefore be necessary before we again attain the traditional quality level." J. Bimbenet, Continuité et automatisme dans les industries agricoles et alimentaires, 1972.

Still, the extension of these processes to all the food-processing routes is often thwarted by the lack of uniformity of the basic commodities and the still very traditional nature of the food-processing operations preceding them (storage, pre-processing, separation).

The application of these techniques therefore often implies a reorganization of the upstream (agricultural supply) and downstream sides of the food industry.

d. Innovations relating to semi-finished food products (operations of separation, fractionation and fixation of the properties of products). It is no coincidence that many recent innovations relate to these operations. Indeed, the technical mastery of these operations again enables food production activities to be redeployed upstream (new relations with agriculture and downstream (continuous processes based on agricultural intermediates; reconstitution of food and non-food products).

The perfecting of these techniques does not fall solely within the scope of the food companies' activities. It involves, more and more, capital goods firms not specialised in food technology,[75] chemical and biochemical firms.

The food-processing industry, in fact, is gradually losing its specific know-how and its control over technological change, as it is already evident in the development of techniques relating to agricultural intermediates, such as:

- extraction techniques, where traditional pressure technology has been supplemented by recent chemical devices (wider range of solvents);
- centrifuging techniques (widening of the fields of application to certain solids with fluidised fine particles, as in flour millings);
- filtering techniques (general introduction of the use of membranes; ultrafiltration, reverse osmosis, in the utilization for dairy products and, more generally, for all liquids);
- electro-dialysis (demineralization by filtering of electrically ionized minerals);
- chemical refining, using resins (utilization in sugar milling at the stages of decalification of the molasses, manufacture of liquid sugar from low-yield and hydrolisis of lactose and fractionation into glucose and galactose).

75/ For example Hitachi, the Japanese electronics manufacturer, is working on vegetable growing factories to be built in industrialised areas. Hydroponics is used and a mass spectrometer measures the light and temperature needed for maximum growth. Computers record the treatment for mass production.

5. The emergence of agro-biochemistry and bioengineering

The increase in the cost of energy and raw materials of fossil origin and the development of biomass processing techniques—and most especially progress in respect of biotechniques[76] (i.e., industrial enzymology and microbiology) appear to give rise to an irreversible restructuring of the agro-industrial complex along the following basic lines:

- natural resources: the resources of the biosphere ("biomass") take precedence over those of the geosphere (geomass) by the very fact of selection of techniques. The agricultural sector, though the principal supplier, becomes only one producer of biomass among others.
- intermediate products: the classical distinction between primary and secondary processing of agricultural products no longer holds good. The function of primary processing is to make possible preservation and transport up to the subsequent stage of processing. It can take place at the industrial level (i.e., ultra-filtration). Agro-biochemical activity per se is the key phase in agro-industrial processes. Nearly all biomass resources must pass through this phase before they can be used in subsequent phases of production. The development of downstream activities, i.e., end utilization, will be based primarily on inputs from the agro-biochemical sector (enzymes, bacteria, products of bio-synthesis, major intermediate products of biomass conversion). Lastly, the basic inputs of the agricultural sector (breeds, seeds and plants) will be produced by the agro-biochemical sector (genetic engineering).
- end utilization of biomass, comprising the production of inputs for agricultural production (animal feed, zoosanitary and phytosanitary products and fertilizers), the production of human foods and all other uses, including fuel and industrial materials.[77]

It can be seen that the end utilization of biomass relates both to the production of intermediate goods (i.e., upstream from agriculture, energy and plastics) and to the production of goods of end consumption (food products, a proportion of energy production and the wood and leather industries, etc.,

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[76] A study predicts that world-wide sales of products made by biotechnology processes may increase to around $27 billion by 1988-1990, compared with current sales of about $25 m. a year. See "World Biotechnology Markets to Blossom in Next Decade," The Economist, 15 September 1980.

[77] Carol Pine, "Enzyme Engineering: A New Era for Agribusiness," Agribusiness Worldwide, April/May 1981.

The phase of production of the major agro-biochemical intermediates is the area most conducive to the development of biotechniques. It appears all at once to have become one of the essential factors in the large companies' strategy because it calls into play a growing number of branches of economic activity and, as a correlate, determines their conditions for production and trade (i.e., profit rates and conditions of competition). Furthermore, it contributes to the restructuring of national production systems and to new orientations of the international division of labour. The technological achievements of agro-biochemistry can bring immense benefits to the developing world. "During the next five years it will be possible to grow better crops. In the case of rice--which has no protein--a gene can be inserted to produce a hybrid that tastes like rice but has a lot of protein."[78] Similar genetic marvels will arise from the development of: (1) a virus-free "germ-plasm" (that could double cassava yields), (2) plant strains with higher rates of photosynthesis (which might lead to a type of superwheat), (3) new salt-tolerant strain of plants (particularly for tomatoes) also tastier and better nutritionally, (4) corn and wheat plants (that would endow them with their own nitrogen-fixing capabilities, eliminating the need for fertilizer) , and (5) green plants (such as "Euphorbia lathyris") to produce hydrocarbon-like materials of suitable molecular weight and structure for fuels and industrial materials.[79] However, the developed countries will tend to strengthen technological relations of dependence with respect to all intermediate inputs, should the governments of the developing countries not allocate adequate resources to build up nuclei of local researchers and adopt appropriate measures (i.e., training their young people in bio-technology) to develop agro-biochemistry and genetic engineering as tools for indigenous creativity.[80]

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[78] UNIDO, "Bio-Technology Promises a Better Life for the Third World," IDO/F/68.

[79] Melvin Calvin, Growing and Engineering Hydrocarbons, a report submitted to the Symposium on the Conversion of Starches and Sucrose in Fuel and Chemical Products, Bologna, 18-19 June 1981.

[80] "Genetic Engineering Aim for A Green Revolution," The Economist, 15 November 1980.

6. Projections of supply and demand

It can generally be assessed that demand for processed food will largely increase over the two decades to come, but with a different pattern among developed and developing countries. On the one hand, developed countries as a whole will see their levelling off in their per capita consumption persist for cereal products (direct consumption), dairy products, except for some variety of cheese, yoghurt and cream.[81] Therefore, growth in demand for these products will mainly come from population increases, except for some Southern and Eastern European countries where further rising income can still provoke higher levels of consumption. However, the factors that will play an important role in future demand, especially through income growth, are: (1) the diversification for diet (particularly from products of vegetable origin) and of meat products, (2) processed food that can be stored for a long time (prepared meat, frozen food, etc.) and, at the same time, (3) the fresh fruit and vegetables for which the income elasticity is still substantially high for developed countries (except for some specific products as bananas).

On the other hand, developing countries, especially those countries with a high or a middle income, will have to face a rapid increasing demand. Such a tendency will remain and even will be strengthened due to population growth, raise in disposable income and very high urbanization rates in many newly industrializing nations. For low income developing countries, the demand is also expected to grow rapidly, especially for staple products such as wheat flour, dairy products, and meat.

The key question for developing countries as a whole, however, is to know whether the supply of processed food will still lag behind the demand as revealed by past trends.

It is to delineate better this fundamental issue that a projection exercise has been conducted for the food-processing industry as a whole under the most optimistic hypothesis of the growth of the agricultural sector.[82]

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[81] See OECD," Study of trends in world supply and demand of major agricultural commodities," Paris, 1976.

[82] That is, the normative scenario which reflects the growth of production in each developing country being accelerated to the maximum considered by FAO to be attainable within overall economic conditions consistent with the macro-growth assumptions. FAO,"Agriculture Toward 2000,", C79/24, Rome, July 1979.

Table 9. Projections of demand and supply for all developing countries (in 1975 U.S. dollars)

	Year 1980	Average annual growth rate (percentage)	Year 1990	Average annual growth rate (percentage)	Year 2000
GDP (million US dollars) (a)	1,071,170.0	6.8	2,071,634.0	7.2	4,156,495.0
GDP per capita (US dollars) (a)	474.2	4.2	712.9	4.9	1,145.1
Population (millions) (a)	2,258.9	2.6	2,906.1	2.3	3,629.9
Demand (million US dollars) (b)	81,116.0	9.5	201,169.9	9.3	491,444.6
Demand per capita (US dollars) (b)	35.9	6.8	69.2	6.9	135.4
Agricultural GDP (million US dollars) (a)	199,537.7	3.3	275,742.5	2.9	365,970.2
Agricultural GDP per capita (US dollars) (a)	88.3	0.7	94.9	0.6	100.8
Value added in food processing/value added in agriculture (c)	0.130		0.156		0.203
Value added in food processing (c)	25939.9	5.2	43015.8	5.6	74292.0
Gross production (million US dollars) (a) (c)	65679.8	5.2	108916.1	5.6	188107.2
Gross production per capita (US dollars) (a) (c)	29.1	2.6	37.5	3.3	51.8
Total deficit (million US dollars)	15436.2		92253.8		303337.4
Per capita deficit (US dollars)	6.8		31.7		83.6
as percentage of demand (percentage)	19.0		45.9		61.7

Notes: (a) FAO, Global Agriculture Programming System (GAP), Basic data set as per 1 April 1981
(b) Apparent consumption figures are calculated from figures in the United Nations Yearbook of International Trade Statistics, United Nations, New York and from the data base of the Regional and Country Studies Branch.
(c) Data base of the Regional and Country Studies Branch, Division for Industrial Studies, UNIDO.

First, the demand for processed food has been projected up to the years 1990 and 2000, through a global demand function having as variables the GDP and the population., both reflecting the specific hypothesis of the FAO normative scenario. The demand curve has been estimated through a multiple-step approach involving:

1. estimation of apparent consumption[83] for separate years and a sample of thirty developing countries;
2. calculation of income elasticities of demand of processed food;
3. curve fitting of those elasticities with the GDP as principal variable.[84]

Second, the prospects for value added of the food-processing industry has been derived from the FAO regional forecasts for agricultural GDP, multiplying it by the ratio "value added in food processing/value added in agriculture" obtained from a regression model using the GDP as the explaining variable. Estimated regional "gross output/value added" has been then used to calculate the gross production figures.

Table 9 gives the principal results for the developing countries as a whole and shows a widening gap between demand and supply of processed food.

On the one hand, the demand per capita increases at the same annual growth rate as the GDP, i.e., around 7 per cent, which itself is largely above the growth rate of the agricultural GDP (around 3 per cent over the period 1980-2000).

On the other hand, the gross production (per capita) only grows at a rate of 2.6 per cent (1980-1990) and 3.3 per cent (1990-2000), thus generating a deficit of 45.9 per cent for 1990 and of 61.7 per cent for 2000. Thus, keeping in mind the constraints on agricultural production, the message conveyed by the above projections is clear: production of processed food must be stepped up greatly and this mainly by an increase of the value-added generated by the processing industry.[85] This would be obtained by the processing of a wider range of commodities and an upgrading of their degree of processing.

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[83] Table 8 shows how the apparent consumption was calculated after matching production and trade data with a reasonable approximation.

[84] Methodological details can be found in the UNIDO Internal Note, "Projections of supply and demand in developing countries for processed food," June 1981.

[85] For the self-sufficiency of the developing countries as a whole, an annual growth rate of the value added of the food-processing industry should be around 10 per cent.

Table 10 • Major agricultural commodities, production and domestic disappearance as food, annual growth rates, 1975-2000, in descending order of production growth rate[a]

(Percentage)

	Production	Domestic disappearance as food
Poultry	7.0	6.8
Eggs	5.9	5.8
Pork	4.6	4.6
(Total meat)[b]	(4.6)	(4.6)
Vegetable oil	4.5	4.7
Citrus fruit	4.2	3.5
Other fruit	4.0	4.1
Maize	4.0	2.8
Vegetables	3.9	3.9
Beef and veal	3.8	3.9
Milk	3.6	3.9
Sugar, raw	3.6	3.7
Pulses	3.2	3.0
Mutton and lamb	3.1	3.8
Bananas and plantains	3.1	3.2
(Total cereals)[c]	(3.1)	(2.7)
Barley	3.0	1.9
Rice	2.9	2.7
Other cereals	2.9	2.1
Roots and tubers	2.9	2.4
Cocoa beans	2.9	4.8
Coffee	2.8	4.0
Tea	2.8	3.6
Wheat	2.8	3.0

Source: FAO, Agriculture toward 2000, C 79/24. Elaborated from data in Table 5 of the Statistical Appendix, pp. 245-248.

a/ Total disappearance equal to production plus or minus net external trade balance, minus feed and domestic use other than human food.

b/ Total meat, i.e. average rate between beef and veal, mutton and lamb, pork and poultry taken together.

c/ Total cereals, i.e. average rate between wheat, rice, maize, barley, and other grains taken together.

It is of course difficult to assess what would be over the next decades the maximum feasible for the ratio "value added food processing/value added agriculture for the developing countries". However, ratios exhibited by various countries with a strong food-processing industry show that under various economic and technological conditions it can be fairly high and range between 0.5 and 1.[86/] This suggests, therefore, that there is still a great scope for developing countries to increase the rate of processing of their agricultural commodities and to improve the quality of their related manufacturing operations.

There are in addition no grounds for expecting that all food input items will continue to participate in the industry's processing in the same proportions as in the past. On the contrary, the very projection exercise shows that this will not be the case. The projected annual rates of growth of production and of domestic disappearance as food of the twenty-two commodities or groups of closely related commodities presented in Table 10 vary within a very wide range which extends from 2.8 to 7 per cent for production, and is even broader for domestic disappearance (i.e., consumption). The implications on the food-processing industry as such are that the hypothesis of constant technology will be clearly untenable because of the necessary changing composition of its inputs. Over ten years the industry will be increasing its inputs from, say, 100 to 182 for wheat, and from 197 for poultry, which will make it a very different industry.

In addition to this direct implication of the projections, the constant technology hypothesis cannot be defended on other grounds. The developing countries' food-processing industry needs to be modernized and expanded. Most of its equipment is still at a very rudimentary stage, in spite of some "modern islands" of up-to-date machinery set up in some capital cities. Modernization and expansion would bring in more efficient technologies, which are better adapted to the needs and conditions of a growing industry.

86/ See Louis Malassis, Economie Agro-alimentaire, Ed. Cujas, 1973.

Productivity increases may stem from many sources, e.g. energy savings, improved plant organization and location, loss reduction, better storage equipment, increasing unit yields (e.g. higher oil or sugar extraction rates) or recuperation of by-products (e.g. hides and skins from livestock slaughtering). All these gains will increase more the gross product of the industry than the value of the input, and hence constitute a higher value added.

The growing per capita incomes, the increase in the number of people gainfully employed in the secondary and tertiary sectors of the economy, together with generally improved standards of living, will demand (and the industry will supply) foods and beverages incorporating larger quantities of processing services.

The expansion of exports from developing countries will also require increased levels of processing. The food-processing industries of the developed countries will continue to supply their domestic and export markets with food products incorporating a great deal of processing services. The developing countries will need to emulate them successfully in their efforts to maintain and expand their foothold in the markets of the industrialized countries. Moreover, the developing countries intend to obtain more favourable conditions of access to the import markets for their highly processed products and develop an adequate industry that would enable them to export larger quantities of value added in processing.

C. Summary

1. The food processing industry - with an estimated world output of US$ 741 billion in 1977 and a labour force of 26.2 million - binding together a very large number of manufacturing activities, represents a very important part of the overall industrial base and economy in many developed and developing countries. In fact, although the size of the industry in absolute terms varies widely from one country to the other, food manufacturing is a leading industrial sector in practically all countries, particularly is that the case in most developing countries, where for several decades to come food-processing industries are likely to remain a key sector.

2. The food-processing industry is geographicall maldistributed. Developed markets (58 per cent) and centrally planned economies (26 per cent) jointly represent more than 84 per cent of the world food- and beverage-processing. The developing countries account for about 16 per cent only of the aggregate value added in food- and beverage-processing. In addition, the bulk of the world's processed food trade is directed towards the developed market economies, with developing countries' imports dangerously concentrated on key items (wheat and dairy-products) and with developing countries' exports (limited in most cases to tropical products) shbwing a poor diversification.

3. The interpenetration of the world patterns of consumption also supports a basic tendency to devaluate traditional foods, thus encouraging a consumption style that may prove inappropriate for the developing countries - due to diffusion in the growing urban centres of most developing countries of "eating habits" increasingly based on a diet which characterizes the developed countries. In fact, the imitation of the consumption patterns of the large industrial centres leads to an agro-model of production often based on the utilization of expensive intermediate inputs and mechanical equipment which tend to displace inexpensive labour-intensive technologies in favour of imported, labour-saving machinery.

4. This situation is particularly disquieting. The degree of self-sufficiency, which can be measured by the ratio of net balance of exchanges versus production, shows that the food dependency of several developing countries is critical and will still grow worse if serious measures are not taken to change the structure of production and of foreign trade. Moreover, the agro-industrial model of production operating in some developed countries cannot be transposed to developing nations, basically because of its high energy requirements and also because it cannot match a completely different set of conditions or problems (e.g. demographic explosion, underemployment of the agricultural population, specific ecological conditions, etc.). Indeed, for most developing countries the problem is to produce the necessary quantity and quality of food calories taking into account two main factors: the uncontrolled demographic growth and the limited arable soil. Therefore, the agro-food production has to be conceived in terms of persons to be fed by hectare at a certain nutritional level, using local resources in the best way possible (ecological and agricultural system and manpower), specially limiting external resources and inputs, - non-renewable energies to be considered in the first place.

5. To attain high production targets of processed foods corresponding and satisfying the rapidly increasing demand, particularly those in many newly industrialising nations, - a redifinition of food-processing models in the developing countries is of utmost importance, with a view to low energy profiles, to rehabilitating basic, indigenous, low-cost food crops, subject to their productivity being substantially improved. The solution - whilst individually suiting conditions in each country - will have to be centered on the replacement of the traditional wheat-meat chain with protein-producing plants (especially leguminous crops with their own inherent bacteria fertilising system), economical animal-husbandry (aviculture, rabbit and game, etc.) and various substitutes foods of local origin (such as "composite flour programmes") stressing by way of convincing and appropriate media campaigns the "superior" quality of foods produced on the basis of local resources.

In addition, appropriate technologies should be conceived so as to foster a better balance between manpower and equipment, the maximum use of raw materials and their processing to the extent of meeting the substantial food demand (nutritional needs, packaging and agro-display), to use - if possible - renewable local energies, to reduce transport costs and stock losses, to adopt recycling of waste and to promote implementation of small-scale projects.

6. Although the food processing models of some developed countries cannot be transposed to developing countries, the contribution and role of the developed countries for the development of the food-processing industry in the developing countries remains essential.

The diversity of the actors, however, that can establish fruitful co-operation links with the national institutions and authorities of the developing countries has to be emphasized. Thus, in addition to the powerful influence of the traditional transnationals (TNCs) there is a growing number of:

"outsiders" (e.g. the giant Japanese trading houses, instruments of their country's foreign economic policy);

"independents" (e.g. the Hamburg grain firm A.C. Toepfer);

major capital goods suppliers (e.g. Alfa Laval, Buhler, Fives-Cail, FMC);

small- and medium-scale manufacturing firms (export-oriented, often disposing of technological novelties acquired by own experience, research and development);

well-established co-operatives, which, operating on the basis of solidarity criteria can provide better conditions for technical aid, financial support, establishment of joint ventures in the field of production, marketing or extension work.

These new actors offer developing countries the opportunity of choosing new partners which - compared to TNCs - appear to be more suitable to the conditions prevailing in the Third World in terms of labour intensity, scale of operation and in particular, valorization of local food resources.

7. A large diversity of means of production and of actors thus represents a counterpart to the diversity of needs and demands. In this way it might be possible to orient the offer/demand and consider each homogenous segment of demand. In particular, in the case of the demand of a poor rural population, several factors (e.g. the social and religious traditions, the lack of consumption or distribution networks, the local eating habits, the non-existence of qualified "industrial" manpower) point towards food policies centred on modernizing and revalorizing the agriculture of self-subsistence. On the other hand the growing urbanization largely justifies a production-model based on modern technologies, large-scale production made possible by masses of consumers living in cities, by a modern system of distribution or by imported goods subject to certain conditions being considered (e.g. the imported products be adapted to the nutritional needs of the population, that none be substituted for traditional ones). Consequently a principle of"combined strategies" emerges as particularly suited for the development of the food-processing industry based on both the factual internal demand and a good linkage with other elements of the agro-production system.

II. GROWTH OF FOOD-PROCESSING INDUSTRIES IN DEVELOPING COUNTRIES

A. International objectives of development

Food production, processing, distribution and consumption present many international issues of a political, social, economic, scientific and technological nature. These issues and the measures to deal with them have occupied the attention of the highest multilateral forums on many occasions and some of them are matters of permanent interest. International action has played a major role in the definition of the growth objectives of the three successive UN development decades launched by the General Assembly since the beginning of the 1960's. In the field of industrial development, the overall objectives of the Third UN Development Decade are closely related to those of the Lima Declaration and Plan of Action on Industrial Development and Cooperation of the Second General Conference of UNIDO.

At the UN General Assembly, the international community recognized that "substantive progress should be made during the decade (i.e. the Third Development Decade) towards food self-sufficiency and food security in developing countries so as to ensure an adequate level of nutrition for everybody. Agricultural production...should expand...so that it will be possible to meet nutritional needs of the populations, to enlarge the base for industrialization and the diversification of the economic structures, and to redress current imbalances in world production" 87/ and that "Industrialization should be aimed at meeting in an integrated way the overall requirements of the development of the national economies of developing countries" 88/ The Lima Declaration provides that "in view of the basic complementarity between industry and agriculture, every attempt should be made to promote agro-based or agro-related industries which,

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87/ Goals and Objectives, International Development Strategy for the Third United Nations Development Decade, United Nations General Assembly Resolution 36/56, Part II, paragraph 28.

88/ Ibid., Part II, paragraph 29.

besides arresting rural exodus and stimulating food production activities, provide an incentive for the establishment of further natural resource-based industries"[89]

These universally accepted principles should inspire the drawing up of national development plans, and the formulation and implementation of policies, measures and programmes. Each developing country will undoubtedly adopt its own strategy following the path most suitable to its own conditions. These differ widely as do among others: (1) the levels of GDP and income distribution among inhabitants or between regions, (2) the ideologies inspiring forms of government and the socio-economic organization of production (whether they are centrally planned or market economy countries), (3) the endowment of natural resources and utilization levels already reached, which includes the availability of arable land not yet brought into cultivation and/or of the inputs to increase the productivity of that already cultivated, such as water supply and irrigation, energy, fertilizer production, etc., (4) available labour and its skills, (5) growth of population and its distribution between rural and urban sectors, (6) share of GDP arising from external trade, (7) competition between domestic and export demand, (8) concentration of export earnings in one or more commodities, and whether their current and prospective situations are favourable, as for oil, or unfavourable. (9) what is each country's food production deficit or surplus with respect to its nutritional objectives and (10) the volume of domestically generated investment funds and export earnings as well as the level and type of expected flow of external resources as financing or other assistance and of competing claims from the food sector and all others.

The variety of conditions exhibited by the developing countries does not detract from their common need to strive to attain the highest possible nutrition levels by encouraging agricultural production and by moving the quantities of food required from producers to consumers by marketing, processing and manufacturing food products at the lowest possible cost to consumers generally, but at farm-gate prices encouraging continuing and expanded production.

89/ Lima Declaration and Plan of Action on Industrial Development and Co-operation, United Nations Industrial Development Organization, paragraph 51.

Even the few developing countries experiencing a very rapid rise in export earnings, such as the oil-exporting countries in recent years, cannot afford to orient their food policies toward deliberately increasing dependence on imports. The longer-term risks of a quasi-total, or even only very large, dependence on imports are too great to be taken beyond those that are unavoidable. Some can be avoided or reduced by developing domestic agriculture compatibly with the climatic, geographic, hydrological, ecological and other conditions relevant to plant and livestock production. Most developing countries, however, suffer from chronic or frequently recurring balance of payment deficits. For them, there is an immediate need to obtain the highest possible levels of domestic production, not only as a hedge against future risks; they would also need to keep food imports at an indispensable minimum to prevent imports from acting as a disincentive to domestic producers. Similarly, imports of raw materials, packaging and labelling products, foreign technology and spare parts required by the food-processing industry should be kept down to unavoidable minima, bearing in mind other drains on external resources by other priority sectors of the economy requiring imports. Thus each country should aim at the highest degree of food self-sufficiency compatible with its own conditions.

B. The need to define national food policies

The growing contribution of food processing to the rapid industrialization of the developing countries envisaged in the International Strategy for Development requires a full mobilization of resources purposefully directed.90/ Thus it demands the intensification of international co-operation between developed and developing countries on a multilateral, regional and bilateral basis in financial and technical assistance and also the stepping-up of co-operation among the developing countries themselves. The framework of international trade also needs to be reviewed and re-structured in order to assure expanded markets, thereby increasing export earnings and incentives for the industrialization of developing countries.

90/ In order to simplify presentation, the main aspects of the developing countries' domestic action are dealt with in Part II of this paper, while the international co-operation and trade aspects are dealt with in Part III. It is recognized, however, that domestic and international aspects of food production and processing cannot be separated so neatly when shaping development plans and policies.

The achievement of the strategy objectives in the food production and processing sector requires both accurate planning and policy formulation and the relentless implementation of all aspects of a food policy. As observed in an OECD paper, the Governments of many developing countries have an agricultural policy but not a food policy.[91] In all too many cases, it could also be said that Governments have had an industrial development policy but no food industry policy. This situation is changing, but in the preparation of development plans[92] there is still room for further practical recognition of the key role of food; adequate priorities should be assigned to unified food policies within the context of the development of industry and agriculture, as well as of processing and marketing, both wholesale and retail.

It should be "realized that neither industry nor agriculture can proceed very far without parallel and balanced development of the other. Growth of agricultural output is usually a critical determinant of the rate at which industrialization can proceed. Conversely, insufficient industrial support for agriculture and a lack of manufacturing facilities to process agricultural output represent a major constraint to output and productivity in agriculture."[93]

However, with few exceptions even in the food-processing sector, policies and development plans still do not exhibit the degree of synchronized and balanced development which would have ensured more rapid progress. The rural sector has continued to lack a dynamic and innovative force which could have been represented by a vigourous food-processing industry, adapted to and integrated with its agricultural environment. Some large islands of modern, highly productive agriculture specializing in crops or export or around large cities have emerged. In all too many cases, these developments have been linked to the processing requirements of transnational corporations (TNCs), or the need of distant import markets for primary commodities.

91/ Adel A. Beshai, Food for All: The Capacity of Development Countries to Meet Their Food Requirements, Country Background Paper: Egypt, Food Situation and Outlook, OECD Development Centre, CD/RI, 79.1112.

92/ The expression "development plans" in the present paper covers also "Government policies" generally.

93/ M.M. Aref, The Role of Agro-Industries in the Industrialization of Developing Countires, UNIDO/IOD, 29 March 1976.

Most developing countries currently find themselves faced with the dilemma: can the challenges of the 1980's be met by continuing to follow past patterns of economic development or should new and alternative national models be designed and applied?

Generally speaking, the former patterns have stressed an "imitative" model of development and GNP growth rather than its distribution. These two aspects have recently come under severe criticism.

For instance, addressing the UN Committee for the New International Development Strategy, Dr. Raoul Prebisch stated: "... We were under the illusion that we could develop in the image and likeness of those centres (i.e., developed countries). We now understand that...(it) was an illusion which is rapidly vanishing, because we see that even in the countries with the highest rates of economic growth social inequalities, instead of diminishing, have increased. In Latin America as a whole - and I believe that this occurred in other parts of the developing world - the masses of the population, despite this high rate of development, were by-passed and received a very meagre share, if any, of the fruits of development... In our zeal to imitate the great industrial centres, we imitated their patterns of consumption, and this went to the extreme , with these patterns of consumption applying to what I call the privileged consumer society, because a relatively small segment of the population is involved."94/

The continuation of existing patterns may intensify the problems of continued stagnation of the rural sectors, the urban population explosion and the rapid escalation of food imports heavily concentrated on wheat and dry-milk products. Both are typically temperate zone commodities. Here the difficulties of tropical countries in equating production to need in a balanced way are the greatest. The current patterns may also lead to expanded TNC ownership of the food-processing industries of the developing countries - a sector where TNC organization, management and technology might not be indispensable. If unchecked, these expanded TNC inroads imply a wider transfer of the decision-making power in the economic field outside the developing countries, with the consequent risks of larger distortions in the countries' patterns of production, trade and technological development.

94/ UN General Assembly, statement by Dr. Raoul Prebisch at the 13th Meeting of the Committee for the New International Development Strategy, 27 February 1980.

These inherent dangers strongly suggest that in the essential sector of food-processing industries, with its serious implications for the whole agricultural and manufacturing development, the developing countries must try to find and apply new alternatives to their present models of growth on the basis of national needs, objectives and resources within a unified food-policy approach.

C. Integrated approach to food-processing industry planning

1. Integrated approach at country and within-country levels.

(a) The State's role and the planning process

At the national level, the most common way of unifying food production and food processing policies is within the framework of a pluri-annual national development plan.

In this case the unifying element is the definition of a specific target for food development and the provision of co-ordinated measures and programmes aimed at that target. Within this framework, the growth of the food-processing industry is viewed in relation to the target, its composition by products and their quantities and geographical distribution, markets and social groups to be served. In particular, the necessary links are reviewed, and, if the situation so warrants, strengthened upstream between industry and agriculture (so that the development of the two sectors is synchronized) and downstream so that the links with distribution and consumption are adequately assured.

The links may be provided structurally as in the case of agricultural development projects embodying processing plants; or by means of rules, such as by legislation providing incentives to the co-operative ownership of the processing plants by the farmers; or by procedures safeguarding producers vis-à-vis the industry in contract farming; or by the establishment of a government agency with monopoly powers in the sector. These alternatives are mentioned merely as examples and in practice there may be a great deal of variation among them. The choice among these alternative options will undoubtedly be influenced by the political and social conditions and preferences of each country. These factors will also influence the choice of the ways in which ownership and management of the processing industries may be envisaged, and by which the industry's downstream links with food marketing and consumption

will be assured. Adequate machinery should be established for the implementation of the measures and the attainment of the objectives.[95/]

As a minimum requirement the plan should include a chapter on food development as a coherent whole, listing the various projects, reforms and measures to be undertaken in the various fields - nutrition policies, agriculture, industry, marketing, exports and imports (agricultural inputs, food industry, domestic marketing, transportation, financial and other investments, etc.) - in order to attain the food objective. This should lead the political and planning authorities to take an overall view of the adequacy of the measures to be adopted and the institutions to be provided.

The preparation of such a chapter at an early stage of major policy formulation could also help in overcoming a basic constraint of an institutional nature common in planning agro-industrial food development - that of defining the fields of competence within a joint policy currently distributed among a good number of ministries and other governmental bodies, e.g. the ministries of public health, agriculture, and industry (this ministry is sometimes split into ministries of heavy industry, light industry and transport), foreign trade, commerce, budget and finance, plus, at least, the national bank, among other governmental bodies. The document to be drawn up would cut across all these compartments and hence its drafting would need the expertise of the various authorities concerned and lead to an integrated formulation of food policy, and as clearly stated in a recent paper,[96/] it "would require a unified approach to be dealt with by a multi-disciplinary team with one concept."

An exercise of this type could also identify possible "loose ends" left in the plan that might constitute weak links with, for instance, input industries, e.g. those producing fertilizers and pesticides, or supporting measures, e.g. the provision of credit, or transport, wholesale and retail marketing infrastructures.

95/ An example of a national food programme is given below, the Mexican Food System (Sistema Alimentario Mexicano, SAM).

96/ W. Moreira-Dias, Integrated Agro-Industry Development, UNIDO/IOD 374, 19 August 1980.

The need for incorporating multidisciplinary machinery in the governmental structures of the developing countries has already been identified as a "priority area" for consideration by the Global Preparatory Meeting for a Consultation on the Food-processing Industry, held in Vienna in 1979.[27] Further consideration of this subject would require a view of the overall machinery existing in developing countries for the preparation of national food plans and policies and the actual experience these countries have gained with various co-ordinating bodies of the types mentioned in the preceeding paragraphs or similar ones. In co-operation with the interested governments, an appraisal could be made of the extent to which they could benefit or would expect to benefit by the institution of machinery of this nature.

An example of an integrated food programme supported by machinery of this kind is provided by SAM (Sistema Alimentario Mexicano, or in English, the Mexican Food System).SAM integrates food objectives from consumption back to production and has an institutional set-up serving objectives from agricultural production to retailing, through processing and marketing. It aims at satisfying the minimum nutritional requirements of all population groups quantitatively defined by main foods and per head of population. It also encourages increasing production of staple foods, e.g. maize, beans and other basic foodstuffs, so as to achieve self-sufficiency in food by a given period, i.e. between 1982 and 1985. It plans to attain these production objectives by opening up new lands and by increasing mechanization and other inputs for rain-fed crops, to operate more equitable income redistribution among the different social groups, among the various regions of the country and between the urban and rural segments of the population. The overall SAM project (composed of twenty interrelated sub-projects, some of them further subdivided) is carried out, supervised and co-ordinated by a central task force within the office of advisors to the President of the Republic of Mexico.

Production incentives of various types include financial support for participating farmers. Traditional agricultural production structures, such as the ejido, the unique Mexican form of collective farming, will be assisted to become more productive, while modern agri-business will also

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27/ "Global Preparatory Meeting for a Consultation on the Food-processing Industry," Report ID/WG.295/1, paragraph 23.

be encouraged. SAN will pursue closer integration between agriculture and expanded and improved marketing and processing. The peasant ejido production enterprises and producers' co-operatives will be linked with state-owned processing and marketing enterprises (with arrangements covering commodity flows and prices, as well as financial, marketing, technological assistance and extending to training). Operating within the System, a state agency (CONASUPO) will assure direct food distribution through its retail stores, administer consumption subsidies and carry out consumer education campaigns.

(b) The State's role within regional development programmes

Within a regional development programme, the objective is usually established in terms of production and productivity growth and of processing facilities rather than of a food target. The development programme usually requires the establishment of an area agency capable of identifying objectives, the projects to achieve them, and co-ordinating their implementation in the processing industry and food production sectors, so that the two are closely integrated. One example of an agency of this type is offered by the Industrial Development Institute of Minas Gerais (INDI) in Brazil. INDI embodies the highest professional qualifications and has a very strong political influence. The programme developed in the State of Minas Gerais is complementary to the Brazilian federal policy to boost agricultural expansion. In the Minas Gerais programme the latter is given incentive by the development of the processing industry. The strategy adopted includes several stages which may be brought under two headings: one is the formulation of quantitative objectives for INDI's action and the other is the identification of projects and the energetic promotion of their financing and implementation. In the early stages, macro-economic studies are made of the resources or of the raw material basis and of the consumer's demand for the products which the processing industry can supply. By this evaluation of the potentialities of the local industry /agri-business situation, the most promising industrial sectors are identified. This stage is followed by the development of integrated projects, which frequently demand creative use of technology.

2. Machinery for project conceptualization

As the cases of SAM and INDI indicate, an integrated approach requires the establishment of adequate, pluri-disciplinary machinery for project conceptualization and development. This need is enhanced in all cases of relocation of food processing industry within integrated rural development programmes.[98/]

Food industry relocation implies that in planning industrial development, the longer term advantage of installing new plants near to the actual and potential sources of domestic food production will be given due weight in the implementation of projects or programmes.

The choice between one option or the other will depend on the relevant circumstances and conditions of each country, area or type of industry. Projects would need to be adapted to local conditions and sectoral programmes of rural development horizontally integrated with national development programmes and vertically within the national food processing and marketing in the urban sector. Among the food processing industries the most favourable opportunities for relocation to the rural sector would be those processing field crops (e.g. grains, oilseeds and pulses), or tree crops (e.g. fruits) and livestock products (e.g. milk and poultry).

But even when economic and technological considerations favour the setting up of a plant at a long distance from its sources of supply of raw materials, or even completely outside the rural sector,[99/] the industrial development project should be considered in association with any necessary adjustment in the agricultural sector so that it would be conceived as an integrated programme. This, of course, would also include technology, transportation and any other factors of infra-structural growth or adequacy.

98/ "In the context of integrated rural development Governments will encourage rural industrialization, the establishment and strengthening of agro-industrial complexes.....and the ensuring thereby of increased production of food and agricultural products and employment for the rural population" UN General Assembly, loc.cit. para 95.

99/ A few cases might be mentioned as for instance plants demanding the immobilization of relatively large capital investments (e.g. vegetable oil or sugar refining) and plants reaching optimum scale of processing at level requiring them to draw their raw materials from wide areas, or necessitating several raw food inputs, e.g. sugar and fruit grown in separate areas of the country.

A successful industrialization programme demands policies and programmes of incentives. Among them should be assistance of a financial and other nature in order to favour the development of a local entrepreneurial class and to prepare skilled workers. But above all, and particularly in the less advanced countries and areas, there is a need for the strengthening of machinery for project identification, preparation, evaluation and implementation.

At the earliest stage of project formulation, "conception" depends above all on intuition, managerial skill and knowledge of local conditions, but the following stages of project preparation and evaluation are technical stages. The skills required may be found in government agencies (central and local) and in specialized bank institutions, such as national, regional and international development banks.

This emphasis on adequate project initiation and preparation stems from the simple but fundamental observation that without initiatives no project materializes, and that faulty preparation will lead to severe losses, feelings of frustration and the failure of a project.

The history of rural and nonrural industrialization is full of examples of failed projects. Any economic undertaking involves risks and failures which cannot be excluded altogether; there is no foolproof way to ensure against these failures, but they can be reduced by strengthening project identification, preparation and evaluation.[100/]

The lack of adequate appraisal, not only of internal consistency and economic profitability but also of the project's links with relevant agricultural production, roads and transportation, marketing, processing, etc., may bring heavy penalties.

A complete feasibility study to reduce the risks of failure requires a multi-disciplinary approach involving far more than simple plant design and equipment. It also requires expertise of various kinds, of which agricultural and economic science, market management and econometrics might be only a few examples. A sound and thorough knowledge of local conditions is essential to success.

These qualifications and specialized knowledge can hardly be found among small- and medium-scale entrepreneurs, and they are particularly scarce in

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100/ Project preparation in developing countries may need the assistance of international co-operation. This aspect is dealt with in Part III.

poor rural sectors. They must be brought from the outside and this can only be on the initiative of government or semi-official bodies.

It would be appropriate to query whether the standard procedures for formal project analysis meet the requirements of an integrated approach to food-processing development, or whether new methodologies and procedures should be envisaged and developed. These doubts arise in many areas and may be overcome when the concept of an integrated approach in food-industry development has been clarified and defined at macro-economic and political levels. At micro-economic level, a first definition of integrated approach could be that of establishing full control of the processing plant over the supply of its main inputs, or the consolidation of the plant and the agricultural producing unit into a single concern, or any other way of strengthening the linkages between the two. In an attempt to develop norms and procedures to identify, plan and implement integrated food-processing projects this criterion might be necessary but not sufficient. If it were sufficient, a TNC development project would qualify as an integrated project. It might or it might not. For instance, a TNC might qualify because of the establishment of linkages between agriculture and processing at high levels of productivity and private profits, but the project might not contribute to the growth of the national integrated agro-food system as a whole or to increasing the interdependence between the various elements of the system. It might not contribute to the realization of food policies, e.g., if its result is to draw resources into a non-priority food product and away from a priority one (priority being assessed in terms of national nutrition policy or income re-distribution policy favouring, say, staple food for the many).

3. Incentives to industrialization

Second only to adequate project preparation is the overcoming of credit constraints and the difficulties experienced by a yet-to-be established industrial concern in obtaining credit.

In spite of their low standards of living and productivity, growers in rural areas are capable of producing savings and capital in the original sense of the word, i.e., under the form of current production saved and not consumed. This "capital" is in specific resources and the markets currently facing the growers are in most cases not capable of transforming it efficiently into funds to invest in local industrial ventures. In addition, small- and medium-sized farms hardly represent acceptable collateral for

long-term borrowings from banks. Thus, apart from projects with immediate and high productivity that cannot be expected to be numerous, the usual case would be that of projects not "bankable" at full commercial terms in the eyes of the usual credit facilities existing in developing countries. Most developing countries suffer from high inflation rates with exceptionally heavy interest rates that, coupled with scarcity of funds for long-term investments, make rather utopian the hope of banks financing industrial development ventures in the rural areas, and the ability of the project promoters to undertake the servicing of a loan at full commercial terms.

In most cases governments would therefore need to intervene by providing a loan facility at concessional, favourable terms through the banking system or in other ways. This facility should be ample enough to provide the funds needed for the approved projects of modernization or the establishment of new plants and, in some cases, the necessary initial working capital. The debt-service charge should be calculated so as to provide an incentive to establish the industry and to assure its viability, which would imply adequate periods of grace, subsidized interest charges and long periods of repayment.

The mobilization of domestic resources will not suffice in most developing countries, especially in the poorer among them, to support the global investment effort they will be called to make in the manufacturing and agricultural sector. External financial assistance, multilateral, regional or bilateral, will need to be extended, particularly under the form of official development assistance at concessional terms. This aspect is dealt with in **Part III**.

The very lack of industrial tradition would also require the introduction of training facilities for the managers and the staff of newly established firms, advisory services (e.g., regarding machine repair and maintenance and market information), and infrastructure (e.g., treated-water supply, electrical power, road networks and transport facilities).

4. The contribution of the private sector

In addition to the incentive previously mentioned, an improved "public climate" is required to achieve a better understanding between developing country Governments and the private sector with the objective of fostering the private sector's contribution.

In this regard, in developing the food processing industry, the foremost tool for developing country Governments is to apply the basic criteria used in the private sector (especially on market accessibility; consistent raw material supply; the availability of credit on reasonable terms, suitable technology, trained technical and managerial staff: locally manufactured processing equipment and packaging material). Moreover, stricter regulations for the public and parastatal enterprises (which can, of course, operate in areas of the food system where long-delayed returns do not attract private parties) should also be enforced to improve their efficiency and achieve substantial savings. On the one hand, this might be accomplished by bringing their finances and general operations under close control of the ministries responsible. On the other hand, persistent cases of irresponsible management and financial quagmire should lead to reform programmes which include scrapping and denationalization of state companies.[101/]

A liberal investment code and tax regime would also greatly enhance the contribution of the private sector, provided that it places the domestically owned industry in a competitive position versus foreign-owned corporations. Thus the benefits envisaged by the investment code and tax regime should give priority to foster the local class of managers and private entrepreneurs, though also applying to the foreign entrepreneurs who, along with domestically owned industries, fulfil goals of fundamental importance such as the attainment of self-sufficiency targets of the development plans and programmes.

D. Elements of integrated food-processing industry development policy

1. Links with agricultural production

(a) Need for agricultural production to adjust to industry's requirements

In many cases available farm produce is inadequate to meet industry's requirements as to quantity, quality and timing of deliveries and this militates against the setting up of processing and manufacturing plants. Successful

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101/ Robert Hecht, "Ivory Coast Scraps Most State Firms", African Economic Digest, 4 July 1980.

adjustment of farm production is a key element of sound industrial development. In some cases, the industry to be established would process a product for which the local agricultural producers have no previous experience, as has been the case recently in some Latin American countries with the introduction of soya bean and cassava, which has required the provision by the industry of specific assistance, extension programmes, training and price incentives. Though these adjustments might be obtained more easily by medium- or large-sized farms, this is not a reason for failing to associate small farmers in the process of industrialization.

In most rural areas in developing countries, mixed farming by peasant operators on small farms generally prevails. Except near large urban centres, these growers are not market-oriented. They are chiefly concerned with satisfying their own needs and the demand of local markets. The quantity of any product any farmer is willing to sell is therefore very small. A continuation of this pulverization of production would make the processing plant dependent on too wide an area of procurement of its raw material, without giving it any assurance as to the quantity of the product obtainable. Moreover, small scale mixed-farming, particularly when scattered over a huge area, is not likely to supply quantities of products that are homogeneous with respect to size, degree of ripeness, sugar or oil or juice content, or available at the desired rhythm, suitable for processing.

In some cases, supplies could be made more homogeneous by selection, separation and grading operations at the industrial plant, but these have their cost and the industry is likely to pass it back in a lower price paid to producers, if it cannot pass it on to consumers. The industry needs both to increase the volume of its operation and to spread the overhead costs over the largest possible volume of output, hence it needs to prolong the cropping season by introducing early or late ripening varieties. Further, the preference for this or the other variety of fruit or vegetables may be dictated by aspects other than the technical ones of processing and manufacturing and be imposed by factors such as consumers' tastes and preferences, the level of their effective demand, the nature, strength and aggressiveness of competition. In no case can these be overlooked, particularly when the processed product is intended, perhaps exclusively, for overseas markets.

Production adjustments to the industry's requirements imply that decisions that are agricultural (for instance, how much to produce, of which varities, etc.) must be centralized and the decision-making process transferred to the industry. This loss of independence will not be easily accepted, particularly by small-scale farmers who must abandon an old for a new philosophy of life and old types of economic activity for new ones. They will have to abandon the traditional idea that only surplus production, i.e., what is obtained over and above their own needs and those of the villages should be marketed and processed. They will need to think of producing first for the market (in some cases distant markets) as indicated to them by the industrial firm, or the processing plant. This will imply the acceptance of decisions made by the industry as regards the new crops, seeds, cultivation practices, fertilizer and pesticide application, cropping time, etc. The more adequate the incentives and the wider their own involvement in this process of transformation, the more easily the growers will accept the changes.

(b) Means to achieve adjustment

The mere appearance in a local market of the demand by a plant would not necessarily obtain the adjustments in the local agricultural production needed to fit the requirements outlined above. Procurement through the market place is practiced in some areas for products obtained from medium- and large-sized farms that have been traditionally market-oriented: here production already takes place on a fairly large scale and responds to market indications. Further, there may be a market - in some cases it is an auction market, as for tea in some major Far Eastern producing countires - where wholesalers bring fairly homogeneous lots they have collected from the farmers. Procurement through the market has some limitations for the industry, among them the risk of fluctuations in prices and supplies. The farmers also may not favour it, particularly if the industry is the sole or the largest buyer in the market.

The adjustments between industrial and farm production and within the farm sector may occur in many forms and degrees, as, for instance, within an agro-industrial concern or by contract farming or co-operative ownership of the plant.

Fundamental determinants of the nature, scope and extent of the vertical integration between industry and agriculture are the types of agricultural products dealt with. Many factors must be considered, such as the risks in production and marketing, existing and potential alternative outlets, the feasibility of storage and transportation, the extraction rate in processing, i.e., the oil content of seeds or the sugar content in cane, the

degree of ripeness for consumption as distinct from processing, as for some fruit, alternative types of fruit processing and the possible different unit costs of processing at increasing scales of operation.

The adjustment of farm production may be achieved with the complete integration within agro-industrial concerns of the agriculture and processing activities. This type of "integrated agro-industrial complex approach"[102] involves the "vertical integration of the whole production process of food, or other agriculturally based consumer goods, from the field to the final consumer". With vertical integration "all stages of the process and their planning are managed, or perhaps owned by a single market-oriented authority having an industrial approach and applying a policy suited to market demands..."

There are some special circumstances that might sway planners in favour of agro-industries. One is that of crops that cannot be consumed directly and that have no alternative market except the processing plant. Independent farmers might not be inclined to depend exclusively on one outlet for their produce, e.g., palm fruit for oil, or sugar cane. Another might be the case of tree crops that cannot be easily accommodated within mixed farming concerns[103], or that have too low yields in these conditions[104], or that have such long gestation periods before any yield is obtained that small farmers cannot consider using them[105]. Finally, there is the case of certain fruits, e.g., pineapples, or of vegetables, that mature earlier or later than those of the import markets in Europe or in the United States of America that are produced exclusively or almost exclusively for export. In these cases, the small farmer might not be interested in or capable of obtaining products up to the qualities and specifications requested by the export markets.

Though successful experience is available, and this type of development is of wide application, there are situations in which other more flexible lines can be followed. In a recent consideration of integrated agro-industrial

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[102] M.A. Aref, The Role of Agro-industries in the Industrialization of Developing Countries, op. cit.

[103] In West Africa, for instance, cocoa is mostly the product of mixed, small-sized farms, but bananas for export have practically disappeared as a product of mixed farming.

[104] In the United Republic of Cameroon, bananas for export can only be produced in large estates because contrary to what happens in other countries the plantation must be renewed every three years and the land taken out of production must be fallowed for another two years before being brought under production again.

[105] This is typically the case of the African palm in West Africa.

development[106], the question of some constraints, particularly for new investments in large plantation and agri-business ventures is raised. If the complex is to incorporate agricultural production, processing, distribution, research and development, in many cases the capital investment required would not be available from local investors. Moreover, the administration of large agro-industrial enterprises is very complex and many failures have been due to this factor.

Among the more flexible approaches, contract farming has gained favour as one way to achieve agricultural production adjustments. The nature and scope of the contracts negotiated between the food-processing industry and the agricultural producers vary greatly. In some instances, prices, quantities to be delivered, forms and timing of payment, and other aspects of the contracts are negotiated between the industry and representatives of agricultural producers in ways similar to labour-management collective bargaining.

Depending upon the degree of risk the industry might incur in obtaining the supplies it requires, the contract may specify the maximum quantities each farmer engages himself to supply or the maximum the industry is prepared to purchase. In some cases, the price may be fixed at the time of planting and tied to a production quota. In other cases, the price is not specified since the government implements a price stabilization scheme and the industry pays fixed governments prices or a target price. In most cases, quality, grades and approximate time of delivery are specified; in others the industry supplies inputs (e.g., seeds, fertilizers, pesticides) or advances funds to meet production expenses, or assures technical assistance to farmers.

An adequate price alone might not be sufficient incentive in directly stimulating production; the local growers must be kept supplied in consumer's goods and production implements at reasonable prices. Money paid to farmers may operate as a disincentive to productivity if they do not find a way of profitably converting food into consumption goods, farm inputs and some amenities of life. Official government supervision of the negotiation of these contracts and to prevent abuses is necessary and it must be adapted to the nature of the contracting parties. The industry may be privately owned, a publicly owned marketing board, or a co-operatively owned plant. The growers may be private

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[106] W. Moreira-Dias, op. cit., p. 5 .

farmers or representatives of a collective body in which the farm owners have a direct interest, i.e. producers' groups of co-operatives.

2. Links towards the consumers

(a) Government price policies

Government price policies will play a very important role in the orientations of food processing industry. With its increasing proportion of poor inhabitants, the expanding urban population will continue to exert strong pressure for price controls on most staple foods and particularly for cereals. Governments will find it difficult to resist. In most cases, policies will also need to be enforced to prevent inflation from affecting wage rates too rapidly. In many developing countries, statutory marketing agencies have been operating in this field, buying from farmers and also importing from abroad at commercial or concessional terms, undertaking or supervising the processing of the supplies acquired and retailing them either directly or through controlled outlets. There are several varieties of marketing agencies of this type, with similar basic characteristics.[107]

The statutory marketing agencies may adjust their prices so as to transfer to either producers or consumers the gains of more efficient large scale, non-profit seeking marketing and processing. Governments

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107/ Examples of these organizations are: CONASUPO (Mexico), EMPROVIT (Ecuador) IDEMA (Colombia) in Latin America; OPVN (Office des Produits Viviers du Niger) nigerian National Supply Company (Nigeria), Food Distribution Corporation (Ghana), and the National Milling Corporation (Tanzania) in Africa; The Food Corporation of India and the Food Corporation of Sri Lanka in the Far East.

that can afford to subsidize either production or consumption use these agencies as vehicles of subsidy distribution by paying higher prices to producers and charging lower prices to consumers. The deficit appearing in the accounts of the statutory marketing agency is made good by the government out of its ordinary budget or other financial sources. Income redistribution of this nature requires that within its economy, the country has a relatively prosperous and sufficiently large sector that can pay the cost of this subsidization through taxation or other means. In the coming years, only a few developing countries are expected to exhibit these conditions, which may exist among the oil-exporting countries.

In some countries when the domestic prices paid to farmers were higher than those prevailing in international markets, the marketing agency has sold at an average price, lower than the farm-gate prices but higher than the import prices, in which case it has protected the domestic producer without excessively penalizing the consumer.

On some occasions in recent years, official marketing agencies have balanced their budgets by keeping the prices to producers too low, particularly in inflationary situations where adjustments for general rises in prices were not made. Income has been redistributed away from the farm producers and domestic production has been discouraged through these price policies.[108]

b. Increasing marketing efficiency

An integrated approach requires the strengthening of the industry's downstream links and in most developing countries, there is a great need to improve the food marketing system that now constitutes a weak link between agricultural production and the processing industries, and between processors and consumers. Ill-equipped markets result in high costs of operation and losses that are reflected on the consumer, processing industries and agricultural producers.

108/ "It is typical for farmers to receive 50-80 percent of the farm-gate equivalent of the export price of their major export crops and value added of their non-traded farm products...", FAO, Agriculture: Toward 2000, p. 166, op.cit.

The level of economic development, consumer's tastes and preferences, the socio-economic structure of the country and the geographic distribution of the population are among the main factors determining the most appropriate form of integration, from farm production to retailing outlets and its adaptation over time. In most developing countries, governments will be increasingly called upon to play a determining role in the organization of central wholesale and retail markets in medium- and large-sized cities, as well as to expand and improve assembly centres and local markets in rural areas. **Since wholesale markets and assembly centres benefit not only producers and processors but also consumers with timely supplies of the main foodstuffs at the lowest possible price, their organization should be a public function and call for public investment. Governments will also need to supply in larger measure than in the past the necessary physical infrastructures, the control and supervision of their functioning, the repression of malpractices, the imposition of grades and standards and, in some cases, price controls.**

(i) Wholesale marketing

Looking into the most suitable ways of strengthening food marketing in developing countries, a marketing specialist of the Inter-American Development Bank[109] pointed out in a recently-published study that it is "imperative for decision-makers in developing countries to obtain policy guidance about alternative labour-intensive marketing technologies suitable for serving rural and urban poor." These technologies apply to city wholesale markets, rural area assembly and processing centres, and other rural outlets. The strengthening of their organization and equipment should receive adequate priority and be looked upon as an essential part of an integrated approach to food-industry development.

In order to meet merchandising needs, well-organized and equipped multi-community wholesale markets for perishables (fruit, vegetables, meats and fish) and non-perishables (cereals and pulses) should possess processing plants for the treatment, selection and grading of foods and their conservation (storage, regrigeration and, where relevant, controlled atmosphere storage). This equipment would also reduce losses and permit the utilization of by-products (the recovery and treatment of hides, skins and feathers from animal slaughtering).

109/ Frank Meisser, "Food Marketing Technology for Developing Countries," Agri-business Worldwide, August-September 1980, pp. 1-5.

The wholesale market would constitute a vehicle by which industry located in rural areas and operators in these areas' assembly centres would distribute supplies among alternative consumers' markets, so as to avoid short-term gluts in one, while there could be shortages in another.

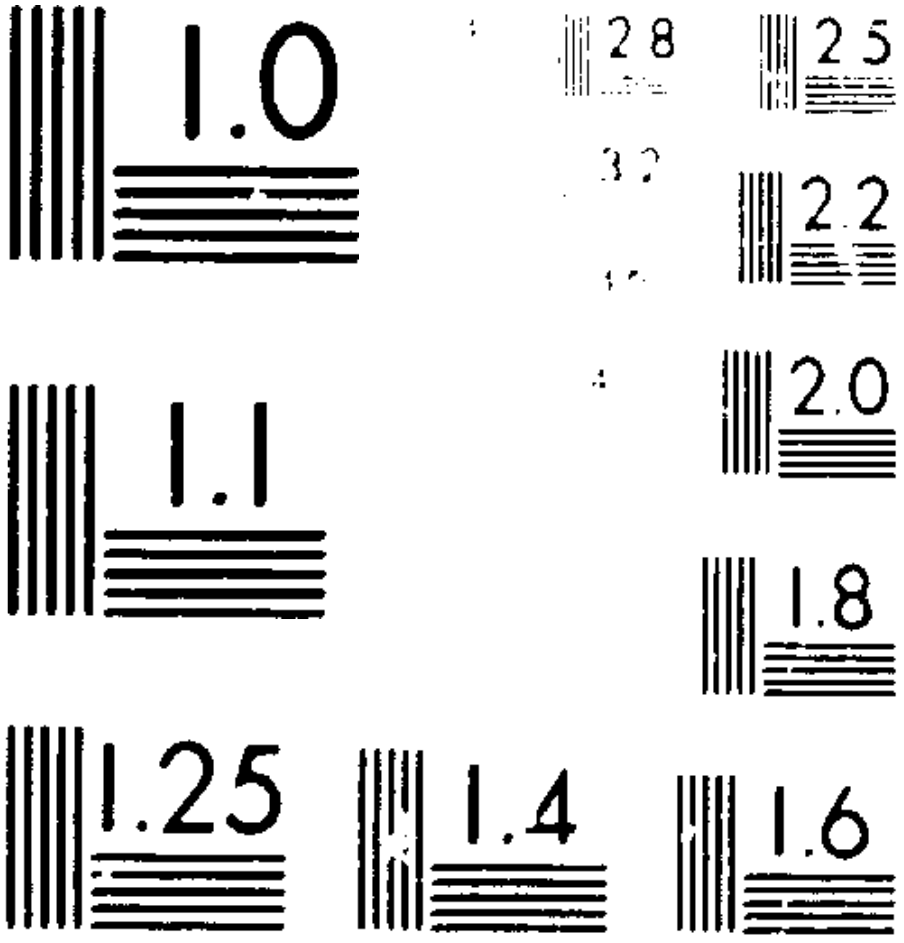
Assembly centres should be enabled to respond to market indicators with timely short-term adjustments of shipments and to transmit incentives to growers to adjust their deliveries. Equipped for cleaning, grading, standardizing, packaging and processing farm produce, so as to obtain the highest possible returns and to reduce transportation and handling losses they would not be limited to combining the deliveries from individual growers into lots.

The development of a solid chain of assembly centres and wholesale markets would also permit a greater participation of the rural sector in urban markets. If assisted and encouraged, producers' marketing co-operatives and their associations could develop in the areas feeding rural assembly and processing centres and through them, realize the vertical integration of the food industry from agricultural production to wholesale distribution.

(ii) Limited supermarket development

The scope for a generalized development of supermarket-type food retailing should be carefully analyzed because of its influences on the type of processing required and on the degree of integration of production-marketing-retailing activities. Within the better-off developing countries, there are some sizable richer--than-average strata of the population capable of patronizing supermarkets and supporting their growth. But where this requisite condition exists, supermarket growth will occur as a natural development of the economy, rather than being planned as a priority objective of development.

Supermarkets are essentially sellers of processed foods with relatively high "value added" and import content. Against the background of food production and processing conditions prevailing in most developing countries, their vaunted superior efficiency in distribution seems open to doubt. The supermarket imposes a type of processing that the poor consumer cannot afford and does not demand, while the city-district retail markets sell the same foods but less processed. In the case of foods that


1.0
2.8
2.5
3.2
2.2
2.0
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1.8
1.25
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1.6

are not highly processed, i.e., fresh fruit and vegetables, pulses, roots and tubers, the supermarkets in most developing countries will find it difficult to purchase directly from farmers so as to obtain a price advantage over other markets. The daily turnover will not always be sufficiently large to permit purchasing supplies directly and the scatter of farm production renders this form of procurement arduous. For staple food and in countries where the marketing of basic commodities, i.e. cereals and pulses, is controlled by an official marketing agency, there is no possibility for a supermarket to procure supplies at more favourable terms. In all these circumstances, the supermarket will in many cases find itself on the same footing as other retailing systems. In addition, in competing with the latter it may be handicapped by its capital-intensive structure because of heavier overheads and higher variable costs in the form of containers, wrappers, packaging and labeling materials.

From a social point of view in labour-abundant societies afflicted by chronic unemployment and underemployment, it must be remembered that **supermarket technology is capital-intensive and practically all imported,**[110/] **and that the few items that can be produced locally include some that are covered by foreign patents or produced under license and subject to the payment of a royalty in foreign currencies.**

110/ Freezers, low temperature display cabinets, wrapping and labelling equipment, electronic scales, sorting equipment, electric and electronic cash registers, etc.

E. Food-processing industry development: technological and organizational alternatives

1. The technological alternatives

(a) Some major features of the industry

In the coming years, the food processing industry will continue to use many techniques that are widely available, most of them decades or even centuries old.[111/] This is one of the major features distinguishing it from other industrial sectors even more dominated by TNC ownership and control of techniques; another is the predominance of medium- and small-sized plants.

The TNCs tend to introduce branded products and their own technology. They supply developing countries with technological "packages" including process, product characteristics, equipment and equipment design, technical assistance, training of personnel, etc. For various reasons these "packages" may not be adequate. In most cases the technology involved is adapted to the physical, social, economic, technical, and other conditions of the industrialized countries and of their products usually in temperate zones. In many cases the products of these zones are different from those of the tropical zones where most of the developing countries are. Moreover, the output of the industries of industrialized countries is intended for consumers who are far richer than those of developing countries - and hence willing to purchase foods incorporating larger shares of value added or "convenience value".[112/]

In most developing countries the most important products of the food processing industry will continue to be staple foods with little value added. Their processing can, and usually does, take place in small- and medium-scale plants. Most of the larger scale plants are connected with international trade, such as grain-milling plans in grain-deficit countries, or sugar-milling and oil-seed crushing and oil refining in exporting countries.

111/ United Nations Centre on Transnational Corporations, op.cit., p.139.

112/ In a study on Latin American food-processing industries, no less than thirteen "genuine" food-processing technologies have been identified, all leading to better use of local products with low capital investment. Jorge P. Guzman and Robert H. Moretti, Draft Assessment of the Current Situation and Projection of the Food Agro-Industries in the Latin American Region, UNIDO/EX.63, December 1978. Consultant paper prepared for the Global Preparatory Meeting for a Consultation on the Food Processing Industry, p. 29. None of these technologies interested the TNCs.

The dispersion of the industry[113] into literally thousands of plants, while it may be an advantage in countries with little technological and organizational experience, may represent a constraint at project conceptualization level. At this essential stage, the potential entrepreneurs (be they individuals, or co-operatives or government agencies) will need the assistance of a body highly decentralized versus production and capable of monitoring current consumption requirements. Without an adequate flow of well-conceived projects, the industrial growth required by the expansion of food demand is not likely to materialize, even if all other requirements are met.

Another consequence of the industry features mentioned above is that in planning the largest possible growth of the domestically owned food processing sector, be it privately, co-operatively or government-owned, governments of most developing countries will not be handicapped by the need to obtain large-scale, capital-intensive foreign-owned and controlled technology to the same extent as in other industrial sectors. They will, however, need to identify the most appropriate technology. In commenting on the requirements of the technology to be purchased for a food industry project in a Middle Eastern country, the market development manager of an international food-machinery company listed the following factors to be taken into account: "1. All machines purchased had to be simple to operate as the available staff was of a low technical ability. 2. All machines had to be reliable and have simple maintenance requirements, with local servicing if at all possible. 3. The supplier had to offer training facilities and product knowledge should it be deemed necessary. 4. A reference plant had to be available for inspection. It was decided that only tried and tested machinery would be purchased as the environment was deemed unsuitable for development units. 5. The price had to be competitive."[114]

113/ The dispersion concerns the plants and not necessarily the firms. These may be highly concentrated.

114/ John Franklin, "Duel under the Sun", Food Manufacture, April 1981, pp. 46-47.

(b) Adaptation of technology

The appropriateness of technology is a dynamic concept depending on the relation between the techniques and equipment employed and the changing environment within which they must be operated. Translated into plainer language, an industrial plant employing a technology capable of being operated locally would promise to be more profitable than another that is less suitable.[115] The conditions vary greatly between and within countries. In countries that do not depend on imported technology, the market may be trusted to guide the industry toward employing production methods, machines and equipment adapted to local conditions. The developing countries, however, depend mostly on imported technology. Thus, they must build appropriate characteristics into technology developed elsewhere, most frequently in developed countries.

There are various ways to obtain this: one would aim at reducing the foreign cost and the domestic maintenance charges by adapting imported technology to the local skilled manpower; another would consist in rescuing "dormant" technology from more economically advanced centres, and a third entails scaling down the advanced technology of these countries to less advanced conditions. Many governments and industrial enterprises in developing countries, moreover, have succeeded in upgrading local technology.[116]

Preference should be given to technologies permitting the use of local materials and components for buildings, machinery and utilities. This would permit the reduction of the "foreign cost" of the initial investment, and might reduce the need for future imports of spare parts.[117]

115/ The following paragraphs draw heavily on a draft on "The Food Processing Industry in Developing Countries from the Point of View of Technological Choice", prepared by G.A. Nuti, UNIDO consultant.

116/ There has been considerable success in some developing countries along these lines. In some countries like Argentina, huge companies have been established for the manufacture of food processing machinery for domestic and international supply. In Brazil, most of the food industry equipment is now designed and constructed in the country. Usually the designs are of original technology adapted to Latin American conditions. Guzman and Moretti, op. cit., pp. 33-38.

117/ This implies the acceptance by the foreign contractors of a contract providing such adaptation to local resources, and the existence in the developing country of an expertise capable of including it in the contracts. This possibility is completely lost in "turn-key"-type contracts, where the foreign contractor is responsible for a project as a whole and has no interest in checking local opportunities that can be more economical from the viewpoint of the "foreign" cost of a plant, but normally much more difficult to integrate and supervise.

Of course, this approach is only possible when the technology to be installed has been carefully analyzed to fit local conditions and has a range of complexity, at least in some main items, that local, skilled, people can master.[118]

In the industrialized countries there exists a wide range of food industry technologies that have fallen into disuse for non-technical reasons. They have been abandoned because of the competition of other technologies that meet the requirements of the prevailing very high-wage environment. Though no general case can be made, it is possible that in a lower-wage environment some of these dormant technologies would again be economically efficient over the expected horizon of their physical amortization.[119] In this environment, these technologies could be more efficient than inappropriate advanced technologies.

An alternative way of obtaining appropriate technologies would be to adapt, where possible, the current advanced technologies used in developed countries bringing their scale and complexity down to meet requirements of the new environment.

Two aspects of the adaptation of technologies should be specifically mentioned: one concerns the production of branded foods as bottled and canned products; the other the question of labour in capital-intensive technologies.

When the production of bottled or canned foods is envisaged, a problem to be faced is the strict technical requirements of the containers, which would be the same for TNC-affiliates or for any locally-owned enterprises. Glass and metallic containers, capable of being sterilized and remaining air- and water-tight for a long period of time.

118/ This might have an effect on plant location. In a feasibility study, location choice is usually influenced only by transportation costs in terms of raw-material input and product output for market destination. But little attention is paid to the influence that the choice of location may have on the technological choice. The linkages of a project should be analyzed according to all their imput/output implications, e.g., also cost and possibilities of maintenance, spare parts, imported raw materials, such as packing, cans, etc.

119/ This is not the case of second-hand machines and equipment. It involves the making of brand new machines, after re-studying the blue-prints of an economically obsolete but still technically valid technology. If found feasible, the production could be undertaken in developing countries.

are products of high technology that only a few firms in the world possess.[120] Much research has been carried out in an attempt to develop new packaging systems, but no concrete practical results have yet been obtained. Hence, this type of food technology is import-dependent.

The other aspect is the effect on employment of an industrial investment. Labour is abundant in developing countries and therefore it is frequently recommended that their industries should be labour intensive. The number of new jobs to be provided by the factory is quoted and accepted as a standard of the social desirability of an investment. However, in an integrated approach to development, this should not necessarily be considered the best standard. A better one could be the global increase of economic activity and hence of the number of jobs created around and in the factory at parity of investment cost and levels of efficiency in production. A capital-intensive turn-key factory may well turn out to be so ill adjusted to its economic environment that it may not create any new local employment opportunities, if most of its personnel has to be drawn from outside, as well as its maintenance and other services.

One of the questions that arises is who would be in a position to operate the adjustment of food-industry technologies so as to make them appropriate to the various environments offered by developing countries. It may be a company in the developed countries seeking to expand its own market in technology transfers of this type; it may be an entrepreneur in the developing countries responding to the incentives given by his government[121] to set up an industrial food concern, or even a medium-sized capital goods firm in a developing country. It may also

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120/ Many difficulties have been met in attempts to produce these containers in small-scale factories in developing countries. Apart from problems of the supply of raw materials in the case of tin-plate and aluminum, the main difficulties have arisen in the availability of small-scale units capable of producing containers within the strict tolerance limits required to make them air- and water-tight.

121/ Some countries, developed and developing, maintain programmes to encourage domestic industrial development. Methods and means used and their efficacy deserve a separate study. In Guyana, for instance, there has been a successful case of capital-goods-production development that is mentioned later in the present report. One of its aspects is that in 1974 a government incentive scheme was set up with the establishment of a Small Industries Corporation. Under it, a local entrepreneur could benefit from incentives under the form of a concessional loan, the location of the factory site at a government-supported industrial estate and a two-year tax holiday.

be a privately or publicly owned concern or an industry-development institute or a food-technology institute set up in the developing country for this specific task.

(c) Alternatives to TNCs' sources of technology

In many industrialized countries assistance might be obtained from the food industry. In these countries there are small- and medium-sized food processing plants in operation that are still working at a profit with simpler machinery than that installed in gigantic factories. Many producers' co-operatives successfully integrate processing plants within their structures. They have good experience in the field and their co-operation could be elicited by interested developing countries.[122]

Side by side with large firms specializing in food-industry equipment and machines, there are many medium- and small-scale firms in developed countries accounting for a large share of the industry's output. Often they are privately owned and owner-managed and capable of executing industrial food-development projects providing all the necessary services with a limited staff, in addition to designing and equipping whole plants.[123]

122/ A UNIDO Expert Group Meeting on the Role of Co-operatives in the Development of Food-Processing Industries in Developing Countries, Vienna, 22-24 April 1981, recognized that "collaboration between well-established co-operatives and developing countries is already taking place in many instances and concluded that"this experience should be used for further expansion of collaboration". It also recognized that "some of the existing constraints connected with the development of the food-processing industry in developing countries could be largely overcome through increased collaboration between existing co-operative organizations and suitable partners in developing countries" and "when providing technical assistance to developing countries, UNIDO and other international organizations should take into consideration the willingness of well-established co-operatives to collaborate with developing countries in supplying expertise and consultancy services".

123/ In UNCTAD, "The role of small- and medium-sized enterprises in the international transfer of technology" (TD/B/C6/64, Summary), Geneva, 22 October 1980, some basic criteria are suggested on how to classify firms into the small- and medium-sized category. Adopting these criteria and out of a limited sample survey, 30 Western European firms of this sample were presently operating in international markets for food industry equipment and machinery. Among them, for instance, a Danish firm that employed 160 persons could supply 550 individual machines for food processing; an Italian firm with only 20 dependents was a world leader for technology in cashew nut shelling and processing. Some of these smaller firms had also formed co-operatives of industrial producers, pooling their knowledge and equipment, undertaking feasibility studies and implementing projects up to start-up stage. In some cases, they joined in joint ventures in developing countries with minimal participations.

The "package" they can offer is admittedly smaller than that offered by TNCs, but could extend to the start-up phase of a project and include various forms of technology adaptation. The role of small and medium firms in this sector has not yet been adequately studied and agro-food industrial development in the developing countries could certainly benefit from such a study and the consolidated presentation of the type of equipment and services they offer.[124] Among the largest and the technically most advanced developing countries, some have already entered the stage of capital goods production in the food industry sector also. They are therefore capable of assisting other developing countries. As in the case of small- and medium-sized industries in industrialized countries, their existence and ranges of machines, equipment and services need to be better known and probably some internationally sponsored channel should be used to this end.[125] Because of their size these firms are not as well known as their bigger competitors in world markets. Their services could be made better known by the setting up of a "roster of adapted systems of food processing". This would consist of a list of different possible technologically adapted systems, each including mixes of different technologies at varying levels of complexity for processing different foods. For each technology, the principles, processes and engineering highlights would be described, together with references to existing and previous applications in various countries and the results obtained. Within each system, reference would be made to the degree of complexity for each technology and thus an indication of the type of socio-economic setting to which it would be adapted. The "roster" could be completed with a listing of contractors in developed and developing countries capable of supplying the types of equipment listed.

124/ In recent years, there has been a remarkable increase in R&D activities in developing countries in food processing technology. In Latin America in 1978, there were 43 institutions teaching and carrying out research in food science, technology and engineering, in Argentina, Chile, Colombia, Peru, and many other Latin American countries. (Guzman and Moretti, op. cit., page 40).

125/ "Latin American countries lack facilities for the dissemination of genuine, low capital investment technologies throughout the region. A great effort is needed in co-operation with Latin American countries, to increase information and documentation facilities". "We should strongly recommend the provision of written know-how and production of catalogues, increase of information facilities, aggressive marketing facilities for these techniques". Guzman and Moretti, op. cit., pp. 31-32.

Further, intermediate technology in food processing, fully adapted to local conditions, can be generated in small countries with little initial capital. The essential factors are entrepreneurs capable of seeing good business opportunities, technical skill to organize production and market output and a government support programme to help overcome the early constraints. A report from the National Science Research Council of Guyana[126/] reports a very interesting case of a local firm that, with a 15-man staff including one design engineer, is capable of setting up complete food processing factories, with food processing equipment and machinery items totalling 250, involving some 44 engineering designs, to process mainly pulses, fish meal, rice flour, spices and fruit. Given the small size of the domestic food processing market, most of the products are custom-made according to the individual demand requirements by food processors. The technology generated comes from two sources: adjustment of technology from industrialized countries to local conditions and the upgrading of traditional technologies to make them more efficient. The firm is competitive with similar imported equipment and machines and has begun to export to Caribbean markets.

In developing countries the adaptation and development of appropriate technology could be enhanced by the establishment or the strengthening of ad hoc programmes of research and development carried out by official food technology institutes or relevant sections of industrial development institutes. Among the other programmes that they could undertake are follow-up studies on the global efficiency results during the life of projects after the start-up phase has been completed, in order to discover the constraints resulting in hidden costs not fully appreciated at project evaluation phase. The knowledge of these hidden costs and their origin could yield some guidance in the process of technology adaptation. Further, the R&D institutes and similar bodies could be related to some kind of "prototype projects" for priority commodities, i.e., fruit and vegetable processing, oilseed crushing and oil extraction and cereals storage and processing. The "prototype" projects could be studied at the feasibility level employing different

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126/ Dr. Frank Long, Capital Goods Production in a Small Developing Economy. The Generation of Intermediate Technology in Food Processing: A Case Study of Guyana, National Science Research Council, Guyana, April 1980.

"downscaled"and/or "dormant" food processing systems. These projects should be in the rangs of small to medium industrial scale aiming to be technically and economically efficient and labour intensive in and around the factory. Small- and medium-sized firms of the developed and developing countries should be involved in the selection of the food processing technologies and in the development of the adapted or re-styled systems and machinery.

2. Organizational alternatives

In their development plans and policies, governments will increasingly be faced with the need to establish priorities among the types of firms constituting the food industry. The various options facing them may be reduced to a few, namely foreign versus domestically owned firms, and privately versus publicly or co-operatively owned firms.

The nature of the food industry, the processes and technologies it employs, the variety of its products, the size of the markets for its output and the territorial scatter of production will undoubtedly influence the choices made. In most cases, the industry will presumably continue to exhibit a variety of approaches, types of firms and technologies. The co-existence of large-, medium- and small-sized firms will also continue. However, it is to be expected that with greater emphasis on rural development, local food production and processing in small-and-medium sized firms will occupy a relatively increasing share. In the evaluation of specific projects, the criterion of efficiency should continue to prevail in the choice of the size of firms or plants.

Most developing countries will continue to depend on exports of some food products, e.g. tropical beverages, vegetable oils, fruits and vegetables, to earn needed foreign exchange. To meet the requirements of importers in developed countries, they will have to compete with foreign suppliers (frequently those of industrialized countries). The technologies to be applied and the standards and characteristics of the products obtained to supply these markets may differ even drastically from those demanded by domestic markets. The size and type of firms required may differ from those serving exclusively domestic markets.

In most developing countries, the expected expansion of the consumer market will offer investment opportunities for profit-seeking international capital and management, i.e. the transnational corporations (TNCs). For developing countries permitting foreign ownership of national companies, this will represent one option for attaining one or more of the following goals: increasing the availability of capital, management and technology;

expanding demand and direct industrial use for local agricultural raw materials; increasing export earnings by gaining access to overseas markets; reducing dependence on imports by stimulating domestic food production.

These goals may also be achieved by other organizational alternatives with different implications for development. The choice will be dictated by a widely differentiated set of considerations, some of which may not be purely economic. Each country will have to consider the main issues presented by each option in the sectors involved, i.e. whether the processing concerns the staple food sector, the branded food sector, the domestic or the export market.

(a) TNC development[127/]

(i) Main issues

The major issue raised by the increased participation of TNC operations in the staple food sector is the danger that they may continue to foster import-dependent processing and thereby impede improvements in indigenous staple food production, marketing and consumption. The expectation of rapidly rising imports of cereals, chiefly wheat, and milk products in the developing countries underlines the relevance of this issue. In order to check such import expansion that could become an intolerable balance-of-payments burden for most countries, a reversal of current trends would require the encouragement of processing and consumption of locally produced staple foods.

A related issue is that of reducing the dependence on imported wheat milling and baking technologies and adapting them to process "composite" flours (i.e. mixtures of wheat with millet or sorghum, etc.).

In the branded food sector, potential TNC inroads in developing countries' food industries may increase. In most developing countries, this sector already tends to be highly concentrated and dominated by TNC affiliates dealing with processed milk, soft drinks, tropical beverages, confectionaries, beer, branded cereal products, margarine, powdered soups and other products. These products are sold almost

127/ Though some independent considerations have been included, in general the present chapter is heavily indebted to: UN Centre on Transnational Corporations, Transnational Corporations in Food and Beverage Processing (UN, New York, 1980) and, in particular, to Issues Related to Transnational Corporations in Developing Food Industries, Chapter III, pp. 117-173.

exclusively in the host country. The potential expansion of TNC affiliate operations threatens to create serious distortions in the utilization of national resources within an overall integrated food policy. It is expected to be commensurate with the expansion of urban population and its GDP (which may represent the largest share of total GDP increase). If this is allowed to take place, the demands of the medium- and high-income strata of the population, particularly in the urban sector, will be more completely satisfied than those of the urban poor and of the whole rural sector.

One major issue that has been raised concerns the priority to be assigned to branded foods over staple food consumption, and to the "true" nutritional contribution the former can make to meet the country's food deficiencies as distinguished from the "social status symbol" aspect of some of these products. A second concerns the limited links of these products with local agriculture and their dependence on imports of raw materials, e.g. concentrated syrups for soft drinks, malt and hops for brewing, or supplies such as tin plate and aluminum cans. A third could be the appropriateness and costs of TNC technologies, and a fourth concerns the effect of TNC competition on local enterprises and possible adverse effects on the growth of domestically owned industry.

In the export oriented food sector, the issues raised will be different and may be considered from two distinct viewpoints, namely the impact on domestic production and marketing on the one hand, and export performance on the other.

TNC operations affect the economies of their host countries differently depending on whether the processing plants are integrated within large agri-business concerns or whether they rely on contract or open market procurement. It is expected that for major export crops, government controls will be continued, and in some cases extended to government monopoly control of the markets (as is the case with marketing boards). When the marketing boards either monopolize exports or effectively control export pricing, TNC operations are not likely to raise serious general issues. But these arise for commodities not covered by government marketing boards or similar agencies and in connection with the exporting countries' increased participation in downstream commodity processing. The TNC may be a dominating firm in the import market for the derived processed and

manufactured food products. Here the size of the host country's share of the market plays a major role: exporting countries with large share of the international raw material market are sometimes able to obtain better terms from TNCs than smaller exporters. Moreover, they can better monitor their performance both in the field of financial outflows (e.g. profits, interest, capital, dividend remittance and export pricing) and their success in capturing the benefits of downstream processing and marketing. But countries producing raw materials often meet with narrowing markets and difficulty in penetrating downstream marketing; cases have been reported of concerted industrial opposition to the entrance of non-TNCs into import markets of processed products.[128]

(ii) Need to evaluate longer term effects

Government priorities and policies will certainly also vary according to whether they deal with staple foods, branded foods or the export sector. At least in so far as the first two are concerned, there is an overall need for the governments of prospective host countries to develop methods and procedures to arrive at an independent evaluation of the total outflow of external resources involved in a potential TNC development project in any sector affected and of the potential relationships of the project with the country's socio-economic and food-policy objectives. Governments should be able to bring this independent evaluation to bear on negotiating a prospective TNC development. In this way, they could evaluate not only the costs and benefits of the project itself, but also the longer term implications.

A study of such evaluation methods and procedures might be very rewarding in realistically weighing the advantages and disadvantages of options other than those offered by the TNC and in designing adequate national policies to curb any tendency toward undesirable effects on economic development.

A study of these evaluation methods might be accompanied by a definition of model guidelines on TNC-investment in the food industries of developing countries. This would need to be preceeded by a review of existing government policies and contractual arrangements between TNCs and host developing countries and their actual operation so that the guidelines could be designed on the basis of clearly ascertained conditions.

128/ United Nations Centre on Transnational Corporations, op. cit., p. 153.

One question should be clarified immediately. Governments should aim at assuring that in principle the TNC would not be favoured over a national firm and that both are placed on equal footing as far as possible.

Particularly in the branded product sector, TNCs in a developing country have several initial advantages over potential local producers.[129] They will normally aim at introducing products that have already gained wide acceptance in other countries and are sometimes already known in the prospective host country because of preceding imports. Presumably the TNC involved has already largely amortized the cost of developing the product, particularly its advertising cost. Experience in the production process and advertising may not exist in the prospective host developing country. Further, in most cases, the TNC affiliate may utilize with little or no adaptation existing can or bottle forms, labels, slogans, scripts and programmes for radio and television advertising. A potential local producer would have to begin from scratch to develop these at high cost[130] and would require years to gain equivalent experience.

Another advantage is the proprietary control of production technology imposed through licensing, servicing and management. The TNC sells to the host country a "complete" package (conceptualization of the project, construction of the plant, start-up and continuing operations, product adaptation and change, as well as marketing and distribution of the product). However, the question may be asked whether by buying the complete "package" the host country is not paying too high a price for the parts of it which could be obtained elsewhere by buying them separately, and whether its consumers are not paying an exhorbitant price for the food content of the branded product because of "its presentation and packaging."

129/ A detailed analysis might show that in a developing country a great deal of the "infant industry" argument applies not only to imports but also to output of a TNC affiliate.

130/ The TNC scale of operations outside a developing country is likely to be several times larger than that envisaged in a developing country. Thus the initial cost of developing and promoting a product has been distributed over a larger output. A local entrepreneur must face proportionately higher, if not more than proportionately higher, initial costs for the same scale of operations as the TNC.

A further TNC advantage lies in the benefits some developing countries have accorded to TNC activities in order to attract foreign investment capital and advanced technology, special and more favourable treatment, i.e. fiscal, foreign exchange and other benefits not available to the domestic entrepreneur. In some circumstances, this has placed foreign-owned corporations in a strong competitive position versus domestically owned industry.

(b) Processing plants integrated within agro-industrial concerns

This form of organization is in many cases favoured, although generally under national rather than foreign ownership and in some cases under the form of joint-venture between public and private capital. In recent years, the TNCs have tended to concentrate on food processing industries, reducing their involvement in direct farm management and ownership. In some developing countries, TNC participation in agro-industrial concerns is, however, continuing with either majority or minority shares.

A few considerations are offered here on the advantages and disadvantages of this type of agro-based industrial organization. While these are generally relevant, it is recognized that others, among them essentially social and political considerations, may be more influential in deciding on specific policies and plans.

The main increase in food production needed in the coming years is expected to be obtained more from higher productivity on existing farms than from bringing new lands into cultivation. This is not equally true for all developing countries, since among them there are a good number that could obtain the same result by utilizing additional arable land and in these cases, the large agro-industrial concern might appeal to the planners as a valid option. The setting up of a huge single farm of several thousand hectares from the planning to the implementation stage is a far simpler operation than setting up many new farms of a few hectares each. The former is an operation that has been planned and carried out hundreds or even thousands of times in the world and there are many points in common.

The human problems alone, raised by setting up and allocating to farm families their own farms and co-ordinating their production and other plans

are far greater than those involved in hiring labour and planning production on a large estate. Moreover, the entry into production of a single agro-industrial development can be obtained more quickly than when thousands of farmers are involved.

Most of these advantages would tend to be reduced, or even disappear, when the industrial development is to take place in areas already under cultivation with established medium and small farms which must disappear as independent producing units to be absorbed into the large agro-industrial development. This situation meets serious political and social constraints in addition to heavy expropriation and compensation costs. To these constraints must be added those existing at the institutional and financial investment levels of the simpler case of integrated agro-industrial concerns on lands to be newly brought under cultivation.

Agro-industrial ventures vertically integrating agricultural production, processing and marketing, already exist and play a role in both the domestic and export markets of the developing countries. In some cases, they are favoured in planning food processing industries and have met with success. An investigation of successful examples, the identification of the constraints and of the means to overcome them could supply valuable indications for the guidance of policy makers in developing countries.

(c) Modular development

The management of large agro-industrial enterprises is complex and their establishment requires heavy initial capital investment. These requirements have suggested the adoption of flexible approaches better adapted to the conditions of the developing countries, among them the modular growth of the agro-food industry, i.e. growth by additions of new farms of processing units or product lines to a relatively modest initial nucleus.

There are some very successful cases of modular development of integrated food processing industry, as for instance the case of the Yougoslavian complex of Podravka[131]. The success of this type of development depends on the ability of the relatively small unit "piloting" the development to transmit a dynamic movement to the peripheral "piloted" units - which may be farms or food-processing concerns.[132]

131/ Podravka started in 1946 and by 1972 completed the process of integration of small and fragmented farms and food production in its original communal area. Since 1972, it has extended its activities, diversifying into an array of food and pharmaceutical products throughout Yugoslavia. The growth of Podravka is characterized by modular growth with a gradual building up of additional units and its modular type of management. A central module concentrates on the general "architecture" of the whole complex with an highly integrated policy of agro-food development. It develops overall production programmes, makes technological choices, organizes systematical co-operation with "piloted" units (20 different types of co-operation contracts), carries out research and development (most of the 800 food and pharmaceutical products have been created by the central research department). It also controls the sales network and marketing and staff development. The piloting unit produces directly only one tenth but organizes nine tenths of the total output of the complex. The piloted units maintain their managerial autonomy within the limits laid down by the contracts, (For a detailed analysis of types of modular management, see Jacques Mélèse, L'Analyse Modulaire des Systemes de Gestion, Ed. Hommes et Techniques, Puteaux, France, 1972. Detailes of the Podravka development are found in Dragutin Feletar, Case Study on Agro-Industry: Podravka, Yugoslavia, Ekonomski Institut, Zagreb, 1980, UNIDO consultant study).

132/ In order to simplify the presentation, it is implicitly assumed that the "piloting unit" incorporates processing plants and the "piloted units" are all agricultural. It is not necessarily so. Modular developments may be designed with one piloting unit and two or more types of piloted ones. For instance, these might be dairy farms, cereal farms, milk processing plants and animal feed plants.

To perform its tasks, the piloting unit must be designed as the true "brain" of the project capable of managing the processing functions while assuming its own growth and that of the whole complex. It will manage a farm with the twin goals of experimentation and demonstration, though the produce of this farm does not play a major role in the agricultural output of the complex. This is obtained by the "piloted" farms,[133/] those whose production is brought within the scope of the complex - normally by means of contracts so that they maintain their autonomy of management. The management decisions which the piloting unit reserves for itself may concern the year-to-year plan of production and the growth of the year-to-year plans. As to the former, they may include those concerning agricultural production planning (e.g. input products to be obtained); the relations with the piloted farms (contracts, allocation of produce quotas, qualities, prices and timing of delivery and, in some cases, inputs to be supplied by the piloting center, e.g. seeds or fertilizer or processing by-products to be used as animal feed, such as whey, or advance payments);

133/ Actually they should be called cooperating farms. This expression is avoided here to prevent confusion with cooperative farming and cooperative ownership of processing plants.

processing operations (inputs, products to be processed and their end use); marketing of the processed products; and, of course, all the ancillary functions and administrative routine. What would typify a "piloting" unit would be its responsibility for assuring the gradual dynamic growth and output diversification of the whole complex, the growth of the year-to-year plans. This must include provision for research and development to innovate technology and products, as well as to expand and diversify production. It must extend to market promotion and new and improved products. These functions are supported by investment studies, a decision making center, and by provisions for the qualification of the personnel. Provision must be made for receiving as a feed-back the observations of farmers' experience with new products, production methods and inputs, cultivation and processing equipment; outlining of farm production contracts; and establishing and maintaining adequate production incentives with stable and renumerative prices.

Part of the success of the type of managerial decisions just described depends on the human resources available and another part on the adequacy of the information as to the development potential of the area and of demand for the end-products obtainable. The socio-economic conditions within which the complex is to operate, the types of processing operations it undertakes and the markets it is to serve would largely influence the design of a development project of this nature.[134/]

Hence, feasibility studies might best be executed after having identified, not only the initial aspects of the project, but also its foreseeable expansion in the light of the possible allocation of managerial and other responsibilities as well as of the types of links which may be provided between the piloting and the piloted units.[135/]

134/ This type of agro-industrial development could also help in overcoming some serious constraints to agro-industrial growth in areas of communal and tribal land ownership - since it does not interfere with local land ownership patterns.

135/ UNIDO is about to undertake, in co-operation with the Brazilian government, a pre-investment analysis for a programme of industrial development. This project aims at obtaining systematic information upon which to base a re-orientation of agro-industrial development policy programmes.

A modular type of integrated agro-industrial development might offer several advantages over a TNC or even a domestically-owned monolithic agri-business concern. It could prove to be well suited for the implementation of policies of industry relocation within integrated rural development programmes. The initial requirements of capital, technology and managerial skills would be smaller than those usually demanded by a monolithic development scheme. They would grow with the growing success of the undertaking.

Consideration should also be given to the different options open as to ownership of the piloting unit. Purely capitalistic private ownership might not be desirable in all cases. It could lead to monopolization of the processing facilities by a private capitalist with consequent exploitation of the piloted units. This could be very serious in cases of agricultural products having no alternative market outside the processing plant (e.g. sugar cane or oilseeds) or highly perishable products (e.g. milk). In these cases, government supervision of contracts and their implementation is an absolute necessity. Public ownership of the piloting unit could be an alternative though it might deprive the unit of the flexibility of action and independence of decision which are major ingredients of success. Where a strong co-operative movement has already established itself, co-operative ownership by the "piloted" farmers themselves would probably offer the best alternative.

In its initial stages, this type of development would most probably limit itself to processing and marketing staple foods for domestic consumption or export. In this sector, it will be definitely more interested than a TNC development in the use of domestic raw materials and technology. It is also better placed and more indicated to support government policies of increased food self-sufficiency. Initially, it would rarely be capable of equalling a TNC development in the branded food sector. As it grows, however, there is no inherent reason why it would not be able to diversify successfully into the branded food sector. Any disadvantages which manifest themselves in the initial stages are likely to disappear in the longer term. On balance this approach does not seem to be inferior to a TNC development. In the longer run, when a modular development has reached its maturity, it will have definite advantages.

In addition to the advantages already pointed out, this approach offers to the developing countries a p. spective of gradual mastery of the agro-industrial production mechanism by sequential autonomous growth following a path of self-reliance.

(d) Co-operative development

The co-operative movement is viewed upon with favour from many sides. It has been supported in many resolutions of the UN and its specialized agencies in the context of overall economic development policies. For integrated rural development, the International Development Strategy recommends that "Government should encourage and support the establishment of agricultural co-operatives"[136]. In a TNC or a domestic modular complex the leading role in agro-industrial development belongs to the industrial sector. In agricultural producers co-operatives[137] this may be largely retained within agriculture. But a distinction must be made between the co-operative activities which may extend only to early processing and wholesale marketing, and the role the co-operative could play when it enters an advanced stage of processing and transformation.

(i) Role of farm producers' co-operatives

In industrialized countries, co-operatives have been remarkably successful especially in the collection, semi-processing and marketing of their members' produce and in common ventures with other co-operatives and co-operative-owned industrial concerns. For instance, in the countries of the European Economic Community, between 50 and 100 per cent of

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136/ UN General Assembly, loc. cit., paragraph 95.

137/ In industrialized countries, some consumers' co-operatives have been extremely successful in integrating from consumers' retailing outlets back to agricultural production (by contract farming) and to processing industry (by supply-contract and/or ownership - total or partial - of processing firms, such as flour mills, spaghetti factories, etc.).

some of the major farm products are handled, and to some extent processed, by co-operatives.[138/]

Although they now control a large share of processing in the milk and meat packing industries and in the canning of fruit and vegetables, most co-operatives in industrialized countries first developed in the collection and early stage processing field. Only later did some of them move into industrial product transformation capturing value-added for their members through further processing and marketing, but most remained within their original sphere of action.

There are examples of successful co-operatives in developing countries,[139/] but there is still plenty of room for further expansion and development. In most cases, two distinct fields of action present themselves to policy-makers: one is how to encourage the general establishment of farm co-operatives and the other how to encourage them to enter the food processing sector.

Genuine co-operative action results from the awareness of agricultural producers of the advantages to be gained through joint action which confers greater bargaining power in the sales of their products. Though this awareness cannot be imposed from above, it may be encouraged by a capillary government information service explaining, where possible with illustrative examples, the objectives, their relevance to the well-being of the farmers and how they can be attained. In addition, a legal framework of incentives, technical assistance on how to take advantage of the provisions, and assistance in the initial stages of the co-operative life are also essential.

138/ For example, 100 per cent of Ireland's butter, 83 per cent of the Netherlands' fruit and vegetables, 79 per cent of the F.R. of Germany's milk, 67 per cent of France's cereals, and 55 per cent of Denmark's meat marketing (R. Demoitié, The Role of Co-operatives of the Developed and Developing Countries in the Expansion of the Food Processing Industry, Centre Interdisciplinaire de Recherches et de Technologies Appliquées au Développement, Louvain, April 1981, p.3). As explained below in most cases co-operatives do not process these products directly but through processing firms the own or joint ventures.

139/ In many developing countries in Latin America, Africa and Asia there already exist co-operative organizations often associated with marketing boards and similar government agencies. The whole Arabica coffee crop of Cameroun, for instance, is marketed and processed for export by a producers' co-operative. Co-operatives have emerged as a major competitive force in certain sectors of the Indian agri-business system. Their network counts around 80 million members. Co-operatives associations control a very large share of food processing, e.g. 52 per cent of the total national output of sugar and 60 per cent of the ortanized milk market (V.B.L. Mathur, Role of Co-operatives in Food Production, Processing and Marketing in India - A case study, UNIDO Consultant paper).

Once a co-operative movement is started, the question is how to assure its viability and success. This requires qualified administrative and managerial skills and their adaptation to the tasks and functions of the co-operative. Programmes aimed at developing the necessary qualifications can be successful even among peasants with no previous experience other than that of managing small traditional farms. The adaptation of the co-operative function to market demand and requirements is more difficult to attain. It requires precise knowledge of their competitive advantage position versus other firms and of ways to improve it so that it can successfully displace them from the market and offer increased material gains to the co-operative members.

It does not follow that the further a co-operative moves into processing and product transformation downstream toward consumers, the larger will be the benefits for its members. Its success here will depend on its managers' grasp of competitive strategies, technological applications and marketing ability in the advanced processing and product transformation business. Some successful individual cases of co-operatives directly undertaking the production and distribution of branded products or highly processed products exist, but generally co-operatives have not entered this field directly 140/.

As has been pointed out "... product transformation by farm co-operatives represents an extremely interesting tool of co-ordination of agriculture and industrial production. It deserves the greatest attention by the authorities since it permits the simultaneous solution of the problems of the harmonization of production processes and the re-equilibration of power positions ... the maximum engagement in favour of co-operative processing is very important for the development of agro-industry but it is equally important to avoid the error of over-estimation of the contribution it is able

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140/ "Positive results have apparently been obtained in cases of co-operation with the private sector, based upon mixed-economy enterprises (joint ventures) in which the co-operative organization holds 51 per cent of the shares and the 'outside' industrialists, its partners, the remaining 49 per cent. Such type of association guarantees the required level of technical know-how". R. Demoitié, op.cit., p. 22

to give because of insufficient understanding of the conditions for success[141].

Although limited in most cases in developing countries to early processing, a sound co-operative movement can play a major role in gradual market-oriented modernization of agricultures and as a linking institution between consumers and farm production. Several agricultural raw materials can undergo first processing operations within co-operatives for local markets or for further processing. These could include maize, rice, cassava, sugar, fruit and vegetables, meat, milk and fish. In all these cases processing technologies for supplying domestic markets are simple, within the grasp of farm co-operatives and can be developed domestically. Early processing of these products can contribute to the expansion of local and other domestic market outlets, reduced losses and to the recuperation of valuable by-products. For export crops such as cocoa and coffee, farm co-operatives can go even further -in many developing countries additional export earnings can be obtained through improved selection and fermentation of cocoa beans, while a shift from sun-dried to washed Arabica coffee add to farm income and export earnings.

(ii) Co-operative industry joint ventures

The extension of early processing activities within farm co-operatives serves the main objective of co-operative action - enhancing the producers' bargaining power through actual control of supply. Beyond this stage, the extension of the co-operative action to include "own" advanced processing and product transforming action would expose the co-operative to the costs and risks of an industrial enterprise for which it might be ill placed. Thus, most co-operatives have preferred to buy or establish a separate food processing and manufacturing concern rather than owning a factory or plant. It is also common for several co-operatives to join in ventures of this type so as to spread risks further and reach larger scales of operations.

141/ Giovanni Galizzi, "Il coordinamento dell' industria alimentare con la produzione agricola" Centro di Ricerche in Economia Agro-alimentare dell' Università Cattolica del Sacro Cuore, Milano, Mimeo, p.10. This point is stressed also by other authors. For instance, Emile Rouch and Philippe Dueroquet in Report on Cereals and their Derived Proteins of the Bureau Economique du Comité Agricole note (p.27) that "for cereals, meat and dairy products co-operatives in exporting countries have considerable control at the collection and local storage level, but lose control of the marketing chain as they approach the national or foreign consumer."

As partners in these joint ventures, farm co-operatives contribute their agricultural raw materials. The industrial concern brings its managerial, scientific and technological know-how coupled with its commercial organization. The relations between the two sides are normally regulated by contracts establishing the allocation of costs, profits, losses and risks. The partners maintain their original identity - farm co-operatives on one side and usually a limited partnership or company on the other. As to the company's capital, the co-operatives usually reserve a majority share for themselves.

With this type of association, the industrial company processes co-operative produce but is also formally responsible for planning its own growth and for deciding the production plan of its own end-products and of its agricultural inputs. It decided on the most economic location and the technologies to be adopted. All these formal decisions, however, are strongly influenced by those having majority voting power in the company, i.e. the co-operatives. The co-operatives joining the venture adjust their production to the requirements of their industrial concern.

There are several interesting consequences of associations of this type. For instance, the partners may benefit from the sources of financing specific to each. Through the co-operatives, industry may have access to systems of agricultural credit; the co-operatives through their industrial association may avoid limitations on their capital formation and gain greater flexibility in action. With little capital immobilization, the co-operatives may obtain the use of advanced processing industries experienced commercial organization and integrated industrial activities downstream towards the production of branded products.

A strong co-operative movement forms part of the integrated rural development policies which have commanded the international attention in recent years. It is a precondition for the development of joint ventures. These may gain ground in countries and areas where the co-operative movement has already progressed and well established co-operatives have acquired the necessary skills to take over industrial concerns, and this alternative option for industrial development in the food industry sector may recommend itself to policy-makers. Thus, while farm co-operatives would concentrate on the marketing of their members' produce and in some lines of early stage processing, incentives should be provided so that those among them capable of undertaking product transformation would not be prevented by legal obstacles or financial constraints.

F. Summary

1. In order to mobilize their resources purposefully, the developing countries need to define national food policies integrating agricultural and food-processing development. These policies should help stimulate food production, overcome continued stagnation in rural sectors, reduce pressure of population growth in urban centres, avoid the rapid escalation, particularly of wheat and dry-milk imports, and check the inroads of foreign capital and technologies.

2. Integrated approaches to national food policies would need to be included in national development plans and in area development programmes. As one practical application of an integrated approach, a specific objective for food growth during the planning period should be included among priority objectives of national development plans, adequate measures should be envisaged and machinery set up to supervise their implementation. The overall national development plan should include a chapter listing, as a coherent whole, projects, reforms and measures to attain their objective. Its preparation would require an inter-ministerial team. The need for multi-disciplinary machinery for this purpose in government structures has already been recognized as a priority area. A review of existing machinery of this type carried out in co-operation with the interested Governments could assist in identifying the role of such machinery in the integrated approach to food-processing industry development. It could also lead to a better understanding of the contribution it can give to improved national planning of the integrated development of the food-processing industry and be of guidance for countries envisaging its establishment.

3. Within a regional development programme, an integrated approach requires the establishment of an area agency capable of identifying objectives, projects and co-ordinating project implementation. Adequate machinery for project conceptualization is a sine qua non of success. Projects should be viewed within an integrated approach to food processing and agricultural adjustment. One might query whether current procedures for formal analysis meet the requirements of such an integrated approach and whether new norms and procedures should not be developed. A successful industrialization programme demands policies and programmes of incentives (e.g., to overcome credit constraints, to develop local managerial and other skills).

4. Agricultural production needs to be adjusted to processing industry requirements, which implies the partial transference of the decision-making process of the agricultural sector to the industry. Rather than through the market mechanism, this may be obtained by means of contract farming or by agro-industrial development. Some advantages of the latter, depending on the nature of crops dealt with, are discussed. It is recognized that there are constraints at the institutional and financial investment levels to the adoption of large agro-industrial concerns. Hence the scope for efficient co-ordination between industry and agriculture and gradual development within a modular approach are reviewed.

5. As to links towards consumers, some aspects and possible consequences of consumer-oriented price policies are pointed out. A development of super-market type retailing systems is considered as a non-priority objective within the requirements of a food policy and compared with the contribution that strengthened wholesale markets and assembly centres could make to agro-industrial development.

6. In coming years, the food-processing industry will continue to use many techniques that are widely available and in use in medium- and small-sized plants. The industry's most important products will continue to be staple foods with little value added. Hence, contrary to what happens in other industrial sectors, in the food-processing sector developing countries are not unavoidably dependent on TNC-type technology. Some developing countries have already progressed along these lines. There are many ways to develop appropriate technology: reducing the foreign cost and the domestic maintenance charges of imported technology; rescuing dormant technology from more economically advanced countries; scaling down advanced technology or up-grading local technology.

7. In developed countries, side by side with large firms specializing in food-industry equipment and machinery, there are medium- and small-scale firms capable of offering packages extending to the start-up phase of projects and including various forms of technology adaptation. Several developing countries now have industries capable of developing and adapting processing technologies. Co-operative associations have also expressed their willingness to collaborate with developing countries in supplying expertise and consultancy services.

8. The dissemination of information on sources of low-capital technologies can play a major role in boosting developing countries' access to non-TNC technology. This objective could be served by setting up a "roster of adapted systems of food processing." This would consist of a list of different possible technologically adapted systems, each including mixes of different technologies at varying levels of complexity for processing different foods. For each technology, the principles, processes and engineering highlights would be described, together with references to existing and previous applications in various countries and the results obtained. Within each system, reference would be made to the degree of complexity for each technology with an indication of the type of socio-economic setting to which it would be suitable. The "roster" could be completed with a list of contractors capable of supplying the types of equipment described in developed and developing countries.

9. Adaptation and development of appropriate technology could be enhanced by the establishment or strengthening of R and D programmes. In their search for new technologies, they might find it useful to rely on "prototype projects" for priority commodities employing "upgraded" domestic technology systems or "downscaled" or "dormant" imported technology systems. They could also initiate follow-up studies on the global efficiency during the life of projects after the start-up phase is completed to identify constraints that are not apparent at project-evaluation phase, but result later in hidden costs.

10. In their development plans and policies, Governments will increasingly be faced with the need to establish priorities among types of firms in the food-processing industry and to decide ownership patterns. The paper analyses the TNC role, the contribution of modular-type development, the co-operative movement and co-operative-owned industrial concerns (joint ventures).

11. As to a TNC-type of development, the paper explores the different issues it might raise in the staple food sector, the branded food sector, and the export and import sectors. It concludes by pointing out that Governments should be enabled not only to evaluate the cost and benefits of a TNC food-processing project, but also its longer term implications. A study of such evaluation methods and procedures might be very rewarding in realistically weighing the advantages and disadvantages of the TNC options and in designing adequate

national policies to curb any tendency towards undesirable effects on economic development.

12. A study of these evaluation methods might be accompanied by a definition of model guidelines on TNC investment in the food industries of developing countries. This would need to be preceded by a review of existing government policies and of contractual arrangements and practices between TNCs and host developing countries, their applications, outcome and effects in the processing industry of these countries.

13. Agro-industrial ventures vertically integrating agricultural production, processing and marketing are in some cases favoured by Governments in planning food-processing industries and have met with success. An investigation of successful examples, the identification of constraints and the means to overcome them could supply valuable indications for the guidance of policy-makers in developing countries.

14. As to modular development by which a project expands with the growth of a "piloting unit" and a number of "piloted modules," i.e., industrial and agricultural units linked by contractual obligations, its success is largely due to the initial design of the piloting unit and its ability to carry out its managerial functions. This type of agro-industrial development offers several advantages over a TNC or even a domestically-owned monolithic agribusiness concern. It would have smaller requirements for capital, technology and managerial skills. It would grow with its own success and in its maturity enter the branded food sector. In the longer run, a modular type development offers the prospective of gradual mastery of the agro-industrial production mechanism following a path of self-reliance by sequential autonomous growth.

15. A strong farm co-operative movement represents a valid tool for co-ordinating agriculture and industrial production requiring the implementation of adequate policies of incentives, as recommended in many resolutions of the United Nations and its specialized agencies. Although initially co-operatives may be limited to marketing and early processing of their members' produce, once they are well established they may enter further product processing, transformation and the branded food sector through joint ventures. With joint ownership with private or public capital and management, co-operatives can become an efficient tool of integrated agro-industrial development deserving incentives by policy-makers.

III. IMPROVING INTERNATIONAL CO-OPERATION

A. Food processing and the New International Economic Order

The international economy remains in a state of structural disequilibrium. It is characterized by a slower growth rate accompanied by a continuing trend of high inflation and unemployment, prolonged monetary instability, intensified protectionist pressures, structural imbalances and uncertain long-term growth prospects. In an interdependent world economy, these difficulties cannot be overcome without resolving the particular problems facing the developing countries. Foremost is the food problem, which is of increasing concern to most developing countries. In this regard, in order to bring about effective solutions, the development of the food-processing industry can be a decisive factor. Its contribution seems particularly important: (1) to improve productivity (by the prevention of wasteful after-crop operations, the preservation of foodstuffs, the amelioration of sanitary conditions, the optimum use of raw materials, the planning of agricultural production and distribution), (2) to favour regional development (by creating activities in rural areas as well as complementary industries and services upstream and downstream), (c) to f[illegible] global growth (with the supply of foods in sufficient quantities at a [illegible]ively low cost and with the increase of export earnings).

[illegible]ial development of the food-processing industry in developing countri[illegible] assumes, however, a modification of present conditions in the world environment. First, the location of the food-processing industry corresponds neither to the distribution of the population nor to that of the raw materials. Three quarters of agricultural production and processed food are carried out by two fifths of mankind. Thus, even for most commodities (cocoa, coffee, tea) exclusively produced by developing countries, the food-processing industry is overwhelmingly located in the countries of the Northern Hemisphere.

The introduction and development of food-processing units where the raw materials are produced should therefore be encouraged, raising the share of the developing countries in world industrial production in accordance with the Lima Declaration and Plan of Action. This involves, as stressed by the Industrial Development Strategy (IDS) of the Third United Nations Development Decade, the transfer of financial, technological, managerial, personnel and other resources to developing countries, including the provision of the necessary training and expert services, as well as the redeployment of industrial capacities on the basis of the principle of dynamic comparative advantage.142/

The establishment of a well-structured import food-processing industry, especially for those developing countries that have to rely on imports of key staple foods, such as grains and dairy products, also needs to be encouraged. Industrialization of grain processing, in particular, represents a step forward because, in addition to generating employment and income, it allows the obtainment of savings from importing bulk grain instead of flour, the improvement of the balance of payments and the utilization of technological advancement.

Second, the present structure of international trade is distorted: the developing countries account for about a third of world exports of processed food (estimated in 1977 at $US 71.4 billion), and the OECD countries account for 78 per cent of imports. Thus, the prospects for processed food exports are greatly affected by the orientation of the demand of the developed countries, e.g., very slow rate of growth and very high caloric consumption, especially in the form of meat, eggs and dairy products. In the very sectors in which developing countries have a quasi-monopoly of exports (for climatic, geographic and ecological reasons), demand for imports is therefore expanding only very sluggishly: between 1 and less than 2 per cent per year for cocoa, coffee and tea. Imports tend to grow more rapidly for low calorie foods, such as fruit, or for foodstuffs, such as coarse grain, soya meal and cassava pellets. On the other hand, the demand for processed-food imports of developed countries is reflecting not only the slow growth of their domestic consump-

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142/ United Nations General Assembly, International Development Strategy for the Third United Nations Development Decade, op.cit., para. 73.

tion, but also the increase of their domestic production taking place behind protective barriers.[143/]

In order to find solutions to these problems, recognition of the developing countries' full rights and true equality in decision-making in international economic affairs is essential. In addition to recourse to collective self-reliance, the correct way to settle the pressing food problem is for the developed countries to sit together with the developing countries for all-round consultation, break the present impasse, explore and adopt effective measures to narrow down the gap between the rich and poor, and establish a new international economic relationship that is equitable, rational and based on equality and mutual benefit. In particular, a framework of international co-operation needs to be established—within the overall context of the International Development Strategy (IDS) of the United Nations Development Decade—to work out long-term industrialization plans and programmes leading to rapid modernization and expansion of the food-processing industry in the developing countries and allowing for efficient long-term co-operation on a sectoral basis between complementary partners of varying technological capability (engineering companies, equipment suppliers, Governments of the countries concerned).[144/] Such a long-term co-operative effort obviously requires a prior understanding of the potentialities of each country, the actors and their strategy. Consultation can therefore take the form of a discussion at diplomatic level, subsequently resulting in a governmental agreement as the basis for a development contract. Finally, the various partners concerned could negotiate the whole of the contract either separately or taken overall. However, other approaches remain possible, either (1) on the basis of industrial partners wishing to co-operate between themselves and attempting to convince their respective Governments of the need to create a basis for co-operation or (2) on the basis of contacts between a developing country and enterprises of various nationalities. In these latter approaches, government-base agreements

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143/ Tate and Lyle's closure of its 300,000 ton-a-year Liverpool refinery is seen by many ACP nations, which adhere to the Lomé Convention, as a first step in the campaign by the EEC beet sugar lobby to erode their position before the sugar policy is reviewed in 1982. "Problems Arise With ACP Sugar as Tate and Lyle Closes Refinery," African Economic Digest, 30 January 1981, p. 15.

144/United Nations Industrial Development Organization, "Long-term Contractual Arrangements for the Setting up of Capital Goods," Global Preparatory Meeting for the First Consultation on the Capital Goods Industry, Warsaw, 24-28 November, 1980, ID/WG.324/5.

remain necessary to guarantee the development contract.[145]

On international trade the IDS prescribes that the developing countries' global exports of goods should expand at an annual rate of not less than 7.5 per cent, thus implying a larger contribution from the food-export sector because of its importance within the trade of developing countries. Therefore, the IDS specifically provides that the developed countries should exert their best efforts to: (1) improve access to their markets for exports of agricultural products on a stable and predictable basis, (2) accord developing countries the opportunity to expand their agricultural exports through continued and accelerated liberalization of agricultural and trade policies; (3) adjust those sectors of their agricultural and manufacturing economies that require protection against exports from developing countries, thus facilitating access to markets of food products; (4) avoid adverse effects on the economies of the developing countries while formulating and implementing their domestic agricultural policies.[146] The attainment of these goals calls for appropriate trade expansion on a long-term basis. Thus, on the pattern already established by certain aspects of East/West industrial co-operation and the Lomé Convention, framework agreements for development and co-operation, reflecting clearly the responsibilities and obligations of the parties concerned, as well as the penalties attached to non-fulfillment, need to be established. The general principles embodied in these agreements should provide secure guidelines for the parties concerned, e.g., long-term credits, buy-back arrangements, marketing, training of personnel, investment guarantees, risk insurance, etc.) as well as trade facilities (e.g., relief from customs duties, temporary admission and drawback procedures and outward processing traffic), especially for the products resulting from production co-operation contracts in specific sub-sectors.[147] Further, since the IDS emphasizes that "specific attention will continue to be given to the impact of food trade on the levels of food production,"[148] it will be necessary to deal with the problem of agricultural protectionism.

145/ United Nations Industrial Development Organization, "Concepts and Proposals Concerning New Contractual Agreements for Setting up a Capital Goods Industry," Global Preparatory Meeting for the First Consultation on the Capital Goods Industry, op. cit., p. 41.

146/ United Nations General Assembly, ibid., para. 60.

147/ United Nations Industrial Development Organization,"Issues to be Covered by the Second Meeting of the Ad Hoc UNCTAD/UNIDO Group of Experts on Trade and Trade-related Aspects of Industrial Collaboration Arrangements," ID/WG.337/6, Vienna, 24 April 1981.

148/ United Nations General Assembly, ibid., para. 94.

B. International co-operation at the service of a self-reliance policy

Developing countries that must depend on developed countries for sales and concessionary grants for food totalling several billion U.S. dollars are in a very vulnerable position. Commercial supplies, even unavailable at certain periods (such as 1973-1974), are subject to highly unstable world prices that frequently extoll exorbitant foreign exchange earnings to developing countries. Concessional supplies, moreover, can be unreliable.

The sovereignty of developing countries must, moreover, be preserved in the face of any use of food as a political weapon. In this regard, although a policy of complete independence from all forms of food imports is a long-term undertaking, the solution to the food-dependency problem, as underlined by a resolution of the United Nations General Assembly, 149/ must begin at the national and regional levels. Important initiatives can, thus, be taken by fostering international co-operation at the service of a self-reliance policy, especially by intensifying intra-developing countries' food trade as well as by implementing innovative regional integration arrangements and specific programmes of mutual assistance in the take-off of food-processing industries.

149/ United Nations General Assembly, Situation of Food and Agriculture in Africa, 23 January 1981, A/RES/35/69, p. 2 and p. 10.

1. Intensification of co-operation among developing countries

There are several main lines of co-operation among developing countries. One concerns food trade, the other mutual assistance in developing their food industries.

a. Recent trends in inter-developing countries' food trade[150/]

By 1979, some 24.6 per cent of exports from developing countries were destined to other developing countries' partners, while 27.4 per cent of imports originated in the developing world. In the 1970s, intra-developing countries trade has been growing rapidly at almost 28 per cent annually. But it still remained a small sector within world trade, 6.1 per cent in 1979. In quantitative terms, while manufactured products were the most dynamic sector, the share of food decreased to 26.2 in 1978.

However, intra-developing countries food trade grew more rapidly than trade with developed areas, as shown by the following quantum index of trade (1970 = 100):

Developing countries food exports to:

	1971	1972	1973	1974	1975	1976	1977	1978
developed countries	99	106	112	96	97	114	112	110
developing countries	114	125	133	150	167	155	144	148

In value terms, in 1978, food items amounted to about $US 10 billion of which 6.3 were of intra-regional trade and the rest inter-regional trade.

Commodity-wise coffee, rice, sugar, maize, vegetable oils and animal feeds had the largest share of food trade. While country-wise Brasil, Argentina, Thailand, Malaysia, Singapore, Spain, India, Sri-Lanka, the Republic of Korea and Pakistan were the largest participants in this trade.

150/ Among other sources the present section draws upon UNCTAD, Updated information among developing countries by main SITC groups and by regions, TD/B/C.7/46, Geneva, April 1981

Those trends seem to indicate that there is no definite bias against trade among developing countries or, rather, if there was it is in the process of being overcome. This might be particularly desirable giving the present vulnerability of developing countries to protectionism in developed countries and the slow growth in their demand for many food products of the developing countries.

b. The development of regional integration arrangements

The reasons for the relatively low volume of intra-trade are varied. In the first instance, many developing countries had historic trade links with different metropolitan countries that, to a considerable extent, have been maintained, given the size of their markets.

Moreover, a number of regional common markets, such as the Latin American Free Trade Association (LAFTA), now superseded by the Latin American Integration Association (LAIA), were created essentially as free trade associations and could not always develop optimal regional productive powers and self-reliance. In some instances, for example in Latin America, major benefits have accrued to foreign corporations and investors because in protecting their domestic industrial markets such arrangements have sometimes supported the earnings of the local branches of foreign companies rather than nurtured the growth of domestically-owned capital and industry.[151/] In addition, trade liberalization within regional co-operative agreements has been often concentrated on manufactured products. Instead, many agricultural and processed-food products have often been excluded from the process of trade liberalization. For those included, tariff-cutting agreements have left out crucial non-tariff barriers, such as quantitative restrictions, import licensing, state trading monopolies, costly and lengthy legal procedures for registering consumer products, standards, exchange controls and different levels of import taxes.

151/ E. Lasslo with J. Kurtzman and A.K. Bhattacharya, Regional Co-operation among Developing Countries: The New imperative of Development in the 1980s, London, Pergamon Press, p.14.

A similar approach, i.e., mere tariff concessions based on a complex and time-consuming case-by-case procedure[152], has been adopted by the GATT Protocol Relating to Trade Negotiations Among Developing Countries, which, since it is open to all developing nations whether or not they are members of GATT[153], could improve food trade co-operation between developing countries if ways and means to overcome effective obstacles to trade and trading opportunities would be identified and implemented.

Also in finance, regional co-operation is inadequate for the task of enhancing collective self-reliance and spurring development. The existing regional development banks, such as the Asian Development Bank and the Inter-American Development Bank (IADB)[154], are essentially extensions of the industrialized economies, designed to finance continued export-orientation rather than self-reliance for the developing countries.

Institutional problems also limit severely the marketing potential of agro-based industries among developing countries. However, in this respect it is interesting to stress the considerable progress made by the members of the Cartagena Agreement, whereas a central office of marketing information, supplying intelligence on prices and supplies of the principal agro-based industrial commodities, has been established. Similarly, an ASEAN Emergency Reserve for Rice is being set up with stocks amounting to some 50,000 tons, which might be the precursor for more extensive arrangements to establish a regional Food Security Reserve against possible critical trends in global food

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[152] Rolf J. Langhammer, "Multilateral Trade Liberalization Among Developing Countries," Journal of World Trade Law, Vol. 14, No. 6, November-December 1980.

[153] Eighteen countries have joined the GATT Protocol: Bangladesh, Brazil, Chile, Egypt, India, Israel, Korea, Mexico, Pakistan, Paraguay, Peru, Philippines, Romania, Spain, Tunisia, Turkey, Uruguay and Yugoslavia. Greece, a participant up to 1980, withdrew because of its accession to EEC.

[154] IADB is funded 50 per cent by the United States of America, which retains veto power over all loans, the hiring of personnel and general policy initiatives.

supplies[155].

c. Mutual assistance in developing food processing industries

Complementarity in food production and food processing between developing countries has, in fact, to be encouraged by appropriate policy instruments. The potentialities for more significant increases in regional trade for processed foods between developing countries seem substantial. Although countries in a region often produce similar raw materials, they are usually processed into different consumer products that could be traded to mutual advantage. Also, food manufacturers in one country could purchase semi-processed products from other countries.

In particular, complementarity could be encouraged by adopting production re-adjustment measures in addition to trade liberalization, through the launching of a sectoral strategy. An interesting example in this context is the Regional Food Plan of the Caribbean and Common Market (CARICOM)[156], whose major aim is to identify and prepare appropriate national and regional food projects to be undertaken by a specially created commercial corporation (Caribbean Food Corporation) with financial and technical assistance from a development bank (Caribbean Development Bank) that is also fostering co-operation with and participation by a number of non-member states and international institutions.

Another example, with a much greater impact given the coverage of 50 countries with a total population of 388.4 million, is the Regional Food Plan for Africa, which, to counteract the drastic decline of food production per capita, aims at enabling member states of the Organization of African Unity (OAU) to be self-sufficient in basic food products (grains, meat and fish) within a period of 10 years. The Plan, in particular, attempts to tackle

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155/ R.J.G. Wells, "ASEAN Intraregional Trading in Food and Agricultural Crops, The Way Ahead," Asian Survey, Vol. XX, No. 6, June 1980, p. 664.

156/ W.J. Philipps, A Framework for Developing a Regional Food and Nutrition Strategy, Economic Commission for Latin America, Office for the Caribbean, Development and Co-operation Committee, Latin American Institute for Social and Economic Planning, Second Meeting of Planning Officials in the Caribbean, Kingston, 29 May to 2 June 1980.

adverse environmental conditions with special regard to drought, lack of adequate financial resources, inappropriate technology and inadequate socio-economic and institutional structures.[157]

Another important factor is the provision of adequate financing, e.g., a specific "food facility," to overcome basic problems such as the poor distribution chain (scarcity of cold storage, lack of transformation facilities, etc.), credit terms as offered by many major international companies, absence of promotional organization, rapidly increasing freight charges, demand for health/hygiene standards as observed by traditional international suppliers.

The OPEC Fund for International Development, in co-operation with appropriate regional banks, e.g., African Development Bank, African Development Fund, having identified food as a priority area, could play in this respect a very important role in marshalling the capital required to establish a specific "food facility" aiming at fostering food production and intra-trade within regional groupings among developing countries.[158]

UNIDO and other international organizations could help identify potential projects as well as potential partners for implementation. Further incentives would be the establishment of practical commercial settings and the possibility of defining joint projects, i.e., joint ventures and multinational operations.

Thus, as an example of practical commercial setting, periodic meetings of buyers and sellers of the main food commodities, particularly state trading corporations, might facilitate intra-trade, especially if it could be demonstrated that trade links are of mutual benefit. A trade negotiations body, confined initially to a few major commodities, might be an appropriate forum within regional groupings where buyers and sellers could meet for the exchange

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[157] UNDP, Conference of African Governmental Experts on Technical Co-operation Among African Countries, Food Production, Processing and Marketing in Africa, working paper, TCDC/AF/6, April 1980.

[158] The OPEC Fund for International Development has already approved grants to the Caribbean Regional Food Plan and for the development of the Red Sea and Gulf fisheries. I. Shihata, "The OPEC Special Fund and the North South Dialogue," Third World Quarterly, Vol. 4, October 1979.

of information and for carrying out trade transactions. Information could be exchanged on such matters as technical obstacles to trade, e.g., importers' need for vegetable oils rather than oilseeds or crude oils, lack of suitable storage facilities, commercial impediments, e.g., regular and reasonably priced shipping facilities and adequate and reasonably priced insurance), tariff and non-tariff barriers, and information concerning ad hoc and projected requirements of certain products. In such a context, a wide range of possibilities for transactions could be opened up on an ad hoc basis, such as spot as well as forward contracts, barter arrangements and specific exchanges of preferences.

The possibility of defining industrial collaboration agreements, centred on joint ventures (preferable with a minority share in equity) and multinational operations between companies in different developing countries, should be considered, in order to:

i. utilize raw materials not likely to be developed on the basis of single nation markets.

ii. integrate different production stages of regional resources and enhance market complementarities;

iii. organize production lines so as to achieve economies of scale and specialization, while providing a mutually acceptable allocation of productive facilities and pooling of markets;

iv. expand and/or develop new intra-trade flows as a basis for building new production capacity to meet domestic and export demands, increasing or saving foreign exchange earnings, developing indigenous technology and reducing dependence on foreign markets;

v. strengthen the bargaining power of developing countries in their trade relations with developed countries through the enhancement of their processing, marketing and distribution capabilities.

Thus, for instance, the Latin American Economic System (SELA, with headquarters in Caracas), an institution created in 1975 by all Latin American countries, including Cuba, is promoting joint ventures in the commercialization of key products. Up to now only sketchy material has been

available on the activities of developing countries' enterprises, both private and public, who are engaged in food multi-country operations within the Third World. But recent studies[159] show that the growth of multinational production enterprises between developing countries is being accelerated owing to active investing operations carried out by Hong Kong, India and the Republic of Korea, on the Asian side, and Argentina and Brazil, on the Latin American side.[160]

New Third World multinationals, both private and public, show in particular signs of having acquired several of the features necessary for successful international corporate activity, e.g., significant technical command, ability to put together investment and technology packages attractive to would-be-recipients, some capacity for after sales servicing, and the germs of relationships with their home country governments that would allow them to receive greater support from the latter. Thus, for example, the Philippine producer of San Miguel beer has conquered the Hong Kong beer market with its promotion and good product. Singapore firms have established strong positions in soft drinks in oriental markets. Inca Kola, a Peruvian firm with headquarters in Ecuador, has penetrated in California and New York, appealing largely to the local immigrant Latin market.[161] In most cases, brand name is not the preferred competitive weapon of the Third World multinational. Price is the usual fighting tool. In fact, even in product lines dominated by heavy advertising in the industrialized countries, there seems to be a corner for a price fighter.

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[159] K. Balakrishnan, MNCs from LDCs: The Case of Indian Joint Ventures Abroad, Mimeo, Ahmedabad, March 1980.

[160] Peter O'Brien, "The Internationalization of Third World Industrial Firms," Multinational Business, No. 4, 1-80, p. 3.

[161] Louis Wells, Jr., "Third World Multinationals," Multinational Business, No. 1, 1980, p. 15.

To effectively penetrate international markets, avoiding the middleman, the organization of specific commodity groupings to co-ordinate production and marketing is another example of formulation of joint approaches between developing countries.[162] Thus, the Bogota Group, a cartel of eight Latin American coffee organizations consisting of Brazil, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico and Venezuela, first met in Bogota in August 1978 to co-ordinate production and marketing of about 60 per cent of the world's coffee. At times the Group has been successful in raising prices in a declining market by intervening in the New York and London coffee futures markets with finances provided by a $US 140 million price stabilization fund. Their method of operating is as follows: whenever coffee spot prices rise, those holding coffee for current sale and delivery ("spot market coffee") typically sell less and hold more for later sale, anticipating that the higher futures prices will induce correspondingly higher spot market prices later. The reduced volume of coffee available on the spot market then drives spot prices up. The process is reversed to lower prices. Thus artful buying and selling of futures contracts makes up the backbone of the Bogota Group's price support efforts. During a two-week period in October 1979, the Group exhibited its strength by sending prices from limit down to limit up. However, when the boom in coffee prices was over, prices fell in spite of the Group's support efforts. While some critics stated that the Group was dead due to the crash in prices, it was also stressed that the Group could adopt a more cautious approach as well as strengthen its organizational framework. Thus, in June 1980 the Bogota Group established an international trading arm, Pan Cafe, S.A., with capital of $US 500 million. This new organization's

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160/ Dennis McGrath, "Commodity Cartels: Can They Work?," Agri-Business Worldwide, December 1980/January 1981.

more formal structure may make it more attractive for other coffee exporters to join and add new capital. Further examples of specific commodity groupings are listed in the following table:

Commodity Groupings

	GEPLACEA (sugar)	Union of Banana Exporting Countries (UPEB)	Bogota Group (coffee)	Coconut Cartel
Founded	1975	1974	1979	September, 1979
Who's involved	21 nations, including Latin American and Caribbean countries, with the Philippines as observer.	Central American countries led by Panama, including Costa Rica, Honduras and Guatemala.	Brazil, Colombia, Mexico, El Salvador, Honduras, Guatemala, Venezuela, Costa Rica.	The Philippine government.
Production of members	29 million tons (1978)	3 million tons	2.8 million metric tons	3.4 million tons of copra worth US$1 billion. (1979)
Percent of world production	31.3 percent	5.5 percent	59 percent	More than 80 percent of world trade.
Strategy	Exchange of information on production, marketing and new technologies.	UPEB demanded a duty of US$1.00 per 40 lb. (18 kilo) box of bananas exported by United Brands, Standard Fruit and Del Monte, the 3 multinational firms that control the Central American banana market.	Creation of a formal, international trading arm with initial capital assets of at least US$500 million.	The government has organized the 54 coconut oil processing companies into a government-sponsored cartel. Each company can become a subsidiary or an affiliate of the government's United Coconut Oil Mills. Those that don't link with the government concern will lose state support and the right to expand. Farmers will own at least 50 percent of United Mills.
Success	Sugar prices continued to decline after the the group was formed, but, as a spokesman said, had the group not been formed, prices might have dropped even lower.	The group fell apart when one company refused to ship bananas, and the largest banana exporting country, Ecuador, refused to join the group.	At times has been successful in raising prices in a declining market.	Not yet known.

Source: D.McGrath, Commodity Cartels: Can They Work ?, AgriBusiness World-Wide Dec.1980/ Jan. 1981.

A less common form of co-operation among developing countries in the area of trade and marketing that has contributed to the development of agro-based industries has been that between non-regionally associated countries. One of the most relevant examples of such co-operation used to be the agreement for trade expansion and economic co-operation between Egypt, Yugoslavia, and India, signed in 1967, that emphasized reciprocal expansion of trade among the three countries through tariff concessions for a large number of agro-based industrial products. In this direction, there is substantial scope for strengthening bilateral/trilateral collaboration between OPEC countries and those developing countries already disposing of considerable business strength in the area of food processing. Thus, for example, the State Bank of India is promoting Indian business in the Middle East. Operations are diverse. But in the field of food processing, the Indian food industry should be in an excellent position to reap the advantages of its competitive prices and its geographical proximity.[163] The opening of a UNIDO office in the Middle East could conceivably help non-oil developing countries to promote their food exports in the oil-rich states, which today import massively from partners as far away as Australia, Japan, New Zealand, and the United States of America, and attract potential investors who are actively seeking investment opportunities.

Similarly, with adequate assistance to overcome infrastructural obstacles (scarcity of storage and transportation means), Sahelian countries can promote the export of frozen meat to the Middle East and North Africa.[164]

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[163] "India pushes on contracts to pay off oil," The Middle East, Feb. 1981, p. 61.

[164] International Trade Centre, UNCTAD/GATT, Market Opportunities in the Near East and North Africa for Meat from Sahelian Countries, report on a mission by Mr. D.W. Manly, meat marketing advisor, October 1979, ITC/DTC/171, p. 1.

The establishment of a strong line of industrial extension work between the R and D institutions and the food industries is also essential both to the identification of worthwhile R and D programmes and to ensuring that the results of such programmes are put to effective use. In Latin American countries a number of well-established research institutions, especially in Argentina, Brazil, Colombia, Guatemala and Mexico, can be considered for strengthening and development into regional centres for food technology development, information and training, to serve the needs of a group of neighboring countries. Similar institutions can also be organized in Nigeria, Tanzania, and Sudan to serve the African region. Developing countries of Asia already possess reputed institutions such as the Central Food Technological Research Institute (CFTRI) in India. A food technology centre is being organized in Indonesia. Thailand, the Republic of Korea and the Philippines have also developed food technology centres. The functions of regional centres for food technology development, information and training should,in particular, be addressed to:

i. stimulating within the industry the acceptance of the idea that food-processing enterprises should be technologically self-sufficient,

ii. improving the quality and quality control of products made by the industry,

iii. research and develop new ways to process local produce, and

iv. assist in the development of new enterprises that utilize the findings of research and development.

UNIDO should encourage the use of these centres by other developing countries as a basis for strengthening technological co-operation among developing countries. UNIDO should also promote the active re-launching of the World Association of Industrial and Technological Research Organizations (WAITRO) to strengthen collaboration between R and D institutions in

problem-solving and technology development, including research and development work on specialized equipment already identified by the developing countries.

There is also need for inter-country co-operation mechanisms in the supply of spares, components and machinery, particularly taking into consideration the development of indigenous manufacture of machines, which have already been established in some developing countries, especially in the field of rice milling, oil-seed processing, sugar refining, etc. In this context, UNIDO, within the framework of a proposed Catalogue on Manufacture of Spares, Components and Machinery , could give particulars of the most reputed firms within regional groupings and, more in general, of the whole spectrum of machinery development in developing countries, emphasising their technical availability for collaboration and their supporting facilities.

UNIDO, moreover, could pave the way to agreements for co-operative R and D programmes, i.e., arranging visits for an exchange of experience and other forms of co-operation in various aspects of the food-processing industry, which in addition to encouraging indigenous creativity and the development of the stock stream of technology are often the only way for meaningful work in some of the field of advanced and nonconventional technology.

There are, in addition, possibilities for fruitful areas of technical assistance among developing countries to advance knowledge and, particularly, to share experience of food processing. Thus, for example, between Brazil, represented by Fundaçao Tropical de Pesquisas e Tecnologia, and the Government of the People's Republic of Angola, a plan of technical co-operation, under the general co-ordination of UNIDO, has been elaborated with the view

toward:

i. making a recuperation of the Angolan food industry possible within the shortest possible time,

ii. making foodstuffs of better quality and quantity available to the Angolan population,

iii. making the best use of the resources existing in the country,

iv. utilizing the human and material resources existing in Brazil in order to achieve the aims in question,

v. training the Angolan personnel in Brazil.

To attain the above-mentioned objective, since it is impossible to attend to the needs of all industrial units in Angola, the proposal has been submitted to UNIDO that one unit of each sub-sector should be selected to serve as example and, at the same time, regarding quality control, maintenance and social assistance to the staff members.[165] The following advantages could then be obtained:

i. a great economy of time and resources, avoiding the necessity of a great number of foreign personnel and making possible a better selection of higher qualified personnel,

ii. assistance toward the efforts of the Angolan Government to form a working force, and

iii. a better control and assessment of the results obtained during the execution of the programme.

UNIDO, through the "solidarity ministerial meetings," which were convened to explore ways in which invited developing countries can co-operate in the industrial development of the meetings of host countries, could for-

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[165] For the above selection, certain parameters have been considered. See UNIDO, Co-operation Between Brazil and Angola in the Food-Processing Industry, UF/ANG/78/212, 15 November 1979, p. 8.

mulate ad hoc programmes of experience-sharing in the area of the food industry.

2. Strengthening the machinery for project identification, preparation, evaluation and implementation in the developing countries

For the many developing countries, particularly in the lower income categories, project identification and preparation, notably feasibility studies, is a major bottleneck in the way of implementing industrial investments.

The lack of adequate project preparation and evaluation, not only of internal consistency but also of the project's links with relevant raw materials, etc., may bring heavy penalties. Many surveys carried out by UNIDO in developing countries have revealed that "large resources had been used to establish industrial plants that were not being properly operated due to various factors, especially the inadequate supply of raw materials. In many cases modern slaughterhouses were producing at ten to fifteen per cent of their capacity due to the lack of animals to slaughter. Fruit- and vegetable-processing plants were not operating for more than a few months per year due to the shortage of raw materials, inadequate quality of fruit and vegetables caused the production of low quality products. In some cases, the established plants were too modern and too large, and in others they were small and obsolete. For one reason or another, the great majority of the food-processing plants operating in developing countries, except those under multinational enterprises, were operating at a loss."[166/] Thus, it is vital that the machinery be strengthened to determine the areas in which worthwhile possibilities exist and translate them from mere ideas into workable projects, as well as to determine whether the returns from such projects would justify the required investment. In this regard,

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166/ W. Moreira-Dias, op. cit., p. 1.

there is a dire need for assistance from regional and international agencies to establish in the developing countries "projects bureaux"[167], whereby the various governmental bodies frequently involved in multi-sectoral-oriented projects join forces and provide the necessary facilities in order to elaborate and evaluate feasibility studies for new food-processing industries, either as private companies or with Government participation as public enterprises. These "projects bureaux" could be assisted by "planning units", manned by technically competent officers from all the ministries concerned, aiming at building maximum flexibility into projects design and development monitoring methods that can alert project management to the need of emerging corrections.[168]

Regional and international agencies, on the other hand, could encourage the strengthening and establishment of new regional and subregional food laboratories[169], which, in addition to elaborating and evaluating feasibility studies for new food-processing industries, can provide a wide range of very useful services, e.g., technical assistance to existing food-processing industries, control of the quality and safety of food produced by local food manufacturing enterprises, establishment and enforcement of standards. To overcome the inadequacy of an integrated framework in the pipeline of projects, e.g., piecemeal approach, lack of information or expertise, regional and international organizations can, moreover, assist the developing countries in the identification of suitable projects through the strengthening of

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167/ Statement by S.L. Bangura, Governor of the Bank of Sierra Leone, New African, April 1978.

168/ A. Ayazi, G. Perrin, De Brichambault, A. MacMillan and R. Spinks, Simple, Flexible, Decentralized, An Evaluation Checklist for Rural Development Projects, Ceres, November-December 1978.

169/ Food laboratories should be more than just laboratories in the common sense. They should become the nucleus for all responsibilities of the Government with regard to foods to the public, namely to the consumers, on one side, and, on the other side, to the processors and traders, ensuring a supply of safe and wholesome food. UNIDO, Food-processing Developing, Samoa, Technical report: Assistance to the Food-processing Laboratory, 15 August 1979, UF/SAM/78/176, p. 37.

inter-agency co-operative programmes of the fielding of missions (of individual staff members or teams of experts). In this regard, the World Bank/UNIDO Co-operative Programme (CP), although a great deal smaller than the similar programme between the Bank and FAO, provides a useful framework in identifying and preparing industrial projects in the developing countries. Through an increase in commitment from both of its supporting organizations, the World Bank/UNIDO Co-operative Programme could hope to expand its role also in the area of food processing, especially in specific sub-sectors, e.g., vegetable oils, sugar, and cashew nuts. However, despite the proposed improvements, the deficiency in project preparation capability in the developing countries would still call for urgent solutions; a more determined effort could originate from the UNIDO proposal of a new Industrial Project Preparation Facility (IPFF).[170] Such a proposal, which already has identified the development of small-scale, agro-based industries as a priority area, would provide the means to prepare industrial projects for implementation, thereby offering special assistance to the least developed countries as well as promoting co-operation between developing countries. In particular, the work of the IPFF would imply:

i. the collection and preparation of project ideas or profiles,

ii. the evaluation and selection of project ideas to be further pursued, and

iii. the preparation of pre-feasibility and feasibility studies.

Industry consultancy[171] is a further, vital instrument to conceive real projects relevant to each country, especially in the area of the food-processing industry whereby a clear understanding of how to implement the project is acutely needed. Technical co-operation among developing countries, e.g., to ensure that opportunities for access to internationally funded investment projects are made available to consultants from developing countries; to support the creation of rosters, consultancy networks and informa-

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170/ UNIDO, Industrial Development Board, Proposal for an Industrial Project Preparation Facility, ID/B/261/Add.5, 23 March 1981.

171/ The term "industrial consultancy" is used to represent the full range of economic, technological, engineering, financial and management services required for industrial development.

tion banks at sub-regional and regional levels; to encourage the adoption of more suitable criteria and procedures for selecting a consultancy firm; to develop training methodology and joint programmes; to develop and arrange for application of suitable techniques and tools for internal management of consultancy practices, including control of costs, time and quality, contracting procedures; to exchange information about techno-economic data, suppliers of technology and equipment in developing countries, the methodology of project formulation and evaluation; to support the creation in sub-regions or regions of adequate conditions for fruitful co-operation such as common codes and procedures, harmonization of legal and administrative practices, etc., could be the most appropriate means.

Due consideration, however, should also be given to develop, within each country, rosters of experts, including individuals normally associated with such institutions as universities and research institutes; to establish or strengthen professional societies and consultancy associations; and to make judicious use of affiliations with other firms, local and foreign.

Suitable actions should also commit the Governments to:

i. make full use of local consultancy capabilities, e.g., when a foreign firm is engaged, a local consultancy organization should be charged with the prime responsibility for the project, unless totally impracticable,

ii. establish incentive schemes, including tax concessions,

iii. establish suitable credit policies to make working capital available to local consulting firms and to ensure that clients of financial institutions employ local consultants whenever possible,

iv. promote linkages between consultancy institutions and universities to stimulate improved preparation for consultancy careers, and

research and development institutions to stimulate research of use to consultancy.

International institutions and organizations should be urged to adopt procedures to encourage greater use of consultancy firms from developing countries. In this regard, UNIDO and other international agencies could promote awareness of opportunities of locally available industrial consultants through appropriate meetings, the preparation and up-dating of manuals for the use of consultancy clients and consultancy staff, the preparation and updating of rosters of consultancy organizations indigenously owned and operated. In fact, in several developing countries the use of the expertise of locally trained scientists and economists to prepare feasibility studies, especially in the area of the food-processing industry, may reflect developing countries' needs more accurately than foreign agencies pretend to do, with very expensive studies frequently characterized by poor mastery of the available data.[172/]

Regional and international agencies, in addition to organizing investment promotion meetings, which bring together project promoters and sponsors with potential partners, play an important role also in providing developing countries with accurate information on the products and the partners who may be involved in setting up food-processing projects. Such a role can be strengthened through the provision of data banks. Thus, the Investment Co-operative Programme Branch (ICPB) of UNIDO is now establishing a computer data bank of information on industrial investment projects and potential partners. This information system, called INPRIS, will allow project promoters and sponsors in the developing countries to search the data bank for suitable potential partners for their projects.

172/ UNIDO, Final Report of the Expert Group Meeting on the Role of Industrial Consultancy in Developing Countries, ID/WG.278/XX, 6 July 1978.

C. The management of interdependence

The international system, although still fragile and frequently complex, has become very interdependent. More and more, local and sectoral problems can only be solved through international solutions. Above all, the achievements of economic growth in one country depend increasingly on the performance of others.[173]

Interdependence, however, should be a positive process based on the rearrangement of international relations, the building of a new order, guided by the principle of equal rights and opportunities, aimed at fair compromise to reduce useless controversies as well as to promote the inter-locked welfare of nations. Such a more realistic concept of interdependence can effectively favour the take-off of vital industries in the developing countries, such as food processing. In fact, in this field industrialized countries need to export machinery and equipment, technologies and know-how, while developing countries need to create or develop an industry that by providing income, employment and foreign exchange earnings enables a move from the subsistence sector into the money economy, thus becoming a major element in the economic growth process. In this regard, the real problem is the management of various degrees and forms of interdependence in key areas of the international system, such as:

1. international trade, to favour growth and diversification of developing countries' exports;

2. export promotion, to define pragmatically actions of co-operation between developed and developing countries;

173/ "North-South: A Programme for Survival," a report of the Independent Commission on International Development Issues (London, Pan Books, 1980), p. 33.

3. import substitution and procurement, to establish a well-structured food-processing industry that will facilitate import-substitution and enhance developing countries' expertise in food purchasing from abroad;
4. industrial corporate and contractual arrangements with the TNCs and other integrated organizations;
5. technical assistance and transfer of technology, with emphasis on training programmes and the selection of appropriate types of equipment and machinery;
6. financial arrangements, to start qualified and original projects, to channel greatly needed equity investment, to find new sources of financing.

1. Protectionism, possible multilateral co-operation to favour growth and diversification of developing countries' food exports

In the developed countries with market economies, protection against food imports has two aspects: one is characterized by tariffs and by non-tariff import measures, such as various forms of quantitative restrictions, and the other is characterized by measures on imports, exports and the domestic market aimed at stabilizing but actually supporting domestic producers' prices.

The first form of protection may be applied in isolation, the second usually accompanies the first one. Thus in the case of commodities that do not compete with domestic produce, e.g., cocoa, coffee, tea and spices, protection is extended only to the domestic processing industry. It is most frequently achieved by means of escalating tariffs. The import duty on the raw materials is frequently zero or very low. For products at the next stages of processing, it rises sharply. This technique can be found in practically all import duty systems. By affording very high levels of protectionism to processing industries in the importing countries, it concentrates their location in these countries.

Agricultural protection is an extremely complex matter including an entire array of measures in addition to protection to the processing

industry.[174] It normally results from measures enacted in domestic markets to support prices and incomes of the local agricultural producers held to be among the less-favoured social groups and most vulnerable to external competition. This apparently purely domestic objective of internal income redistribution has serious implications for international markets.

The countries of Eastern Europe with planned economies carry on import trade by means of State monopolies. Import duties on products from developing countries are rather low or even null. However, since national development plans regulate imports and exports, the amount and rate of increase of imports from developing countries are pre-determined by the state trading organizations. In this respect, according to some authors,[175] there is some existence of a bias in centrally-planned-economy countries' favouring imports of commodities at the earliest stage of processing that is similar to that discernible in developed market-economy countries.

The implications of agricultural protectionism concern not only access to the markets of the developed countries, but also access to international markets in general. One of the major contradictions of economic life today is that in order to support economically a social group, which within their rich economy may be considered as less-favoured, some of the developed countries have been unable to design measures which do not adversely affect the economic well-being of larger social groups, and by any standards for poorer groups of agricultural producers in the developing countries.

The levels and methods of price supports vary very widely between countries and also commodities. In addition to the traditional array of tariff and non-tariff measures, a variable levy system has been dominating the scene, particularly in Western Europe. Support programmes of this

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174/ For a brief and accurate description of agricultural protectionism, see UNCTAD, The influence of protectionism on trade in primary and processed commodities, the results of multilateral trade negotiations and areas for further international co-operative action, TD/B/C.1/207/Add.2 Geneva, August 1980; UN World Food Council, Seventh Ministerial Session, Report of the United Nations Conference on Trade and Development, WFC/1981/8, Rome, April 1981; FAO Commodity Review and Outlook, New Protectionism and Attempts at Liberalization in Agricultural Trade, pp. 10-122.

175/ See, for instance, A.J. Yeats, Trade Barriers Facing Developing Countries (London, MacMillan, 1979), p. 56.

type are operated most extensively in EEC but they are a feature of agricultural policy in Sweden and Switzerland also. Variable levy schemes may result in high levels of protection, just as all the more traditional schemes based on measures or imports. Table 11 shows pre-Tokyo Round of Multilateral Trade Negotiations nominal and effective tariff rates for selected processed-food products as well as the estimated total effective protection afforded by tariff and non-tariff barriers in the European Economic Community, Japan and the United States of America. Table 12 lists EEC non-tariff barriers on agricultural imports.

The high levels of protection revealed by the data in the above two tables have encouraged domestic production, reduced imports and concentrated processing in regions that were traditionally large net importers, transforming them into large exporters. This has been the case of the EEC for wheat, dairy products, sugar and meat, and of Japan for rice. These exports surpluses cannot be exported at the domestic prices that are higher than international prices, hence they are exported with the assistance of government payments. Commercially exporting countries, including developing countries, have not only seen possible markets closed to them, but also the emergence of competing exports at depressed prices. So long as agricultural price-support policies can rely on sufficiently large financial means, there is no way for the economically weaker exporting countries to counteract effectively the competition of the richer countries, except by reducing their output when prices in international markets cease to be remunerative for them.[176/]

The longer term effects of price support policies may be favourable to the countries applying them. Contrary to what usually happens in the case of industrial protection, it may contribute to increased productivity of the more dynamic sector of agriculture (while contributing to maintaining a relatively inefficient sector). This apparent paradox is due

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176/ It should be noted that the industrialized countries can redistribute large sums from the richer sectors to agriculture. The contrary might be true for developing countries, and particularly the smaller and the poorer ones.

Table 11. Trade effects of the Tokyo Round tariff cuts for agricultural products
(values in $US million)

Product group	European Economic Community				Japan				United States			
	Average MFN tariff		Imports from developing countries		Average MFN tariff		Imports from developing countries		Average MFN tariff		Imports from developing countries	
	Pre	Post	1976	Projected Change	Pre	Post	1976	Projected change	Pre	Post	1976	Projected change
MEAT												
1. Fresh meat	10.1	9.1	179.8	1.0 to 1.1	9.3	8.0	174.3	2.6	5.0	3.4	181.8	3.1
2. Prepared meat	21.8	21.8	181.8	0.0	18.9	18.8	4.5	-	6.8	4.9	184.2	2.7 to 2.9
FISH												
1. Fresh fish	13.8	12.9	143.6	-2.4 to -3.8	6.0	4.2	1 208.7	20.7	0.0	0.0	676.6	0.0
2. Prepared fish	22.4	22.4	129.2	0.0	15.0	14.9	85.0	-0.2	1.9	1.5	112.8	0.4 to 0.5
FRUIT												
1. Fresh fruit	15.0	14.8	957.1	-0.4 to -0.8	38.7	26.0	205.1	-	2.0	1.2	907.7	1.3
2. Preserved fruit	21.3	20.1	201.0	-5.1 to -5.8	28.1	24.7	31.6	0.8	13.7	11.6	144.0	3.6
VEGETABLES												
1. Fresh vegetables	9.2	9.1	744.5	-1.8 to -2.8	7.5	7.4	130.0	0.1	17.9	16.4	151.3	0.7
2. Preserved veg.	20.6	20.5	174.6	0.1	20.6	20.4	54.3	-0.1	12.1	10.9	98.8	0.8 to 0.9
SUGAR												
1. Raw sugar	0.0	0.0	439.6	0.0)								
2. Refined sugar	0.0	0.0	46.2	0.0)	35.4	35.4	435.5	0.0	6.6	6.6	1 023.7	0.0
3. Sugar preparations	21.0	21.0	4.4	0.0	37.7	32.3	2.5	0.1	6.6	5.9	14.6	-
COFFEE												
1. Green or roasted	7.0	5.0	2 879.0	35.4	0.0	0.0	337.9	0.0	0.0	0.0	2 671.8	0.0
2. Coffee extracts	18.0	18.0	80.1	0.0	25.0	17.5	6.9	0.4 to 0.5	0.0	0.0	129.5	0.0
COCOA												
1. Cocoa beans	3.0	3.0	720.3	0.0	0.0	0.0	61.1	0.0	0.0	0.0	358.1	0.0
2. Powder and butter	12.2	12.2	144.7	0.0	5.2	4.9	31.9	-0.1	1.6	0.3	196.7	2.5
3. Chocolate	27.0	27.0	7.9	0.0	29.0	27.4	5.6	0.0	6.5	6.5	5.7	0.0

Source: UNCTAD, The influence of protectionism on trade in primary and processed commodities, the results of multilateral trade negotiations and areas for further international co-operative action, TD/B/C.1/207/Add.2, p. 23.

Table 12.

Non-tariff trade barriers facing agricultural exports to the European Economic Community

SITC	Description	Non-tariff trade restraint a/
011	Meat, fresh, chilled or frozen	HS, PHS, DL, GQ, R, MP, ST, VL, SP
013	Meat in airtight containers	HS, PHS, R, DL, VL, SP
022	Milk and cream	VL
032	Fish and fish preparations	SP, Q, BQ
041	Wheat and meslin unmilled	VL, SP
042	Rice	VL, SP
043	Barley unmilled	VL, SP
044	Maize unmilled	VL, SP
045	Other cereals unmilled	VL, SP
046	Meal and wheat flour	VL, SP
047	Meal and cereal flour	VL, SP
048	Cereal preparations	VL, SP, ST, HS
051	Fresh fruit and nuts	HS, GQ, BQ, SP, R, SR, DL, SR
052	Dried fruit	DL, HS, Q
053	Preserved fruit	BQ, Q, HS, DL, GQ, VL, SP
054	Preserved vegetables	SP, BQ, DL
055	Vegetable roots and tubers	SP, HS, BQ, GQ
061	Sugar and honey	VL, SP, PHS, L, HS, BQ
071	Coffee	SP
072	Cocoa	SP
073	Cocoa food preparations	SP, HS, BQ, LL, DL
074	Tea and Maté	SP
099	Food preparations, n.e.s.	SP, L, BQ, DL
112	Alcoholic beverages	R, SP, HS, ST, DL, LL
422	Fixed vegetable oils	SP
431	Processed oils	SP, R, DL

a/ Restrictions applied in whole or in part to the SITC group. The key to these symbols is as follows: PHS, HS = prohibitions due to health and sanitary reasons or health and sanitary regulations; SP = special import preferences for States associated with the EEC; Q = quotas (method unspecified) or bilateral quotas; GQ = global quotas; DL, LL = discretionary or liberal licensing of imports; L = import licensing (method unspecified); VL, MP = variable levy or other minimum import price restrictions; R = restrictions (method unspecified) or special seasonal restrictions; and ST = State trading.

Source: UNCTAD, The influence of protectionism on trade in primary and processed commodities, the results of multilateral trade negotiations and areas for further international co-operative action, TD/B/C.1/207, Add. 2., Geneva, August 1980.

to the fact that productivity and farm sizes within agriculture are not uniform. Certainty of future prices reduces production risks greatly. Once already technically efficient farmers are not longer exposed to crippling price uncertainties and assured high income levels, they are induced to adopt better production methods and practices. Moreover, the stability of their income makes them more eligible for loans, technical and other assistance. This is another incentive t modernize. In part this increased productivity may be dependent on the continuation of the high price supports, but in part it is a definite and permanent dynamic consequence of these policies. This effect is financed in part by the consumer or the taxpayer of the countries concerned; in part, however, it is gained at the expense of competitors.

In the eyes of the developing countries, the outcome of all trade negotiations carried out so far cannot fail to appear far below expectations. For products of tropical zones competing with those of the temperate zone (among which oil seeds, oils and fats, sugar) which represent around 60 per cent of developing countries' food exports, the negotiations have left untouched in the developed countries national agricultural price support policies, even those which include the most restrictive market access measures.

Thus, more detailed preparatory work will be needed for any new attempt at liberalization. Agricultural price supports are essentially social welfare programmes in favour of the farmers in developed countries. The array of import restrictions and export encouragements they seem to require is the consequence of the way in which price support is granted and the level at which it is granted rather than an unavoidable necessity of the welfare aspect of the programmes. Bearing this in mind, preparations for a renewal of negotiations on trade liberalization would need to identify the types of price support policies having the least harmful international effects and requiring a minimum of import-control or export-support measures.

Progress in this direction could be made by proceeding along sector and sub-sector food product lines. To this end, fruitful multilateral co-operation could be achieved in studies to ascertain by sector and sub-sector the immediate and longer term "injury" to other countries' export and industrial development interests by these apparently purely domestic programmes. Such studies could be accompanied by an appraisal of these

Table 13. -TRADE IN AGRICULTURAL PRODUCTS

(1977 US$ Million)

Product Categories	Total	Duty-Free	Dutiable	GSP Products
EEC				
Food Products[a]	6,748	1,373	5,375	1,585
Major Products[b]	6,029	1,219	4,810	1,381
Intermediate Products[c]	683	147	536	195
Minor Products[d]	36	7	29	9
Other Agricultural Products[e]	7,786	1,389	6,397	1,884
All Agricultural Products[f]	14,534	2,762	11,772	3,469
Japan				
Food Products	4,178	1,134	3,044	382
Major Products	3,187	979	2,208	271
Intermediate Products	984	153	831	110
Minor Products	7	2	5	1
Other Agricultural Products	460	130	330	170
All Agricultural Products	4,638	1,264	3,374	554
US				
Food Products	8,601	6,193	2,408	1,089
Major Products	7,869	6,038	1,831	957
Intermediate Products	678	116	562	125
Minor Products	54	39	15	7
Other Agricultural Products	1,619	1,070	549	342
All Agricultural Products	10,220	7,263	2,957	1,431

Source: UNCTAD secretariat calculations.

[a]Products falling in CCCN chapters 2-4, 7-12 and 15-22 are considered to be food products. A few animal food items are included in these chapters.

[b]Imports exceed $25 million annually.

[c]Imports are in the range of $1 million and $25 million annually.

[d]Imports are less than $1 million annually.

[e]Products falling in CCN chapters 1, 5, 6, 13, 14, 23, and 24 are considered as nonfood agricultural products.

[f]Products falling in CCCN chapters 1-24.

programmes' costs and benefits to identify the sector or sub-sectors of the food industry where modifications of the programmes would meet the least resistance while reducing or eliminating their international effects.

Exercises of this kind could contribute to making developed countries more aware of the repercussions of their internal policies on developing countries. They could, then, take them into account when planning their policies. Moreover, these studies could provide essential inputs for progressive trade liberalization. The movement away from present types and high levels of price support should originate within developed countries now applying them. Their co-operation would be needed in any multilateral consideration of their situation. Modification of these programmes might stimulate an awareness of their costs and benefits, of the injury they inflict on the legitimate interests of other countries and of the existence of equally efficient alternative forms of support. Among the latter are systems of direct income payments limited to the less-advantaged farmers (usually the true object of price support policies) and to define quotas of domestic production. Domestic income supports may be considered as domestic affairs, but their international effects and the injury they can cause to producers and exporters in other countries are certainly open to international examination. Within any multi-lateral consultations, ample time should be allocated to the possible adverse effects of certain forms of protection on the development of the food industry in developing countries.

A more general question would arise in the course of such an examination, i.e., whether access to import markets should be on an MFN basis, or on a preferential basis in favour of the developing countries. Opinions are not unanimous. Within the international development strategy the latter method is favoured. There are strong arguments in favour of this view. Improved access to existing import markets and the opening up of new ones would require the setting up of new industries in developing countries. Vis-à-vis the older and well-established industries in the developed countries, which can also rely on a large domestic market, these new industries would find themselves in a definitely disadvantageous competitive position. A preferential system of access to import markets would assist them in overcoming this initial disadvantage.

For non-competing commodities, such as cocoa, coffee, tea and spices, there has already been some moderate movement towards liberalisation,[177]

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[177] Within the Tokyo Round of Multilateral Trade Negotiations particularly significant reductions for cocoa, coffee and tea (34 per cent) were agreed upon. GATT, The Tokyo Round of Multilateral Trade Negotiations, Geneva, January 1980, p. 37.

Table 14. Comparison of nominal and effective rates of protection for processed agricultural products in the European Economic Community, Japan and the United States of America, in percentages

Product	European Economic Community			Japan		United States		
	Tariff Rate		Effective	Nominal	Effective	Nominal	Effective	
	Nominal	Effective	protection a/	protection	protection a/	protection	protection b/	
Meat products	19.5	36.6	165.0 (90)c/	17.9	69.1	5.9	10.3	(5)
Preserved sea foods	21.5	52.6	52.6 (50)	13.6	34.7	6.0	15.6	(20)
Preserved fruit and vegetables	20.5	44.9	74.7	18.5	49.3	14.8	36.8	(35)
Dairy products								
Cheese	23.0	58.8	276.0 (180)	35.3	174.7	11.5	34.5	(50)
Butter	21.0	76.5	327.7 (900)	45.0	417.7	10.3	46.7	(70)
Condensed and evap. milk	21.3	44.3	334.4 (400)	31.7	153.9	10.7	29.6	(50)
Grain and grain products								
Corn milling	12.0	21.8	82.1	25.6	68.7	4.3	0.0	(15)
Rice milling	16.0	70.3	105.9	15.0	49.0	36.2	327.6	(320)
Prepared foods	5.6	0.0	-50.0 (-20)	0.7	-21.2	6.2	7.4	(0)
Flour and cereal preparations	20.1	48.9	94.7	23.8	75.4	10.9	34.8	(70)
Bakery products	12.0	0.9	0.0	20.9	17.3	1.9	0.0	(-10)
Prepared and processed foods								
Pickles and dressings	20.1	25.9	25.9	21.9	59.8	9.4	-26.9	(-20)
Roasted coffee	15.2	35.7	35.7	35.0	137.1	0.0	0.0	
Cocoa powder and butter	13.6	76.0	76.0	15.0	125.0	2.6	22.0	
Miscellaneous food products	12.0	6.7	6.7	28.6	58.2	2.7	0.2	(5)
Vegetable oils								
Cocoanut oil	11.5	132.9	132.9	9.0	49.2	9.4	16.3	
Cottonseed oil	11.0	79.0	79.0	25.8	200.3	59.6	465.9	
Groundnut oil	11.3	139.7	139.7	14.2	96.5	15.0	6.7	
Soyabean oil	11.0	148.1	148.1	25.4	268.3	22.5	252.9	
Rapeseed oil	9.0	57.2	57.2	15.1	22.3	20.8	60.9	
Palm kernel oil	10.5	141.5	141.5	7.2	49.2	3.8	29.2	

a/ Includes levies and other special charges.
b/ Effective tariff protection.
c/ Data in parentheses include other non-tariff barriers.

Source: Adapted from A.J. Yeats, "Effective Protection for Processed Agricultural Products: A Comparison on Industrial Countries," Journal of Economics and Business, Fall 1976, Table 1, p. 35, and UNCTAD, The influence of protectionism on trade in primary and processed commodities, the results of multilateral trade negotiations and areas for further international co-operative action, TD/B/C.1, 207, Add.2, Geneva, August 1980.

particularly under GSP schemes.[178] This sector contributes 40 per cent of developing countries' food exports and is threatened by slow growth in demand in developed countries. Larger export earnings should mostly arise from diversification into further processing. International trade in this sector would benefit from a detailed study conducted in a multilateral forum on all the major factors and affecting its constraints from the consumers' to the producers' markets which prevent developing countries from taking advantage of import liberalization. It should include consideration of matters such as the nature and prospective developments of demand, reasons for the maintenance of residual trade restrictions, particularly for the various processed products, the desirability from the developing countries' viewpoint of GSP or MFN type liberalization, the factors, other than trade restrictions, affecting entry into the markets of the developed countries (e.g. wholesale and retailing structures, TNCs control of the market), differential transportation costs for raw materials and processed products and any other factors affecting the location of the industry, such as capital requirements and costs of production and necessary technologies. Such an integrated sector study carried out with governmental co-operation could provide a sound basis for attempts at further liberalization in this sector; it could also be of guidance to interested developing countries, multilateral, regional and bilateral financial and technical assistance agencies in their activities in favour of industrial development. Experience would also be acquired in developing a methodology of integrated studies on sectoral trade liberalization which could provide valuable guidance in tackling the problems of other commodities.

178/ During the 1970s the OECD countries and five Socialist Countries of Eastern Europe all introduced a system of preference in favour of developing countries. These schemes are called the "Generalized Ssytem of Preferences" (GSP), although they consist of independent national (regional in the EEC case) preference arrangements rather than a single scheme. Food products were excluded from the schemes ab initio, except for items specifically included, because extensive preferences in the food sector would have interfered with national programmes of agricultural protection. Thus, GSP has remained decidedly skewed against food products, although over the years, the developed countries have enlarged their arrangements and extended them on the insistance of the developing countries, to include additional items. In addition to limited commodity coverage, GSP does not on the whole favour imports of products at "further" stages of processing, because, this favourable development, is hindered by the operation of rules of origin for eligibility of preferential treatment, safeguard mechanisms and the US "competitive" need limitation.

Quite apart from trade expansion and diversification, occasioned by liberalization, multilateral consultations could lead to improved utilization of existing trade opportunities by developing countries more generally. This might be achieved through studies of potential trade flows and their development. These could include a review of the factors affecting production and processing costs, technology, industry location, transportation, natural obstacles and man-made barriers to the growth and diversification of developing countries' export trade in specific food sectors and the means to overcome existing constraints through international co-operation.

To ensure more stable earnings in future years assistance could also be given through the International Monetary Fund's rarely used scheme to extend credit to countries whose export earnings plummet. The Brandt Commission has sensibly urged that loans should be based on need, not the size of quota. It has also called for the IMF's fund to be trebled to US $ 12 billion. Similarly, the EEC's Stabex scheme should be enlarged and liberalized still further. UNCTAD's common fund is far too small to take on the world's commodity market. Where it could be helpful is in its second window which will be used to finance measures such as research, marketing and improving the competitiveness of individual commodities. However, contributions to these more intelligent forms of finance are both voluntary and small (US $ 350 million).

Other schemes - characterized by pragmatism - to aid the commodity producers and exporters of the developing countries, less grandiose than commodity pacts, are more likely to work.

One approach is the conclusion of special agreements granting reduced tariff rates or reduced levies, according to the market situation, thus removing parti ly some impediments to trade. This is, for instance, the case of the agreements concluded by the EEC with Uruguay and Argentina for the supply of manufacturing beef. An escape clause provides for the suspension of the reduced tariffs and levies in case of special difficulties in the European market. A not dissimilar approach for specific commodities subject to strong competition, such as processed fruit and vegetables, has been the arrangements for imports from developing countries under duty-free quotas. This, for example, is the case of the agreements concluded between the EEC and ASEAN countries for imports into EEC of

canned pineapple. Another approach involves elements of market-sharing such as the United States scheme for processing strawberries imported from Mexico.

Another approach is the use of a conference, attended by the representatives of governments, industries and trade unions of the countries involved, with the object of improving the market situation by agreeing on such things as restricting direct and indirect subsidies, providing for the exchange of information on production and marketing and by discussing the problems of market access and the possibilities for expansion on the markets.[179]

In fact, the likely form of any future agreements seem to be the creation of centres for consultation and information exchange among producers and consumers, under the general co-ordination of specialized international agencies, without any planned interference with market mechanisms.[180]

In this respect, UNIDO, in collaboration with OECD (for developed market-economy countries) and COMECON (for centrally planned economies) could play a role in co-ordinating the positions of food-processing industries in developing and developed countries for specific sub-sectors.

Other useful indications can be provided by the analysis of the international trade flows of machinery and equipment. Unfortunately, foreign trade data, although more disaggregated for OECD countries (where the overwhelming part of the industry as well as of the trade flows are concentrated), do not provide adequate elements especially on their utilization. The work that UNIDO has started in this field,[181] therefore, should be deepened with the view of obtaining a more comprehensive understanding of the specific problems and perspectives in machinery and equipment for the agro-food industry. In addition, the convening of a symposium on food processing machinery and equipment, with the participa-

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179/OECD, Processed Agricultural Products and Agricultural Adjustment, Paris, 30 July 1973, p. 44.

180/B. Khindaria, UNCTAD Agreements, Doubts Grow About Commodity Pacts, The Financial Times, 31 March 1981.

181/INITEC (Empresa Nacional de Ingeneria Y Technologia), Analisi de Maquinaria Para La Industria Agro-Alimentaria, Part III, Madrid, November 1980, A study on behalf of UNIDO.

tion of manufacturers, traders, experts, could be a useful device to accelerate UNIDO's role in an area of overwhelming importance for the food system of the developing countries.

2. Export promotion policies

The fostering of processed-food exports is essential to meet basic import needs and, above all, to promote a process of growth aimed, in particular, at the rapid development of the food industry. In this respect, it has been estimated that in the area of food exports, developing countries could achieve $US 7 to 12 billion as an annual additional gain in foreign exchange.[182]

Growth potential for exports seems, in particular, to be considerable for those products that:

1. give the idea of real and natural foods, responding to dietetic requirements, e.g., canned fruit packed in their own juice with no sugar added, and appealing to the healthy needs of an increasing number of older citizens, e.g., bio-foods,[183]
2. combine natural nutrition in easy convenience items, e.g., deep-frozen products instead of canned products,[184]
3. are considered specialties and gourmet items, e.g., snails and snail products, shrimp and lobsters, frogs' legs, etc.,
4. are considered by the trade as new flavours that can be marketed on a large scale, e.g., tropical fruit salads,
5. appeal to ethnic minority groups that are willing to pay even higher prices to obtain familiar food items,
6. are intended for consumer packaging, e.g., hygienic infusions that are used to make the drinks the trade refers to[185] or that can be exported in bulk, e.g., spices and spice mixtures.

182/ UNCTAD, "The processing before exports of primary commodities: areas for further international co-operation," TD/229/Supp. 2, 28 March 1979, p. 31.

183/ Bee products, for instance, offer developing countries substantial openings in international markets for quality supplies. International Trade Centre, UNCTAD/GATT, Major Markets for Honey, Geneva, 1977.

184/ The fish products sector, for instance, is one group where prospects for increasing exports from developing countries are good in frozen fish, while for canned fish entry into developed country markets will be difficult, except for exporters with known and accepted products. The development of Exclusive Economic Zones (EEZ) is likely to lead to considerable expansion of trade in marine products from the developing countries.

185/ Although small quantities of consumer-packed hygienic infusions are imported into the OECD area from developing countries, the trade has up to now been interested almost exclusively in importing the plant material because the industry claims that each packer packs for a specific clientele and provides it with the flavour it expects from a particular brand. ITC/UNCTAD/GATT, A Study of the Market for Herbal/Medicinal Plant Infusions in France and the Federal Republic of Germany,

7. are utilized by the large and expanding institutional and catering sectors, e.g., hotels, restaurants, hospitals, canteens, etc., whereas less promotional investment than the retail market is requested, and
8. are subject to less rigourously controlled import schemes, e.g., semi-processed fruit and berries in the form of pulp or half/whole fruit and berries, and where the growth of international trade is still relatively promising, e.g., minor meat such as game and horsemeat.

Thus, as indicated by an ITC survey[186] mainly concentrated on items with a relatively high added value, a number of examples prove that developing countries can succeed in stepping up sales to major markets. However, if the export of processed food products is to play its full part in development programmes, coherent export measures have to be formulated.

Different from the case of the domestic market, the basic requirement is to base the export strategy on a consumer-oriented marketing approach that is aimed at meeting the international marketing requirements. Traditional production-oriented approaches and the idea of treating supplies for export as an "expert surplus" would not be successful. Production must be geared to exporting.[187] Technology is to a large extent influenced by the international marketing competition, currently operating very sophisticated equipment. In this area, therefore, large-scale sophisticated factories should be considered as appropriate to the destimination market, even if it is being operated in a developing country with different social and economic environment.

Such a different approach on technology requirements for the domestic and the international markets does not mean that development in the export of traditional products is exceedingly difficult, provided that certain basic conditions are met, e.g., supplies are good and prices are kept within reason, and that well-planned publicity campaigns, targeted to key buying sectors, are effectively undertaken.

186/ International Trade Centre, UNCTAD/GATT, Trade Promotion and Export Marketing of Processed-Food Products, Future Needs and Challenges for Developing Countries, working paper prepared for UNIDO in relation to the working group on food processing, Geneva, August 1980.

187/ In the Philippines in the industry for the production of dessicated coconut, mostly exported to the United States of America, the processing that has to be made in sterile rooms to fulfill U.S. relations for dessicated coconut preservation can be achieved only by large sophisticated and automatically controlled processing equipment.

Table 15. Examples of export take-off for selected processed food products from developing countries to 18 OECD countries, 1974-1978

SITC products Suppliers	Import value into 18 OECD markets (US$ million) 1974	1978	Principal take-off markets in decreasing order of 1978 value
SITC 032.01: Preserved fish			
Fiji	0.24	7.43	CAN, UK
Ghana	0.00	2.95	B/L, DK, FIN, NL
Solomon Islands	0.13	2.75	JAP, UK
Indonesia	0.07	0.54	JAP
SITC 053.3: Fruit, jams, jellies			
Chile	0.00	0.11	JAP
Republic of Korea	0.00	0.11	JAP
SITC 053.5: Fruit or vegetable juice			
Thailand	0.01	2.24	USA
Chile	0.00	0.74	USA
SITC 053.61: Frozen fruits, without sugar			
Thailand	0.33	13.78	JAP
Malaysia	0.00	1.47	JAP
Turkey	0.04	1.03	FRG, UK
SITC 053.9: Canned fruit, nuts			
Malawi	0.01	1.02	FRA
Costa Rica	0.02	0.88	USA
SITC 054.61: Frozen vegetables			
Dominican Republic	0.00	0.53	UK
Morocco	0.03	0.31	FRA, JAP
SITC 073.0: Chocolate and products			
Ivory Coast	0.00	8.93	FRA
Philippines	0.00	0.67	JAP
SITC 099.06: Yeast, baking powder			
Philippines	0.00	14.52	JAP
Brazil	0.00	0.79	USA
SITC 111.02: Nonalcoholic drinks			
Singapore	0.00	1.00	JAP

Source: UN Statistical Office (UNSO) Series D on magnetic tapes, processed in ITC Exporient data bank (Profilimport programme); International Trade FORUM, April-June 1980.

Country abbreviations:

B/L - Belgium-Luxembourg
CAN = Canada
DK = Denmark
FIN = Finlans
FRA = France
FRG = Federal Republic of Germany
JAP = Japan
NL = Netherlands
UK = United Kingdom
USA = United States

One example, in this respect, is the vanilla programme that Madagascar has sponsored in the United States of America.[188] Natural vanilla was a dying ingredient in the United States of America eight years ago. Artificially flavoured products were dominant and consumers were not conscious of the difference. But given consumers' interest in natural products, the launching of a publicity campaign with a packaging symbol called "Vanillamark" obtained great success. The Vanillamark was not only eagerly accepted by the companies still using natural vanilla, but many other firms recognized its promotional potential and decided to switch back to the real flavour. Within a few years, U.S. imports of vanilla started to reflect the impact of so many Vanillamark products. Unfortunately very substantial price increases after the programme began tended to work against the campaign. Then, budgetary cuts reduced its activities. And most recently the lack of supplies sent prices out of sight. A programme of trade promotion and export marketing, sponsored for at least several years, can only succeed if goods meeting consumers' needs can be supplied to export markets on a reliable and regular basis. Thus, a multidisciplinary approach to planning will be necessary to ensure integration of agricultural, industrial and marketing plans. But the secret in building demand is to make consumers aware of a particular product because in a fierce competitive market, i.e., in the average American supermarket, there is a bewildering array of 8,000 products; only those items that make themselves continually evident will survive.

To fulfil such a task, paid advertising is rather costly[189]. But there are other less expensive ways, i.e., the possibility of carrying a certain amount of publicity messages, considered to be educational material, through specific sectoral organizations, i.e., the American Spice Trade Association. The cost of publicity campaigns is thus limited to a public relations agency, which provides creativity in the preparation of the information for media. In addition, publicity is more believable because it is the specific sectoral organization that is recommending the product. Another possibility is to rely on collective efforts. Thus, for example, in 1959 the Colombian Federation of Coffee Growers decided that to make an impact in the world coffee market, they would have to reach the consumer directly. The Federation believed its coffee was superior to other coffees, but at that same time Brazil set the pattern for coffee pricing. The Federation

188/ Marshall W. Neale, Spice Promotion in the United States, International Trade Forum, Geneva, July-September 1980, p. 12.

189/ Today in the United States of America, a million dollars is a small budget for a national advertising campaign.

adopted a logo and a fictional spokesman in "Juan Valdez"; Colombian coffee now brings a premium price and there are 100-per-cent-Colombian coffees on the market today where none existed 20 years ago. The premium that Colombian coffee brings is illustrated by comparing 1977 export figures for Brazil and Colombia. In 1977 Brazil earned $US 2.3 billion in exporting 28 million bags while, in the same year, Colombia earned $US 1.5 billion in exporting only ten million bags. And while Brazil's market share has eroded in recent years due to new production in Asia and Africa, Colombia's share has held steady.[190]

Exporters in developing countries can increase their sales to major markets also through the import promotion offices established by the Governments of the major importing countries as an initial contact point, especially in order to take advantage of the Generalized System of Preferences (GSP).[191] The Dutch Government was the first to institute such an office in 1971 and since then many other countries have followed suit. The latest import promotion office to be established is the Trade Facilitation Office in Canada. Most of these offices provide their services free of charge. Other organizations assisting developing countries' exports include the chambers of commerce. In particular, African and French chambers of commerce, in addition to having established new institutions, i.e., an advanced institute of overseas technology in Bordeaux, a Mediterranean Institute for the Application and Transfer of Technology in Marseille, have set up a permanent conference to pursue very useful goals, i.e., promote the sale of tropical products from the ACP countries of the Lomé Convention by lowering costs of freight; build-up co-prosperity projects through joint ventures and other forms of co-operation; help create small and intermediate industries.

Diversification into non-traditional items is another suitable strategy, since one of the problems of many developing countries is the concentration of exports on a very small range of products. Thus, for instance, developing countries should try to export frozen snail meat, since it has a market value about three times as high as that of canned snails.[192] Furthermore, frozen

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190/ J.M. Fox, "How Chiquita Helped United Fruit", Agribusiness Worldwide, February-March 1980, p. 17.

191/ Under the GSP, tariffs charged on imports of products from the developing countries are granted preferential reductions in tariffs, whereas imports from other countries are charged full, most-favoured nation tariffs.

192/ ITC/UNCTAD/GATT, Tecnopan '80, working paper on export opportunities and marketing for marine products from Latin America, Geneva, September 1980, p. 30.

snail flesh is granted duty-free access in most industrial countries' markets. Consideration of markets for processed-food products must include markets for by-products, since the economies of both are closely linked. Examples of this linkage abound. The waste products of sugar refining are valuable raw materials for the chemical industry. The by-products of meat production in slaughterhouses provides animal casings, bone meal and meat extracts; the residues of citrus juice extraction make a valuable animal feed.

As well as product diversification, market diversification is a recommended strategy since some developing countries for historical reasons export the bulk of their produce to a single or to a few industrial countries. Thus, developing countries whose exports go traditionally to one or to two major markets may easily suffer from the impact of economic recession, currency changes and other adverse economic conditions in their traditional markets.

However, it is important to stress that despite a revival of protectionism trends, the developed market economies will remain the biggest most important markets for developing country exporters. Prospects in Eastern European countries appear to be good in the medium- to long-term, as shown by the recent trend of increased imports from developing countries. However, as purchases are centralized through state trading organizations, a different sales approach is required. In particular, new suppliers must become familiar with the potential offered by long-term, intergovernmental framework agreements as well as be prepared to adapt to specific market techniques, e.g., barter, compensation, compensatory transactions, product exchange, product buy-back arrangements, self-finances operations, etc., which can also include third parties, i.e., tripartite co-operation.[193/]

To support new food industries seeking export outlets, export incentives are needed to offset disadvantages vis-à-vis foreign competitors (owing to higher taxes and duties, costs of materials, transport costs and so on), as well as to compensate for higher initial costs of penetrating international markets and other reasons, i.e., on over-valued exchange rate, which may arise from import restrictions.

193/ Meeting of the Ad Hoc UNCTAD/UNIDO Group of Experts on Trade and Trade-related Aspects of Industrial Collaboration Arrangements, The Development of East-West Industrial Co-operation, prepared by the secretariat of the Economic Commission for Europe, Vienna, 25 February 1981, ID/WG.337/1, pp. 39-40.

Export incentive schemes can take various forms: export bonus, import entitlement, exchange retention, duty drawbacks, refunding duties and taxes on inputs, tax holidays for a number of years, partial or total exemption of profits on exports from income tax, deducting approved expenditure on export promotion from taxable income. In setting up export incentives, developing countries should, however, avoid competitive export subsidization and authorities should examine whether the inducements provided are sufficient to make an impact on export performance.194/

In this respect, it is useful to relate the positive experience of Malaysian authorities195/, who, in order to encourage the export of manufactures, including food products, to overseas markets, grant an Export Allowance, i.e., 5 per cent for every dollar of the increase in the export sales of a taxpayer, such an increase being the excess of his total export sales of the year in question over the average annual export sales of the five or four immediately preceeding years as the case may be. Other export incentives take the form of deduction for expenses incurred for the purpose of seeking opportunities for export of products manufactured in Malaysia. Resident companies, if they export 20 per cent (by value) of their total production and if they incur qualifying plant expenditure for the purpose of modernizing the company's production techniques, or to set up a modernized factory, are entitled to an accelerated depreciation allowance of 40 per cent per annum in addition to the initial allowance of 20 per cent. Under this concession, more than 90 per cent of the eligible capital expenditure can be written off in approximately four years as against about 20 years under the normal rate.

Another possible instrument, which, jointly with other measures, may at a given stage of development have a positive impact is the establishment of export-led food industries within industrial estates and export processing zones, which, in addition to removing complex bureaucratic procedures, offer an elaborate package of incentives (tax concessions, factory space, utilities and fully developed infrastructural services, duty free import and export of goods, provision of labour at special conditions). Moreover, industrial estates

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194/ P.B. Satagopan, Export Incentives, International Trade Forum, Geneva, October-December 1980, p. 5.

195/ Malacca, A Proven Profit Centre for International Companies, The Malaccan State Development Corporation, 1980, p. 54.

and processing zones frequently attract foreign capital, advanced technical know-how and management skill in international marketing, so as to promote partnerships in projects from which both developing and developed countries could benefit.196/

In this respect, the experience of Malaysia is again useful, which in its seven industrial estates (including two free trade zones) has succeeded in attracting several food industries, particularly in the subsectors of instant noodles, preserved fruit, popcorn, coconut oil, animal feed, coffee powder.

Government support for stimulating exports, other than through economic and financial inducements discussed so far, can take the following forms, among others:

i. collecting and disseminating information on foreign markets,
ii. undertaking surveys on foreign markets,
iii. training export management personnel,
iv. assisting in export product design and export packaging,
v. arranging for the production and distribution of product brochures and catalogues,
vi. sponsoring participation in national and international fairs, especially specialized fairs such as SIAL in Paris and ANUGA in Cologne,
vii.. sending trade delegations abroad,
viii. inviting prospective buyers to visit local production facilities,
ix. opening overseas offices, and
x. giving awards for outstanding export efforts.

These services are generally provided to exporters through a central institution, i.e., national trade promotion organization, which, in addition to identifying the products that can be produced for export as well as target export markets, co-ordinates the work of the various ministries involved. In its activities a national trade promotion organization can count on the assistance of international agencies, especially of the International Trade Centre UNCTAD/GATT (on export promotion), UNIDO (on technology selection), FAO (on the more suitable varieties and on the co-ordination of cultivation with processing), the UN Centre on Transnational Corporations (on policies, laws and regulations relating to TNCs), the Economic Commission for Europe

196/ For the definition of "export processing zones" and "free trade zones", see UNIDO, Export processing zones in developing countries, working paper on structural changes, no. 19, August 1980, p. 6.

(on fostering co-operation with countries having different economic and social systems), the International Standard Organization (ISO), etc.

Any country seeking to promote exports by providing incentives should also try as much as possible to:

1. simplify bureaucratic procedures (on exchange control clearance, customs and port procedures, authorization of overseas business travel, etc.),
2. establish an effective system of quality control (to ensure that goods are being manufactured in conformity with the needs of the international markets;
3. give careful consideration to the role of export packaging, cutting down costs (using alternative materials such as retort pouches and plastics) as well as enhancing flexibility and functional design (to ensure maximum shelf-life)[197],
4. establish and strengthen an information network in foreign target markets (to ensure the continuing collection of up-to-date trade and marketing information).

197/ Thus, for instance, distribution of soy milk—one of the most popular and successful foods for breakfast in oriental countries—in glass bottles was limited owing to the fact that the recovery of bottles was costly. Recently, however, a food company developed "soy bean milk with honey" in tetrapaks, which, because of the convenience, has found wide acceptance and has become a multi-billion dollar business.

3. Import substitution and procurement

Emphasis on potential increase in export flows cannot change the fact that many developing countries will not only continue to be net importers, but will also have to increase dramatically their commercial purchases in the international market during the years ahead. It is therefore of the utmost importance that developing countries - instead of having recourse to special financing to consolidate traditional imports flows[198] - utilize the experience of technically advanced countries to establish a well structured import-substitution food processing industry, especially in key-sub-sectors such as grains and dairy products. Industrialization of grain processing, in particular, represents a step forward, since it allows to experience savings from importing bulk grain instead of flour, to improve the balance of payments, to utilize technological advancement, to generate additional employment and income. In this respect, industry experts consider Saudi Arabia grain processing "revolution" a very useful example.[199]

In addition to abandoning stone grist mills for modern roller milling methods, the Saudis (who used to import second clears - a co-product of milling a high patent flour - with much waste and spoilage when unloading and storing the flour) constructed: (i) a flour and feed mill in Riyadh with storage capacity for 80,000 metric tons; (ii) a flour and feed mill in Dammam, as well as storage facilities for 80,000 metric tons; (iii) a flour and feed mill and grain storage silos at Jeddah; (iv) a grain elevator with 20,000 metric ton capacity at Quaseem. Both the Riyadh and Dammam projects were undertaken by Ocrim, S.p.A. of Cremona, Italy, as turn-key operations. Equipment manufacturer for the Jeddah plant was Buhler Brothers Ltd., Uzwill, Switzerland. Two milling units were installed at the Riyadh plant with accommodation for a third unit to be installed at a later date. At Damman two units, with space for a third, were installed, while the Jeddah plant is equipped with four milling units. The mills all use Pillsbury's unique processing flow design. However, there is little resemblance to the older equipment used by Pillsbury in their U.S. plant. While the mills, powered by diesel-fueled electric generators, are not considered innovative, engineers were required to design the plants to operate

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198/ The proposal of an IMF Food Facility, though designed to help low-income countries when they experience unusual surges in the food import bills, would risk to strengthen the traditional patterns of imports flows. A food facility providing help to establish a well structured import-substitution food processing industry would, instead, be beneficial to both developing and developed countries.

199/ Dennis A. Johnson, Pillsbury's "Involvement With the Saudi Arabian Flour Mills," Agribusiness Worldwide, October/November 1980.

under extreme climatic conditions. In Riyadh, for example, summer temperatures soar to 49°C with relative humidity as low as 5 per cent. To compensate for the low moisture content, large evaporated coolers were installed. In Dammam and Jeddah, the relative humidity is as high as 95 per cent during the summer. At those mills mechanical refrigerators were installed to extract excessive moisture. In addition to Buhler and Ocrim, several other U.S. and European firms were used. Construction and civil engineering work was, in particular, sub-contracted to Howe Richardson Co., England, scales and metering equipment; Schugi Co., Holland, fats and molasses injection equipment; California Pellet Mills, Belgium, feed pelleting equipment. Saudi Arabian King Khaled dedicated the Jeddah complex during ceremonies in October 1979. The occasion officially marked the successful completion of the entire $US 261 million project, which included intensive on-the-job training at various mills operated by Pillsbury in the United States of America, as well as orientation sessions by equipment suppliers in the United Kingdom and Italy. Another exemplary undertaking, again in Saudi Arabia, is the Al-Khary project - the Middle East's largest integrated dairy project owned by the Saudi Arabian Agriculture and Dairy Company (Saadco), which awarded a seven-year management and technical contract to the Swedish engineering and food-processing concern Alfa-Laval. Development at Al-Khary is in two phases. Phase one has already been completed with the construction of facilities for more than 4,000 animals. Phase two is for completition by the end of 1982, when the project will utilize a cattle of 17,000-18,000 heads. When it is fully operational the project will require a staff of 180 persons of whom about 60 are skilled Western Europeans. Saadco, then, plans to phase out the latter by 1985 when Alfa-Laval's management contract ends[200]. When phase two is completed, Saadco's strategy is to set up a dairy near Jeddah as well as one to serve the industrial conurbations of Dammam, Dharan and Al-Khobar. A slaughterhouse is also to be built at Al-Kharj for killing and processing Saudi-born bulls and culled dairy cows.

In addition to import substitution, developing countries also need international assistance to remove major constraints on import procurement (e.g. lack of qualified personnel, inadequate market information, time-consuming tendering procedures, often not clear tender terms, exaggerated rigidity of procurement methods and purchasing strategies). In this respect, the UNCTAD secretariat is executing a UNDP-financed interregional advisory project[201]

200/ Edmund O'Sullivan, Biggest Dairy in the Middle East, MEED, 13 February 1981.

201/ Alexander Bohrisch, "Improving Food Procurement by Developing Countries," Agribusiness Worldwide, February/March 1981.

particulary on grains (wheat, corn, rice), sugar, vegetable oils and beans. The objective of this project is to assist interested government departments and/or state buying agencies in developing countries in Asia, Africa, Latin America and Southern Europe in improving planning, import management and market information in connection with their food commodity imports and the efficiency of food procurement in international markets. The principal areas of assistance under this project are: (i) to evaluate import procedures, market information and analysis, buying practices and freight; ii) to advise on import planning, alternative procurement methods, procurement preparation, tender/contract terms; (iii) to advise on international market information, in particular alternative sources of supplies, buying practices, quality control/inspection, freight contracting; (iv) to improve the co-ordination and operational contacts among various governmental agencies directly or indirectly involved in food commodity imports; (v) to train governmental officers responsible for food commodity imports. The project offers assistance through advisory services, organization of training activities, import procurement seminars and the publication of a handbook on international procurement of wheat and corn.

4. The TNCs and the alternatives to the traditional marketing networks

Most of the international trade in food processing is a highly concentrated busiess. A limited number of international companies dominates world markets. Grains and beans, including oils of the soya family, are mainly carried on by firms that also store and ship: Cargill (the United States), Continental (the United States), Bunge and Born (Argentina), Louis Dreyfus (France), André (Switzerland), Topfer (FRG). For sugar, with the exception of some interstate dealings (Cuba-COMECOM or EEC-ACP countries), no more than 10 companies (e.g., Sucres et Denrées, Philip Brothers, Tate and Lyle, Ed F. Man) control the free trade flows. For molasses the main traders are Tate and Lyle (the United Kingdom), Carib Molasses (an association between Cuba and the French trader Sucres et Denrées), Van Ginniken (the Netherlands). For cocoa, Gill and Duffus (the United Kingdom) is responsible for about 50 per cent of world cocoa trade and is also involved in cocoa production. For coffee, more important than the efforts of state organizations, such as the already mentioned Bogota Group, is the direct buying made by roasters, often through international brokers. For most teas the blending companies, such as Lyons and Lipton, have establishe control of major markets.[202/]

Thus, most firms of the developing countries - particularly in entering the European, Japanese and United States markets - have to utilize the established international marketing network of transnational trading enterprises and of large, important firms often vertically integrated (such as, for instance, Unilever by far the biggest of this kind in the area of vegetable oils). As indicated in a study by the joint CTC/ESCAP unit on transnational corporations,[203/] "there is overwhelming dependence on TNCs to perform the export marketing of pineapple canned in Thailand. Advertising acts as a barrier to entry by the product of wholly Thai-owned firms into the premium level of the brand-conscious United States of America market. Through this market segmentation, Dole, Del Monte and Libby's - all TNCs - are able to command a price premium over other brands. Only a minor share of the output of wholly Thai-owned firms is marketed under their own labels."

202/ Ph. Chalmin, International Commodity Trading Companies, Journal of World Trade Law, Nov. Dec. 1980, Vol. 14, No. 6.

203/ Economic and Social Commission for Asia and the Pacific, Transnational Corporations and the International Commercialization of Pineapple Canned in Thailand, Joint CTC/ESCAP unit on transnational corporations, working paper No. 3, Bangkok, August 1979, p. 48.

To lessen dependence on TNCs, virtually all developing countries with important food export industries have established national marketing agencies and/or fostered producer co-operatives capable of bargaining directly with TNCs. National marketing agencies, however, do not normally exercise a strong bargaining position in assessing the worthiness of a food-processing project for export marketing. Partly, this is a result of inadequate information. Control of pertinent information is, in fact, one fundamental reason that allowed the already mentioned Bogota Group to succeed in raising prices. Only they knew total supplies and marketing plans. Another case in point is the marketing of soybeans from Brazil. Both private companies and the government market soybeans and both have to "register" their products. Depending on market conditions, the government opens or closes the soy complex for export. This has a predictable influence on world soybean prices. If it is known that Brazil will not permit exports, markets will usually go higher. To capitalize on this knowledge, COBEC (Brazilian Trading and Warehousing Corporation) has its own man at the Chicago Trade Board. He has advance knowledge of Brazilian registration and is able to use that knowledge in taking positions on the Chicago market - the world's largest soybean futures market. Thus, Brazil, although it does not control all the world's soybeans, is able to control information and, therefore, to enhance significantly its position in dealing with the TNCs. A number of agencies and organizations within the UN system can assist the national information systems of the developing countries with a large stock of material on many aspects of the food processing trade flows. The International Trade Centre UNCTAD/GATT is, in particular, able to supply a developing country with the necessary statistical data to evaluate past performance compared to competitors and to identify growth products and markets in international trade. ITC also keeps in its data bank profiles of exporters, numbering over 1,000 in developing countries and systematically collects and stores information on importers in both developed and developing countries who are interested in importing from developing country suppliers. This system encourages a two-way flow of information between exporters and importers. The UN Centre on Transnational Corporations and its Joint Units - in addition to developing a comprehensive information system that eventually will be linked with national information systems - is also implementing an inter-regional project on primary commodity exports which aims at increasing the gains of developing countries and strengthening

their negotiating capacity vis-à-vis TNCs.

Other critical ingredients to bolster the bargaining power of governments of developing countries in their dealing with TNCs relate, in particular, to the evaluation of the merits of alternative types of corporate and contractual arrangements. An example is the "full disclosure" export contract, so designed that developing countries can share in the proceeds from the final sale. The full disclosure contract, in fact, enables the producer to participate in a C.I.F. (Cost, Insurance and Freight) sale by having an experienced trading firm handle all the logistics and documentation. Each party brings its strehgth to the venture and responsibilities are set forth in a Memorandum of Agreement which itemizes the exporter's cost to be charged against the final export sale price and the marketing fee (either a certain amount per MT or a percentage of the final sales price) to be retained by the exporter. The trading firm's costs in some instances are determined and agreed to by the producer before the sale is made. Finally, all the costs and revenues of the transactions are documented for all parties to see. Thus, for example, Josco Agricola do Brasil was able to gain a major share of Brazil's citrus pulp exports which approach 400,000 MT and bring in over US $ 60 million in foreign exchange each year. Josco has also used this technique with sunflowers, corn gluten feed, molasses, beet pulp, coffee by-products, brewer's grains, cassava and several other products.[204]

There is therefore substantial room to carry out a policy of economic pragmatism (based on realistic, flexible and selective evaluation of international co-operation projects with the TNCs) rather than pursuing a sterile atmosphere of confrontation, which, though sometimes with justification, has been damaging to both parties. The goal of bolstering developing countries in their dealings with TNCs should be to promote co-operation for the sake of mutual self-interest.[205] On the one hand, TNCs should recognize that Third World governments are committed

[204] It is likely that full disclosure contracts will be more extensively used in the future, because there are three main benefits for the developing countries' exporters: (i) to make the producer an established exporter by putting his name in the export market; (ii) to control costs all the way to destination and fix certain variable expenses within the full disclosure framework; (iii) to provide the producer with the opportunity to maximize the net return since it is based on the foreign price. J. Freivalds, "Marketing commodities: New Types of Export Contracts," Agribusiness Worldwide, April/May 1980.

[205] I. Frank, Foreign Enterprise in Developing Countries, Johns Hopkins University, 1980. V.N. Balasubramanyam, Multinational Enterprises and the Third World, Trade Policy Research Centre, London, 1980.

to fulfilling the social and economic needs of their people and therefore require to accrue substantially the retained value of their food exports which, at present, represents less than half of the retail prices obtained in the markets of the industrialized countries.[206] On the other hand, developing countries should recognize that TNCs could make major contributions to Third World development goals especially if their activities are channelled into areas ensuring market access.

In this latter regard, it must be stressed that - since industrial countries' consumers are heavily brand conscious - TNCs, having been able to develop and promote brand names, enjoy a foremost advantage on the premium market. Developing countries, instead, in spite of some valuable exceptions, being unable to mobilize the funds necessary for launching extensive advertising campaigns through the mass media, can usually sell their products only on the second market (through large supermarkets chains and other low-price outlets). Moreover, although the basic quality of the developing countries' products is sound, most of the smaller Third World companies find it difficult to match the quality standards of the TNCs, because the F.O.B. price for their product does not justify the additional expense of performing more meticulous operations. A further obstacle is the cost of freight. Handling about two thirds of general cargo and semi-bulk trade from the developing countries are the foreign shipping conferences. Oligopolistic control is exerted by these conferences through their wide membership and through a system of loyalty rebates whereby an exporter is entitled to a deferred rebate on some proportion of freight charges as a reward for dealing with the conference. Breaking the loyalty tie by shipping with non-conference vessels is likely to result in suspension of the rebates on future shipments with the conference. Article 12 of the UN Code of Conduct for Linear Conference which will come into force in 1981 or 1982 should, however, favour the containment of freight costs, because it requires that, in their setting, rates "shall be fixed as low a level as is feasible from the commercial point of view."

Therefore, with a more intensive bargaining process, it is wiser - particularly for the least developed countries - to use pragmatically the vehicle of the TNCs in the critical areas of shipping, distribution

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206/ Economic and Social Commission for Asia and the Pacific, Transnational Corporations and the International Commercialization of Pineapple Canned in Thailand, op. cit., p. 22.

and marketing rather than embarking on expensive and difficult export programmes. Such an orientation does not, however, exclude the strengthening of the international machinery which may sanction the TNCs (as it has been the case for baby foods advertising) as well as the research of alternatives to the existing marketing networks.

With regard to corporate and contractual arrangements between the developing countries and the TNCs, the strengthening of the international machinery on TNCs activities should focus on the establishment of guidelines concerning terms and conditions such as tie-in clauses, territorial sales restrictions, grant-backs, the duration of agreements, principles for computation of royalties and fees, use of trademarks and trade secrets, training, the use of domestic inputs, technical services and other contractual provisions. UNIDO in collaboration with other international organizations (especially the UN Centre on Transnational Corporations and OECD[207]) could play a pioneering role in contributing to a system of periodic reviews of corporate and contractual arrangements unpackaging the foreign input provided by the TNCs, so that terms more favourable to the developing countries are enhanced to the extent that the domestic sector is in a position to provide a countervailing force.

With regard to effective and potential alternatives to the existing marketing networks, it has to be underlined that, in recent years, private companies as well as producer groups and governmental organizations have set up their own integrated trading firms. For example, Interbras, the Brazilian state trading firm - in addition to carrying out state-to-state trading and facilitate long-term agreements - provides a solid support for the private sector by such means as the organization of export pools of individual companies and co-operatives. For instance, Interbras has succeeded in organizing 19 separate fishing boat operators and co-operatives into one international marketing organization which is now the largest exporter of lobster tails to the U.S.A., earning some US $ 50 million in 1980. To implement such a collective marketing project,

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207/ Outside the United Nations one of the most important efforts is the "Declaration on International Investment and Multinational Enterprises" adopted by the OECD members in June 1976, revised and further strengthened in 1979. These guidelines constitute the first set of international rules addressed to TNCs and they reflect the recognition of the major home countries that international action is necessary in this field.

Interbras has organized the fishing operators (providing a stable, dependable supply with a premium price), developed a brand identity in the United States of America (to compete against other exporting companies) and established a distribution network within the United States of America (to offer a stable on-call supply).[208]

Another example is provided by a Philippine state organization which for the core of world exports of copra oil tries more and more to limit the influence of international trading companies by setting points in consuming countries (e.g. Poland).

As already emphasized Third World multinationals are another alternative. Although in some sectors (e.g. trading in palm oil) there are already well established Third World multinationals (e.g. Sime Darby, a Malaysian company, which manages some 70,000 hectares of land and over 200 subsidiaries in 29 nations [209], developing countries enterprises are making their first attempts to create multi-country operations. They do not yet possess the same integrated structures as the well known TNCs but they do show signs of some capacity for after sales servicing and some marketing skills, so that their presence in international markets creates an alternative in certain markets to the dependence on traditional TNCs. The vast majority of Third World multinationals originate from the newly industrializing countries (NIC). They have either grown as public sector companies (especially in India, Argentina, Brazil and Mexico) or as an operation between two or more developing country governments with the aim of carving out a place for themselves in markets long dominated by the traditional TNCs. A third way is the expansion of private firms using domestic capital. The most active investors are India, Hong Kong and the Republic of Korea on the Asian side and Argentina and Brazil on the Latin American. The process of expansion is usually a foothold via the exports of products and technology, then establish foreign production

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208/ D. Levy, A Lobster Tale,"The collective marketing of Brazilian seafood," Agribusiness Worldwide , June/July 1980.

209/ Sales are near the US $ 1 billion mark and the company - which even tried to take over the control of Guthrie - the British-owned Malayan palm-oil and rubber plantation group - is now seeking new areas of expansion in Thailand, the Philippines and Australia.

facilities. In this respect, Brazil is particularly active in Nigeria where more than 40 Brazilian firms are starting to assemble a wide range of consumer items. The extent to which the firms can or want to expand abroad depends on several conditions: their size, type of production (e.g. possibilities for vertical and horizontal integration), market option, government policies at home and abroad, and the nature of competition from established TNCs. The vast majority of Third World multinationals are producers of consumer goods.

In the food processing area, in addition to the examples already mentioned, Third World multinationals have emerged in response to the difficulties found in importing inputs (e.g. in India the restrictions on imports of vegetable oils and on the use of edible oils for soap manufacture has led Indian firms to develop skills in the processing of oils available at home; Indian firms have then carried the resulting skills to other developing countries), in response to the environment (e.g. an Indian firm has developed sun-fast dyes which it now produces abroad for tropical markets; Brazilian firms are marketing equipment in Africa claiming that they are especially designed for tropical conditions) and in response to a scale more appropriate for developing countries (e.g. a Pakistani firm has designed a flexible paper packaging plant for Zambia). With some exceptions (e.g. San Miguel beer, Inca Cola), few of the developing countries multinationals have strong brand names. Thus, co-operative arrangements with traditional TNCs are sometimes made, whereby the multinational from the advanced country provides cheap management, small scale technology and an ability to operate smoothly in a developing country. For some projects, the older multinationals may turn to Third World firms to take up an opportunity that, for some reason, does not attract direct action by the advanced country firm. Thus, for instance, a European firm that supplies paper packaging technology recommended a company in a developing country in its place to take up a contract in another developing country in which it was not active. In some projects, a closer co-operation may develop. Thus, for example, an investor from an industrialized country required cartons for exports of foodstuffs that it was processing in Africa. To obtain a reliable supplier, it sought an Asian firm with which it had maintained a satisfactory supply relationship in its Asian market. In Africa they established a joint venture. Separate investments appeared unsuitable,

given the fact that the Asian-owned firm (with import protection) would probably be the only box supplier, and the user would be the only customer.[210] In collaboration with other international organizations (especially the UN Centre on Transnational Corporations), UNIDO should collect data and information on the activities of Third World multinationals and attempt to identify areas of the food processing industry in which marketing networks to specific target markets can be improved to the advantage of the developing countries.

The co-operative organizations, particularly those of the developed countries, are another group of "changemakers" offering great potential - up to now only marginally exploited - to afford developing countries to play a more significant role in export markets.[211] Although their power of control is mainly concentrated at the collection and local storage level, several co-operatives already carry out very successful processing operations especially in the dairy, meat, fruit and vegetable sectors. In the Netherlands and the Nordic countries, for instance, dairy co-operatives have established a substantial share in the dairy market including processing products. The Yoplait - yoghurt and Candia - milk co-operative trademarks are well known in France as well as in other countries. In Japan co-operatives process very high quality milk and fruit juice and have successfully marketed it directly to supermarkets.[212] On the other hand, although the vast majority are rather small business organizations there are already "super-co-operatives"[213] which carry out activities in food processing as well as in food distribution and marketing comparable, and even more important (on certain markets), than the large TNCs. Thus,

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210/ Louis Wells Jr., Third World Multinationals, op. cit. pp. 15-16.

211/ John G. Craig, Multinational Co-operatives, An Alternative for World Development, Western Producer Prairie Books, Saskatchewan, 1976.

212/ International Federation of Agricultural Producers, Farming in the Eighties: Interdependence or Domination, 24th General Conference, Buenos Aires, July 1980, p. 23.

213/ Such as, for example, Farmland Industries, Associated Milk Producers, Agway, Land O'Lake, Grain Terminal Association, Illinois Grau Terminal and Gold Kist (U.S.A.), Saskatchewan Wheat Pool (Canada); Groupe Grama and Union Laitière Normande (France), Lega Nazionale delle Cooperative (Italy); KF (Sweden); Agrober-Agro-Invest (Hungary), COBEC (Brazil); AMUL, NAFED (India); Central Co-operative Union (Bulgaria)

for example, the Swiss market is dominated - in terms of sales - by two co-operative organizations ("Migros" and "Co-op") which, in addition to processing a wide variety of foodstuffs, dispose of very efficient chains of supermarkets. Similarly, Coop-Italia (also endowed with its own production facilities) is the largest food retailer and one of the fastest growing on the Italian market.

In fact, to by-pass the traditional marketing networks, specific trading circuits can be set up by the co-operatives. This can be done by using multiform solutions, such as: (i) long- or medium-term trading agreements between co-operatives of different countries, or between co-operatives and a properly constituted government-sponsored body;[214] (ii) triangular or multi-angular trading, bringing in various countries and various commodities to facilitate arbitrages; (iii) creation of mixed structures between Governments and/or co-operatives with international capital.

The development of generally complementary trade links between co-operatives of different nationalities should constitute the best way for developing countries to enter foreign markets. The reciprocal advantages would be to:

- eliminate the use of intermediaries by putting buyer co-operatives freely in contact with seller co-operatives;
- provide greater security and help to regulate the product markets through the drawing up of medium-and long-term trading agreements;
- reduce the dangers of speculation and the risks now being run;
- avoid dispersion and favour rapidity of intervention by having a single negotiator in each country or group of countries.

Joint undertakings with commercial and industrial purposes could thus emerge fulfilling, at domestic level, the requirements of an integrated development of the food-processing industry in the developing nations and, at international level, the requirement of an ensured market outlet. Thus, for example, in soya beans the German co-operatives have drawn up a system of collaboration with Brazilian production co-operatives. They have set up in Brazil a German-Brazilian company which

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214/ Direct collaboration between a firm and a government is never possible; there will always be an intermediary body acting for the government (either co-operative or a firm).

has built and is operating a soya-bean grinding unit, the full product of which - oils and cake - is exported to the Federal Republic of Germany.

This co-operative strategy would, therefore, lead not only to the setting up of specific trading circuits but to a comprehensive, international, industrial and social co-operative policy (facilitating, in addition to distribution and marketing, the manufacture of equipment, the subsequent maintenance and operation of the machinery, training of personnel), thus enhancing the creation or development of co-operatives in developing countries as an instrument of planned economic and social growth.[215]

The potential for triangular or multi-angular trading, bringing in various countries and various commodities, could instead become a reality with the development of multinational federation of co-operatives, which could compete on more equal terms with the TNCs. Some international co-operative organizations already exist. Thus, for example, Inter-Coop, a consumer organization from about 20 countries, carries out joint purchasing of goods and collaboratesin production. Another example is the International Co-operative Bank - INGEBA - which, with members in 20 countries, functions as a merchant banker for the co-operative banking system. Co-operative Fertilizer International (CFI), in addition, founded by U.S.A. co-operatives and the U.S.A.-Canadian co-operative C.F. Industries, has made possible for the Indian Farmers Fertilizers Co-operative Ltd., through a joint venture, to construct and operate two very large fertilizer factories. However, more active multinational federations of co-operatives for specific types of activities, particularly in the food-processing area, could be established and developed.

The creation of mixed structures between the co-operatives and the more progressive trading companies and TNCs is another possible solution. An example is provided by the Union des Coopératives Agricoles du Sud-Ouest (UCASO) in France which decided to create a subsidiary, the Interagra Company which, on behalf of French co-operative groups, intervenes on the international agro-food market (cereals, milk, butter, meat, wine) and has initiated assistance to developing countries, dealing with the delivery of equipment and help in setting up production techniques.

215/ V.B.L. Mathur, Role of Co-operatives in Food Production, Processing and Marketing in India: A Case Study, Op. cit.

Another example is the recent setting up of the American and European co-operative group with Toepfer with the objective of concentrating co-operative bidding and achieve vertical integration with diversification. By means of this group, American and European co-operatives can take advantage of pre-existing commercial know-how, and of a long established international organization[216/] Such a co-operative international strategy requires mobilization of financial resources, revision of protectionist policies, use of efficient information and data analysis systems.

Another possibility is of using TNCs expertise by signing management contracts which would not give them financial power. This has been done in the case of Swift's (U.S.A.) for a meat processing plant and with Booker's to manage sugar factories and cane production, including small holders out-growers schemes. Co-operative could well also provide such management services: Swed-Farm, a swedish co-operative organization and the Agricultural Co-operative Development International (U.S.A.), already provide such services.

To be able to enter foreign markets, products must be supported by considerable financial means. International financing insurance could be provided by those banks and mutual insurance societies, members of the International Co-operative Alliance (ICA). Tariff and non-tariff barriers cause more difficulties for co-operatives than for multinational firms because the former can seldom effect investment abroad and do not have the capital mobility for the latter. The solution would be to lean toward medium- and long-term contracts and create an inter-co-operative consultative body. In addition to a system for providing information about markets and on the commercial subsidiaries and networks already operated internationally by co-operatives, there is a dire need of adequate information on suitable or potential co-operative trading partner. UNIDO, in this respect, in collaboration with other international organizations, especially the International Federation of Agricultural Producers (IFAP), which is promoting a data bank project in the field, could envisage the setting up of an "International Co-operative Exchange" providing - with the assistance of co-operatives in developed and developing countries - the necessary facilities

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216/ E. Rouch and Ph. Ducroquet, Report on Cereals and Their Derived Proteins, International Co-operative Trade Conference Moscow 1980, Bureau Economique du Comité Agricole, Paris.

for ensuring markets and enable transactions to get started on better terms and conditions other than those offered by the TNCs.

Another effective tool is the collaboration between the medium- and small-scale firms of developed and developing countries. In fact, given the opportunity and necessary support, small enterprises in developed countries may prove to be exemplary partners for co-operation with equivalent enterprises in developing countries whereby they can provide not only appropriate technology and know-how but also the wide spectrum of industrial collaboration (co-production, sub-contracting, licenses and franchise) including marketing in international markets and other supportive elements (i.e. financing, training, management). In this respect, a starting example is the UNIDO project for co-operation in the area of food processing between small enterprises in the Netherlands and equivalent enterprises in four developing countries (China, Sudan, Thailand and Uruguay). Such a project could, in particular, be promoted by other developed countries, under the general co-ordination of UNIDO, and extended so as to cover - in addition to the flow of technology - the whole aspect of industrial collaboration including international marketing.

The role of small- and medium-sized firms in the food-processing sector has not yet been adequately studied. Existing literature on the subject is very scanty compared with the avalanche of books and reports concerning the activities of the TNCs. It would seem that almost all economists, taken with their hate and love complexes with the TNCs, have forgotten that small and medium firms account for an important part of the productive structures in developed countries and for an overwhelming part of the food industry in the developing countries. From a limited sample survey, mainly carried out with direct interviews on the basis of a prepared questionnaire, consisting of about 30 European firms operating in the field of food processing in international markets, especially in the developing countries, it appears that small- and middle-scale firms operate in highly specialized sub-sectors whereby their contribution is unique. Thus, for example, the firm "Zucca Rabarsucca" produces four million bottles of the world famous aperitif "Zucca" which is obtained from a starch in the Kansu' region of the People's Republic of China.

Another small firm, highly specialized in the business of cashew nuts, in addition to providing unique technology and know how, is marketing the cashew nuts in Italy and the Federal Republic of Germany, taking advantage of the distribution channels already well established by a collateral import/export trading firm.

UNIDO could play a pioneering role in identifying the activities of the highly specialized small- and medium-scale firms, so as to build up profitable commercial and industrial operations for the specialized food items of the developing countries.

5. Technical assistance and transfer of technology

The expansion of food processing industries in developing countries requires the creation of some form of mechanism for the transfer of technology from developed countries.

The traditional mechanism for the transfer of technology has been technical assistance, which, in its many forms, has been provided by multilateral agencies, national governments and private industry. Originally conceived as a one-way process of transferring Western know how to developing countries, it is now being viewed as part of a complex network of actions aiming at the transfer of technology. This approach to technical assistance has grown to include that part of technology which is protected by patents held by individual firms, as well as the transfer of technology linked to capital projects involving direct foreign investment in agro-based industries.

An increasing share of technical assistance in the last ten-fifteen years has been devoted to training programmes. Since management in the economic sector has to create the conditions for a domestic and foreign trade policy geared towards production growth, employment and food, UNIDO - in addition to a variety of field operations (especially in activities which contribute in developing countries to the industrial training infrastructure), seminars and study, individual fellowship programmes - is attaching considerable importance to training programmes for managers, engineers and newly graduate technical personnel from developing countries having managerial or supervisory positions in agro-industrial or food-processing enterprises. Thus, since 1977, UNIDO - in collaboration with several governments of the developed countries - is organizing in-plant group training programmes for managers, engineers and technical personnel from developing countries providing theoretical knowledge and practical experience in organizational and managerial aspects of agro-industrial complex and its enterprises. Similarly, a number of in-plant training programmes are organized by UNIDO to be implemented in the developing countries, using indigenous instructors

with only minimal assistance from UNIDO. Thus, in 1980 in-plant training programmes were implemented in Turkey on the sugar industry and in Yugoslavia on the management of agro-industries.

Since training is now generally regarded as investment, the following activities[217] even in the specific sector of the food processing industry - could open avenues for possible future co-operation between developed/ developing countries:

a) To expand the access of developing countries to training facilities, a survey could be undertaken by UNIDO and the International Chamber of Commerce (ICC) to assess in qualitative and quantitative terms the existing institutions and establishment which are willing and can provide training for higher technical and managerial personnel required for the food industry.[218] By the same token it could identify industries (particularly small-and-medium size firms) which are willing to devise in-plant training programmes, prepare training manuals, provide training staff, technical personnel to bridge temporary gaps.

The information gathered could be disseminated to industrial circles and finance in the developing countries. If required, UNIDO could include such information in its guide entitled "Guide to Training Opportunities in Industrial Development" which is published every year.

b) UNIDO - in collaboration with UNICE (Union of Industries of the EEC), WFEO (World Federation of Engineering Organization), WAITRO (World Association of Industrial and Technological Research Organization) and ICA (International Co-operative Alliance) - could serve as a "think tank" to its members in order to contribute substantively to the objectives of international co-operation. It could, in particular, devise a network strategy to provide guidance and facilitate interchanges of information between its members and the developed countries to encourage co-operation in the field of training, starting with the key sector of agro-based industries.

217/ These suggestions are extracted and adapted from a presentation given by Mrs. I. Lorenzo, Head, Training Branch, UNIDO, Vienna at a meeting of the International Chamber of Commerce in Paris on September 18th, 1980.

218/ In this respect, the Expert Group Meeting on the Role of Co-operatives in the Development of Food-Processing Industries in Developing Countries held in Vienna on 22-24 April 1981, has already stressed that "UNIDO and other international organizations should take into consideration the willingness of well established co-operatives with developing countries in supplying expertise and consultancy services."

Within this framework, UNIDO could identify a range of possibilities for training linked to industrial co-operation, industrial promotion, industrial information, technology transfer and, in particular, within the framework of well-established co-operatives and small and medium scale enterprises;

c) To improve - through joint UNIDO/ICC programs - the quality of professional expertise in the chambers of commerce in developing countries, starting with the key sector of agro-based industries;

- Organize group training programmes for the professional staff of the secretariat of chambers of commerce in developing countries on the common services that chambers of commerce can provide to their members of the operative details of organizing a service;
- Arrange for individual fellowship for those who want to study a particular aspect of chamber management such as building up information systems, organizing a data bank, or compilation of a directory;
- Prepare a manual of chamber services.

d) Encourage package contracts which provide for financing, transfer of technology and know how, especially with the well-established co-operatives and the small- and medium-scale firms.

The selection of processing technology calls for sound programmes of research, tests and modifications. In this respect, with regard to the selection of technologies implying or permitting - as stressed in Chapter II of this paper - the use of local materials and components, UNIDO with the Technology Information Exchange System (TIES)[219] could study the practical possibilities of special international request for tenders specifying, among the criteria for allocating contracts, the ratio of utilization of local resources and spare parts. Similarly, UNIDO's recently adopted programme[220] for plant level co-operation for the transfer of technology to small-scale industries in the developing countries could play a pioneering role with regard to "restyling"

219/ To date, 25 countries have joined TIES. UNIDO publishes the TIES Newsletter bi-monthly.

220/ UNIDO, World Assembly of Small and Medium Enterprises, Prospects of Co-operation between small and medium size industrial enterprises in developed and developing countries in the field of transfer of technology, New Delhi, 12-14 Nov. 1980, p. 8.

technologies and know how that once permitted to industrial countries to develop. As mentioned in Chapter II of this paper, in most industrialized countries there are many small and medium scale food processing plants working with simpler (but profitable) machinery that can be utilized at lower prices by their counter enterprises in the developing countries. UNIDO's programme, moreover, could be extended to the well established co-operatives which usually have an excellent experience in an integrated approach of the food processing industry.[221] In fact, the exchange of a vast range of food industrial technologies that have fallen in disuse for non-technical reasons, could turn out to be a bargain business for both developed and developing countries. On one side, developing countries could adopt - at lower prices - technologies technically and economically efficient. On the other hand, small-and-medium-scale entrepreneurs and well established co-operatives operating in the processing as well as in the equipment construction, could enter successfully a very promising international market, from which they are to-day excluded by the sophisticated "packages" of the TNCs.

Such a course would, in particular, become a reality if the general co-ordination of such a potential market for "restyled" technologies could be pioneered by an international agency, such as UNIDO, stressing the fact that "restyled" technologies and know how do not constitute "second-hand equipments", but an effective alternative approach to meet the pressing needs of the developing countries for a rapid expansion of their food industry.

Before starting such an undertaking, for whose preparation UNIDO could convene an international congress, a certain number of "prototype projects"[222] should be studied at the feasibility level, using different

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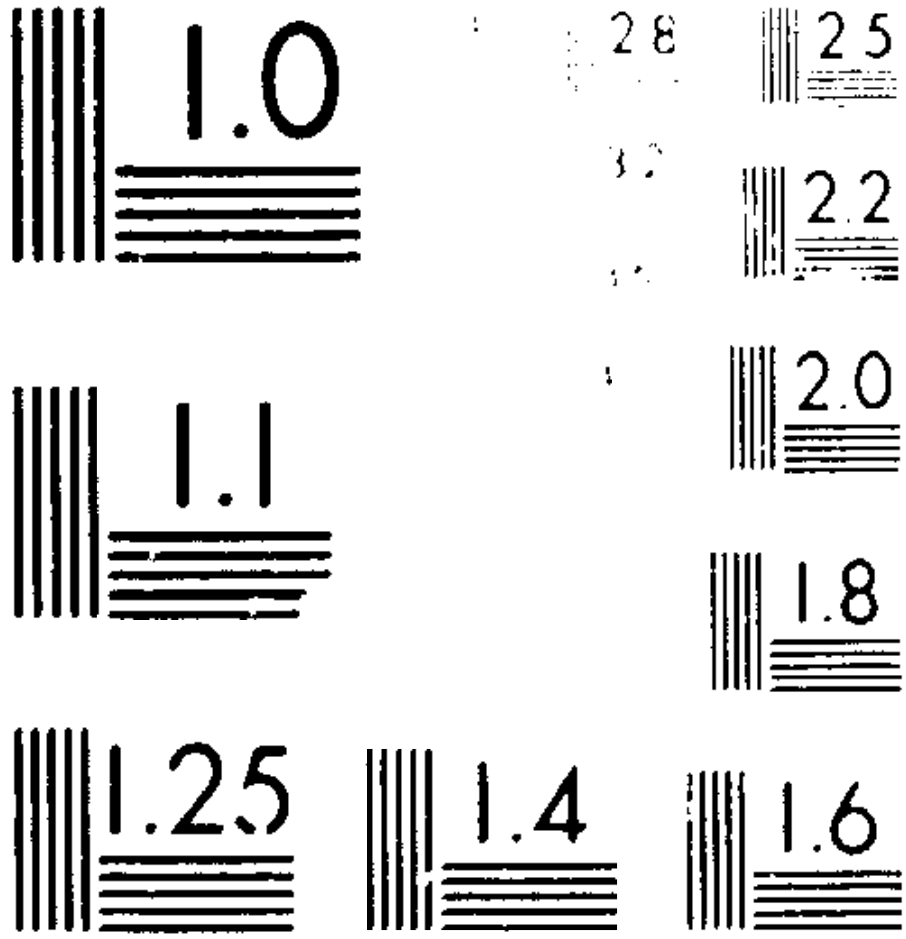
221/ The Expert Group Meeting on the Role of Co-operatives in the Development of Food-Processing Industries in Developing Countries held in Vienna on 22-24 April 1981 has stressed, in its recommendations that "UNIDO and other international organizations should give active consideration to co-operatives' experience in transfer of technology and know-how including management."

222/ Very few data are currently available, but operational cost analyses done so far (especially on rice milling, palm oil production, the bread industry) are encouraging and further efforts should be put in collecting more information on existing case studies. See for instance G. Flynn and P.A. Clark, An Industrial Profile of Rice Milling, Tropical Products Institute, London, December 1980; A. Goedhart, Sugar and Palm Oil Production, paper prepared for the Seminar on Agro-Industrie, 13-14 November 1980, Royal Tropical Institute, Amsterdam; E. Chuta, The Bread Industry of Sierra Leone, A Case Study in Appropriate Technology, paper prepared for the Seminar on Agro-Industries, 13-14 November 1980, Royal Tropical Institute, Amsterdam.


1.0
2.8
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

"scaled-down" food processing systems. These projects should be on the range of small to medium scale industrial (and not artisanal) plants, aimed to be technically and economically efficient. Small-to- medium sized firms - both from developed and developing countries - should be involved in the choice of food processing technologies and in the development of adapted or "re-styled" technologies for food processing such as fruit and vegetables, oilseeds, cereals, seen in the framework of an integrated approach with local conditions of infrastructure and of agricultural production deemed to be necessary.

The feasibility of these projects could, thus, help local entrepreneurs and governments to make possible alternative technology choices.

In this regard, as already mentioned in Chapter II of this paper, a "roster" of adapted systems for food processing[223/] could be very helpful in defining what is a really available - in practice - as adapted technological system, at a scale compatible with environmental and conditions of different countries.

Moreover, UNIDO - within the framework of the establishing information system INPRIS - could also provide adequate indication of potential partners (giving priority to the identification of highly specialized small-and-medium scale firms and well-established co-operatives of the developed countries, and, more in general, to those enterprises suitable and willing to participate on a long-term basis in projects in developing countries) as well as up-to-date information (with emphasis on the company or institution at the back of the projects in the developing countries) of interest to entrepreneurs

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223/ Within the UNIDO's programmes of collection and dissemination of information through the Industrial and Technological Information Bank (INTIB).

seeking investment opportunities. UNIDO, moreover - owing to present inadequate information - could also bring out a Catalogue on Manufacture of Spares, Components and Machinery, giving particular of manufacturers, as well as assist developing countries in preparing an inventory of spares and components required.[224] In addition, UNIDO could initiate co-operative programmes in the field of food processing to establish twinning arrangements between national and development centres in the developing countries and related institutions in the industrialized countries in order to improve their effectiveness and enhance their potential. Such collaboration would strengthen the capabilities of developing countries' research centres, especially by sharing work and experience on the same problems at various levels.

The use of alternative renewable sources of energy - such as solar, bio-mass, animal and plant wastes and by-products - provides a very important area whereas development of new technologies can be promoted to the mutual advantage of developing and developed countries. Scientists have already started testing systems which use solar energy to provide heat for cooking, blanching and pasteurizing processes. These systems are also being tested for cooling beverages and vegetables, and partially freezing fish, meat and vegetables. Similarly, bio-mass programs include improvements in cooking and heating equipment, and a number of techniques employing fermentation or photosynthetic stages - accompanied where necessary by chemical or physical treatments - are being tested to the residues.[225] UNIDO in collaboration with other international organizations could thus encourage: (i) the establishment of pilot projects in developing countries; (ii) the setting-up of a joint co-ordinate applied research and development programmes between national institutions of developed and developing countries in order to define appropriate technologies for the

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224/ To this end, the first session of the regional consultative forum on the vegetable oils and fats industry for Asia and the Pacific, held in Djakarta on 23-27 March 1981, has already decided that UNIDO will draft a questionnaire to suit individual country's requirements and after due modification would proceed with the compilation of the inventories specifically for the vegetable oils and fats industry. UNIDO, Report of the First Session of the Regional Consultative Forum on the vegetable oils and fats industry for Asia and the Pacific, PC 4, 16 April 1981, p. 9.

225/ R.P. Oulette, N.W. Lord P.N. Cheremisinoff, Food Industry Energy Alternatives, Westport, 1980.

production, use and conservation of renewable energy in food processing development; (iii) the fostering of pioneering work in specific sectors such as the use of vegetable oils as fuel, which, although not well advanced to-day owing to the high costs of production, has the advantage of being a very good extender for gas/diesel oil.[226] In fact, several countries are interested in the use of vegetable oils as fuel for strategic reasons. For example: Brazil (groundnuts and, perhaps later, palm oil) and Zimbabwe (sunflowers). Brazil, in addition, has half its vegetable oil crushing capacity idle at present and plans to use it as soon as possible as a vegetable oil program can be developed.

In the area of reduced energy consumption, moreover - since the operation which needs most energy in food processing (e.g. the thermic process for heating, cooling, concentrating, sublimizing) cannot be substituted by human labour - energy-saving programs need to be worked out, especially on the purchase of machinery designed to have a low fuel consumption, the use of heat pumps or heat exchangers (e.g. using the heat from milk in bulk cooking tanks to heat water for dairy cleaning), the installation of control equipment, the development of alternative packaging materials (e.g. retort pouches made of polypropylene, aluminium foil and polyester) to replace metal cans in the future.[227]

Special attention should also be devoted to the development of non-conventional technologies with the purposes of transforming unexploited and neglected agricultural raw materials ("multipurpose native crops") into products with considerable market potential both in developing and

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226/ While alcohol blends very well with gasoline, it is not a very good extender for gas/diesel oil. Initially the use of vegetable oils as fuel caused gumming and smoke, but modern technology can now cope with these problems. See: International Federation of Agricultural Producers (IFAP), Farmers and the Energy Situation, 24th General Conference, Buenos Aires, July 1980, doc. P 4/80, p. 13.

227/ Processing times using pouches may be reduced 30 per cent to 70 per cent and brine fill may be cut by 30 per cent, resulting in lighter food packages. Producing pouches is also less energy-intensive than manufacturing cans. Transporting the smaller, lighter pouches, either filled or empty, requires substantially less energy than for cans. However, although the pouch line has the smallest total energy requirement, a thorough economic analysis of labor costs, capital investment, equipment depreciation, money, maintenance and total labor must be made before adopting retort processing technology on a large scale.

developed countries. In fact, despite their potential impact on local food production systems, native crops are often considered of little importance.[228] Today, however, it is increasingly recognized that these crops deserve particular attention in order to strategically meet global food needs and provide industrial raw materials of satisfactory characteristics and of acceptable price. Thus, efforts now need to be made to: (i) collect more in-depth data and information (on the farming systems in which these crops play a role; their food and industrial uses; their costs of production and prices; the required financial resources; the typical conditions of the markets); (ii) establish comprehensive research programmes between research and scientific institutions in developing and developed countries (to develop cultivated plantations, technologies unique in their nature and economically suitable; to asses the viability of processing, etc.); (iii) assist in the setting up of original, pioneering plants.

In this connexion, UNIDO's role can be of great value, especially for:

- the identification and evaluation of potentially viable[229] projects;
- the promotion of research at the technological level;
- the dissemination of such information as already exists in this field;
- the undertaking of pre-project and feasibility studies for the development of processing operations;[230]
- the training of selected workers from the developing countries.

228/ As in the case of the soybean in future decades it may be today's neglected native crops that are feeding the world and some of its industries. Just fifty years ago, the soybean was a poor man's crop. To be at that time a soybean advocate was to risk being considered a fool. But in the 1920 University of Illinois researchers established a comprehensive soybean programme which helped sweep aside this discrimination. National Academy of Science, Underexploited Tropical Plants with Promising Economic Value, Washington DC, 1975.

229/ See for example, the investigation on "balanites aegyptiaca" believed to be available in exploitable quantities in several areas of the Sudan. UNIDO Contract 79/28, 15 July 1979.

230/ Industries Development Corporation, Pre-project study for the development of a Jojoba Processing Technology resulting in the establishment of a model plant in a developing country with a jojoba potential, a study on behalf of UNIDO, January 1981.

In addition, UNIDO can provide direct technical support to promising projects and model schemes, as for instance, it was done in the case of spirulina - a blue green alga of exceptional value of high protein and vitamin supplement - whereby UNIDO contributed in setting up an original, successful, pilot plant in Mexico.[231]

231/UNIDO, The case of Spirulina, a review made by L. Skowronski on the work of the Sosa Texaco S.A. Mexico, the Research and Productivity Council, Fredericton, Canada, and individual international experts, 19 Dec. 1980.

6. International industrial financial aspects

The recognition of the urgency of a very rapid increase in the production capacity of the food industry requires - given the acute shortage of domestic savings, particularly in the oil-importing and least developed countries - a substantial flow of external sources of financing.

In this respect, the increasingly high dependence of industrial financing on private sources - owing to the relative stagnation of official development assistance and the limited number of food projects financed by multilateral institutions[232] - places many developing countries in a very difficult position.

Private foreign investment can provide all the finance necessary for the various enterprises, or the local savers such as landlords, large companies, big traders. However, even if politically acceptable, this source of finance tends to be available more for the larger-scale projects as well as concentrated on a small number of upper-income countries.

Since, however, the major goal of an effective food industry development strategy - aiming at increasing dramatically local supplies presently imported (so as to generate net foreign exchange savings) as well as at undertaking capillary new ventures - is to mobilize a large number of countries as well as of protagonists, very serious is the need for increasing sources of financial means, as well as to find new ways for lending money[233].

232/ UNIDO, Report of the Global Preparatory Meeting for the First Consultation on Industrial Financing, Vienna, 23-25 March 1981, p. 6. On the basis of existing information it is not possible to identify committments of capital assistance to the food processing industry. Estimates for the funds available through international organizations, such as the World Bank, IDA and IFC, show, anyway, that only a very small amount of capital assistance is channelled to the food processing industry in the developing countries (i.e. no more than 6 per cent of the total funds available for agriculture and agro-industries, which include industries other than food processing).

The World Food Conference, held in 1974, estimated that the annual external assistance for food production would need to increase to at least US $ 5 billion a year in 1972 prices or about US $ 12.4 a year in 1979 prices. See: Trade Policy for Developing Countries, World Bank Staff Working Paper, No. 353, August 1979, p. 15.

233/ Existing credit schemes are often inflexible, which usually ends up channelling the bulk of grants and loans to specific class strata and a limited number of countries with respectable collaterals.

The International Fund for Agricultural Development (IFAD) in addition to having established a rare atmosphere of North-South co-operation between the two rich-country donors, has appeared in this context as a response to the needs of small farmers and landless peasants designing projects (at concessional funds) geared to introduce, expand or improve food production systems and to strengthen related policies and institutions in food-deficit developing countries.

UNIDO's proposal to set up an International Bank for Industrial Development [234] could also offer a response for the needs of industrial entrepreneurs, including food-processers in the oil importing and least developed countries.

The proposed Bank could operate as a vehicle for channelling equity equipment as well as promote a package of services (i.e. project feasibility, joint-ventures, export re-financing), all operations of essential importance for the development of the food industry, in the developing countries.

Loans on concessional terms could be provided in developing countries for qualified projects to be especially carried out in partnership with co-operatives and small- and medium-scale firms, for which lack of finance in the implementation of integrated food industry projects constitutes a severe obstacle.[235]

234/ UNIDO, Industrial Development Board, Proposal for setting up an International Bank for Industrial Development, ID/B/261/Add.7, 10 April 1981.

235/ UNIDO, Expert Group Meeting on the Role of Co-operatives in the Development of Food-Processing Industries in Developing Countries, op. cit., p. 4, recommendation No. 3. See also the Report of the Global Preparatory Meeting for the First Consultation on Industrial Financing, notably pp. 12-14.

In particular, emphasis on well prepared food industry projects could attract the interest of a wide spread of potential Arab investors actively seeking investment opportunity; such as the Arab Office for Development and Financing, the Industrial Bank of Kuwait, the Islamic Development Bank, the Abu Dhabi Investment Authority, the Al-Futtaim Trading Group.

Another approach is the conclusion of new co-financing arrangements to help finance original projects, whereby the financial partners - in addition to well established international agencies and local development banks - are new, small, well managed merchant/investment institutions[236], independent importing/exporting companies, national and regional development banks.

One example, in this respect, is the successfull tea venture SORWATHE' in Rwanda, which will double its processing capacity with loans provided by the International Finance Corporation, the Overseas Private Investment Corporation of the United States, the Banque Rwandaise de Developpement and an equity investment provided by Teas Importers of the U.S., one of the largest independent tea importing companies in North America. In addition to benefitting smallholders - who, without the new processing facilities would waste part of their crops, - the project, to be completed in the last quarter of 1981, is expected to result in net foreign exchange earnings of US $ 1 million a year.

A second example is a malt project, undertaken by Cervecería Boliviana Nacional S.A. (CBN) financed by Corporación Andina de Fomento (CAF) (the regional development bank of the Andean Pact countries) and the International Finance Corporation (IFC). The project - one of the largest presently being implemented in Bolivia - in addition to benefit the Bolivian economy by providing a competitive, reliable local supply of a commodity presently imported, generating net foreign exchange savings - includes contracts with farmers and farm co-operatives to assure growers of a market for the barley they produce.

Another example is a US $ 9.8 million packaging project undertaken by Packages Limited, a leading Pakistan package manufacturing company, which will increase its paperboard production and expand its conversion capacity for tetra paper used for beverage containers. The International Finance Corporation (IFC) is lending US $ 2,1 million for the project; Pakistan Industrial Credit and Investment Corp. Ltd. (PICIC) US $ 888,000; and

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236/ E. Meadows, Small Banks Stand Up tc the Goliaths, Fortune, January 26, 1981.

American Express Banking Corporation of the United States US $ 727,000. A US $ 1,5 million rupee debenture arranged by Investment Corporation of Pakistan, US $ 729,000 in customs debentures, and US $ 3,8 million in cash generation complete the financial plan. The project will allow a net foreign exchange savings estimated at US $ 5,4 million a year since Packages Ltd. will make extensive use of residues and wastes for its raw material supply.

Of great interest is also the participation of international financial agencies in venture capital companies in developing countries. Thus, for instance, the International Finance Corporation (IFC) has joined a broad group of investors in Brasilpar Comercio e Participaçoes S.A., a venture capital company in Brazil which will make equity investments in medium-sized companies engaged mainly in high-priority sectors such as the food processing industry. Besides IFC, the sponsors of the project include leading Brazilian entrepreneurs and institutions (including even a leading supermarket chain) as well as several foreign organizations (Interdec, an affiliate of Riyadh Development Corporation; Banque de Paris et des Pays Bas of France; Agiart, a subsidiary of Assurance Generales de France).

The establishment of new financial institutions in the developing countries sponsored by local entrepreneurs and private investors, with the assistance of intermediate agencies and international banks, is also very useful, especially if addressed towards the expansion of new financial services and local firms which have limited access to existing financing sources. Thus, for instance, "Sur Invest Corporation" has recently been established in Montevideo (Uruguay) by a group of entrepreneurs and private investors - with the assistance of the International Financial Corporation and a London merchant bank - to develop new financing services, primarily industrial equipment leasing and underwriting of corporate bonds and equities placing emphasis on small and medium-scale enterprises.

E. Summary

1. The attainment of the objectives of growth set up by the International Strategy for Development of the United Nations Development Decade coupled with the current very low level of development of the food-processing industries of developing countries requires the full mobilization of developing countries' resources, a redeployment of industrial capacities and a restructuring of international trade.

2. In particular, and in addition to the intensification of international assistance, a framework of international co-operation between developed and developing countries as well as among developing nations needs to be centred on working out long-term industrialization programmes and industrial collaborations agreements, allowing rapid expansion of the food-processing industries in developing countries. These programmes and agreements should provide secure guidelines for the parties concerned (e.g. long-term credits, buy-back arrangements, marketing, training of personnel, investment guarantees, risk insurance) as well as trade facilities (e.g. relief from customs duties, temporary admission and drawback procedures, and outward processing traffic), in particular for products resulting from production co-operation contracts.

3. Initiatives at the service of a self-reliance policy can be of great significance especially through intensification of inter-developing countries food trade, implementation of innovative regional integration arrangements and specific programmes of mutual assistance. Complementarity in food production and processing among developing countries, in fact, has to be encouraged by appropriate policy instruments. In particular, it could be fostered by adopting production re-adjustment measures, in addition to trade liberalization, through the launching of sectoral strategy (e.g. regional food plan for Africa). Another important factor is the provision of adequate financing (e.g. a specific food facility) to overcome basic problems such as the poor distribution chain (scarcity of cold storage, lack of transformation facilities, etc.), credit terms as offered by the major international companies, absence of promotional organization, rapidly increasing freight charges, demand for health/hygiene standards as observed by traditional international suppliers. Further incentives could be provided by the establishment of practical commercial settings (e.g. periodic meetings of buyers and sellers of the main commodities) and by the possibility of defining industrial collaboration agreements (centred on joint ventures and multinational operations between companies in different developing countries)

as well as joint approaches (e.g. organization of specific commodity groupings) to coordinate production and marketing. Another possibility is to strengthen bilateral/trilateral co-operation between OPEC countries and those developing countries which already dispose of considerable business power in the area of food-processing (e.g. India can promote the export of a wide variety of processed foods to the countries of the Gulf area). Further on, in addition to greater possibilities of technical assistance (e.g. sharing experiences of food-processing industries) and of industrial extension work between the research and development institutions, there is considerable room for inter-country co-operation in the supply of spares, components and machinery especially considering the existence of indigenous manufacturers of machines and equipment in some developing countries, notabl in the fields of rice milling, oilseed - processing, sugar refining, etc.

4. There is also a dire need to improve pragmatically the multilateral management of various degrees and forms of interdependence in key areas of the food processing industries. Thus, on the agricultural protectionism - which encourages domestic production, reduces imports and concentrates processing in regions once traditionally large net of importers - any new attempt at liberalization requires more detailed preparatory work. To this end fruitful, multilateral, co-operation could be achieved with studies aiming at ascertaining by sector and sub-sectors the immediate and long-term injury to other countries' export and industrial development interests by apparently purely domestic programmes. Such studies could be accompanied by an appraisal of these programmes' costs and benefits to identify the sector or sub-sectors of the food-processing industry where modifications of the programmes would meet the least resistence while reducing or eliminating their international effects.

5. On industrial protectionism, which is affecting non-competing products (such as cocoa, coffee, tea and spices), there has already been some moderate movement towards liberalization, particularly under GSP schemes. Here again the sector could benefit from a detailed integrated study conducted in a multilateral forum on all the major factors (including TNCs' control of the market, differential transportation costs for raw materials and processed products and any other factor affecting the location of the industry, such as capital requirements and costs of production and necessary technologies), which prevent developing countries from taking advantage of import liberalization.

6. Other useful indications could be provided by the analysis of the international trade flows of machinery and equipment with the view to obtaining a more comprehensive understanding of the specific problems and perspectives in machinery and equipment for the agro-food industry. In this respect, the convening of a symposium on food processing machinery and equipment, with the participation of manufacturers, traders, experts, could be a useful device to resist protectionism in an area of overwhelming importance for the food system of the developing countries.

7. Most of the international trade in food-processing is a highly concentrated business. However, most developing countries, rather than pursuing a sterile atmosphere of confrontation, can utilize the established international marketing network of transnational trading enterprises (as well as of large, important, TNCs) carrying out a policy based on realistic, flexible and selective evaluation of specific opportunities and co-operation projects. In particular, with a more intensive bargaining process, it is wiser for developing countries to use pragmatically the vehicle of the TNCs in the critical areas of distribution and marketing. In this regard, international organizations could play a pioneering role in contributing to a system of periodic reviews of corporate and contractual arrangements unpackaging the foreign input provided by the TNCs, so that terms more favorable to the developing countries are enhanced to the extent that the domestic sector is in a position to provide a countervailing force.

8. Such an orientation does not, however, exclude the strenghthening of the international machinery which may sanction the TNCs (as it has been the case for baby foods advertising) as well as the research of alternatives to the existing marketing networks. In this latter respect, in addition to some integrated structures (such as state trading firms and Third World multinationals), the co-operative organizations of the developed countries and of some developing nations are a promising group of "changemakers" which could afford developing countries to play a more significant role in export markets. In fact, to by-pass the traditional marketing networks, specific trading circuits can be set up by the co-operatives (e.g. creation of mixed structures between governments and/or co-operatives with international capital; long- or medium-term trading agreements between co-operatives of different countries; triangular or multi-angular trading bringing in various countries and various commodities to facilitate arbitrages).

Another effective tool is the collaboration of the medium- and small-scale firms. In fact, given the opportunity and necessary support, small enterprises in developed countries may prove to be exemplary partners for co-operation with equivalent firms in developing countries whereby they can provide not only appropriate technology and know-how but also the wide spectrum of industrial collaboration (co-production, sub-contracting, licences and franchise) including marketing in international markets and other supportive elements (e.g. financing-training-management).

9. Emphasis on resisting protectionism and gain market access cannot change the fact that many developing countries will have to foster dramatically both their domestic food-processing industries and their commercial purchases in the international market during the years ahead. In this latter respect, it is of the utmost importance that developing nations utilize the experience of technically-advanced countries to establish a well-structured import-substitution food processing industry especially in key-sub-sectors such as grains and dairy products.

10. The expansion of food-processing industries in developing countries also requires an increasing number of technical assistance programmes focussing on training facilities for managers, engineers and especially technical personnel. In this respect, it is suggested that international agencies identify industries in developed countries which are willing to, and can, provide training for technical and managerial personnel. By the same token it is also suggested that international institutions encourage package contracts whereby training is linked to industrial co-operation, industrial promotion, industrial information and technology transfer.

11. The selection of processing technology equally calls for sound programmes from international institutions. In particular, with regard to the selection of technologies implying or permitting the use of local materials and components, it is suggested that developing countries receive adequate assistance to be able to specify in their tenders - among the criteria for allocating contracts - the ratio of utilization of local resources and spare parts.

In conjunction with a roster of adapted systems, international institutions could provide adequate indication of potential partners (giving priority to the identification of highly specialized small - and medium-scale firms

and well-established co-operatives, and more in general, to those enterprises suitable and willing to participate on a long-term basis in projects in developing countries) as well as up-todate information (with emphasis on the company of institution at the back of the projects in developing countries) of interest to entrepreneurs seeking investment opportunities.

12. The recognition of the urgency of a very rapid increase in the production capacity of the food-processing industry in developing countries requires a substantial increase in the flow of external sources of financing.

Emphasis on well prepared food industry projects - especially on the part of international institutions and organizations which should devote a higher share of capital assistance to the food-processing industry - could attract the interest of a wide range of potential OPEC investors actively seeking investment opportunities.

Another approach is the conclusion of new co-financing arrangements to help finance original projects, whereby the financial partners - in addition to well-established international agencies and local development banks - are new, small, well-managed merchant/investment institutions, independent importing/exporting companies, national and regional development banks. Of great interest is also the participation of international financial agencies in venture capital companies in developing countries which will make equity investments in medium-sized companies engaged mainly in high-priority sectors such as the food-processing industry. The establishment of new financial institutions in the developing countries sponsored by local entrepreneurs and private investors, with the assistance of intermediate agencies and international banks, is also very useful especially if addressed towards the expansion of new financial services and local firms which have limited access to existing financing sources.

CONCLUSIONS AND RECOMMENDATIONS

The potential for North-South co-operation on the food-processing industry sector is so great that achieving co-operation could set the tone for the resolution of other basic North-South concerns.[237] But it is an issue that has defied resolutions through traditional approaches and mechanisms. What now must be done is to approach the basic problem (i.e. accelerate the growth of the food-processing industry in the developing countries) in the context of the major political and economic facts described in this paper.

By framing the resolution of the food-processing problem in the context of what are the respective self-interests of developed and developing countries, the available options are now clearer. By basing our recommendations on accepting new approaches and mechanisms as well as defining partnerships with new protagonists, it should be easier for political decision-makers to adopt effective policies and measures.

In any case, it is important that political decision-makers and their negotiators resolve the food-processing issue for several reasons, amongst others it is their common self-interest to do so. First, food-processing production and trade is concentrated in a few developed countries, and an even lesser number of middle-income developed countries, while the international system, although still fragile and frequently complex, has become very interdependent; in fact, industrialized countries need to export machinery and equipment, technologies and know-how, while developing countries need to create or develop a food processing industry that by providing income, employment and foreign exchange earnings enables to move from the subsistence sector into the money economy, thus becoming a major element in the economic growth process. Second, the dramatic, widening, gap between demand and supply of processed and unprocessed foods of the developing countries as a whole - over the two decades to come (owing to population growth, raise of disposable income, very high urbanization rates and larger participation of women in growth of tertiary economic activities) - is causing an intolerable balance of payments burden and risks to produce political instability. Third, there is a need to encourage investment of local entrepreneurs and new partners such as the small scale manufacturing firms and co-operatives of the developed nations and of some developing countries; at the same time, while using pragmatically the vehicle of transnational corporations in some critical areas (i.e. distribution and marketing), there is a need - for the sake of common self-interest- to supervise food processing projects involving the participation of TNCs, so as to ensure that foreign capital and technologies do not operate or retard the development of a national industry.

237/ Dale E. Hathaway, "Food Issues In North-South Relations", The World Economy, Vol. 3, No. 4, January 1981, pp.447.

Areas for International Co-operation

Effective measures are needed to foster the substantial development of the food-processing industry of the developing countries.

1. Various paths and forms of co-operation can be opened for negotiations between developed and developing countries. In particular, developed countries could conclude with developing countries' long-term industrialization programmes and industrial collaboration agreements, providing rapid expansion of the food-processing industry through secure guidelines for the partners concerned (e.g., long-term credits, investment guarantees, risk insurance, etc.) as well as special trade facilities (e.g., relief from customs duties, temporary admission and drawback procedures, outward processing traffic), particularly for goods produced through joint ventures and other forms of multi-national partnership.

2. Governments of the market economy countries do not normally get involved directly with co-operative agreements or long-term arrangements related to specific projects. However, Governments of the market economy countries can provide a very useful framework for long-term industrial co-operation, in particular by encouraging long-term inter-enterprise agreements (leading to co-prosperity projects through joint-ventures and other forms of production co-operation) and participation of co-operatives as well as small- and medium-scale industries in the developing countries' food-processing projects.

3. Governments of centrally planned economies are directly involved in long-term contractual arrangements and carry out an increasingly wide variety of new forms of co-operation (e.g., buy-back agreements, production compensation and barter deals). The centrally planned economies already have industrial collaboration arrangements for various types of activities and projects with over seventy-eight developing countries. However, this long-term industrial co-operation is mostly related to non-food-processing industries and to large-scale projects. A greater emphasis needs, therefore, to be placed on the food-processing industry as well as on relatively smaller and medium-sized projects.

4. The industrial and agricultural protectionism that developing countries face in developed market-economy countries needs to be overcome through new multilateral trade negotiations. In particular, for non-competing products (such as cocoa, coffee, tea and spices), which represent around 40 per cent of developing countries' food exports, the escalation of tariffs—in spite of some progress made with GSP schemes, the Tokyo Round of Multilateral Trade Negotiations (MTN) and, above all, the Lomé Convention (which allows the 60 ACP suppliers duty-free access to EEC markets)—needs to be further reduced.

For competing products (such as oilseeds, oils and fats and sugar), which represent around 60 per cent of developing countries' food exports, alternative forms of support for farmers could be explored. For example, limited support payments to the less-advantaged, defined quotas of domestic production will permit the moving away from present types of very costly national agricultural price-support policies. In fact, as long as agricultural price-support policies are carried through with sufficiently large financial means, there is no way for economically weaker exporting countries to counter effectively the competition of the richer countries, except by reducing their output when prices in international markets cease to be remunerative.

5. The expansion of developing countries' export earnings in developed market economies can also be enhanced pragmatically. Examples of such action are:

(i) Import promotion offices, having been established in most developed market economy countries, could play a more active role in stimulating the export potential of developing countries by supporting promotion campaigns and publicizing new processed food products of developing countries.

(ii) Extension of assistance to all developing countries for participation in international specialized fairs such as the SIAL in Paris and ANUGA in Cologne (granted, for example, by the EEC to ACP countries).

(iii) New forms of co-operation with operational institutions (such as between African and French chambers of commerce, which

promote the sale of tropical products by lowering the cost of freight and encourage the growth of small- and medium-scale industries with co-prosperity projects.

With regard to centrally planned economies, recent trends of increased imports from developing countries show that processed food outlets also exist in these countries. State trading organisations can strengthen their links with the national trade promotion agencies of the developing countries to make new suppliers familiar with the potential offered by long-term inter-governmental framework agreements as well as make them prepared to adapt to specific market techniques (e.g., barter, compensatory transactions, product buy-back arrangements, self-finance operations) that may also include third parties (i.e., tripartite co-operation).

6. Developing countries' priorities and policies encouraging processing and consumption of locally produced foods as well as partial replacement of imported foods with domestic foods do not exclude appropriate forms of co-operation with transnational corporations. In particular, with a more intensive bargaining process, it can be useful for developing countries to use the vehicle of the TNCs in the critical areas of distribution and marketing as well as in contributing to fostering the production of locally produced staple and branded foods. In this connection, international organisations could play a pioneering role in stimulating a dialogue between developing countries and the TNCs, aimed at improving the existing contractual arrangements for the mutual benefit of both parties concerned and in order to ensure that such contractual arrangements pay greater attention to the national food priorities of developing countries.

7. There are many actors that can establish fruitful co-operation links with the national institutions and authorities of the developing countries. Thus, in addition to state trading firms and Third World multinationals, co-operative organizations of the developed countries and of some developing countries, as well as major and small-medium-scale capital goods suppliers constitute a promising group of new partners. The increased co-operation with such non-TNC partners would allow developing countries to play a more significant role in export markets as well as to enhance the redefinition of food-processing models aiming at rehabilitating basic, indigenous, low-cost food crops. Mechanisms for stimulating such a development could be studied by international organizations.

8. Furthermore, developing countries are also not necessarily dependent on TNC-type technology. Several developing countries have now built industries capable of improving and adapting processing technologies to their own needs. In addition, there are many ways of developing appropriate technologies, e.g. reducing the foreign cost and the domestic maintenance charges of imported technology, rescuing "dormant" technology from countries more economically advanced, "scaling down" the advanced technology or upgrading local technology. Co-operatives and equipment suppliers of the developed countries are willing to collaborate, supplying expertise and management services. The possibility should be explored of setting up a roster of adapted systems for the food-processing industry that could provide adequate indications of the different technologies available at varying levels of complexity for processing different foods.

9. The expansion of food-processing industries in developing countries also requires an increasing number of technical assistance programmes focusing on training facilities for managers, engineers, and especially technical personnel. In this respect, it is suggested that international agencies identify industries in developed countries that are willing to, and can provide training for technical and managerial personnel. By the same token, it is also suggested that international institutions encourage package contracts, whereby training is linked to industrial co-operation, industrial promotion, industrial information and technology transfer.

10. A successful industrialization programme requires that the Government provide adequate incentives to potential local food producers. Thus, there should be: assistance of a financial nature, training facilities and infrastructures (e.g. treated-water supply, electrical power, road networks, transport and storage facilities). But, above all, and particularly in less advanced countries and areas, there is a dire need for strengthening the machinery for project identification, preparation, evaluation and implementation. This need is enhanced in all cases of relocation of the food-processing industry within integrated rural development programmes. An integrated approach within a regional development programme will, thus, require the establishment of an "area agency" or at least a "project bureau" capable of identifying objectives, projects, and the co-ordination of their implementation.

11. With the new protectionist trends directed mainly against developing countries, initiatives of collective self-reliance should be pursued, especially through intensification of inter-developing countries' food trade, implementation of innovative regional integration arrangements and specific programmes of mutual assistance. Complementarity in food production and processing among developing countries - in addition to the launching of sectoral strategy (e.g. regional food plan for Africa) - requires the provision of adequate financing (e.g. a specific food facility), the establishment of practical commercial settings (e.g. periodic meetings of buyers and sellers of the main commodities) the possible application of industrial collaboration agreements (centred on joint ventures and multinational operations between companies in different developing countries) and joint approaches (e.g. organization of specific commodity groupings) to co-ordinate production and marketing.

Another possibility is to strengthen bilateral/trilateral co-operation between OPEC countries and those developing countries that are already experienced in the area of food processing (e.g. India can promote the export of a wide variety of processed foods to the countries of the Gulf area). Furthermore, economic co-operation among developing countries in the food-processing sector needs further strengthening, for example in sharing experiences of food-processing industries, and industrial extension work between research and development institutions, inter-country co-operation in the supply of spares, components and machinery, especially in specific sectors, e.g. rice-milling, oilseed processing, sugar refining.

12. The flow of finance necessary for a very rapid expansion of developing countries' food-processing industry needs to be increased, given the acute shortage of domestic savings, especially in the oil-importing and least developed countries. In fact, funds available through bilateral programmes and multilateral lending authorities, such as the World Bank Group, seem to constitute no more than six per cent of total capital assistance. It would thus be very useful to improve the IMF food-financing facility (FFF) - designed to minimize the effects of foreign exchange availability constraints by developing countries that experience unusual surges in cereal import bills. This could be done by including in the facility the means to finance specific projects whereby developing countries utilize the experience of technically advanced nations to establish a well-structured import-substitution food-processing industry, especially in key sub-sectors such as grains and dairy products.

13. Developed market economy countries could provide financial incentive schemes to their co-operative groups, small and medium-sized enterprises, etc. which normally lack the necessary capital for implementing integrated food-processing projects in developing countries. This would remove a serious obstacle to the involvement of co-operatives, small- and medium-sized enterprises in food-processing projects of the Third World. These incentive schemes could provide the equity investment necessary for a rapid expansion of an integrated food-processing industry, considering the socio-economic environment of the developing countries. Moreover, these schemes could provide an impetus to those industries of the developed countries that want to move South, stressing the development of new services (such as industrial equipment leasing) and technological innovations (such as energy-saving devices and application of solar energy).

14. UNIDO should continue its studies concerning the world-wide developments of the food-processing industry. These studies, however, should concentrate on selected, strategic, subsectors as well as on selected developing countries in Africa, Asia and Latin America, with emphasis on the identification of potential partners, with the aim of removing serious technical and infrastructures obstacles (e.g. roads, transport, storage facilities) which have hindered the development of the food-processing sector in the developing countries.

In collaboration with other international organizations, UNIDO could also prepare:

- A data system to co-ordinate the collection of the necessary statistics allowing an overall view of the food-processing industry throughout the world; the area covered would involve basic data (on production, consumption, trade, investment, strategies of the actors, technological innovations) relating to economic and technological aspects, so that trends and developments could be monitored and expected needs of developing countries carefully identified;
- An integrated sector study, aiming at ascertaining by sectors and subsectors the most appropriate areas where protectionism could be removed with the least resistance; such an integrated sector study could thus provide a sound basis for attempts at progressive industrial redeployment and trade liberalization;
- A deeper analysis of trade and investment flows of capital goods in the food-processing sector, to obtain a more comprehensive understanding of the specific problems and perspectives in machinery and equipment;
- Follow-up evaluation studies of the efficacy of specific projects after the start-up phase has been completed so as to identify constraints and suggest remedial action;

- A survey to asses (in qualitative and quantitative terms) the existing institutions and establishment, which are willing and can provide training for technical and managerial personnel required for the food-processing industry;
- A catalogue of manufacture of spares, components and machinery, giving particulars of manufacturers which would assist developing countries in preparing an inventory of spares and components; UNIDO could consider convening a symposium on food-processing machinery and equipment, with the participation of manufacturers, traders and experts in which potential co-operation arrangements could be identified;
- A practical hand-book on financial aid for the development of the food-processing industry, giving details of the private and public sources of finance as well as of procedures, terms and conditions.