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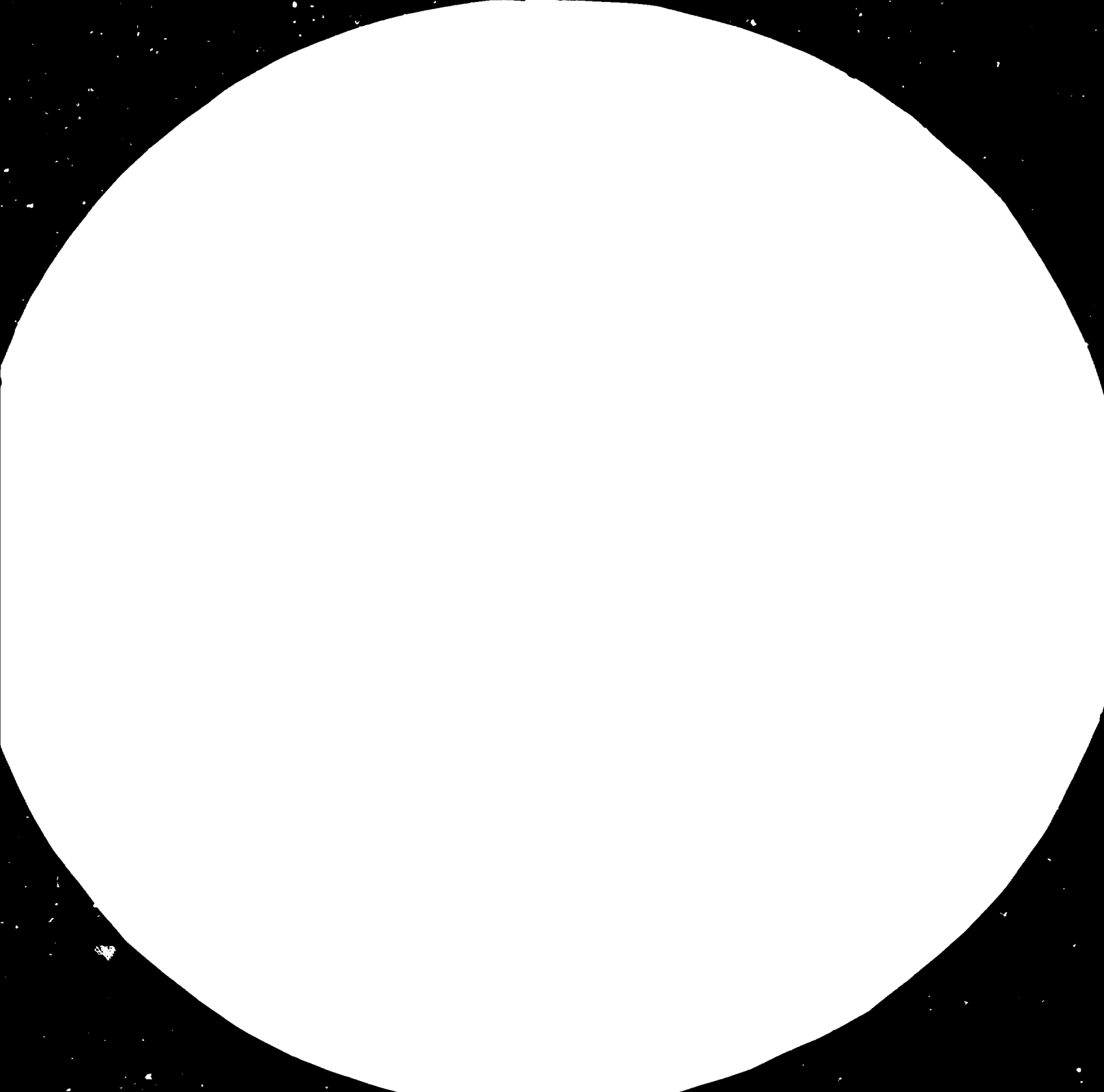

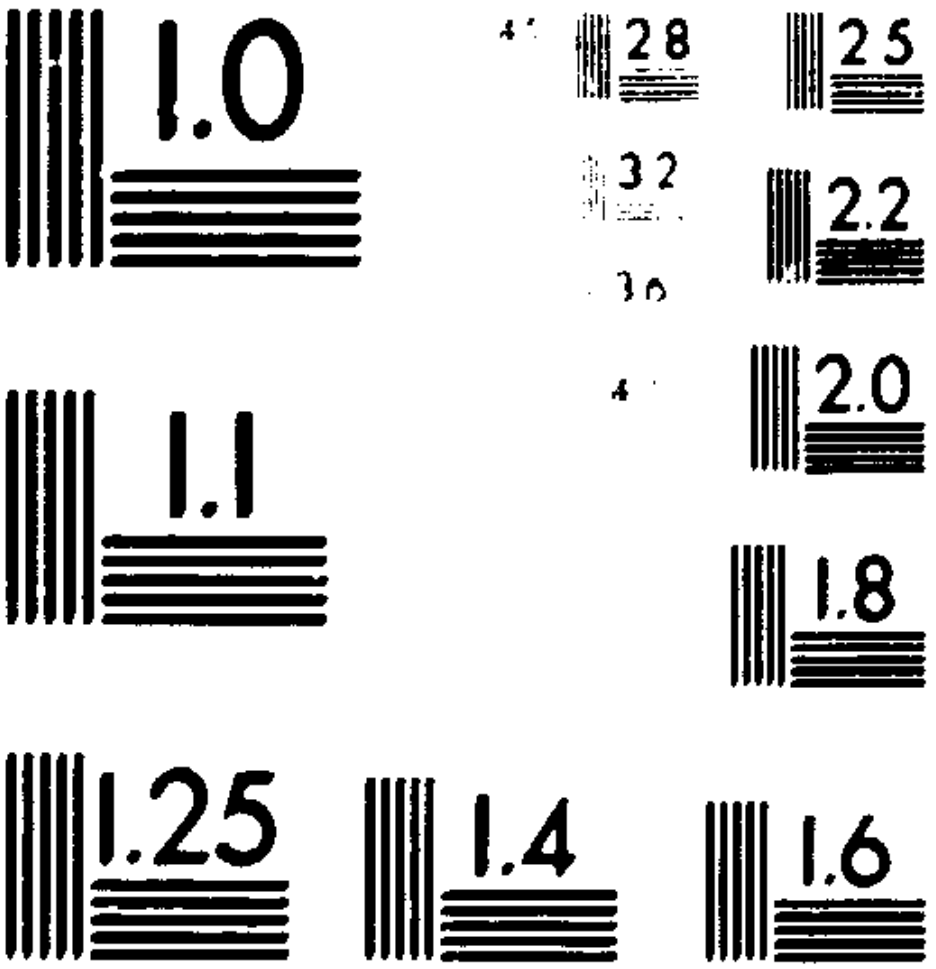

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AGRO-FOOD INDUSTRIES: A COMPARATIVE INTERNATIONAL TYPOLOGY OF PERFORMANCES AND PROSPECTS..

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Chapter I

The agro-food industries in the Developed Market Economies (DME)

I.1 Recent trends in industry growth and food consumption in DME's

At the beginning of the 1980's the value added by the food and beverages industries of the DME represented about 55% of the world value added of the sector (1). This share is slowly declining with time (Table 1).

Table 1 — Share of DME food and beverage industries in world value added of the sector.

in US$ billions, 1975 prices

	Developped Market Economies		European Centrally Planned Economies		Developing Countries		World	
	1975	1981	1975	1981	1975	1981	1975	1981
Value added (in billions US$ at 1975 prices)	112	132	58	68	26	38	196	238
Share of value added (%)	57.3	55.4	29.1	28.6	13.3	16.0	100.0	100.0

Sources of estimates: -U.N., CTC, Transnational Corporation in Food and Beverage Processing, New York, 1981, p. 5
-U.N., Yearbook of Industrial Statistics, 1981 edition, Vol. 1, New York, 1983.

Inside the DME, the food and beverages industries of the European Economic Community (EEC), United States and Japan do represent about 90% of the value added of the group.

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(1) World excluding China and centrally planned developing economies of Asia. China represented, in 1981, 5% of gross output of Food and Beverage industries in DME at 1981 prices. Applied to the value added of 1981, at 1975 prices, this ratio does imply a decrease of the share of DME from 55.4 to 55.9% of world value added in 1981.

The EEC industry is the more important, compared with the United States and Japan, in terms of value added and employment. (Table 2)

Table 2 Basic comparative data for food and beverages industries in DME (Average 1977-1981)

	Value added in billions US dollars	Number of employees (1000)
E.E.C (a)	77.1	2.124
United States	64.5	1.540
Japan	27.3	1.060

(a) Excluding Ireland, Greece and Luxemburg.

Source: U.N. Yearbook of Industrial Statistics, 1981 Ed. N.Y. 1983, with data converted in US$ on the basis of DM yearly conversion rates.

In the 1970's the DME's food and beverages industries have grown at a rate slower than during the 1960's: the average rate of growth between 1969 and 1981 has been 3.0% against 4.1% between 1960 and 1970. But during the 1970's the food and beverages industries (ISIC GROUP 311-313) have grown at a faster rate than the manufacturing sector as a whole (total manufacturing = 2.7%), whereas it had been the contrary for the years 1960-1970 (total manufacturing = 5.9%). (2)

However Japan is an exception. In Japan the rate of growth of food industries has been much lower (1.3%) the the DME average, and much lower than the rate of growth of total manufacturing output due to the high level of the latest: (4.1%) this point will be examined later.(3) In North America and Western

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(2) Sources: U.N., Y.I.S., 1981 Ed. 1983, p. 625; UNIDO/ICIS 65, 1977, p. 19; World Bank, World Development Report 1982, p. 115.

(3) This phenomenon is partly linked with a statistical problem due to the exclusion of small scale enterprises from industrial output statistics.

Europe the evolution, is linked with the behaviour of food industries relatively to total manufacturing in a period of huge economic fluctuation and slow industrial growth: consumer good industries have had a slow but steady pace of growth through the 1970's, whereas total manufacturing has been affected by cyclical fluctuations: more rapid expansion between 1969-1973 and 1976-1979, but severe recession in 1974-1975 and 1980-1981.

This evolution entailed a stabilization of the share of the 311-313 ISIC group around 10% of the total manufacturing output, in the U.S.A., E.E.C. and Japan, whereas it had continuously declined from 1950 to 1970.

The slow but steady rate of growth of the food and beverages industries in DME is partly derived from the slow rate of growth of food consumption expenditures in DME: it ranged from 0,5 to 2% in most of the high income OECD countries between 1968 and 1978, where it was of course always inferior to the rate of growth of total consumption expenditures (by 40 to 60%). The well known low income elasticity affecting the weight of food products in total consumption expenditures has continued to play in the 1970's, reducing progressively their share to about 20%-25% in most high-income DME. (4)

Food industries are indirectly affected by the growing importance of services in consumer expenditures, because of the increasing place of catering expenditure in total food expenditure. For instance the share of restaurant and catering service in total food expenditure in Japan jumped from 7 to 15% between 1965 and 1975, trasnassing the level of the United Kingdom, which is looked as having an "advanced" profile in this respect (12% in 1960, 13% in 1980). (5)

Nevertheless, the rate of growth of food industries in the 1970's, stayed as before, above the rate of growth of food expenditures, because the trend toward a higher degree of industrial transformation and value added in the food

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(4) OCDE, Comptes Nationaux des Pays de l'OCDE, 1961-1978, Paris 1980.

(5) OCDE, Evolution du Système alimentaire du Japon au cours des annès 80, DAA/1792/CT/RUR/221, 1982, p. 8

basket continued. In Germany, for instance, the share of food industries in food spendings has increased from 36% in 1960, to 41% in 1970 and 44% in 1980. (6)

In high-income DME, the slow pace of growth of total food consumption and the apparent stability of the share of different food groups in total food spendings do not preclude changes in the structure of food demand. The increasing share of industry processed foods in total food consumption is linked with these changes, though differenciation and subtitution inside every food group, in favour of products with a high industrial value added. In the United Kingdom, for example, the share of different food groups has been fairly constant in total household food expenditures between 1960 and 1980. But inside every group there has been an important shift toward foods with a higher value added, including more industrial transformation and/or services: breakfast cereals are expanding whereas bread is receding, sugar confectionnnery does increase but sugar is diminising, beef does regress but pork and poultry meat are expanding, etc. (Table 3)

These products have an income elasticity which is much higher than the food group to which they belong: in U.K. between 1972-1977 the income elasticity for frozen vegetables was estimated to be 0.75 against 0.14 for the vegetable group as a whole. (7)

In France in the dairy products group, between 1974-1979 concentrated milk has diminished by 37%, milk has increased by 8%, but yoghourt and cheese have progressed by 19% and dessert and ice cream by 30%.

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(6) W. CROSSKOPF, Ajustements structurels des industries alimentaires en République Fédérale d'Allemagne, OCDE, Paris, 1982, p.2.

(7) DAFSA, Les Industries de la Surgélation en Europe, Paris, 1980, p. 9.

Table 3 The evolution of different food groups in food spendings and the evolution of specific food items in food groups: U.K. 1960 - 1980

	1960	1970	1980
Bread and cereals (% of F.E.)(i)	13	13	13
White bread (Indice)	114	100	68
Breakfast cereals: (Indice)	66	100	124
Meat and meat products (% of F.E.)	27	27	28
Beef, veal (Indice)	118	100	97
Pork "	71	100	146
Poultry "	35	100	133
Dairy products (% of F.E.)	15	15	15
Milk (Indice)	104	100	89
Other "	89	100	104
Sugar, preserves, confectionery (% of F.E.)	10	9	10
Sugar (Indice)	105	100	66
Beverages (% of F.E.)	6	6	8
Soft drinks (Indice)	79	100	194

(i) F.E. = Food Expenditures

Source: D. MORRIS, The Food Sector in the context of the U.K. Economy, in J. BURS, ed. The Food industry, Heinemann, London, 1983, p. 21-23

I.2 Patterns of growth and structures of food industries in DME's

Because of these changes in demand, there is therefore much room for industrial dynamism in the food sector, despite its decreasing share in total consumer expenditure.

These changes in demand are generally explained by the action of interdependent factors which converge to enlarge the market size for time-saving, sophisticated and high quality convenience foods in DME: increasing real household incomes, increase of home equipment (deep freezing units, micro-wave oven, etc.), changes in work participation of women, the growing importance of suburban housing and private transportation, the shift in distribution channels toward multipurpose general foodstore, etc. With different

emphasis, all are pinpointing in the same direction: the relative growth of industrial value added in food spendings is linked with the transformations of the global development framework which have, since World War II, deeply modified the economic and social conditions of living in D.M.E.

However the level of industrial value added in food spending is not a simple function of the general development level (measured by GNP per capita) nor of the level of women participation in economic activity. It is influenced by specific historical conditions which have hindered or stimulated the rise of industrial value added in food spendings.

Japan has a GNP per capita which is 20% higher than in U.K. (1980 figures) and a women rate of activity which is also higher than in U.K. (an average of respectively 56.1% and 54.3% for the period 1972-1981). (8) But the proportion of processed foods in total food expenditure is only 50% in Japan against 85% in U.K. (9) Moreover the most important difference lies in the nature of processing: in Japan until very recently, food processing has been ensured by very small scale workshops. In 1979, the number of food processing establishments was 14 times superior in Japan compared with UK for a total value only 1.8 higher; the average number of employees per enterprise was 8 times smaller.(10) That means that Japan, as a DME, has for a very long period of time, maintained a largely non-industrial answer to the problem of an increasing rate of food processing. Despite of a very high level of industrialization, a complex set of factors has limited the activity of industrial enterprises in the field of food transformation.

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(8) EUROSTAT, Review 1972-1981, Luxemburg, 1983, p. 117

(9) Y. ONO, Evolution de système alimentaire du Japon pendant les annés 80, OCDE, DAA/1792/CT/RUR/224, Paris, 1982 and
D. MORDUE, The Food Sector... op. cit., 1983, p. 20: for U.K. the figure does include slaughtering (70% if excluded).

(10) Calculations made from the date of U.N., Y.I.S, 1981 ed. N;Y, 1983.

The British experience is an extreme case in the opposite direction. If the U.K. has the highest share of industrially processed food in food spendings among DME's, this is linked with historical features which have provided exceptionnal opportunities for the development of large industrial enterprises in the food sector. The free-trade approach in agricultural and food policies since the mid XIXth. century has opened the British market widely to cheap overseas agricultural imports. Compared with other European countries, this has sharply reduced the share of national agricultural output in food expenditures. But it has fostered the growth of large enterprises, located near the import areas, able to benefit fully from economies of scale at the level of inputs (world scale for raw materials supplies) and at the level of output (national size of the market). Large industrial enterprises have therefore known a precocious development in the U.K. food sector and have had a greater weight in food spendings than elsewhere in Europe. (11) After Second World War, they were in a good position to shape the adaptation of the food pattern toward more convenience foods required by the transformation of the global development framework. They have consequently been able to increase further their share in food spendings and to play an active role in the slow but positive growth of the latest.

The U.S experience is relatively similar to the British one, even if the historical conditions have been different. In the U.S.A. large food enterprises could develop also precociously and benefit fully from economies of scale at least in the field of semi-processed products. Until World War I, they were confronted with a very diversified market at the stage of final consumption, given the multinational features of urban food patterns.

But the inter war years were extremely active to reduce that handicap and promote convenience foods with a high level of industrial value added at the final stage. They were as innovative as to promote a real new pattern of food consumption, which became a "new frontier" for the food industry. The latest was consequently in an outstanding position to promote a food pattern adapted to the changing conditions of living after World War II. (12)

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(11) J. BURNS, A synoptic View of the Food Industry, in J. Burns, ed. The Food Industry, Heinemann, London, 1985, p. 10-13

(12) UNIDO, The Changing World Industry, Vienna, 1985, Ch. IV.

The British and North American experiences do indicate the importance of the role of supply structures to shape the evolution of food expenditures toward a higher industrial content. They are not simple national success stories of the food industries. They have played a pionneer role in what is generally looked as the modernization path of the DME food pattern. Moreover British and U.S. food industries have together a dominant position among the DME as a whole. In the mid 1970's among the 100 largest food enterprises of the DME, 48 were U.S. based with 52% of the total DME turnover, and 23 were U.K. based with 22% of the DME turnover. (13)

The U.S. and British food industry structures are therefore more mature ones, and their development structures does thrown some light, and exert some demonstration effect and influence (in technology and product and marketing strategies) upon the behaviour of food industries in other DME under-going the same modernization process.

In the two countries the concentration ratio in food industries is very high and above the average industry level. In U.K. the concentration ratio at the sales level has been estimated recently at 74% for the 5 largest enterprises (C5, 1977), against 65% for the manufacturing sector as a whole. (14) Due to the early development of large enterprises in the food sector in U.K. the difference was still larger in 1958 (68% and 55% respectively). For 60 of the most important food products, 37 (representing 62% of total sales) were produced with a C5 concentration ratio above 70% (1977).

In the United States, in 1977, the average concentration ratio for the 4 largest enterprises (C4) in the food sector was 50%. for 47 food categories (listed according to the IST classification), 26 had a C4 above 50%, among which 17 had a C4 above 60%. (15) Between 1947 and 1977 the number of food enterprises has diminished by 50%.

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(13) UNIDO, ICIS. 65, 1977, p. 42

(14) B.C. WATTS, Ajustement Structurel des industries alimentaries au Royaume Uni, OCDE, Paris, 1982, p. 25-31

(15) J.M. CONNOR, Ajustement Structurel des industries alimentaires des Etats-Unis, OCDE, Paris, 1982.

In the two countries the concentration ratios of the food industry is well above the level one does recognize as critical for substituting cooperation among firms and oligopolistic behaviour to competition.

Table 4 does shown that for 18 comparable food items, the level of concentration is in general much higher in the U.K. than in the U.S.A. (16)

Table 4 Share of the largest enterprises in food sales (in %)
Comparison between U.S.A. and U.K. 1977

	United Kingdom			United States	
	C_3	C_5	(i)	C_4	(i)
Flour and milling prod.	79	86		42	
Breakfast cereals	85	91		81	
Bakery products	76	81		57	
Biscuits	60	80		61	
Ice Cream	68	90		66	
Sugar	86	100		67	
Chocolate products	65	84		72	
Frozen fruits and vegetables	56	78		35	
Coffee	65	93		65	
Sausages and canned meat	-	54		22	
Fish frozen products	-	73		26	
Poultry products	-	56		29	
Milk	-	53		66	
Butter	-	72		30	
Cheese	-	79		45	
Soups and baby foods	-	79		68	
Oils and fats	-	89		53	
Beer	-	41		66	
Ice Cream	-	90		66	

Source: B.G. WATTS and J.M. CONNOR, op.cit.,OECD, 1982.

(i) C_3, C_4, C_5: Concentration ratios for the 3,4,5 largest firms.

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(16) For most products the difference can not be explained only by the difference in concentration index (C_5 and C_4); moreover for a majority of products with available data, C_3 is higher in U.K. than C_4 in the U.S.A.

Despite the large differences in the size of national markets, huge discrepancies in concentration ratios can not be explained merely in terms of economies of scale. In both countries for most products, concentration ratios are well above the optimal size defined by technological norms at the production level, and are much higher at the enterprise level than at the establishment level. (17) In countries with much similar food industry structures, the pattern is the same: in Canada, where foreign firms, especially U.S. and U.K. firms play an important role, the C_4 concentration ratios at the enterprises and establishment levels are respectively 55.4% and 27.5% (1978). (18)

Economies of scale of technological origin have provided a direct contribution to economic concentration in certain semi-processed food products (sugar, grain milling, vegetable oils) at early stages. General development conditions were especially favourable in U.K. and U.S.A. to stimulate the use of their full potential by large enterprises. The latest were then in a good position to increase further their market shares through mergers and to alleviate competition pressures in sector with homogenous products through branding and active marketing. In these sectors, technological economies of scale have therefore often played only a role of "starter" in the formation of oligopolistic structures. In the field of new industrial food products (soft drinks, breakfast cereals, chewing gum, chips, etc.) at an early stage, economies of scale were more important in marketing and sales promotion than at the level of production, whereas these sectors had, from the beginning, highly oligopolistic or even monopolistic structures.

Convergent tendencies led therefore to the consolidation of highly concentrated structures in the U.S.A. and the U.K. food sectors. Consequently after World War II competition strategy through systematic product differentiation became the main factor to shape the evolution of the food industry in these two countries. It required simultaneously large investments to conquer a large

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(17) J.M. CONNOR, The United States food and tobacco manufacturing industries: market structure, structural change and economic performance. United States Department of Agriculture, Washington D.C. 1980.

(18) P.K. GORECKI, L'ajustement structurel du secteur canadien de l'alimentation et des boissons, OCDE, 1982, p. 6-7

of the potential market and costly promotion campaigns to ensure
---opriate outlets to the new products in order to benefit fully from
advantage of large-scale production. From the point of view of
.facturers the process of control over the market through increased
-packaging, branding and advertising on the one hand, and the higher
.els of production capital intensiveness and the incidence of largely
.d promotional cost on the other, became self-reinforcing. (19)

Large firms expansion rooted upon their capacity to launch permanen-
high-value added new products, the huge investment level required by
latest being also the best barriers to entry.

Market dominance was therefore the rule for new industrial food pro-
.ts, whereas large firms tended also to increase economies of scale of
products management through diversification accross product lines and
.l sectors.

Because of the links which exist between the large firms strategies
countries with a mature food industry and the evolution of the food
.sumption pattern, it can be expected that to the apparent stability of
.l spendings among different food groups (see Table 3) does correspond
apparent stability of the contribution of the different food indus-
.es to the sector as a whole. In the United States, for example, in
period of continious innovations and changes in food products and
.its, the share of the different food branches in total value added
remained fairly stable between 1967 and 1977. (Table 5)

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(19) S. HOWE, Competition and Performance in Food Manufacturing,
in J. Burns, ed. The Food Industry, op. cit. 1983,
p. 103-107

Table 5 Evolution of different food branches in total value added of the United States Food industries (%)

	1967	1977
Total food and beverages	100.0	100.0
Meat products	13.3	13.3
Bakery products	13.1	12.6
Sugar and confectionnery	7.1	7.4
Fats and oils	3.4	3.3
Beverages	17.9	17.6
Preserved fruits and vegetables	12.2	13.7
Dairy products	13.2	10.0
Grain Mill Products	10.6	11.8
Miscelaneous Foods	8.9	10.3

Source: Statistical Abstract of the United States, 1982-1983, p. 772-73.

The role of large food enterprises in U.K. and the U.S.A. is a central piece of the food industries in DME. It shows a close interdependency between the rise of industrial value added in food expenditures and the strategy of firm expansion through product differenciation in a highly concentrated sector. This rise of value added is largerly independent of any increase in the nutrient value of food: it depends entirely upon the ability of enterprises to incorporate successfully "services" in the industrial transformation of the product. (20)

Large food enterprises in the U.S.A. and U.K. have therefore been the key agents and the pionneers among DME's of a highly industry mastered answer to the need for a greater degree of food transformation. This answer was not automatically determined by a high degree of industrialization as we have seen in the case of Japan.

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20) A. AUSBY, The Economic environment of the Food Industry, ibidem, 1983, p. 52-55

Because of their ability to shape changes in demand (in an otherwise slowly growing sector) along the requirements of dynamic growth in industry, their strategy became dominant or imposed itself as a model to ensure a leading role of the food industries in the transformation of the food chain in DME's.

I.3 Innovation and technological change

The key role of product differenciation and diversification in increasing the industrial component of food consumption in DME's does influence heavily the pattern of innovation in this sector. Innovation in fast expanding food products, with a high industrial value added, is a complex process in which technological change is only a part. Large U.S. and U.K. corporations have largely set the standard strategy for corporate product planning, which is reproduced, with some degree of variance, by emerging large food corporate enterprises in other DME's.

The elaboration of a new product does require a global strategy where three sequences can be distinguished: the identification of a potential market through the careful analysis of consumers needs, behaviours and changing environment (product concept), the realization and testing of a prototype and the effective promotion of the new product through appropriate advertising and marketing techniques. It is a lenghthy process (between an average 40 months for retorted and hot filled products, and 55 months for frozen and dry mix products), which requires synergistic efforts between a large number of corporate teams. (21)

In this context, the cost of innovation does lie much more at the level of marketing than at the level of production. Corporate strategies of planned growth are relying upon a rapid turnover of new products (in the U.S.A. large corporations launch an average 5.000 "new" grocery products every year) (22);

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(21) R.S. MEYER Eleven stages of successful new product development, Food Technology, July 1984, p. 71-78.

(22) OCDE Les Industries Alimentaires de l'OCDE dans les années 80, Paris, 1983, p. 135.

Germany (F.R.) this number has been estimated at 650 in 1979. (23) This requires a very costly promotion effort to shape the evolution of consumer demand in accordance with the rythm of planned innovation. At the same time innovation itself does often consist in a creative application to food products of techniques which have been developed in other industries or research fields (chemistry, plastic packaging, colorants, additives, biological research). This cost of innovation is therefore largely a kind of externality for food industries. This is well reflected by the relative weight of R. and D. expenses and advertising expenses in the food industries of the two countries which have pioneered the corporate led industrial food patern. In the United States, in 1980, mass media advertising expenses (which represented around 35% of total advertising expenses) of food industries, amounted to 5.5 times their R. and D. expenses. The latest represented 0.7% of value added against 5.7% for the manufacturing industry as a whole), whereas total advertising expenses amounted to 13% of value added. (24) This proportion was much higher for fancy products like breakfast cereals and soft drinks.

In the U.K. it can be estimated that in 1976-1977, T.V. and newspaper advertising expenses represented 3 times the R. and D. expenses of food industries. (25) However given the leading role of U.K. enterprises in the elaboration of industrial food products, industrial food research workers represented 30% of the total EEC workforce engaged in this activity (with 1/3 in private research companies and bodies). In 1980 the total EEC R. and D. expenses in food industries amounted to 0.5% of their value added, and represented 2/3 of the U.S. food industries R. and D. expenses. (26)

The last 20 years have seen a large flow of innovations and technical changes which have all helped to increase the share of industrial value added in the slowly expanding food consumption in DME's.

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(23) W. GROSSKOPF, op. cit., 1982, p.11

(24) United States Statistical Abstract, 1982-1983 ed., p. 567-568, 595, 773.

(25) S. HOWE, op. cit., 1983, p. 108-109.

(26) Commission of the European Communities, Food Industry in the European Economic Community, Brussels, 1981, p. 80.

A first type of innovations is linked with further extensions of industrial processing along the food chain. This has been the case in meat industries. They have benefited of technical improvements in transport and packaging (multi-temperature vehicles, oxygen and moisture barrier, plastic films and vacuum packed products). This has stimulated the substitution of industrial second transformation in large plant near production areas, to handicraft processing at the level of distribution and therefore induced a reduction of non industrial costs (including transport) in final products.

Another less known case is the application of irradiation techniques to perishable food products in order to extend their shelf-life before spoiling (meat, fish, seafood products, fruits and vegetables), through the destruction of insects and microorganisms. Irradiation is also applied for processing heat sensitive foods (certain flours). (27) Since 1970 an increased number of products are allowed to irradiation (potatoes, onions, strawberies, pepper, wheat flour, poultry, shrimps) in many DME's. The widespread use of the technique is limited by existing regulations (in the United States for instance) by psychological resistance in consumer's opinion, and by the high fixed costs of equipment: in France it was estimated in 1980 that the optimal size for onions irradiation treatmant was 1[illegible] T/h. (28) By its very nature irradiation requires industrial size and does represent an extension of industrial techniques (sometimes in association with freezing techniques) to new fields in the food chain.

A second type of innovation is derived from a "package" application of new techniques which have helped to increase in different food branches the number of products which answer ot the norms of typical and standardized industrial products.

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(27) E.S. JOSEPHSON, An historical review of food irradiation, in "Irradiated Foods-A report by the American Council on Science and Health, Summit, New Jersey, 1982.

(28) APRIA, Les Technologies des industries agro-alimentaires. Progrès récents et perspectives, Paris, 1981, p. 37-52.

This has been the case with the techniques combining ultra-high-tempera-re processing and asentic packing which originally provided long-life milk · were in the 1970's increasingly applied to other products. Aseptic ackaging has many-sided effects in reducing non-industrial costs (energy; ransport, package and storage savings). It has been applied progressively a large number of dairy and non-dairy products (yoghurt, ice cream mix, ipping cream, process cheese spread, fruit juices, tomato juice, etc.). is innovation is mainly linked with the rise of the corporate model in d processing in Western Europe and Japan (in the field of carton packs, s, sachets and cans, 15 of the largest manufacturers are European, 4 are ericans; in the field of pouches Japanese and European sales represented of D&E's sales in 1980). This feature is attributed partly to the fact at in 1970's Japanese and European food enterprises were more energy and ransport saving oriented than their American counterparts.(29) Another se will be mentioned only briefly: the recent development of food extrusion chnology which has boosted the range of cookies, and snack products.

A third type of innovation has probably played the most important role the last 15 years in the D&E's food industries. It is aimed at increasing industrial yield of raw materials, and at finding new outlets for tradi-nal agricultural or food products, through the increase of high industrial lue added by-products.

The most famous example is the increasing outlet given to corn products, th the conversion of corn starch into high fructose corn syrup (HFCS) through use of immobilized glucose isomerose. In the U.S.A. the role of isoglucose a sweetener has gained more and more importance since the 1970's. At the me time new ranges of utilization for corn production were opened through transformation of starch in ethanol.

Many significant changes, in recent years, have affected the transforma-on of milk and considerably enlarged the production of non-fat milk (NFM) -products. Caseins, caseinates and co-precipitate protein products have ined a considerable importance as functional ingredients in formulated od products. In the United States in 1980, 76 million lb. of casein and aseinates were used for human food applications (mainly for imitation cheese

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(29) E.R. WEIDRAL, Overseas Influence on U.S. Food Technology, Food Technology, November, 1981.

and coffee whiteners), and 52 million lb. were utilized in non-food applications: animal feed, medical and speciality products and industrial products (glues, paints, cleaning agents). Whey products do play a determinant role in the utilization of milk by-products by other food and non-food industries. In 1982 in the U.S.A., 308 million lb. was used in animal feed manufacture, and 476 million lb. were utilized in human foods (bakery, dairy, prepared mixes, soup, processed meat).

In the last five years new progresses in the techniques of ultrafiltration have open new fields for the utilization of whey protein concentrates (WPC) in meat products, carbonated beverages, fruit juices, and medical and pharmaceutical products. (30)

At the same time whey ultrafiltration permeates allow to increase considerably the rate of lactose recovery, and the production of alcohol and yeast protein. The outlets for WPC in the United States is expected to increase from 35 million lb. in 1982 to 300 million lb. in the next several years. (31) New ultrafiltration techniques do also allow to increase the diversification of industrial cheese products and cost reduction. (32)

Another well known case is the extension of the role of soya products as functional ingredients for human food products, through the development of spinning, extrusion and steam-texturization processes for soy proteins. Soy proteins processing is also a good case of application to food industries of well mastered techniques in other industries in order to create new food industrial components with new fields of application. Four basic soya products (full-fat protein products, defatted soy protein qualities, soya concentrates and soya isolates) do allow to supply a large number of components (baking products, soya flours and milk, soy spun protein) which can enter in the production of many final food products (biscuits, cakes, chocolate spreads, ice cream confectionnery, bread, meat products). (33)

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(30) C.V. MORR, Production and Use of Milk Proteins in Food, Food Technology, July 1984.

(31) R.R. ZALL, Trends in whey fractionation and utilization. A global perspective. Proceedings of the Am. Dairy Sci.Association Meetings, Madison, Wisconsin, 1983.

(32) M. MAMET, J.L. MARGOIS et al. Elements de fabrication de fromages frais par ultrafiltration, La technique laitière, 1982, N° 961, p.9-15.

(33) Soy products in foodstuffs, Food Processing, October 1983.

This third type of innovation has important effects on the structures and features of the food industries in DME's. It increases considerably the intrasectorial links among the different industries, which are becoming much more interdependent with each other for the supply and demand of food components and ingredients. On one side this evolution does entail a continuous rise of the share of industrial transformations of basic foodstuffs, an increasing share of industrially processed raw materials in the intermediary consumption of food industries, and an increasing role of intermediate demand in comparison with final demand for the output of many food industries. On the other side, these components and ingredients are competing with each other as substitutes, (a well known case being the competition between soya and milk proteins), most of the time according to the evolution of relative prices. That means that if the production of new ingredients does play an important role in the growth of some food industries, they are in a less favourable position to control price formation in the sales for intermediate consumption than at the level of final demand. One answer to this contradiction has been to increase the specification of fundamental properties and performance, in order to reproduce the pattern of growth through differenciation at the level of intermediate demand. One example of it is the extraordinary diversification of starches each being marketed with highly specific properties: cold-water solubility, viscosity without detectable gel-structure, delayed-action viscosity development, freeze-thaw stability, etc. (34)

Another way of evolution could be in next years new patterns of diversification accross different branches of the food industries, which would allow to some large enterprises a better control over the competing outlets of substituable components.

Meanwhile, the present situation can entail pressures for adjustment between different food industries, which have, at the same time, international aspects. This is the case for the valorization of U.S. corn by-products.

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(34) R. BLANCHFIELD, Technological Change in Food Manufacturing and Distribution, in J. BURNS, ed. op. cit. 1983, p. 90-95.

The increasing role of isoglucose in the United States will require, with time, adjustments on the world sugar market and pressures upon the EEC sugar output. In most EEC countries the latest is oriented mainly toward intermediate consumption by food industries (2/3 of sugar output), a situation which could be modified by increased isoglucose utilization which represents for the moment only 50% of the U.S. level. (35)

The increased output of corn starches in the U.S.A. does increase also the supply of gluten feed which can not find appropiate outlets on the American market of animal feedstuffs and need to find new export markets, especially to the EEC and Japan, a feature which can affect lastingly the sources of animal feedings in the latests.

A case in the reverse direction is the production and consumption of milk proteins. EEC, New Zealand and Australia do supply respectively 50% and 35% of the world output of caseins and caseinates, and share together 90% of the U.S. imports which have increased by 50% in the 1970's and did represent in 1980, 30% of the world output. (36)

A fourth and last type of innovation is closer to the classical technological changes which occur in all industrial sectors. It is linked with the search for economies of scale and increasing productivity factors, and does entail in general a higher capital intensity. Many different technological changes have worked in this direction since 1970. Optimum plant sizes have in many food branches reached higher levels with concomittant extension of the batch processes, fluidized bed processes, and microprocessor-controlled processes. This phenomenon is generally accompanied by a reduction of the number of establishments and workers, and by an increase of the average number of employees, and value added per establishment, and of capital, and value added per worker.

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(35) DAFSA, L'industrie européenne du Sucre, Paris, 1981, p. 34.

(36) USDA, U.S. casein and lactalbumin imports: an economic and policy persnective, Report AGESS 810521, U.S. Dept. of Agriculture, Washington D.C. 1981.

Due to the specific features of the food industries, (slow but steady growth and no violent fluctuations) these aspects can be tempered by continious corporate led diversification which induce more capital-using, but not necessarily labour-saving innovations. The rate of growth will therefore affect the prevailing effects of innovation and technological change: a higher rate of growth will be linked with the prevalence of expansion effects through diversification, whereas a slower rate of growth will entail the prevalence of labour-saving effects through rationalization. As the years 1970's have been a slower rate of growth of the food industries, in countries with mature food industries not heavily affected by specific or external conditions, the second type of effects has prevailed.

This has been clearly the case in the U.S.A. Between 1970 and 1980, the capital stock per hour worked has increased in real terms by 21% in the food industries against 11% for the period 1960-1970. During the years 1970's, among the 10 most important industrial sectors the food industries are in the only 3 which have seen an increase of their real K/L ratio higher than in 1960-1970. (37) This evolution toward a relatively higher capital intensity is coherent with other indices. Between 1967 and 1977, the food and beverages industries have shown a more rapid increase than the average of all manufacture industries, as far as the ratios employees/establishment (L/E), value-added/establishment (Y/E) and labour productivity (Y/L) are concerned. At the end of the period, they had an average level of productivity which was much higher than the total manufacturing sector average. Moreover, between 1967 and 1977, there has been a reduction of the gaps between the leading branches of the food industries and the other ones for the ratios L/E and Y/E. (Table 6)

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(37) S. HOWE, op. cit. 1983, p. 114

Table 6 United States: compared evolution of the ratios (L/E), (Y/E) and (Y/L) for food industries and all manufactures. (1967-1977)

	1967			1977		
	L/E	Y/E	Y/L (a)	L/E	Y/E	Y/L
Average ratios						
1. All Manufactures	100	100	100	100	100	100
2. Food and Beverages	82	99	119	107	167	156
3. Highest level in food and beverage industries	100	100	100	100	100	100
4. Average of all the other food branches	50	53	64	59	68	64

Calculations made from data in Statistical Abstract of the United States, 1983-1984 ed.

(a) (L/E) number of employees/number of establishment
(Y/E) value-added/number of establishment
(Y/L)= (Y/E)/(L/E)

Capital intensive and labour-saving technological changes have therefore clearly taken the lead in the innovation patterns of the U.S. food industries in employment. In EEC's when the rate of growth of food industries has been still lower the losses in terms of employment have been more important. This is the case for EEC countries, and especially for U.K. where the earlier diffusion of convenience foods has been followed by a relatively more important slowdown of output during the 1970's (heavily affected by the decline of traditional foods), (37) and a more severe adjustment in terms of employment (Table 7).

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(37) S. HOKE, op. cit. 1983, p. 114.

Table - Compared evolution of O (output), L (employment), and O/L (productivity) in food and beverage industries in certain DME's

	U.S.A. and CANADA			E.E.C.			U.K.			
	1969	1975	1981	1969	1975	1981	1960	1970	1975	1980
Output	85	100	125	85	100	115	80	96	100	99
Labour	106	100	101	105	100	98	109	112	100	94
Productivity	80	100	121	81	100	117	73	86	100	105

However, at the time being, differences in pace and patterns of technological changes and innovation do play only a minor role to influence the relative position of DME's in the international evolution of the food economy, comparatively with other features and variables.

I.4 International aspects of the structural changes in DME's food industries

The last 25 years have seen a growing internationalization of the food consumption patterns among DME's, associated with the rise of industrial value-added in the final product, with the pervasive diffusion of the convenience food model initiated in the U.S.A. and U.K., and with capital intensive, optimum scale increasing technological changes.

International trade, international investment and less quantifiable factors, like the demonstration and imitation effects at the level of consumption and production have played uneven roles in this steady and rather non problematic process.

The role of international trade has to be assessed carefully. International trade in foodstuffs and food products has, for most OECD contries, increased its share in their total food consumption spendings. Between 1968 and 1978, the share of food exports relatively to domestic output has increased remarkedly in the United States, Belgium, France, Germany (F.R.),

Netherlands and the United Kingdom. Share of imports relatively to national consumption has risen especially strongly in Belgium, France, Italy and the Netherlands (38). The above listed countries do indicate that a growing role of international trade in food products is especially important in EEC countries.

This feature is heavily linked with the large internationalization process of the food chain inside EEC itself. In 1980, intra-EEC food imports represented 47% of total food imports, and intra-EEC food exports amounted to 65% of total food exports. (39)

The EEC extra-trade in foodstuffs has not a significant different size than in the U.S. (between 8 and 10% of total food sales in the two regions), but the dependence on imports is higher in EEC than in the U.S. (respectively 5.2% and 3.7% of food sales in 1979). (40) The EEC, taken as a whole is a large food exporter (extra EEC food trade do represent in 1980 33% of all OECD processed food exports against 43% for the U.S.)(41), and a net exporter of processed food products: in 1980, exports of the food industry were 30% higher than imports of food industry products. (42) The latest do represent only 4% of processed food sales in EEC, but the import of raw materials used by the food industry are 2.5 times higher. Imports from U.S. cereals and oilseeds products for animal feeding have played an important role in these imports.

Contrary to EEC, Japan has seen a decrease of total international trade in its food consumption during the 1970's. But the structures of its imports have shifted toward more Western type food products, including meat and animal feedstuffs (43) Imports from the United States have here also played a significant role. (Table 8)

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(38) OCDE, La Politique alimentaire, Paris, 1981, p. 24

(39) Commission of the European Communities,
The Agricultural Situation in the Community,
1982 Report, p. 260-261

(40) J.M. CONNOR, Les facteurs qui déterminent les ajustements structurels des industries alimentaires, OECD, Paris, 1982.

(41) Commission des Communautés européens. La compétitivité des industries de la communauté, Luxembourg, 1982, p. 27

(42) Commission of the European Communities,
The Agricultural situation in the Community,
1982 Report, p. 28-29

(43) OCDE, Problèmes des échanges agricoles, Paris, 1982, p. 18.

Table 8 Evolution of imports of food products in certain OCDE countries, 1970-1979

in billions U.S. $

Exporting countries	Importing countries: North America 1970	North America 1979	Japan 1970	Japan 1979	EEC (a) 1970	EEC (a) 1979
North America	1.2	3.8	1.4	7.1	3.0	10.2
Japan	0.2	0.2	-	-	0.1	0.2
EEC	1.1	3.1	0.1	0.9	7.9	40.6

(a) including intra EEC imports

Source: OCDE, Problèmes des échanges agricoles, Paris, 1982, p. 153.

Exports of U.S. food products with a high industrial value added have played a limited role in the rapidly increasing consumption of these products in other DME groups. But international trade has played a more important role inside EEC (including U.K. exports) in the diffusion of industrial food patterns.

The role of international trade has been increasingly important among DME groups for cereals and oil seeds by-products for animal feeding.

U.S. exports of these products are playing a leading role in the intermediary consumption of other DME's, which have reproduced the U.S. techniques of industrial animal feeding and raising, independently of U.S. direct investment in the field. However this trend is more a matter of trade and price policies, especially in EEC and Japan, than the result of a constraint linked with technological dependence or imitation, or even with comparative advantages in resource endowment (especially for EEC).

Large transnational corporations are actively involved in this trade, and it has been recently estimated that 6 enterprises do control 85-90% of world trade of the cereal and soya products. (44)

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(44) OCDE, Problèmes des échanges agricoles, Paris, 1982, p. 115.

International direct investment between EEC has played an important role in the diffusion of industrial food products and technology. Among the 58 largest food corporations in EEC, 35 are from U.S. origin or U.K. based. (45) U.S. large food groups have been particularly active to invest in Canada, and during the 1960's in EEC countries, where the changes in general development structures and the enlarged marked sizes offered optimal conditions for their expansion.

EEC markets gave new opportunities to increase the product life cycle and play therefore an important role in corporate strategies oriented toward diversification and differenciation.

Large European multinationals played also an active role in the shaping of mass demand toward more convenience foods with a high industrial value added. In the field of frozen foods 2 European multinationals shared in 1980 65% of the market in U.K., 55% in Belgium, 60% in Italy (through the joint control of a local affiliate), and one of them detained respectively 40% of the market in Germany (F.R.) and 20% in France. (46)

European multinationals established also ties of cooperation in the field of traditional products where economies of scale favoured concentration. In the case of sugar, for instance, the largest Italian, French and U.K. groups have crossed participations (47).

U.K. multinational enterprises have been actively involved in the evolution of th EEC food industries, even before the entry of U.K. in the Common Market. For instance, during the 1960's, investments in European breweries and beverages industries have been a part of the merger strategy which has entailed the rise of powerful groups in the U.K. beverages industry. (48)

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(45) J. BOMBAL AND PH. CHALMIN, L'agro-alimentaire, P.U.F., Paris, 1980, p.42

(46) DAFSA, Les industries de la surgélation en Europe, Paris, 1980, p. 67-88.

(47) DAFSA, L'industrie européenne du sucre, Paris, 1981.

(48) B.G. WATTS, L'ajustement structurel des industries alimentaires au Royaime-Uni au cours des vingt dernières annés, OCDE, Paris, 1982, p. 8-9.

International investments have continued to be important in EEC food industries during the 1970's. In general, these investments are made more through merging existing local enterprises than though the creation of new ones.

The global result is a rather important participation of foreign investments in the food industries of different EEC countries. It has been estimated that in Germany (F.R.) foreign enterprises controled 15% of assets in the food industries; their share was especially high in oils and fats, processed cheese and concentrated milk, frozen products and during the 1970's investments made by multinational enterprises from U.S. and Swiss origin have taken the lead. (49) In Netherlands the participation of foreign enterprises in food industries has been estimated to an average 11% of sales (50), and in France it is very high in certain industries (margarine, soups, powdered coffee, biscuits and confectionnery). (51) But in no EEC countries the role of foreign investment has reached the level it has in Canada where 33% of sales (52) are made by foreign enterprises. Moreover, in the 1970's large European multinational groups have developed in turn direct investment in the United States, but the weight of foreign investment does remain much less heavier in this country where it realizes only 5% of sales. (53)

Since 1980 two main tendencies have to be underlined. Firstly there was recently a new wave of foreign investment in both directions between the United States and EEC which have involved mergers among extremely important enterprises on both sides.(54) Secondly, U.S. and EEC multinational groups have undertaken investments in Japan through cooperation and joint ventures with large Japanese groups, actively involved in the late expansion of branded industrial food products in this country.

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(49) W. GROSSKOPF, op. cit., 1982, p. 15, 27-28.

(50) E. KLEIN, Les industries alimentaires aux Pays-Bas: Structures et politique des pouvoirs publics, OCDE, 1982, p. 10.

(51) B. FRANCZYK, L'ajustement structurel des industries agricoles et alimentaires en France au cours des vingt derniers annés, OCE, Paris, 1982, p. 15.

(52) P.K. GORECKI, op. cit. p. 11.

(53) OCDE, Les industries alimentaires de l'OCDE dans les annés 80, Paris, OCDE, 1985, p. 17.

(54) The New Food Giants in International Business Week, N° 2861, September 1984, P. 82-103.

Therefore one does assist to a growing internationalization of investment in food industries between the main DME groups.

International trade and investments are not the only vehicles of a growing internationalization of industrial food products and technologies between DME's. In many cases their influence is much more important than their share in total sales and assets because of huge multiplying effects through imitations and demonstrations effects. In food industries, not only technological knowledge can be as in other industrial sectors acquired through licensing and patenting, but moreover technology is often a new field application of processes experienced in other industry sectors. When global economic conditions become favourable to it, large enterprises are expanding from local structures, and reproduce, with some delay, the pattern of growth initiated by U.S. and U.K. food enterprises, combining technological innovation with product strategy. The experience does shown that in EEC, and lately, Japan, large food enterprises have been very dynamic in this respect and have in many cases catch up with the forerunners standards.

Therefore food technologies and products are much more standardized between DME than it could be supposed through the examination of trade and investment flows.

Three situations have to be distinguished, according to the stage of product transformation.

The first stage products: the share of value added in gross output is low but the value added per worker is high in most cases due to important economies of scale and labour saving technology; technology and final product are highly standardized at the international level: international investment is not important, but international trade is important, and due to specific reasons mentioned above, it does entail a structural shift toward a large internationalization of the corn-oil-animal feedstuffs chain among DME's.

The second stage products: the share of value added is higher but value added per worker is lower than in the first case; technology and products are the least standardized among the three groups; and there is also much less internationalization in the field of investment and trade, intra-EEC trade excepted.

The third stage products: most of the variables are at the highest level. The degree of standardization of technology and products are closely linked with the level of international investment but not with the level of international trade between DME zones. The growth of industrial value-added through branding and product differenciation does lead to highly standardized qualities of products in the field of functional ingredients, packaging and technical processing. (Table 9)

Table 9 Food products: estimation of the degree of standardization and level of internationalization among DME in relation with the stage of transformation.

Products and Stages	Share of value added in gross output	Value added per worker	Degree of Standardization		Level of internationalization			
					Trade		Investment	
			Technology	Products	Between DME Zones	Inside EEC	Between DME Zones	Inside EEC
1st.Stage of transformation								
Milk	1	2	3	3	1	1	1	1
Meat	1	1	3	3	2	3	1	1
Sugar	1	3	3	3	1	2	1	2
Flour	1	3	3	3	2	2	1	1
Oils and Fats	1	3	3	3	2	3	1	1
Corn and oil products for animal feeding	1	3	3	3	3	3	2	1
Fruit and vegetable juices and preserves	1	1	3	3	2	3	1	2
2nd.Stage of transformation								
Bread and flour confectionnery	2	1	1	1	1	1	1	2
Meat products	2	2	2	1	1	3	1	1
Animal feedstuff	2	3	2	2	1	3	1	1
Chocolate and sugar confect.	2	2	2	2	1	3	1	1
Dairy products	2	1	1	1	1	3	1	1
3rd.Stage of transformation								
Frozen products	3	3	3	3	1	3	1	3
Biscuits, snacks	3	1	3	3	2	3	3	3
Highly processed dairy products	3	3	3	3	2	3	3	3
Baby and pet foods	3	3	3	3	2	3	3	3
Soups and breakfast cereals	3	3	3	3	1	3	3	3
Soft drinks	3	3	3	3	1	3	3	3
Powdered coffee	3	3	3	3	2	3	3	3
Brewery	3	3	2	2	1	3	1	2
Food ingredients	3	3	3	3	2	3	1	1

(1) Low or very low

(2) Medium

(3) High or very high

However the growing internationalization and standardization of technology and product profiles among EME does not preclude the persistance of important structural discrepancies between countries.

These discrepancies are influenced by many different factors. The pattern of industrial organization, the general economic environment at the national level, differences in national agro-food policies and cultural habits, are all playing a role, often in an interdependant way.

Important differences in industrial organization at the second stage of transformation are playing a particular role to maintain structural disparities between EME. They are linked with persistant specific social and cultural habits rather than with technological backwardness. For instance industrial bakery is much less developed in Germany (F.R.) and especially in France than in U.K. (Table 10).

Table 10 Comparison of the relative importance of industrial bakery products in U.K., France and Germany (F.R.) (1981)

Countries	Share of bakery and flour products in food consumption (%)	Industrial bakery Output (1.000 T)	Industrial bakery Employment (1.000)
United Kingdom	8.4	2.250	129
Germany (F.R.)	10.0	1.480	55
France	10.2	50	12

Source: DAFSA, Les industries européens de la biscuiterie et de la panification, Paris, 1983.

The persistance of small-scale, highly specialized food enterprises, in the second transformation stage is of peculiar importance to maintain structural differences between EME. At the end of 1970's, in U.K. food enterprises with less than 1.000 employees supplied only 27% of employment and 31% of value added; in France, enterprises with less than 500 employees represented still 57% of employment and 59% of turnover, whereas in Germany (F.R.), they participated to 75% of sales.

In Japan the overwhelming weight of small scale enterprises in the food sector is linked with the large predominance of second transformation products in food consumption and with the persistance of semi-industrial or even handicraft processes at the first stage. Large industrial enterprises are leading the shift toward a growing consumption of convenience foods with highly standardized and internationalized products and technology at the third stage of transformation.

This situation does entail altogether the persistance of important structural differences between Japan and other DME, with huge structural discrepancies amidst types of enterprises in Japan itself. (Table 11)

Table 11 JAPAN: Some compared features of large and small food enterprises

	Large enterprises		Small enterprises	
	1978	1981	1978	1981
Fixed assets/employee (1.000 ¥)	2.920	3.700	1.106	1.347
Profit/assets in %	7.8	7.2	3.8	1.6
Profit/sales in %	4.0	3.6	0.6	0.3

Source: Japan Statistical Yearbook, 1985.

Differences in the general economic environment at the national level can also entail persistent structural differences among the compared level of some economic indicators in the food industries of different DME. For instance, U.K. food industries have a comparatively low level of productivity (measured by the value added per worker), which does contrast sharply with their relative advance in terms of product technology and strategy. In their case there is a clear-cut reverse relationship between the degree of concentration and the level of economic efficiency. This feature has been heavily influenced by a specific national environment which resulted in a general low level of wages and productivity. Merging initiatives have been stimulated by a favourable law environment and have not been followed in most cases by economic restructuring, at least until the 1970's. However the British food industry is a comparatively profitable sector in respect with other manufacturing industries in U.K. (55), even if it does not reach

(55)B.C. KNITS, OCDE, Paris, 1982 op. cit.

the average international standard of other DME, in terms of non wage value added (Table 12).

Table 12 DME: international comparison of value-added per employee (Y/L), wages and salaries per employee (W/L), non-wage value added per employee (Y-W/L), and quantity of electricity consumed per employee (proxy of K/L) (average 1977-1981)

	(Y/L) (1.000 U.S.$)	(W/L) (1.000U.S.$)	(Y-W/L) (1.000 U.S.$)	(K/L) 1.000 KW.h.
United States	42	13	29	-
United Kingdom	22	8	14	10
Germany (F.R.)	50	15	35	16
France	45	14	31	17
Netherlands	35	16	19	22
Italy	29	10	19	21
Belgium	43	13	30	17
Denmark	35	18	17	17
Sweden	37	13	24	21
Japan	26	9	17	6

Sources: Yearbook of industrial statistics, different years.
-EEC, Doc. III/100:81-EN, 1981.

Finally persistant structural differences among DME can result also from specific policies at the national or regional level. The structure of output of the food industries does not reflect only the evolution toward a supposed relative similar distribution of food spendings between different food groups (see p. 4-5). It is also affected by active policies to create or support some advantages in exports: this does entail for instance large differences in the relative weight of grain milling products and sugar in U.S.A. and EEC industries. Combined with persistant cultural differences (the case of beverages in EEC and again the general food structure in Japan), these elements do lead toward rather important different in the shares of different food industries (Table 13).

Table 15 Compared shares of different food industries in total value added of the sector (%)
U. S. A. (1977), E. E. C. (1977), J A P A N (1979)

	U.S.A	E.E.C.	JAPAN
Total Food and beverages industries	100.0	100.0	100.0
Meat products	13.3	11.9	5.9
Dairy products	10.0	12.6	8.1
Preserved fruits and vegetables	13.7	6.0	3.0
Grain mill. products	11.8	2.8	5.6
Bakery products	12.6	9.4	13.5
Sugar and sugar confectionnery	7.4	15.1	3.1
Fats and oils	3.3	3.6	4.0
Beer and soft drinks and alcohols	17.6	25.8	17.9
Miscellaned foods	10.3	12.8	38.9 (1)

(1) including 13.2% of fish products and preserves, 5% for sauces and 12.4% for traditional products.

Sources: U.S. Statistical Abstract, 1982-1983;
EEC, Doc. III/100/81-EN, 1981; OCDE, DAA/1792/CT/RUR/224, 1982.

Chapter II

II.1. Recent trends in food industry growth in developing countries in relation with the level of income and of industrialization

During the years 1970's, the annual rate of growth of food and beverages industries in developing market economies has been much higher (5.8% for the period 1969-1981) than the world average (3.8%), but slightly inferior to the rate of growth of the manufacturing sector as a whole (6.2%). Between 1975 and 1981, the growth of food industries has been higher than total manufacturing, whereas it had been lower between 1969 and 1975. This is associated with a relative slowdown of the manufacturing rate of growth in developing countries at the second end of the 1970's conaratively with the first one (Table 14).

Table 14 Growth of food and beverages industries and manufacturing industries in developing market economies. 1969-1981

		1969	1975	1981	Annual Growth rate
Developing market economies	Food and beverages	74	100	145	5.8
	Total manufacturing	65	100	154	6.2
Caribbean, Central and South America	Food and beverages	77	100	140	5.1
	Total manufacturing	64	100	127	5.9
Developing Asia	Food and beverages	74	100	148	6.0
	Total manufacturing	64	100	140	6.7

Source: U.N. Yearbook of Industrial Statistics, 1981 ed. N.Y., 1983.

In developing market economies with a high rate of industrial growth, the rate of food industries has been in general lower than in other developing countries, comparatively with the average rate of growth of manufacturing, due to the high pace of the latest. This situation has changed after 1979, when the rates of growth of manufacturing have decelerated. In most countries, the growth of beverages industries has been much higher than food industries (Table 15).

Table 15 Growth of manufacturing and food and beverages industries in developing market economies with high rates of industrial growth (*)

Countries ranked according to GNP per capita (1982)	(1) GNP per capita 1982 (US $)	(2) Growth of Manufacturing (1970-1982)	(3) Growth of food and beverages industries (1972-1981)	
		(Annual growth rates)		
			Food	Beverages
Developing Countries		6.2 (a)		
1. Kuwait	19.870	9.5		
2. Saudi Arabia	16.000	6.8		
3. Libya	8.510	14.7 (b)		
4. Irak	-	-		
5. Singapore	5.910	9.3	2.6	7.4
6. Hong Kong	5.340	-		
7. Venezuela	4.140	10.8 (c)	11.2	16.0
8. Algeria	2.350	10.9		
9. Mexico	2.270	6.8	4.1	7.7
10. Brazil	2.240	7.8	5.0 (d)	5.3 (d)
11. Korea (Rep. of)	1.910	14.5	15.1	14.0
12. Malaysia	1.860	10.6	5.2	11.1
13. Colombia	1.460	5.7	5.3	7.3
14. Ivory Coast	950	8.6		
15. Nigeria	860	12.0		
16. Philippines	820	6.6	4.9	5.8
17. Egypt	690	9.3		
18. Indonesia	580	13.4	15.0 (d)	5.3 (d)
19. Kenya	390	9.0	7.0	9.6
20. India	260	4.5	3.8	4.2

(*) The 20 selected countries have a rate of growth of manufacturing higher than the developing market economies average or than their income group average (according to the World Bank ranking).

(a) 1969-1981
(b) 1970-1981
(c) 1972-1981
(d) 1975-1981

Sources (1) and (2) World Bank, World Development Report, 1984
(3) U.N., Yearbook of Industrial Statistics, 1981 ed., 1983.

In the 1970's relative high rates of industrial growth have been reached by developing countries with very different levels of GNP per capita and very different sizes of population.

Therefore in 1980, countries with performances in terms of industrial growth above the average, presented industrial sectors with very different sizes (from 1 to 100) in terms of value added in manufacturing.

The 20 countries represented more than 70% of the value added in manufacturing by all the developing countries in 1980, and the 7 countries with the largest manufacturing sector amounted to about 60%.

The same 7 countries accounted for 44% of value added in food and beverages industries of all developing countries in 1975, and 43% in 1980.

However the features of agro food industries in the 7 countries are very different. The food sector has the largest size in the 2 countries (Brazil and Mexico) with the largest value added in manufacturing: they have in common with other Latin American NIC's (Venezuela) a relatively high level of value added per person employed in the food sector and of processed food sales per capita (Table 5).

The features of 3 Asian NIC's are very different.

In Korea (Rep. of) despite the importance of the manufacturing sector, the levels of processed food sales per capita and of labour productivity in the food sector are below the average of all developing countries.

In the 2 other countries (India and Indonesia) which have the largest population of the 20, the share of the food sector is much below the average, and the levels of productivity and sales of processed food per capita are the lowest.

In some Asian NIC's and Arab oil exporting countries with very high levels of GNP per capita but no significant contribution of the agricultural sector to the GNP (Hong Kong, Singapore, Saudi Arabia, Kuwait, Libya), the level of processed food sales per capita and of labour productivity are very high, but the size of the agro food industrial sector is very small.

Table 16 Developing market economies with high industrial growth: value added in food industries and sales of processed foods

Ranking of countries according to value added in manufacturing (1980)	Value added in manufacturing (billions of 1975) 1970	1980	Value added in food and beverages industries (billions of 1975) 1975	1980 (•)	(2) (1) (%) (of 1980) 1980 (a)	Sales of processed food per capita (of 1975) Total population	Urban population	Value added per person employed (of 1975)
Developing Countries (all)	102.0	202.5	26.00	35.90	19.8	48	116	2673
1. Brazil	20.7	50.8	4.30	5.76	12.7	125	211	8464
2. Mexico	13.5	24.3	2.82	3.55	22.3	145	246	7446
3. India	10.7	16.5	1.19	1.43	8.5	16	48	470
4. Korea (Rep. of)	2.3	10.8	0.50	1.19	10.7	38	69	2595
5. Venezuela	4.1	5.8	1.09	2.22	14.6	254	317	11299
6. Indonesia	2.8	5.6	0.48	1.12	12.5	12	29	335
7. Philippines	2.8	5.6	1.02	1.51	25.9	50	99	2377
8. Colombia	2.0	3.7	0.80	1.02	27.6	98	144	9459
9. Egypt	1.9	3.7	0.36	-	[12.8]	56	123	1595
10. Hong Kong	1.7	3.2	0.11	-	3.6	253	272	6882
11. Malaysia	1.0	3.0	0.24	0.32	21.9	65	134	5370
12. Nigeria	1.1	2.7	0.49	-	21.6	19	54	8517
13. Saudi Arabia	1.7	2.7	0.06	-	[2.7]		221	3765
14. Singapore	0.8	2.3	0.08	0.11	4.3	232	244	5923
15. Algeria	0.8	1.4	0.25	-	[22.7]	57	131	8063
16. Iraq	0.5	1.4	0.14	-	[14.7]	39	69	2808
17. Kuwait	-	1.1	0.03	-	6.5	402	406	8250
18. Ivory Coast	0.3	0.9	0.09	-	[15.0]	35	195	8545
19. Libya	0.1	0.6	0.03	-	[8.5]	177	230	3714
20. Kenya	0.2	0.5	0.14	0.20	37.9	39	197	3512

Sources: UNIDO/IS.93/Rev.1/1982. U.N. ST/CTC/19, 1981; U.N. ST/CTC/24, 1983; U.N., Yearbook of Industrial Statistics, 1981 ed. 1983.

(•) Calculation made upon the assumption that no significant change has occured in the share of value added in gross output between 1975 and 1980.

(a) figures in brackets: estimation based on various sources.

In some African countries (Ivory Coast, Nigeria, Kenya) the very low level of processed food sales per capita does contrast with the high level of labour productivity.

These huge discrepancies do point to structural aspects which have altogether determined very different profiles of development of the agro-food sector in the 20 countries: role of external trade in the food output and sales, evolution of the food patterns and structures of the food industry in relation with overall industrialization, income distribution, firms behaviour and food policies, and finally the links between the food industry and the agricultural sector.

II.2. External trade and food industry profiles in developing market economies with rate of industrial growth.

External trade does affect the food industry profile in three different ways: the relative share of value added of the food sector in total manufacturing, the ratio between food sales per capita and industrial food output per capita and the level of labour productivity.

Exports of agricultural products (including processed or semi-processed food products) played, between 1965 and 1980, very different role in total exports of the countries under study (Table 17).

Table 17 Evolution of the share of agricultural exports in % of total exports in developing countries with high rates of industrial growth 1965-1980

	1965	1970	1975	1980
Brazil	78	72	56	45
Mexico	56	54	34	31
Korea (Rep. of)	25	9	7	4
Indonesia	52	42	12	1
Philippines	60	42	56	31
Colombia	74	81	74	77
Malaysia	49	45	45	28
Nigeria	63	35	5	3
Singapore	42	17	6	8
Ivory Coast	66	72	64	66
Kenya	56	58	50	52

Source: FAO Yearbook of Trade Statistics 1970,1977,1981.

In oil exporting countries with large populations and low or lower middle level of income per capita (Nigeria and Indonesia), which were formerly large exporters of agricultural products, the share of the latest in total exports has dwindled to insignificant levels between 1965 and 1980.

In countries with high rates of growth in the manufacturing sector the share of agricultural exports has been reduced sharply (especially in Korea (Rep.) and Singapore), but stayed anyway relatively at high levels in some of them (Malaysia, Philippines, Mexico and particularly Brazil).

In countries where the share of agricultural exports remained above 50% (Colombia, Ivory Coast and Kenya), the predominant role of export in the agro food sector is associated with high levels of labour productivity despite low levels of processed food sales per capita. In these countries the size of agro-food exports does play a role to exert a constraint on food imports and the external food balance is generally positive.

In other countries, the growth of manufacturing exports or of oil products, has largely alleviated the constraints of the food balance.

During the 1970's there was therefore large room for the growth of food imports in the majority of the 20 countries under examination. They have increased considerably, for almost all food categories, their share in total food imports of all developing market economies (Table 18).

Table 18 Developing market economies food and beverages imports: share of 20 countries with high rate of manufacturing growth in %

SITC CODE		1970	1979
011	Meat (fresh, chilled, frozen)	38	58
022	Milk and cream	39	52
023	Butter	28	39
024	Cheese	36	43
041	Wheat unmilled	59	57
042	Rice	51	62
044	Maize unmilled	54	61
046	Wheat flour	32	43
048	Cereals preparations	46	54
054	Vegetables fresh or simply preserved	43	57
061	Sugar	36	56
062	Sugar confectionnnery	35	46
071	Coffee and sust.	28	59
081	Animal foodstuffs	54	56

Calculated from data in:
Yearbook of International Trade Statistics, 1972-73 and 1980.

Newly industrializing countries have consequently played an important role to stimulate the growth of international trade in food products. The role of oil exporting countries has been particularly significant in this respect(56). Table 19 does shown that the food imports of these countries have "exploded" in the past 1973-74 period (the past 1976-77 period for Mexico) independently of their level of income per capita.

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(56) OCDE, Echanges agricoles avec les pays en développement, Paris, 1984, ch. II and III.

Table 19 Evolution of food imports in countries with high rate of growth in manufacturing in current dollars index 1970 = 100

	1973-74	1976-77	1979-80
1. Oil exporting			
Algeria	232	627	1050
Saudi Arabia	220	750	2138
Nigeria	250	-	2078
Mexico	556	359	1513
Indonesia	180	742	979
Libya	262	394	751
2. Others			
India	141	-	234
Brazil	310	282	-
Colombia	245	450	402
Korea (Rep.)	261	238	570
Malaysia	209	-	407
Singapore	225	310	522
Hong Kong	240	310	473

Calculated from data in:
Yearbook of International Trade Statistics, 1972-73 and 1980.

However there is some relation between the level of income per capita and the structure of food imports. The share of basic staples is overwhelming in food imports of low income countries, oil exporting (Indonesia) as well as oil importing (India).

This share is decreasing in most middle income countries, especially for oil exporting countries (Nigeria, Algeria). It is low or very low for high income exporting countries, including oil exporting ones (Table 20).

Table 20 Developing market economies with high rate of industrial growth: share of imports of basic staple food (CITC 04, 06 and 41) in total food imports according to the level of GNP per capita (1980) * (in %)

1. Low income countries	
India	85
Indonesia	81
2. Middle income countries	
Korea (Rep.)	91
Mexico	79
Brazil (1978)	75
Colombia	75
Nigeria	59
Algeria	59
3. High income countries	
Singapore	46
Saudi Arabia	40
Libya	24
Hong Kong	20
Kuwait	18

* basic staples: cereals, sugar, oils and fats.
Calculations made from data in:
Yearbook of International Trade Statistics, 1980.

High income oil exporting countries (i.e. Saudi Arabia) have increased during the 1970's their imports of all categories of food products at extremely high rates. They were imitated by middle income oil exporting countries (Algeria, Nigeria) but for a more restricted number of food items (Table 21).

Table 21 Evolution of food imports in oil exporting developing countries 1970-1980

Index of food imports in current dollars

SITC CODE	Food items	World Market Economies	20 developing countries with high rate of industrial growth	Saudi Arabia	Algeria	Nigeria
011	Meat	453	1517	4966	-	-
022	Milk and cream	562	649	1650	-	1163
023	Butter	403	953	1400	1850	-
024	Cheese	507	857	1540	-	-
041	Wheat unmil.	340	390	630	-	1095
042	Rice	420	489	551	2800	-
044	Maize unmil.	409	1133	5100	10500	1990
046	Wheat flour	323	436	1150	-	-
048	Cereals prep.	537	621	3500	-	-
054	Vegetables	378	622	1560	1420	-
061	Sugar	294	798	962	-	1568

Calculations made from data in
Yearbook of International Trade Statistics, 1980.

Oil revenues have played a determinant role to alleviate the constraints of external food balance and local traditiona agricultural supply. In most oil exporting countries they have introduced a large degree of flexibility for the evolution and diversification of the food pattern, entailing a growing dependency upon agricultural or processed food imports. (57)

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(57) M. PAPAYANNAKIS et al. Le développement agro-alimentaire des pays arabes et leurs ranport avec l'Europe in Cooperation Euro-Arabe, Volume III, CERMAC, Louvain la Neuve, 1983, p.280-307.

Such an evolution has far reaching consequences upon the evolution of the food pattern and upon the capacity of adaptation of the food industry and national agriculture to it.

II.3. Evolution of the food industry structures and of the food pattern in the context of the global development framework

Differences in the rate of increase and the product structure of food imports among different groups of developing countries with high industrial growth, are associated with important differences in the relative contribution of food imports and food output to sales of processed foods on the national market.

Three types of countries can be distinguished. (Table 22) The first and second types are dominated by the oil exporting countries. The first type does include high income oil exporting countries and high income manufacturing exporting countries with small national agricultural sector. In these countries the local sales of processed food products per capita are very important, but national output of processed food products does represent in general only a small share of them and they are covered mainly by imports.

The structure of food imports is highly diversified, and the food pattern has been transformed in a very short period of time toward an increasing westernization in very large sections of the population.

In these countries the rapid internationalization of the production structure through export-led growth has therefore entailed a very quick internationalization of the food consumption model.

In the second type of countries including lower middle and middle income oil exporting countries, the contribution of food industries to local sales of processed food is more important, and food imports do represent a smaller share of processed food output by local industry.

Table 22 Developing countries with high industrial growth rate: share of food industry output and of food imports in total sales of processed food products on national market (1975)

	Output / Sales (%)	Imports / Output (%)
1. Hong Kong	27	474
Libya	19	470
Saudi Arabia	39	378
Kuwait	27	342
Singapore	68	260
2. Nigeria	75	89
Algeria	86	79
Indonesia	83	49
3. India	107	8
Brazil	116	7
Colombia	105	7
Mexico	101	7
Korea (Rep.)	117	54
Malaysia	146	56

Sources: FAO Production Yearbook 1980; U.N., ST/CTC/1981; Yearbook of International Trade Statistics, 1977.

However, comparatively with oil importing countries at the same level of income, the contribution of food imports is important. It has answered to the growing local demand for food products, stimulated by the type of income redistribution originating in oil revenues, to which local supply of processed foods did not adapt in appropriate pace. The structure of food imports is less diversifisied than in the first type of country, but diversification is increasing with time, especially through the substitution of western type staples to the local traditional staples.

In a third type of countries, which are oil importing ones, the level of processed food output is above the level of local sales, whereas the ratio of imports to output is lower than in the two previous cases and imports include mainly basic staples. Many factors have influenced this situation. In these countries the output of food industries has adapted more or less to the pace of food demand independently of large differences in the rates of industrial growth and in the levels of income disparities. Both are higher in Brazil than in India, and result in a more diversified food demand in Brazil. Brazilian food industry has adapted to that demand through a diversified process of import substitution. The same process occured in India but was restricted to basic staples. In these countries the pace of food demand has not been stimulated by redistributive policies in the same proportion than in oil exporting countries, and this has probably played a role to damp food imports to lower levels. However, when such a move toward redistributive policies has occured because of the growth of oil exports, it has produced a sharp increase in the imports/output ratio: this has been the case of Mexico in the past 1975 period, when it has shifted from the third type to the second type of countries.

In many of these countries, export of food products are still playing an important role in food industry output, even if they have known a sharp reduction in total exports. In some of these countries the permanent high share of traditional export in total food output is associated with rigidities in the adaptation of food output to the evolution of food patterns induced by the high pace of industrialization; in Korea (Rep.) and Malaysia this feature does result in a relatively high ratio of food imports/food output.

The evolution studied here above has entailed important differences among developing market economies with high rate of industrial growth, as far as the structures of food industries are concerned. The three stages of product transformation, mentioned in the analysis of the developed market economies, provide in this case too a good framework to understand the dynamics of the food industries and their contradictions, in the different types of countries.

In the first type of countries, the large disparity between the size of the processed food sales and of the food industry can be attributed partly to the importance of sophisticated products of the third stage of transforma-

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Table 23 Saudi Arabi
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l imports and output
strialization (1970-1980)

	1974-75	1979-80
	ions current Saudi Riyals	
1. GDP of oil sector	111.0	254.3
2. GDP of manufacturing	1.6	6.4
3. GDP of construction s	7.0	40.4
4. Total imports	14.8	100.3
5. Food imports	2.5	14.1
6. Estimated output of	0.4	1.7
7. GDP of Agriculture	1.5	4.6

Sources:-Saudi Arabi
Development
Riyadh, 19
-UNIDO, Lon
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(58) A. MARTENS L'économie
ch. VI and

a, Paris, 1983

The processing industries do produce new staples (wheat flour, meat and milk) according to the westernization of the food pattern. In this context, the traditional small scale enterprises processing traditional food at the second stage are progressively eliminated, and one does assist to the constitution of a new food chain with direct connection between modern food industries and large distribution outlets of the western type.

In the second type of countries, the food industries do contribute more to total food sales than in the first case. In oil exporting countries with middle income (Nigeria, Algeria), the huge increase of demand for new staples is fostering the growth of processing units at the first stage of transformation. Due to the size of the population and the rapid substitution of new staples to traditional ones because of rising incomes and price support policies, there is room for the expansion of enterprises producing flour, meat, milk, edible oils and fats and sugar.

The growth of industries at the first stage of transformation does allow the growth of industries at the second stage of transformation based on new staples, (bread and animal feedstuff, for instance).

The traditional sector at this second stage is progressively put under pressure to adapt partly to the new food patterns, and does therefore play an important role as a bridge between old and new food patterns. It is typical of a kind of "transitional dualism" in societies where the prexisting traditional food model was shared by all social groups, and where the evolution toward the modern food type is more rapid in upper income groups, but is tempered by uneven survivance of cultural habits common to all social groups.

Finally in these countries the size of the population has allowed the expansion of beverages industries, but the local production of other products belonging to the third stage of transformation is generally limited and imports continue to provide the largest share of these products for upper income groups.

The countries of the third type have in common a higher degree of self-sufficiency, but they present huge discrepancies among them as far as the structures of the food industries are concerned.

These disparities are linked with differences in income levels and distribution, and with food habits.

Among the upper middle income countries, Brazil and Mexico are representative of a kind of structural dualism, which affect the food model: the opposition is not between new foods and old foods but between new forms of "food for the rich" and "food for the poor". In these countries, the traditional food model was itself dualistic: the food pattern of high income groups was rooted upon the traditional Western diet and incorporated a large content of processing by domestic services, whereas the food pattern of low income groups was based upon local staples. The high pace of industrialization has been associated with a specific type of increasing unequal income distribution and, therefore the modernization of the food pattern has reproduced on a new and larger basis the historical dualism. Upper and upper-middle income groups have moved along the lines of the evolution of the Western food patterns, toward more processed, branded and sophisticated food products. Lower income groups remained partly with the traditional popular staples, but moved partly toward a creeping form of modern food pattern, incorporating in the diet some products of the modern type: products of the third stage of transformation (for instance carbonated beverages) with high price/nutrient content ratio, and new staples (wheat flour), with lower relative prices. (59)

The overall result has been that, given the size of the population and of the upper and upper-middle income groups, the food industries have been able to expand in all the stages of product transformation, according to the international norms of the Western Model. Therefore the distribution of value added accross food industries is extremely diversified. (60) It includes elementary processing of basic staples of the Western type and of tropical export food (first stage transformation), more advanced processing of these staples at the second stage and finally a complete assortment of third stage transformation products. (Table 24)

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(59) J.P. BERTRAND Le marché des grains, l'exemple brésilien, Projet N° 182, 1984, p. 172-193.

(60) A. MIROUX Agriculture et balance des paiements au Brésil: necessité d'ajustement et redécouverte du sector agricole, Notes et études documentaires, n° 4675-76, La documentation francaise, Paris 1985.

Table 24 Mexico and Brazil: share of different food branches in total food industries.

	Gross output 1975 in %	
	MEXICO	BRAZIL
Grain milling	13.8	16.2
Bread and flour preparations	11.4	9.0
Meat processing	5.5	20.9
Vegetables and fruit processing	5.3	3.9
Dairy products	12.0	5.0
Sugar and sugar confectionnery	7.9	9.7
Coffee and cacao processing	2.3	12.7
Chocolate confectionnnery and coffee preparations	1.8	3.2
Oils and fats	11.9	6.7
Animal feedstuffs	9.1	4.2
Food ingredients	4.0	1.0
Miscellaneous foods	14.9	7.5
Total food industries	100.0	100.0

In these 2 countries processing of traditional staple has continued to be important at the first stage until recently: traditional flours did represent in the mid 1970's still 30% of grain milling activities in Mexico and 20% in Brazil. But they were progressively receding in importance in favour of new staples which dominated completely the evolution of the transformation activities at the second stage.

However high rates of industrial growth are not associated everywhere, with increasing income disparities and structural dualism in the food pattern. In this respect they are important differences between Latin American and Asian NIC's. In Korea (Rep.), very high rates of industrial growth have been associated with less important income disparities, and with a greater permanence of basic food habits, entailing a high level of vegetable proteins in the diet, and a lower level of processed food sales per capita. (Table 25)

Table 25 Levels of industrial output, food sales, income disparities and structure of the diet: Brazil, Mexico and Korea (Ren.)

Countries	Industrial output per capita (1975)	% of incomes received by		Processed food sales per capita	Nutrition 1980		
		lowest 40%	highest 10%		Calories/ inhabitant	Total proteins inh/day in grs	Animal proteins inh/day grs
BRAZIL	100	7	51	100	2447	59	23
MEXICO	120	10	41	110	2791	72	24
KOREA (Ren.)	82	17	27	30	2957	80	16

Source: World Bank Development Report 1982,
CTC/ST/CTC/19, 1981
FAO, Production Yearbook, 1982.

The simultaneous effects of a better income distribution and of the permanence of cultural habits based on the intake of relatively cheap vegetable and fish proteins, have allowed a better nutritional situation accross large sections of the population. (61) In this context second stage transformation processing rooted on traditional staples and products has kept a great importance, and like in Japan, has remained largely a labour intensive sector. Third stage transformation products have still limited outlets and therefore the growth of this type of industries has been much more limited than in Latin American NIC's (except for beverages).

However, the rapidly rising average real incomes have induced a progressive diversification of the food pattern in the direction of the Western diet and toward a greater intake of animal proteins. This has been realized through large imports of new staples and through the local development of processing units at the first and second stage of transformation based on the new staples. (Table 26)

Korea (Ren.) is therefore closer to the case of "transitional dualism" than to the case of structural dualism. But they are important differences in

(61) D.H. KIM and Y.J. JOO The food situation and policies in the Republic of Korea, OCDE, Paris, 1982.

the dynamics of changes: the traditional food pattern is offering a better resistance because of his balanced and diversified diet rooted on improved local supply, whereas the better income distribution would favour an acceleration of the diffusion of the Western type of food accross all sections of the population. The global result could be in the long run a very diversified food pattern, integrating as well traditional products than new staples in the popular diet.

Table 26 Evolution of the food pattern in Korea (Rep.)

	Food consumption per capita per year (kg)			Food self-sufficiency rate (1)
	1965	1975	1979	1979
Rice	122	124	135	86
Wheat	14	29	31	3
Vegetables	42	62	122	99
Meat	3	6	11	63
Milk	0	5	10	66
Eggs	2	4	6	66
Sea products	18	30	26	100

(1) output consumption in %

Source: D.H. KIM and Y.J. JOO, The Food Situation and Policies in the Republic of Korea, OCDE, Paris, 1982.

II.4. The agents of food-industries development, food policies and their impact on the food industry structure.

The diversity of agents of the food industry growth in developing market economies with high rates of industrial growth does paralel the extreme diversity of their food structures.

Given the fact that high industrial growth rates have in most cases been associated with export growth and with an active involvement in the expansion of international trade, it is not surprising to find the presence of transnational firms in the agro food sector as a common feature to almost all these countries.

However they are great regional differences. Among the 368 transnational firms which operated in the agro food sector of these countries in the mid-1970's, 197 operated in the 4 Latin American NIC's, whereas only 10 operated in the 6 Arab oil-exporting countries under study. (62)

This aspect is partly linked with the existence of large markets for products of the second and especially third stage transformation in Latin American NIC's, whereas they are much more restricted in Arab countries. It is also linked with the upgrading and diversification of agro food exports in Latin American NIC's. Transnational firms in these two kinds of products [items (7) to (10)] were 88 in Latin American NIC's against 2 in the Arab countries. (Table 27)

Differences in regulations and attitudes toward multinational firms have also played a role to explain that situation. In the 20 countries taken together they were 129 transnational firms in the field of agro-food exports [items (7) and (8)], 47 firms in the third stage transformation sector [items (9) and (10)], and 176 firms in activities linked with the "cereal-oilseed-animal protein chain" [items (2) to (6)]. It means that transnational firms had still an important presence in export oriented food processing activities legated by the classical international division of labour, but were also actively involved in the transformation of the food pattern induced by consequences of the new international division of labour.

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(62) U.N., Centre on Transnational Corporations,
Transnational Corporations in Food and Beverages processing,
New York, 1981,
and Les societés transnationales dans le développement mondial,
Troisième étude, ONU, New York, 1983.

Table 27 Transnational corporations in the food industries of developing countries with high industrial rates of growth (1976)

Number of TNC affiliates by country and sector

Countries	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	Total
India	1	1	1	2	1	3	3	3	2		17
Kenya		1	1	2	1	3	6	5	3	4	26
Indonesia			1		1	3	1	3	1	3	13
Egypt							1				1
Philippines	1	2	1	4	2	5	8	3	4		30
Nigeria	1		2	1		5	4	2	1	3	19
Ivory Coast						2	1	2		1	6
Colombia	1	2	3	2	1	4	6	3	3	1	26
Malaysia				4		4	6	4		2	20
Korea (Rep. of)			2		2	2	1	2	1		10
Brazil	3	4	8	9	6	6	13	8	4	2	63
Mexico	3	4	4	6	5	10	14	7	6		59
Algeria						2	1				3
Venezuela	5	3	4	3	6	6	13	5	2	2	49
Hong Kong		1	1	1	1	1	1			1	7
Singapore	1	1		2	1	4	2	1		1	13
Irak											0
Libya											0
Saudi Arabia											4
Kuwait											2
Total	16	19	30	36	29	62	81	48	27	20	368

(1) Flour milling
(2) Corn milling
(3) Animal feed
(4) Vegetal oil processing
(5) Meat packing and processing
(6) Dairy industry
(7) Fruits and vegetables processing
(8) Coffee and cocoa processing
(9) Soft drinks
(10) Beer

Sources: Data in U.N. ST/CTC/19, N.Y. 1981
U.N. ST/CTC/46, N.Y. 1983

They had a particularly heavy presence in the sector which has been at the core of this transformation, i.e. the increasing role of animal proteins in the diet. (63)

Through such a participation they have been involved in one of the fastest growing food market in the developing economies. Transnational corporations have been able to play a key role in this expansion, because its national features are closely interwoven with international factors.

The internationalization of the animal protein chain in developing economies with high rates of industrial growth is much more important than in developed market economies, because of the huge discrepancies between the demand profile and the conditions of supply. The model of animal protein diet is imitated from Western countries with factor endowment appropriate to it, and transplanted in countries with inadequate or inexisting endowment. Transnational corporations are in the best position to fill the gaps in different ways: imports of basic new staples, technology transfers (through direct investment or turn-key projects) to develop processing activities at the first or second stage of transformation, and even adaptation of local agricultural supply to the production of new staples.

The rapid expansion of the animal protein food model is rooted upon many interdependent elements: promotion by transnational corporations helped by aid and agricultural policies of their country of origin, pervasive international demonstration effects in countries with increasing international minded middle classes, and food policies of governments geared to cheap food prices for urban dwellers in a context of heavy agricultural constraints and easily available external resources.

In middle income countries with a largely inappropriate factor endowment for such a food model, there is a general predominance of dairy production based

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(63) UNIDO, Second Consultation on the Food-Processing Industry with Special Emphasis on Vegetable Oils and Fats, Copenhagen, October 1984 Doc. ID/W.G. 427/1/2/4/6.

upon output of recomposed dry milk and of poultry meat production based on imported broilers and feedstuffs; transnational corporations are mastering the conditions of this latest production.

In some oil exporting high income countries with inappropriate factor endowment, costly efforts have been made to substitute partly local supplies to imported products, in a context of rising demand for high quality and high price products (fresh dairy products, fresh beef meat, etc.). Local firms, public or private, are involved in these activities restricted mainly to the first stage of processing, but they rely on imported technology corresponding to sophisticated international standards. But imports are still largely predominant as well for first stage than second stage products, including animal feedstuffs.

In upper middle income countries with high industrial rates of growth and local factor endowment there is a large diversification of the animal protein intake. Transnational corporations have played a key role to initiate the development of first stage processing with imported or local inputs. (64) But they have been progressively substituted by local firms, as well in the fiels of processing than of staple producing. Imports of basic staples linked with this new food model are generally increasing especially for cattle feeding.

In Brazil, which belongs to that category of country, transnational corporations have diminished their share in traditional food exports and in the animal protein chain oriented toward the internal market, but their presence has increased considerably in oilseeds processing, through which the Brazilian agro-food export sector has entered as an active partner in the internationalization of the animal protein sector. (Table 28)

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(64) G. ARROYO et al. Transnationales et agriculture, Amérique Latine, N° 1, 1980, p. 45-81.

Table 28 BRAZIL: share of foreign firms in some agro-food industries

	Share of Assets		Turnover		in % Employment
	1970	1977	1970	1977	1977
Coffee	15	12	15	13	19
Cereals	35	27	35	15	16
Meat	26	20	26	23	27
Beverages	13	17	13	24	17
Vegetal oils	4	52	4	59	45

Source: J. MOONEY and R. NEWFARMER,
State Enterprise and Private Sector Development in Brazil,
U.N. Center on Transnational Corporations, (mim.)
New York, 1981.

In countries where the "cereal-oilseed-animal protein chain" has developed according to the above analysed problems, the result is an increasing share of new staples processing at the first stage of transformations, with a relatively high capital intensity. At the same time this movement does foster the growth of capital intensive "modern" activities in the second stage of transformations, which has been conquered by them in various proportions in different countries. Finally in some countries there is the presence also of export food industries and third stage transformation industries, aligned upon the international norms of technology.

The golobal result has been an increasing capital intensity in the agro-food sector of the majority of NIC's with upper middle and higher income levels.

The level of value added per employee has rised in due proportion and reached, around 1980, between 20 and 40% of the EEC countries average.

But in most countries, due to lower wage levels, the performance in terms of non wage value added was higher, high income countries with relatively high wages (Singapore, Kuwait and Venezuela) being exceptions. (Table 29)

Table 29 Comparison of value-added, wages, and non wage value added per employee in some NIC's and some DME's

EEC average = 100 (1977-1981)

	Value added per employee (Y/L)	Wages and salaries per employee (W/L)	Non wage value added per employee (Y-W/L)
Mexico	44	25	54
Brazil	33	17	42
Singapore	36	33	33
Korea (Rep.)	39	25	46
Colombia	42	25	50
Venezuela	64	58	62
Kuwait	33	50	21
Nigeria	28	17	33
Malaysia	33	17	42

Estimations from data in
U.N. Yearbook of Industrial Statistics 1981 ed.
N.Y. 1983
and converted in U.S. dollars on basis of PPP conversion rates.

II.5. The problems of articulation between food industries and agriculture in developing countries with high industrial growth rates.

The rapidity of changes in food habits in developing countries with high industrial growth rates, associated with the increasing share of new staples, and the adaptation of internationally standardized technology for processing them at the first and second stage of transformation, have exerted heavy strains upon local agricultural systems.

This is clearly indicated by the rapid increase of livestock products output in these countries comparatively to the general increase of agricultural output per capita.

With the noticeable exception of most of the new Asian NIC's with large population and of Brazil, the majority of the countries under review have known a decrease of agricultural output per capita after 1978, more important than the average for all developing countries. In contrast with that evolution, livestock products output per capita has continued to increase remarkedly, or at least has not decreased in the same proportion. And in all countries the production of poultry meat has known a sharp increase. (Table 30)

Table 30 Evolution of agricultural, livestock and poultry meat output in selected NIC's 1972-1983

	Indice of output per capita (1974-76=100)						Indice of output 1974-76=100	
	Agriculture			Livestock products				
	1972	1978	1983	1972	1978	1983	Meat Total	Poultry Meat
World	97	103	102	98	102	104	124	154
Developing market economies	97	104	102	96	106	110	132	190
Brazil	96	99	110	91	105	114	145	280
Mexico	104	111	103	95	114	109	128	145
Venezuela	99	100	88	95	104	113	155	190
Nigeria	104	99	91	101	111	128	153	259
Kenya	102	99	90	108	108	106	144	145
Egypt	107	96	92	105	98	100	127	186
India	95	110	115	94	106	117	134	154
Indonesia	93	107	122	100	107	145	135	191

Source: FAO, Monthly Bulletin of Statistics, 1984.

This evolution does point at the same time to deepening structural problems of adjustment of the agricultural sector in many countries with high rates of industrial growth, and to the dichotomous evolution of the agrarian structures and food structures. The latest, geared to the requirements of the fast rising food demand in the industrial and urban sectors, looks at the same time more autonomous from the agricultural sector and more dependent from imported staples, technology and know-own. The most typical product of that situation is precisely poultry meat, which is an integrated and even automated industrial process, located in urban areas and largerly independent of peasant agriculture.

Availability of external financial resources through oil or manufactured goods exports revenues or through foreign credit has pushed many countries to choose that short-term easy solution. This has been the case of middle income countries (Nigeria,Brazil,Mexico), where poultry meat huge growth has enabled to incorporate cheap animal protein in the popular diet as a substitute to the lack of adjustment of traditional staples and peasant agriculture.

In certain oil exporting countries with upper middle or high income per capita, besides the expansion of poultry meat industrial projects, one has been the realization of capital intensive agricultural projects to supply high quality and high price new staples to the food industry or fresh products to the consumers. In these countries we assist to the growth of beef meat, milk, wheat and vegetables production, whereas in many cases traditional cereals are receding in importance. (Table 31)

Table 31 Evolution of new agricultural staples output in oil exporting countries

Average growth rates 1961-65/1975-79

	ALGERIA	IRAQ	LIBYA	SAUDI ARABIA
Beef meat	2.9	3.3	12.9	6.0
Poultry meat	6.2	15.3	26.3	24.0
Total meat	3.6	3.2	8.4	10.6
Milk	5.3	1.2	8.8	13.4
Cereals	-1.2	0.3	11.9	- 4.7
Vegetables	2.4	4.1	11.5	8.4

Sources: M. PAPAVANNAKIS and al. op.cit. 1982, p.318-322.

In Asian new NIC's with high rates of industrial growth and large population one has assisted also in recent years to a rapid growth of poultry meat consumption and production, especially in Indonesia. This is linked with the rapid increase of exports revenues and the changes they induce in food demand and patterns especially among urban dwellers.

This recent evolution does entail therefore a growing internationalization of the popular diet through industrial poultry meat. It has still limited effects given the very small size of total meat production in countries like India and Indonesia. It does contrast however with the past tendencies in these countries where food diet was dominated by vegetable proteins, and where the processing of traditional staples was realized at the first as well as at the second stage of transformation through handicraft or small scale industrial units. These processing units were located as well in rural areas than in urban areas. The result was a low level of productivity of labour compared with other NIC's (especially Latin Americans) but also a large contribution of the food sector to employment and intricate links between rural areas and urban centers and between production structures and distribution channels. (Table 32)

Table 32 Gross output, employment and gross output per employee in some Asian and Latin American NIC's. (1977-1980)

	Gross output (billions U.S. dollars)	Employment (1000)	Gross output per employee (1000 $)
India	8.7	1160	7980
Indonesia	1.3	150	8800
China	28.8	2130	13000
Brazil	21.1	540	42880
Mexico	18.9	390	47340
Colombia	4.5	95	45440

Calculations from data in Yearbook of Industrial Statistics, 1981 ed. with conversion in dollars along IMF tables.

This system does adjust with many difficulties to the rapidly evolving conditions of food demand, and there are many presures to substitute industrial meat turn-key projects to it.

However the experience of China during the last 25 years does indicate that there are many possibilities to integrate peasant agriculture to the animal protein chain expansion associated with the consequences of ranid industrial and urban growths.

China has an animal protein output per capita which is much higher than in other Asian NIC's with large populations. This is due partly to differences in cultural food traditions and partly to differences in evolution of the agricultural sector during the period of rapid industrialization.

It is linked with large differences in the structure of meat output. In China pig meat did represent 83% of total meat output as well in 1983 than in 1974-76, and poultry meat does represent only 9%. This situation does contrast sharply xith the structure of meat output in other NIC's during the same period (Table 33).

Table 33 Structure of meat output in some NIC's 1974-76/1983

Countries	Total Meat		Beef Meat		Sheep Meat		Pig Meat		Poultry	
	1974-76	1983	1974-76	1983	1974-76	1983	1974-76	1983	1974-76	1983
	1000 T.		Total Meat = 100							
Brazil	3594	5137	60	48	2	1	21	18	16	31
Mexico	1283	1648	40	37	2	2	30	30	24	27
Nigeria	538	826	34	28	25	22	6	6	19	32
India	714	958	22	22	46	44	7	8	12	14
Indonesia	400	540	38	30	12	11	19	17	27	38
China	9370	16862	2	2	3	3	83	83	9	9

Calculation made from:
FAO, Monthly Bulletin of Statistics, 1984.

In China pigmeat production has been developped since 25 years as a typical cooperative and peasant product. It is rooted upon the use of local agricultural resources and wastes and does provide large opportunities for employment and income increases in rural areas. It gives therefore an answer to the problems of rising animal protein demand in the framework of rapid industrialization, through deepening interlinkages between the peasant economy and the industrial economy.

This has resulted in the simultaneous development of a small-scale, labour intensive agro food sector located in rural areas, side by side with a more capital intensive agro food sector located in urban areas. This is illustrated by important differences in productivity levels in the two sub-sectors. (Table 34)

Table 34: China: Some structural aspects of the agro-food sector
Independent accounting enterprises (1981)

	Labour productivity		Enterprises owned by State	
	Enterprises owned by collectives	Enterprises owned by the State	Gross output value/assets	Profits and taxes/assets
	in Renminbi at 1970 constant prices		Original value of fixed assets = 100	
All branches	7.294	11.815	96	23
Light industry	7.812	18.187	271	64
Food industry	8.136	21.893	318	76

Source: Statistical Yearbook of China, 1981 ed. p.268-272.

Small scale enterprises managed by rural or urban collectives and cooperatives have much lower productivity but also capital requirements than State owned enterprises. However State owned enterprises in the food sector, even with a higher capital intensity than in the collective sector, can develop quickly thanks to their high output-capital ratio, comparatively with other State owned industrial sectors. At the same time, the industrial agro-food sector does make an interesting contribution to the general accumulation funds because of its high profits and taxes ratios.

Chinese experience does shown that it is possible to integrate peasant agriculture with the increase of animal protein demand resulting from high rates of industrial growth. The shift toward more export led growth in this country does not seem to have affected this type of evolution.

The integration of the animal protein chain with local staples and with peasant agriculture is one of the most urgent task of the agro-food policies in the next several years, for low or middle income level countries with high rates of industrial growth and large population.

Many possibilities of evolution are opened in this respect: enlarge the role of local staples in the animal feeding, adapt new genetic strains and breeds to local conditions, develop new sources of vegetable proteins as a partial substitute to excessive animal protein dependency.

All these aspects have tremendous importance to articulate in a more dynamic fashion the still huge peasant economy in the process of rapid economic transformation. Small scale rural industrialization based upon appropriate technology, fostered by local research and supported by international cooperation, has to play a key role in this prospect.