INSTITUTE OF SOCIAL STUDIES

Working Paper Series No. 162

AGROINDUSTRIAL MODERNIZATION AND GLOBALIZATION: Towards a New World Food Regime

M. Teubal

December 1993

WORKING PAPERS

Comments are welcome and should be addressed to the author:
c/o Publications Office - Institute of Social Studies - P.O. Box 29776
2502 LT The Hague - The Netherlands

Working Paper Series No. 162

AGROINDUSTRIAL MODERNIZATION AND GLOBALIZATION: Towards a New World Food Regime

M. Teubal

December 1993

AGROINDUSTRIAL MODERNIZATION AND GLOBALIZATION: TOWARDS A NEW WORLD FOOD REGIME

Miguel Teubal[1]

Introduction

The present stage of history has been considered as one in which a new global system or regime of accumulation seems to be emerging in which nation states tend to disappear as autonomous entities influencing world developments (see McMichael and Myere, 1990). Structural adjustments being implemented world-wide, the formation of trade blocks on the world arena, and the intense transnationalization of the global economy form part of the new environment of today's international economic affairs. Within this context world power relations with regard to food and agriculture are changing and exerting a substantial influence on the development of what one author has called a "new world food regime" (Friedmann, 1992).[2]

Much has been said and written on the internationalization or transnationalization of the world economy. In this paper we deal with a topic related to the analysis of these globalization trends: the impact of agroindustrial modernization and globalization on third world (TW) economies and societies. Present day "agroindustrial modernization" cannot be dissociated from broader "globalization" trends, since food and agricultural systems throughout the world are being influenced considerably by global modernization processes. What are the main characteristics of these processes and their implications for the peoples of the TW are some of the problems we are interested in analysing in this paper.

Within this context agroindustry has become one of the catchwords reflecting important aspects of these "modernizing" trends. New technologies and inputs applied to agriculture -seeds, agrochemicals, machinery, and more recently biotechnologies, genetic engineering, etc.- as well as those applied to the processing and distribution of food are central aspects of these agroindustrial modernization processes. Within this context large transnational corporations are some of the main agents of agroindustrial modernization and globalization. New agriculture and agroindustrial commodities traded on world markets, the global expansion of agroindustries (agribusiness) and the organizational forms they introduce are factors exerting a substantial impact on rural societies and food security in the TW. Thus, global agroindustrial modernization plays an important role in what appears to be the development of a new world food regime or system (Wilkinson, 1989, Arroyo, Rama and Rello, 1985, Teubal, 1987, Friedmann, 1990, 1992).

Not only is this new world food regime being influenced, both directly and indirectly, by world-wide technological, production and trade strategies of agribusiness. Government policies of the industrialized countries, the US and the other members of the EC, and policies promoted by international organizations such as GATT, IMF and the World Bank, are also influencing considerably the formation of a "new international division of labour in agriculture". In sum, the internationalization of capital exerts an impact on food and agricultural developments world-wide via the globalization of agroindustrial modernization.

---

[1] Professor of Economics, University of Buenos Aires, Argentina and Visiting Research Fellow, Institute of Social Studies in 1992. A draft of this paper was presented at the workshop on 'Agroindustrial Modernization and Globalization' held at the ISS on the 3rd and 4th of December 1992.

[2] "There was a stable international food regime between roughly 1947 and 1972. It created a new set of relations between farmers and consumers, and a new set of trade relations among countries. The root of the regime was American domestic farm policy during a period of United States hegemony" (Friedmann, 1990:13).

Nevertheless, the internationalization of agroindustrial capital is a complex and many sided process. To a large extent it refers to the operations of large transnational corporations, though these are not the only factors influencing these processes. In recent years, there have been changes in the international trade of agriculture and agroindustrial commodities, an increased homogenization of production, technological, organizational and consumptions patterns prevailing in the highly industrialized countries, with spinoffs to the third world, all of which reflect these processes.

A new phase related to food, agriculture and agroindustrial developments world-wide in which agroindustry, agroindustrial complexes, or agrofood systems play dominant roles seems to be emerging. Inputs and technologies developed in the "First World" can be associated with new forms of organization of agricultural production and the "agroindustrial chain" or "complex" in the third world (Wilson, 1986; Winson, 1988,1990). Many of these developments are induced by "industrial agribusiness" (Strange, 1988). "First world" governments and/or international organizations also play an important role. Changes in world trade of agricultural and agroindustrial commodities (Watkins, 1992), new consumption patterns, technologies and innovations applied to the agrofood chain, are also important aspects of these global agroindustrial modernization processes (Wilkinson, 1989; Rama, 1985).

Does all this imply a new logic of accumulation for global agriculture and agroindustry (agribusiness)? How is it to influence agriculture and food developments in the third world? To what extend do changes in the patterns of international trade, foreign investments and in the structure of agriculture and agroindustry on a world scale reflect these trends? (Teubal, 1987). To what extent can we speak of the development of a new world agroindustrial or agrofood "model of development" or food regime (Friedmann, 1990, 1992).

Global agroindustrial modernization is also being influenced by the environment in which it is carried out, namely "structural adjustments" and the conformation of new trade blocks (EEC, NAFTA, Mercosur, etc), as well as the export orientation and liberalization strategies being implemented in much of the third world. To what extent can we visualize a "new international division of labour in agriculture" in which the South specializes in export of labour-intensive luxury crops (off season fruits and vegetables, beef, poultry, fish, flowers, etc) and the North in exports of capital intensive, "low-value", surplus raw foods such as grains? While the South's food production is in large measure reoriented to higher value markets overseas, the North exports (or dumps) its domestic surpluses? The former compromises or preempts a coherent national agricultural sector, while the latter expresses the highly-protected agricultural sectors of the metropolitan nations (McMichael and Myere, 1990). A consideration of trends in agroindustrial investments can also give some notion of these structural changes occurring in world agroindustry (see Rama, 1992).

The internationalization of TW agriculture can also be seen as a movement sponsored in large measure by the State, which includes "the development of agro-export production as well as the consolidation of agroindustrial systems, both of which displace basic food production and reduce food security for the working poor" (McMichael and Myere, 1990: 66).

What is the impact of the widespread diffusion into the third world of new organizational forms being applied to agriculture in the industrialized countries - vertical integration and contract farming - thereby exerting a significant influence on the ways whereby peasants and small farmers, as well as other social actors of agriculture and rural society, relate and interact with agroindustry and other sectors of the agroindustrial complex? The most notorious of these have to do with the widespread expansion of vertical integration and contract farming, probably as a spinoff of developments in the farm sectors of the first world, and third world strategies of agribusiness.

The formation of a new world food system or regime as a consequence of global agroindustrial modernization can be related to trends and forces influencing food developments in the "First World". This, consequently, is an important starting point for our analysis. In the following pages we present schematically some of the agricultural and agrofood "modernization" processes as they have evolved in much of the "first world". What are some of the implications of these developments for agroindustry, food and agriculture in the world economy and for the third world is subsequently considered.

Table 1. Farm output accounted for by production contracts and vertical integration, selected commodities, 1960-1980

Commodity	1960	1980	% change
	Production Contracts (%)		
Sugar beets	98	98	0
Fluid Milk	95	95	0
Broiler chickens	93	89	-433
Processed vegetables	67	85	26.8
Seed crops	80	80	0
Citrus fruits	60	65	8.3
Turkeys	30	62	106.6
Eggs	5	52	940.0
Sugar cane	40	40	0
Other fruits/nuts	20	35	75.0
Total farm output	15	23	53.3
	Vertical Integration (%)		
Sugar cane	60	60	0
Eggs	10	37	270
Fresh vegetables	25	35	40
Potatoes	30	35	10
Citrus fruits	20	35	75
Turkeys	4	28	600
Other fruits/nuts	15	25	66.6
Processed vegetables	8	15	87.5
Broiler chickens	5	10	100
Seed crops	0.3	10	3233.3
Total farm output	4	7	75

Source: Calculated from Kenneth R. Krause, *Corporate Farming, 1969-1982.* Washington, DC USDA, 1987 Table 9.

Modernization of 'First World' Agrofood Systems

Agrofood systems - agriculture, processing and marketing of food - and food consumption patterns in the advanced industrialized countries have been changing substantially in recent decades. Global and Third World agrofood problems can be approached initially by analysing trends and characteristics of "first world " agroindustrial modernization processes. What has occurred in recent decades in the advanced industrialized countries (US, and countries of the EC and/or OECD), can help us perceive what is to be the probable impact to be expected of agroindustrial modernization and globalization in the Third World.

In the following pages some "modernizing" trends are pin-pointed for "first world" agriculture and agrofood systems as a whole:

a) The following "modernization" trends for the agriculture sector of the advanced industrialized countries can be considered:

i) The intensified use of inputs and technological packages -fertilizers, pesticides, new seeds, agricultural machinery, etc.- which require large amounts of non-renewable fossil hydro-carbon energy sources, and induce farmers to increasingly articulate with agricultural input agroindustries.

ii) Greater specialization of production, and articulation with agroindustrial complexes through increased contract farming and vertical integration. When farmers enter into such arrangements, they tend to lose their decision-making capacity, "they lose the freedom to choose where and at what time to sell their product. They get some protection from sudden collapses in prices, but they lose their autonomy...and end up being in effect divisions of large food processing corporations" (Flaherty, 1988: 101).

In the US the percentage of farm production integrated vertically or produced under contract farming increased from 19% in 1960 to more than 30% in 1980. Contract farming was particularly important in the production of sugarbeets, fluid milk, processed vegetables, seed crops and broiler chickens.[3]On the other hand, vertical integration in 1980 was important in producing sugar cane, eggs, fresh vegetables, potatoes, citrus fruits, and other commodities (See Table 1).

Why has contract farming been favoured by processors, at least in the case of certain commodities? It has been suggested that, for processing firms, production contracting provides the control they require over agricultural production (i.e. over quantity and quality of the raw product), with the minimal outlay of capital. This control entails an influence over both the production process, thereby maximizing productivity, and over the off-farm exchange processes, maximizing the transfer of surplus from farm operators to the capitalist sector (Winson, 1988: 531/532).

According to a government report on the state of agriculture in 1981, vertical integration and contract arrangements are "one more force pushing family-sized farms to grow or die. Contract arrangements also limit the role of the open market in agriculture. These arrangements mean that even middle-sized farms, those that seem to fit most closely the image of the rugged, independent farm family, may not be what they seem" (Flaherty, 1988: 101).

Production contract arrangements are also widespread in Europe, though they vary by country, region and commodity type. Arrangements range from contracts to purchase- which merely specify the quantity, price and delivery times - to contracts entailing complete control over production by the processor, including supply of inputs and responsibility for management decisions concerning agricultural production processes (Winson, 1988). In Belgium and the Netherlands, apart from certain areas such as the production of calves for veal, the bulk of production occurs under contract (OECD, 1979: 155).

iii) Between 1950 and 1984 the total number of US farms fell from 5.4 to 2.4 million. Population in agriculture represented 15% of total population in 1950 but only 2.2% in 1984. The rate of decline in farm numbers accelerated during the 1980_ as the farm recession affected the financial status of many farmers. Farm numbers declined at a rate of 4% per year in the 1950s and 3% in the 1960s. However, in the financially distressed period of 1982-1987, the rate of decline in the

[3] "The poultry industry...represents large-scale vertically integrated agriculture. Of all the US commodity subsectors, the poultry industry most closely represents an industry structure similar to that of nonfarm manufacturing. The 1987 census recorded 38,000 poultry operations in the U.S. Production through marketing processes are highly coordinated, and poultry farmers generally produce under contracts with large processors". (USDA, Agricultural Outlook, October 1991: 33).

number of all farms was 6.8%. In the latter year less then 2.1 million farms were remaining (Flaherty, 1988; USDA, 1991: 33/34).

The average size of US farms has also increased in recent decades. In 1950 average farm size amounted to 216 acres, percentage of farm labour hired 23%, and value of machinery per worker (at 1984 prices) 5303 U$S. In 1984 the average farm size had more than doubled to 436 acres, almost 40% of farm labour was hired, and the value of machinery per worker had increased to 31263 u$s. (Flaherty, 1988: 95). Recent information denotes that in 1987 average farm size amounted to 462 acres (186.5 hectares) (USDA, 1991: 35; USDA, 1990: 88).

Although the number of farms in the European Community (EC) has fallen by nearly 40% since 1960, the Community currently has 3 times more farms (6.93 million) than the US and, on average, each farm covers an area less then one-tenth the size of its counterpart in the US (see Table 2). Italy, Greece and Portugal together have over half of all farms in the EC combined, but account for only about 20 percent of agricultural area. The average size of farms in these three countries is less than 10 hectares, compared with nearly 70 hectares on average in the UK which has the largest average farm size in the EC. Almost 90 percent of Greek farms are less than 10 hectares (628,700 farms out of a total of 703,500), and only 0.5% percent of Greek farms are over 50 hectares. On the whole, employment in EC agriculture fell from 13.9 million persons in 1975 representing 11.4 percent of total civilian population, to 9.4 million in 1988 representing 7.4 percent of population (Herlihy and Weiss, 1990: 88).

Table No. 2: Structure of Agricultural Holdings

	United States			European Community[1]		
	Number of Farms	Utilized Agric. Area	Avg. Farm Size	Number of Farms	Utilized Agric.Area	Avg. Farm Size
	1,000	1,000 Has.	Hectares	1,000	1,000 Has.	Hectares
1960	3,963	476,276	120.2	8,147	99,356	12.2
1970	2,949	446,369	151.4	6,588	91,997	14.0
1975	2,521	428,747	170.1	5,901	90,448	15.3
1980	2,433	420,437	172.8	5,458	88,878	16.3
1985	2,275	410,521	180.4	5,037	87,634	17.4
1987	2,176	405,753	186.5	5,005	86,679	17.3
				(6,929)	(114,562)	(16.5)

[1] EC-10 except for the numbers in parenthesis which are EC-12 for 1987.

Sources: USDA, Agricultural Statistics, various issues; and EC Commission, Agricultural Situation y the Community, various issues.

Table No. 3: Employment in agriculture

	United States		European Community	
	1,000 Persons	% of total civil employment	1,000 Persons	% of total civil employment
1975	3,408	4.0	13,935	11.4
1976	3,331	3.8	13,570	11.2
1977	3,283	3.6	13,133	10.8
1978	3,387	3.5	12,769	10.4
1979	3,347	3.4	12,410	10.1
1980	3,364	3.4	11,963	9.7
1981	3,368	3.4	11,561	9.5
1982	3,401	3.4	11,112	9.2
1983	3,383	3.4	11,041	9.2
1984	3,321	3.2	10,755	8.9
1985	3,179	3.0	10,514	8.7
1986	3,163	2.9	10,090	8.3
1987	3,208	2.9	9,802	7.8
1988	3,169	2.8	9,470	7.4

Data are for the EC-12.
Sources: Economic Report for the President, February 1990; EC Commission, Agricultural Situation in the Community, Various issues; and Eurostat Review, various issues.

iv) One of the most significant changes in the US agriculture since the mid-1970s has been the substantial increase in off-farm work by farm operators. The proportion of farm operators whose principal occupation was something other than farming rose from 37 to 46 percent during 1974-1987. Off-farm work now provides over half of farm operator household income, and regularly exceeds net farm income. According to the USDA, this trend, and its substantial contribution to sector income, is likely to continue, mainly because of changes in the underlying profile of farming (USDA, 1991: 33).

v) According to the USDA a dualistic distribution is emerging in agriculture, revealing growth in the number of small and large farms and a decline in the number of mid-sized farms, considered to be the typical "family farm". Amongst the mid-sized farms, the "small commercial farms" with annual sales of US$ 50.000 to 99.999 fell at twice the national rate - minus 13.3 percent - while the number of "moderate farms" - those with annual sales of $100.000 to 249.999 - declined by 6 percent. While their numbers have fallen, mid-sized farms remain a significant part of US agriculture. According to the 1987 Census of Agriculture, mid-sized farms accounted for 20 percent of all farms, 40 percent of all land in farms, and 34 percent of total value of farm product sales. These farms were larger than average with higher sales per farm. Among the mid-sized farms the small commercial farms had an average size of 743 acres, while the moderate commercial farm had an average of 1,111 acres. Mid-sized farms made up 65% of all cash grain farms, 50 percent of the nation's livestock farms, and 42 percent of the dairy farms (USDA, 1991:

35). They were typically highly capital intensive, much more so than similar earning non farm businesses.[4]

vi) The fact that ownership of farms still rests, in large measure, with families, should not obscure the fact of concentration of land ownership in the US. A series of policies and the impact they have had in the farm sector have helped create a system of concentrated ownership and large farms. The percentage of farms in the largest size category quadrupled between 1960 and 1980, from less than 1 percent of all farms to 4.4 percent. In 1978, the largest 5% of landowners owned 75% of the land. One force behind this structural shift is increased mechanization, reflected in the fact that large farms (with sales of more than 200,000 u$s) used more than twice the amount of machinery per acre as mid-sized farms (those with sales of 40,000 to 199,999) (Flaherty, 1988: 99).

vii) The farm population was also becoming older, more indebted, and large corporations were increasing their role in the US farm sector in the 1980s. The push to exports also had far-reaching effects on the structure of agriculture as well: farmers became more susceptible to changing prices, and small and medium-sized farms in general were more vulnerable to bad years, given a new pattern of one crop, export-based agricultural activity, particularly in the grain belt. Furthermore, one of the most important changes is the mix of crops produced: between 1969 and 1980, the share of major export crops - corn, wheat, soybeans and cotton - rose from 58 percent to 70 percent of total acres of cropland (Flaherty, 1988: 98).

viii) Farm practices characteristic of US farming have caused significant ecological deterioration of land and soil conditions, due to intensive use of chemicals and mechanical means. Soil and water deterioration as well as other environmental hazards increased considerably due to the "inappropriate" technologies and practices of US farming (Belden et al. 1986: chapter 3). This is also due to the fact that farms "are being squeezed so hard that conservation is a luxury they can't afford" (Flaherty, 1988: 103). Livestock feedlots and the heavy use of fertilizers cause water pollution. Pesticides are a health hazard to the farmer "and are ultimately self-defeating, as their target species develop resistance to commonly used pesticides and as the poisons kill off natural pest predators. (Furthermore) continuous planting of the same crop year after year (monoculture) depletes soil nutrients and leads to escalating dependence on chemical fertilizers" (Belden et.al. 1986: 6). Other malpractices have to do with the dangerous narrowing of the genetic resource base of major food crops, as well as the loss of a large amount of farmland to other uses. Not only does agriculture place great stress on the environment, human health also tends to become jeopardized as a consequence.

In sum, intense technological development mostly with "inappropriate" technologies, increased integration into agroindustrial chains through vertical integration and contract farming, increased export orientation and specialization, ecological deterioration and the notable disappearance of the "family farm" all form part of basic "modernization" trends of "first world "agriculture in recent decades.

---

[4] "In the US, technological advances and the increased use of machinery have made farming a capital intensive industry. With the greater utilization of large tractors, combines, and computers, the optimal size for farming in the US has increased, resulting in fewer, but larger, farms" (Herlihy and Weiss, 1990: 88). A similar trend can be noted for the EC.

b) Changes in the processing of food products:

i) Until World War II US food processing was typically organized on a local or regional basis, purchasing inputs directly from farmers. Mechanical processing technologies were simple (drying, separating, canning) and processed staples were largely distributed through small-scale, locally-owned retail outlets. However, it was during the early decades of this century that the forerunners of today's multinational corporate processors took shape in the US and Europe. (Winson, citing Frundt, 1981 and Connor et al. 1985). Horizontal integration created large-scale economic organizations in meat packing, dairy, milling and fruit canning sectors. After the Second World War a new phase began with the rapid expansion of brand name processed staples, and a shift to more processed foods (cake mixes, breakfast cereals) with a higher value-added component. This permitted greater corporate control over raw material prices and the distribution of processed foods. Brand differentiation for large manufacturers gave particular salience to advertising as a fundamental component of growth strategies (Winson,1988:524/525).

In the 1950s and 1960s diversification became a central component of food processor's corporate strategies, especially the larger ones, as well as the takeover of smaller firms in many food sectors. By 1962 the top 50 processing companies of the US controlled 70 percent of sales in practically all product categories. Small craft-like establishments with a few employees had become a relatively insignificant part of the US scene in food processing. In Europe - in particular France and Italy - the situation was different since small enterprises continued constituting an very sizable segment of processing establishments (OECD, 1979:135; Winson 1988)

Increased concentration and centralization in the food processing industry is denoted by the fact that the 50 largest firms of the US controlling 36% of the industry's net worth in 1950 increased their share in 1978 to 64% due mainly to takeovers, and merger activities (Belden 1986; Flaherty, 1988).

Concentration in processing has been expensive for both farmers and consumers. Today over 90 percent of food is processed, and agricultural processing and distribution are characterized by large-scale corporations with fewer and fewer firms (Connor and Marion 1985, cited by Winson, 1988).

The four largest "brand producers" of the US sold 70 percent of total brand product sales in 1977 denoting the fact that advertising, particularly in television, contributed substantially to the concentration of sales (Flaherty 1988:100). Mergers and takeovers continued intensely in this period and later on (Wilkinson, 1989:96). Increased processing of food products and technological changes contributed to increased control by major processors of the agrofood chain vis-à-vis farmers and consumers (Goodman, Sorj y Wilkinson 1987; Flaherty 1988).

In Canada "the three major meat packers have 55% of the national market, seven companies account for 85% of all fruit and vegetable processing, four companies have 77 percent of the flour milling capacity and four companies have 96 percent of all breakfast cereal manufacturing (cited by Winson 1988: 529).

Thus, processed foods - prepared foods in particular - took hold of the industry. "The food industry learned that the biggest growth and profit potential lies in prepared foods...Food processors increased their share of the retail food dollar from fifty cents in 1947 to sixty-three cents in 1964. By the 1960s processed foods accounted for one third of all the food Americans ate (Wessel, 1983: 158 citing Forbes magazine).

ii) Technological change in the food industry tended to be labour-saving and threatened to increase unemployment. According to a recent USDA report "food and beverage processors offered limited potential for U.S. rural employment growth in the 1990's". Only four food processing activities were expected to offer brighter job prospects: poultry dressing, meat-packing, cheese processing, and frozen fruit and vegetable processing. "Employment will grow in several clusters of rural counties across the US that can provide the raw inputs for these operations.

However, employment in the industry as a whole will continue to contract well into the 1990's" (USDA, 1991: 1)

The food and beverage processing sector of the US includes 47 manufacturing industries. Some 20,000 food processing establishments provided jobs to 1.4 million workers nationally in 1987, which nonetheless represented less than half the numbers employed by US farms. In the 1980's more than half of all jobs in food and beverage processing were in just 7 of these 47 industries: bread and related products; meat packing; poultry dressing; bottled and canned soft drink processing; fluid milk production; sausage and other prepared meat production; and miscellaneous food preparations.

"Food processing industries lost some 59,000 jobs during 1981-87, as a wave of mergers and acquisitions swept the industry. Labour-intensive plants were either scrapped and replaced or rebuilt to rely more on machinery." (USDA, 1991:28/29).

iii) Related to concentration in food processing and the expansion of the operations of inputs and processing industries is the progressive internationalization of agroindustrial capital. While the forerunners of today's processing multinationals, such as Nestlé, Unilever and United Fruit, had already established subsidiaries throughout the world early in this century, a mayor period of internationalization began after 1955, spurred largely by US capital, and later on, by UK firms redeploying their investments into continental Europe (OECD 1979: 274).

Limited domestic economic growth and market saturation of demand induced US agribusiness to look at growing consumer markets abroad (Teubal, 1987, Winson, 1988). Unilever, Nestlé, Pepsi Cola, Coca Cola, Ralston Purina became familiar names in many countries representing firms that adopted a global perspective. Firms such as Harvester and John Deere expanded their world operations of agriculture machinery from California to Brazil and Thailand, and Quaker Oats and General Foods provide world-wide highly elaborated foods. By 1970 major US food companies were making one fourth of their total sales abroad (Wessel, 1983: 160)

vi) The large agrofood industries induced much of the research and development of new technologies including the development of biotechnologies. The food industry tended to induce the reduction of the proportion of raw materials in relation to the value added by industrial activity. The chemical industry has also acquired an increased strategic role in relation to the structure of agroindustry (Wilkinson, 1988).

Due to the shifting frontier of technological innovation in the food industry from mechanical to chemical and biochemical engineering and, in particular, the close integration of biotechnologies and automation, it is increasingly difficult to distinguish as between the physical, biological and chemical properties of food. One of the key issues in the formation of a new bio-industry is related to the control the food industry can exert over the biocatalytic activity of microorganisms, in particular bacteria and enzymes, as agents of chemical transformation to process raw materials and produce selected compounds for the food industry. New biotechnologies permit reprogramming processes and the formation of specific products via genetic engineering.

"In fermentation technology, living organisms serve as miniature factories converting raw materials into end products. In enzyme technology, biological catalysts extracted from those living organisms are used to make the products...Genetic engineering brings significant refinements to these conventional methods since microorganisms and enzymes now can be modified and improved

for industrial purposes in a direct, controlled and predictable manner" (Goodman, Sorj and Wilkinson, 1985, chapter III).[5]

One of the end results of this is the "loosening the food industry's dependence on 'agriculture' as conventionally defined...The full implications of these technological developments for resource use in agriculture obviously are uncertain at present. However, as progress in biotechnology makes fermentation methods of biomass conversion more efficient...the action of ... industrial microbiology again is to reduce the importance of agriculture, where this is defined as the production of field crops associated with specific food and fibre systems for processing and distribution...In essence, these advanced techniques threaten to trivialize agriculture, transforming it into one among several competing sources of organic matter for biomass conversion and fractionalism. The privileged position of conventional field crops in current land use patterns thus increasingly will be challenged" (Goodman, Sorj and Wilkinson 1985).

c) Analogous trends can be observed in the wholesale and retailing sectors of the agrofood chain:

i) Supermarkets and hypermarkets (wholesale supermarkets) increased substantially their leverage in highly industrialized countries. In the US large grocery chains of more than 100 stores controlled 27 percent of sales in 1948. By 1977 this control had increased to 41 percent (Belden 1986: 5). In Great Britain "the proportion of food retailing accounted for by large food retailers has grown over the past 25 years. The five largest multiple food retailers (Tesco, Asda, Sainsbury, Argyll and Dee Corp) accounted for 32 percent of grocery sales in 1977; by 1982 this figure had increased to 50 percent overall and to 55 percent in the London television area (Hill and Ray 1987: 68).

Competition among food outlets in the U.S. followed the pattern for production and processing of food. In 1958 the top four supermarket chains captured more than half of all sales in about 40 percent of local markets. By 1977, the top four firms accounted for more than half of food sales in 67% of local markets. The share of sales going to chains with more than 11 stores rose from about 42 percent in 1958 to almost 60 percent in 1982. The growth of chains was most rapid after 1975, apparently because the Federal Trade Commission's relaxation of enforcement of laws regulating "horizontal mergers" of chain stores (cited by Flaherty, 1988: 101).

ii) In several first world countries both wholesalers and retailers, on the one hand, and the processing industry, on the other, vie to increase their share of the market in relation to farmers. This is reflected in the share of post-farm margins in the price of food. In this respect both farmers and consumers tended to lose out vis a vis processors and retailers (Hill and Ray 1987). Concentration and conglomeration in the food industry and in wholesaling and retailing tended to increase food prices affecting lower income groups proportionately more. According to a report by the Federal Trade Commission of the US if the food distribution industry were more competitive - that is, if the top four firms accounted for only 40 percent or less of industry sales (lower than what it was at the time) - retail prices would fall at least 25 percent (quoted by Flaherty 1988: 101). Between 1980 and 1983, most of the increases in food prices came after food left the farm, in what is called the farm-to-retail price spread, or retail spread. (Flaherty: 1988: 101)

---

[5] "...the range of raw materials or feedstocks that can be converted into food products or, for that matter, fuel, fibres, and chemicals, will increase very significantly. The combination of wider feestock selection and more efficient conversion inteo food ingredients will greatly reinforce existing pressures on traditional agro-food chains and is likely to provoke radical restructuring in certain food sectors. The impact of high fructose corn syrups (HFCS) on the sugar industry is a case in point"(Goodman, Sorj, Wilkinson, 1985)

iii) Supermarkets and fast foods such as McDonalds and Kentucky Fried Chicken were also significantly transnationalized in recent decades. In accordance with trends denoting the increased consumption of food away from home fast food businesses have expanded their operations substantially and are considered to be among the most stable and profitable of the world. In the US, fast food restaurants tripled their sales in the 1974-1982 period and had annual sales of over 58 billion dollars in the early 1980s (Giai, 1989). Apart from this, fast food businesses have rapidly expanded throughout the world.

d) Food consumption patterns and the quality of food consumed have also been transformed in recent decades:

i) The increased processing of food means that proportionately the "agricultural" or "natural" content of final food commodities slowly was reduced in relation to "processing" and "servicing" incorporated into the final product. This influenced prices and a certain homogeneity of consumption patterns.

The massive diffusion of canned and frozen foods, and of those requiring the use of a series of preservatives and additives - providing aromas, colours, tastes, - as well as greater integration with the chemical and pharmaceutical industries, have significantly influenced consumption patterns in recent years.

Food safety and quality are also problems for consumers. Since 1970, the number of additives in US food has risen 40 percent - 27,000 additives are now in use. According to some authors current federal labelling and testing regulations are inadequate to protect human health (see Belden et al. 1986: 7).

ii) The above developments went along with the growing importance of "brand products" and product differentiation strategies developed by large agroindustrial firms, to which reference has also been made previously.

iii) The quality of food consumption in the US has also been frequently put in question, since many Americans overeat, consume poor-quality diets, or are undernourished. On the one hand, the now defunct Senate Select Committee on Nutrition and Human Needs recommended in 1977 that people consume less fat, sugar and salt, and more grains, vegetables and fruits. The food industry vehemently opposed this common-sense approach to diet, and since 1981 the USDA and Congress have not publicized these recommendations (see Belden et. al, 1986: 6/7).

On the other hand, "hunger in the US is on the rise, as a result of the deep budget cuts made in food programs since 1981. Food stamp benefits amount to only about 43 cents per meal for each of the 22 million people now receiving them, while many of the 35 million people now living in poverty are not even on the program" (Belden et.al.1986:7)

vi) In recent years important reactions against unhealthy processed foods, and in favour of more wholesale "natural" foods has emerged. For the time being this appears to be a relatively small and uninfluential movement.

In sum "agroindustrial modernization" as described above is a complex process involving interests associated with agriculture as well as with processing, distribution and the consumption of food. Globalization of agroindustry was to influence trade, investment, consumption and production patterns throughout the world.

Globalization of Agroindustrial Modernization

Trends in agroindustrial modernization were intensely projected on to the world economy in the post-World War II period, and particularly in the 1970s and 1980s.

Changes in the pattern and organization of international trade of agricultural and agroindustrial commodities were important consequences of agroindustrial modernization and globalization. Changes in trends in foreign investments in the food industry as well. As we shall see both exerted a significant influence on the workings of the global agrofood economy, something which can be kept in mind when considering specific case studies.

a) Patterns of international trade

Up to the early 1970s a large proportion of surplus agricultural production of the US and Europe was disposed of via food aid programs. Beginning the late 1950s and 1960s and continuing intensely in the 1970s these food aid programs were almost completely replaced by exports. Thus, the US reasserted the power of its agriculture in the international economy by massively increasing its exports of agricultural and agroindustrial commodities to world markets (Teubal, 1987). US-Soviet detente, and changes in the domestic policies of the USSR led to the massive US exports to the Socialist Block beginning the early 1970s. The disintegration of the peasant agricultures of the TW also contributed to the formation of new export markets for the EC and the US.

The value of US agricultural exports (including some processed commodities) rose from an average of 6.5 billion in 1966-1970 to a peak of 44.6 billion in 1981. In the 1980s agricultural exports declined somewhat due to a number of factors - increased competition from the EC, an overvalued dollar, the third world debt crisis, recession in the industrialized countries, etc. - though they remained at relatively high levels. While half of total US agricultural exports was oriented to the EC, an increasing proportion went to third world countries.

EC agricultural exports also increased substantially in recent years nearly tripling between 1975 and 1987 from $11.6 billion to $30.7 billion. As a result, the EC became the world's second largest agricultural exporter behind the US, even exceeding the US in some years. The value of EC and US agricultural imports also rose, mostly from each other and as a consequence of increasing intra-EC agricultural trade.

Third World countries (including the Asian NICs), were a key growth market for farm commodities during the 1970s. While global agricultural trade was expanding in the 1970s (due mostly to the expansion of trade between developed countries), third world farm imports grew faster than the world average. By 1979-81 they accounted for 19 percent of global farm imports and 27 percent of US farm exports. When growth in world farm trade slowed in the 1980s, and US farm exports fell, declining imports by TW countries were an important determining factor. The downturn in global economic growth, and constraints on TW countries' commercial import capacity because of weakening export earnings (falling international prices in many cases and a rising foreign debt), all contributed to slower growth in TW imports of farm products in the 1980s. Adjustment policies as well were in particular responsible for reduced import capacity of TW countries. The reduction in TW agricultural imports occurred despite increased external food dependency that had begun previously (see Teubal, 1987) and the relative importance of food and other agricultural imports in the import regimes of TW countries (USDA, 1990b: 5).

Increased external food dependency and the export orientation of local agricultures induced, to a large extent, by structural adjustments and the growing disintegration of peasant staple goods producing economies of the TW were some of the main trends of the 1980s. Apart from a new born external food dependency that hardly existed prior to the 1970s, new exports, in many cases of high value commodities, increased substantially in the 1970s and 1980s. This changeover from the production of staple foods oriented to the demand of the local economies to a new export orientation of production had important consequences for the peasant economies of the third world.

b) The development of some world food complexes

Associated with much of the world wide expansion of international trade – and foreign investments in agroindustry – is the development of a series of distinct world food complexes. According to

Friedmann the most important changes in the world food regime of recent decades can be traced to the wheat, durable food and livestock complexes. To this could be added the fruit and vegetables complex. Each complex is defined as "a chain (or web) of production and consumption relations, linking farmers and farm workers to consuming individuals, households and communities. Within each web are private and state institutions which buy, sell, provide inputs, process, transport, distribute and finance each link. Each complex includes many class, gender and cultural relations, within a specific (changing) international division of labour" (Friedmann, 1992: 371).

A major source of TW food import dependency is wheat, a commodity 25% more expensive than maize and more than six times higher than rice (5 times the price per ton of petroleum). Between the early 1950s and late 1970s per capita consumption of wheat increased by 63% in market economies of the third world. For the TW, the wheat complex was the major source of food import dependency. "When previously self-provisioning countries began to import food in the 1950s and 1960s, the food they imported most of all was wheat, no matter what the customary dietary staples. As a result, when they became dependent on imports, they were hooked on the most expensive grain. Based on a new axis between the US and the TW, between the early 1950s and the 1970s, world wheat exports increased 2.5 times. In the 1950s and 1960s, the US share of world wheat exports grew from just over a third to more than half. As Europe substituted domestic production for its historic imports, the TW (and Japan) became the major importers. The TW share of wheat imports grew from 19% in the late 1950s to 66% in the late 1960s" (Friedmann, 1992: 372).

In the late 1960s, the aim of creating commercial markets through aid had begun to succeed. Many TW countries were beginning to depend almost completely on US wheat imports. However, the policies of self-sufficiency (CAP) of the EC, the Soviet grain purchases beginning the early 1970s, and for some countries the "green revolution" and policies tending to self sufficiency (for example, in India), all complicated this matter in different ways.

World trade in wheat dropped sharply in the mid-1980s, and the US share fell even more, from 43 million to 29 million tons between 1980 and 1985. For third world countries structural adjustments played havoc: measures taken as conditions for rescheduling foreign debts invariably restrained imports, and reduced or abolished price subsidies to consumers. Domestic agricultural producers were, nevertheless, not favoured: "structural adjustment also forces domestic agriculture into export production to pay debts, and privatisation of public projects often compromises existing potential" (Friedmann, 1992: 374).

The second important world complex Friedmann considers is the durable goods complex. During the 1950s and 1960s, food manufacturing corporations in advanced capitalist countries increasingly replaced simple refiners and final consumers as buyers of tropical agricultural products. Chemical and biological substitutes for industrial raw materials, including the key ingredients, sweeteners and fats replaced the demand for raw sugar and vegetable oils. These commodities lost their climatic monopoly and became one of a growing category of substitutable raw materials for industrial foods. As industrial chemists made new sweeteners from grain and improved the blending and substitution of oils, the fate of tropical exports and third world countries dependent on them was touched upon.

As was mentioned above corporations which invent, market and buy inputs for increasingly complex edible commodities, went through an intense period of concentration in the 1970s and 1980s. (Beatrice Foods, Kraft, General Foods, McDonald). The shift to industrial raw materials was accelerated further. Substitution and corporate concentration mean that efforts to increase tropical exports are doomed to a vicious spiral of declining prices. As substitutes for these traditional exports many TW countries turned to "non-traditional" exports, a factor which, nonetheless, created new problems: fresh fruits, vegetables, flowers and ornamental plants, tended many times to compete directly with domestic products in the US and the EC.

While the TW is influenced by the eruption and transformation of some of the main durable food complexes, traditional commodities still continue being the main support of many TW countries. Nevertheless, these, by no means, constitute the main staple goods consumed in the first world. First world staples - grains, dairy products and assorted meats - are mostly surplus products or products

in which "first world countries" deliberately tend towards self-sufficiency or are a consequence of cheap food policies. The TW nevertheless continued exporting in the early 1980s 91,3% of world cocoa exports, 91.4% of world coffee, 85.5% of tea, 57% of rice, 74% of sugar, 86% of bananas, 85% of coco oil, 80% of palm oil, 98% of caucho, and 50% of tobacco exports (Santos, 1992, Table VI). These commodities continued representing a substantial proportion of TW country export earning capacity.

The world livestock complex also suffered an important restructuring in recent decades. While high meat consumption was the key to the postwar diet of the USA and Europe, soya and maize were as important to the emergence of the livestock complex as factory production of poultry and pork, and the growth of cattle feedlots. Soybeans are by far the fastest growing crop in world agriculture since 1945. From an Asian food crop, soybeans became the basis for a global transformation of livestock production, linking field crops with intensive, scientifically produced animals, through giant agrifood corporations, across many national boundaries (Friedmann, 1992). Like automobiles or aircraft - in which multiple components produced in different factories, and in different national economies, came to be linked by TNC as direct subsidiaries or through subcontracts - the specialized livestock sector was connected, via the transnational feedstuffs industry to specialised crop farmers (Teubal, 1987, Friedmann, 1992).

Sanderson has argued that there is a tendency to create a 'world steer' parallel to the better known 'world car'. The world steer reorganizes beef production to meet international (for Mexico, US and Japan) standards through expensive feeds and medicines, concentrated feedlots, and centralised slaughtering. The displacement of traditional marketing and processing means that small, sideline producers lose access to markets (Friedmann, 1992: 378,379).

Thus, world food systems and complexes are changing substantially. According to Friedmann "after WWII state agricultural and trade policies within the framework of monetary rules and military alliances, created an institutional framework for fledgling agrifood capitals to become strategic poles of the food regime... More rapidly and deeply than before, transnational agrifood capitals disconnect production from consumption and relink them through buying and selling. They have created an integrated productive sector of the world economy, and peoples of the TW has been incorporated or marginalized - often simultaneously - as consumers and workers.... Farmers would adapt production to demand for raw materials by a small set of transnational corporations and in order to meet quality standards would buy inputs and services from (often the same) transnational corporation. Relations of consumption and production would be shaped within the possibilities of incorporation or marginalization by agrifood corporations" (Friedmann, 1992: 379/80).

The three main food complexes which have emerged on the world arena all have widespread implications for small peasant and farmers, as well as food security in Third World. Wheat and other grain (maize) exports to the third world, and the formation of a wheat complex, have important effects on food dependency which also preempts peasant production. As Barraclaugh points out this might be one of the more inconvenient effects of the formation of NAFTA for the Mexican peasant staple producers (Barraclough , 1992). In the case of the so-called durable complexes, many peasant producers, for example sugar cane growers, might also be easily thrown out of the market. With regards to the cattle complex, apart from its effects on the development of the associated oilseed complexes of the so-called "new agricultural countries" of Argentina and Brazil, the transfer of land for cattle production, may also be highly inconvenient for peasant producers in the TW.

c. <u>The impact of modernization on third world peasantry</u>

The application of "first world" technologies to TW economies may have lasting effects on continuing disarticulation of the peasant economies of the TW. As we have seen, modernization – mechanization and the use of other "modern" techniques – in the US, Canada and Europe has brought about the disappearance of many farms, specially the smaller ones, and a decrease in the opportunities for agricultural labourers. These trends have not been compensated by developments in the food industry where technological change also tended to be labour-saving.

This same type of "inappropriate" technological change is being transferred massively to the third world, to economies that are much poorer and with agriculture sectors and peasant populations which are larger and sustaining much lower incomes. In 1989, the average GNP per cápita of the 35 lowest income countries of the world was 330 dólares, while the 19 industrialized countries of the OECD had an average income per capita of 19.090 dólares. The total populations of the poor countries amounted to 3000 million, more than four times the combined populations of the OECD countries (775 million). Apart from these 55 middle income countries had an average income per capita of 2.040 dollars for a total population of 1 100 million inhabitants.

The bulk of the worlds poor are peasants and landless labourers of the third world. They live in much lower income per capita economies, and in agricultural and rural sectors which are much poorer and widespread than those of the advanced capitalist countries. Thus, the negative effects of "inappropriate" technologies and modernization are liable to be much greater. The exclusion and the marginalization of the peasantry has been frequently pointed out in much of the literature on the rural modernization of the third world. Agroindustrial modernization and globalization is only to increase negative trends which characterize third world peasant economies.

As in the "first world", the available technology which is diffused world-wide requires an agriculture of a larger scale, a factor that excludes vast sectors of the population from its benefits. Agroindustry also tends to be labour saving and articulated in many cases with larger farms. Concentration and centralization of capital also proceeds rapidly in the processing and distribution of food. Supermarkets in the TW tend to cater mostly to middle or upper income classes, seldom to lower income ones, contributing to a greater "disarticulation" (de Janvry) than what prevails in the advanced capitalist countries. All these factors point out to the fact that the "unfettered" diffusion of "first world" modernization to the TW is liable to cause much greater marginalization and disarticulation than what has seemingly occurred in the advanced industrialized countries.

Postfordist Agrifood Regimes?

Agriculture and food in the advanced industrialized countries under Fordist regimes of accumulation provided cheap food, and hence low reproduction costs for labour, setting aside greater demand for other non-food commodities. Now that agroindustrial modernization is set into the accumulation regime, agriculture and agrofood systems are being drawn into global accumulation processes.

Cheap food policies have lost much of the interest they used to have in the advanced industrialized countries as food has become a marginal part of family expenditures. Imported foods from abroad and raw materials provided traditionally by TW countries, have also lost much of their importance. New high cost speciality foods are increasingly demanded. Raw materials are substituted for other industrialized commodities as the "substitution" effect advances (Goodman, Wilkinson and Sorj, 1987). Both these factors reflect differing patterns from those that formed part of the Fordist regime in the post World War II years.

The North continues dumping cheap surplus foods into the TW, transforming aid into exports, while the debt crisis and falling international food prices require more exports by the TW to pay for servicing of foreign debt. Furthermore, import-substitution industrialization, though limited in the TW, has also been set aside as a viable strategy for most TW countries. Only the manufactured exports strategy of the Asian NICs appear to have had some degree of success, but there too soil depletion and inappropriate technologies are playing havoc in local agricultures.

In the advanced countries the family farm integrated into the grain and dairy complexes used to play an important role in providing cheap food, via the "treadmill effect" and intensive technological change. Nevertheless, this important actor of the Fordist regime is also tending to disappear.

In the previous regime of accumulation, cheap food had the effect of contributing to the Fordist mode of reproduction. Agroindustry increases profitability of certain commodities, but reduces cheap food availabilities. This has also occurred in the TW. Traditional grains are being substituted for wheat (imports), sugar is on the declining edge, and beef, poultry and pork complexes have also

substituted for cheaper staple commodities. Large-scale disarticulation of the world wide regime of accumulation seems to be under way. Traditional crops - sugar, tea, etc. are also on the decline.

In the Third World, cheap food policies implied a role for the peasantry and production of basic foods, particularly under import substitution industrialization. State intervention had the role of guaranteeing availability of cheap food and sustaining domestic markets (a certain public goods vision). Basic foods were produced mostly by peasants and small farmers and were consumed by the bulk of the population; recent trends denote that both peasants and staple food production are tending to disappear. Peasants and basic foods are being excluded, and this appears to be inherent in the modernization processes which are inducing the formation of a new world food regime of accumulation.

Bibliography

Arroyo, G., Rama, R., y Rello, F. (1985), Agricultura y alimentos en América Latina: el poder de las transnacionales, UNAM-ICI.

Barraclough, S., (1982), A Preliminary Analysis of the Nicaraguan Food System, UNRISD.

Barraclough, S. (1992), "Algunas cuestiones sobre las implicaciones del TLC en el México rural", Problemas del Desarrollo, (México), Vol. XXIII, abril-junio.

Barkin, D. y Rozo, E., (1981), "L'agriculture et l'internationalization du capital", Revue Tiers Monde, No. 22.

Belden, J. et al (1986), Dirt Rich, Dirt Poor: America's Food and Farm Crisis, The Institute for Policy Studies, Routledge and Kegan Paul, New York and London.

Davis, J.E. (1980), "Capitalist Agricultural Development and the Exploitation of the Propertied Labourer", in F.Buttel and H.Newby (eds.), The Rural Sociology of Advanced Societies: Critical Perspectives. Osmun and Co.

de Janvry (1985), "La desarticulación social en la historia de América Latina", in Investigación Económica, Facultad de Economia de la Universidad Nacional Autónoma de México, No. 172, Abril-June.

Flaherty, D. (1988), "The Farm Crisis", in URPE, The Imperiled Economy, Book II, Through the Safety Net, New York.

Friedmann, H. (1990), "The Origins of Third World Food Dependence", in Bernstein, Crow, Mackintosh and Martin (Eds.), The Food Question-Profits Versus People, Monthly Review Press.

Friedmann, H. (1992), "Distance and Durability: Shaky Foundations of the World Food Economy", Third World Quarterly, Vol. 13, No. 2

Giai, E., (1989), "Las transnacionales agroalimentarias de la comida rápida", Realidad Económica, No. 89 (Argentina).

Goodman, D., Sorj, B. and Wilkinson, J. (1987), From Farming to Biotechnology: A Theory of Agroindustrial Development, Basil & Blackwell, London.

Herlihy, M. and K.R. Weiss (1990), "Profiles of Agriculture in the United States and European Community" in USDA, Western Europe Agriculture and Trade Report, ERS, Agriculture and Trade Analysis Division, November.

Hill, B., and Ray, D. (1987), Economics for Agriculture: Food, Farming and Rural Economic, MacMillan.

McMichael, Ph. and D. Myhere (1990), "Global Regulation vs. the Nation State: Agro-Food Systems and the New Politics of Capital", Review of Radical Political Economics, Vol. 22 (1), Spring.

OECD (1979), "Impact of Multinational Enterprises on National Scientific and Technical Capacities: Food Industry", Paris, OECD.

Rama, R. (1985), "Some Effects of the Internationalization of Agriculture on the Mexican Agricultural Crisis", in Steven Sanderson (ed.), The Americas in the New International Division of Labor, Holmes and Meier.

Rama, R. (1992), Investing in Food, Development Centre of the OECD.

Rama, R. and Vigorito, R.(1979), El complejo de frutas y legumbres en México, ILET-Editorial Nueva Imágen (México).

Strange, M. (1988), Family Farming. A New Economic Vision, University of Nebraska Press and Institute for Food and Development Policy.

Streeten, P. (1987), What Price Food?, Macmillan.

Teubal, M., (1979), "La crisis alimenticia y el tercer mundo", Economía de América Latina, No. 2, (segundo semestre) (México).

Teubal, M. (1987), "Internationalization of Capital and Agroindustrial Complexes. Impacts on Latin American Agriculture", Latin American Perspectives, Issue 54, Vol 14, No.3, Summer.

Teubal, M. (1992), "Food Security and 'Regimes of Accumulation': The Case of Argentina", Working Paper Series No. 123, Institute of Social Studies, May, The Hague, The Netherlands.

USDA (1989), "A look at farmers leaving farms", Agricultural Outlook, 157 Economic Research Service, October.

USDA (1991a), "Outlook Dim for Food-Related Job Growth", Agricultural Outlook 173, ERS, April

USDA (1991b), "The US Farm Sector in Review", Agricultural Outlook, 179, Economic Research Service, October.

USDA (1990), Developing Economies Agriculture and Trade Report, RS90-5, ERS, July.

Watkins, K. (1992), "GATT and the Third World: fixing the rules", Race and Class, Vol. 34 (1), July-September.

Wessel, J. and M. Hantman (1983), Trading the Future-Farm Exports and the Concentration of Economic Power in Our Food Economy, Institute for Food and Development Policy, San Francisco, California.

Wilson, J. (1986) "The Political Economy of Contract Farming", Radical Review of Political Economy, Vol.18(4), Winter 1986.

Wilkinson, J. (1989), O Futuro do Sistema Alimentar, Dossié FAST, Editora Hucitec, Sao Paolo, Brasil.

Winson, A. (1988), "Researching the Food Processing-Farm Chain: The Case of Sova Scotia", Canadian Review of Sociology and Anthropology, Vol. 25 (4).

Winson, A. (1990), "Capitalist Coordination of Agriculture: Food Processing Firms and Farming in Central Canada", Rural Sociology, Vol. 55, No. 3.