Iberoamericana. Nordic Journal of Latin American and Caribbean Studies
Vol. XXXI: 1 2001, pp. 37-53

INTEGRATION AND RESTRUCTURING OF THE FOOD INDUSTRY. THE CASE OF FROZEN VEGETABLES IN MEXICO

Flavia Echánove Huacuja

I. INTRODUCTION

Agriculture is being restructured around the world: the types of commodities produced, the way in which production is organized, and the livelihoods which it engenders are all changing (Raynolds 1997:119). This restructuring has been influenced by big transnational corporations trough international agencies like the International Monetary Fund (IMF) and The World Bank which imposed structural adjustment policies on Third World debtor countries since the 1980's (Raynolds 1997:122; Haubert 1997:14; McMichael 1988:125,152; Teubal 1998:35; Llambi 1994a:193, 1994b:184).

Within the framework of those policies, agro-exports of non-traditional products were promoted, particularly horticultural products. In Mexico, the frozen vegetables production oriented toward the United States market has been very dynamic since the mid 1980's, related to the growing globalization and consumption of fruits and vegetables (fresh, frozen and processed). In 1988, these products represented the fourth most important commodity group in world agricultural trade (Islam 1990), found on a year-around basis on the tables of consumers in the industrialized countries. As Watts (1994:3) points out; "sitting down to supper in a North American home – whether the fare is a TV dinner, a homemade salad, or nouvelle cuisine embellished with "designer vegetables" – is to engage in an act of global consumption. Fresh, frozen, and processed fruit and vegetables circulate in worldwide commodity systems".

Per capita consumption of frozen vegetables in the United States expanded by 21 percent between 1985 and 2000 (USDA 2000), where Mexico provides two-thirds of the import value of those commodities. Consumers are demanding easy-to-prepare ("convenience") food, greater quality, product diversity and more value-added product forms (Cook

doi:https://doi.org/10.16993/ibero.117

1998:2). This has been stimulated by numerous demographic and lifestyle trends including changing income distribution, entry of women into the work force in record numbers, and consequently, more eating outside the home, aging of population, decreasing household size, increase in ethnic expression, and the growth of public knowledge about health and fitness (Cook 1990:67; Friedland 1994:220). On the supply side, the expansion in consumption has been possible owing to major advances in post-harvest handling technology which have improved control over the cold chain: the development of biotechnology (new varieties more resistant to storage and transport), trade liberalization, improvements in marketing structures, availability of produce from sources all over the world on a year-around basis, and the existence of a certain infrastructure at home (refrigeration, microwave ovens) (Cook 1998:2; Aguiar *et al*. 1998:5).

In this article, I study the structure and changes in the Mexican industry of frozen vegetables since the mid-1980. This necessarily implies an analysis of the deep relation that exists between this productive sector and the economy of the United States, whose consumption tendencies as well as the development of the retail food sector are determinant elements of this commodity chain in both countries.

According to some authors (Burch & Goss 1999), there are few studies about the role of the retail sector in the restructuring of the agro-food processing system. However, there are many cases that prove how that sector controls not only the industrial activity but also the agricultural process, as it happens in the case examined in this paper.

The general approach of the case study presented here included participant observation and semi-structured interviews conducted in the eleven agro-industries located in the central part of Mexico (the state of Guanajuato). Most of the data I present is based on a field study in this region where many growers, laborers and technicians were interviewed.

The paper begins with a brief overview of the world market of frozen vegetables and the specific situation of Mexico. I then provide a background of the companies studied, the characteristics of the industrial process involved, the crucial role played by the US retail and food service sector, and the control that these companies have over the agriculture process. Finally, I examine the integration and restructuring of the commodity chain in Mexico and United States.

II. Industry in Mexico: Supplier to the US Market

Mexico is the third largest exporter in the world market for frozen vegetables, preceded by Belgium-Luxembourg and China, and followed by

France, Poland and Spain (Table 1). All the European countries combined account for almost half of the world exports. At the same time they are also significant buyers, given the fact that they account for about 40 percent of total world imports (FAO 1998).

Table 1 - Frozen Vegetables in the World Market (1997)

Countries	Metric tons
Frozen Vegetables Exports	
World	2,215,582
Belgium-Luxembourg	582,456
China	243,615
Mexico	224,248
France	136,259
Poland	122,641
Spain	118,985
Frozen Vegetables Imports	
World	2,113,370
Germany	364,202
United States of America	319,971
Japan	254,476
France	247,903
United Kingdom	146,066
Belgium-Luxembourg	142,038

Source: FAO, Faostat Database Results, 1998

Growth in Mexico's exports of frozen vegetables has increased considerably since the middle of the 1980's, although less than her exports of fresh vegetables. Between 1991 and 1998, the value of frozen vegetables exported grew by a third; the main produce exported being broccoli (accounting for almost 60 percent of the total value), strawberries, cauliflower, mixed vegetables and spinach (Table 2). The produce showing the greatest increase during the nineties are okra, mixed vegetables, asparagus, spinach and sweet corn.

From the time the industry began, the frozen vegetable business in Mexico has aimed the bulk of its production towards the foreign market, fundamentally the US market. Exporting to other countries, such as Canada and Japan, or some European countries (Germany and the United Kingdom), has been a strategy attempted by frozen vegetable companies in

Table 2 - Mexico: Exports of Frozen Vegetables to the US (thousands of USD)

Commodity	1991	1992	1993	1994	1995	1996	1997	1998
Broccoli	72,037	106,106	89,782	82,204	87,264	90,740	92,504	86,919
Strawberries	21,375	16,247	17,242	17,712	23,622	19,489	22,663	22,709
Cauliflower	16,429	13,658	17,919	19,328	11,292	12,139	13,517	12,762
Mixtures	1,737	2,393	3,415	3,992	4,511	6,715	9,994	12,555
Spinach	661	707	160	1,139	674	1,354	1,722	1,598
Okra	6	39	235	1,697	294	672	754	966
Brussels Sprouts	324	347	193	554	860	617	736	415
Sweet Corn	0	0	59	456	142	133	201	66
Peas	101	9	89	412	18	67	37	128
Asparagus	79	45	251	287	127	131	200	252
Other Vegetables	3,894	6,097	6,960	8,646	12,651	16,976	14,366	14,040
Total	116,643	145,648	136,305	136,427	141,455	149,033	156,694	152,410

Source: US Department of Commerce, Bureau of the Census (1991-95), and The World Trade Atlas (1996-98)

order to diversify their markets, but with little success to date. In 1997, for example, of the total value of frozen vegetables exported by Mexico, 98 percent went to the US, 1.35 percent to Japan, and 0.14 percent to Canada Mexico is the largest supplier of frozen vegetables to the United States. In 1999, Mexican exports to that country constituted 62 percent of the total value of frozen vegetable imports, the next largest supplier being Canada at 20 percent, then Guatemala at 11 percent (The World Trade Atlas 1998).

A more detailed analysis by product puts Mexico in an even more prominent position. In 1998, for example, the volume of Mexico's principal vegetable export, broccoli, made up 82 percent of the total US foreign purchase of this vegetable. Likewise, Mexican cauliflower represented 88 percent of the total US purchase of this product. Mexico's exports of the first product constituted 62 percent of its consumption in the US market, whereas the second vegetable represented 43 percent (Ibid.).

III. Company Background and Typology

There are currently 16 frozen vegetable companies operating in Mexico, the majority (11) established in the country's central region in the State of Guanajuato. These are the companies that were analyzed in preparation for this article.[1] All these companies are strategically located close to the main highway running north and they handle produce from wide valleys also located in the region, ideally suited to the cultivation of many different vegetable crops.

In 1967, the US frozen food company, Birdseye, established operations in Guanajuato. It was the first company in Mexico to freeze vegetables such as broccoli, cauliflower and okra, and that was the time when the production of those particular vegetables first began in Mexico.[2] According to the company's directors, the arrival of Birdseye in Mexico resulted from a policy decision recognizing the advantage of cheap labor, a key element in this agro-industry which is highly labor-intensive.

In 1983, the US transnational, Green Giant, opened its business in Mexico. Later in 1991, this company transferred to Mexico a large part of the processing equipment from its California plant in Watsonville. In 1994, the California plant was shut down altogether. Currently, Green Giant controls 20 percent of the frozen vegetable market in the US, the company's country of origin[3].

The majority of the frozen food companies currently in operation first opened their doors for business in mid-1980. With the exception of the two transnational companies mentioned above, Birdseye and Green Giant, which dominated and energized the business throughout that

decade, the majority of the remaining agro-industries that started up at the time were established using Mexican capital. Most of the capital was financed by large farming families within the Guanajuato region, who began by supplying vegetables on contract to Birdseye and/or canning companies, and then decided to become vertically integrated, thus embarking on a phase that witnessed the transformation of their products.

Table 3 - Mexico: Frozen Vegetable Processing Firms* (1991 and 1998)

Firm	Location	Start Year	Capital	Annual Production (Million pounds)	
				1991**	1998
1. MARBRAN-SIMPLOT	Irapuato Jaral	1980 1995	Mex-E.U.	49	115
2.EXPOR SAN ANTONIO	Villagrán	1990	Mexican	28	95
3. BIRDSEYE	Celaya	1967	E.U.	44	62
4. GREEN GIANT	Irapuato	1983	E.U.	50	60
5. COVEMEX	Celaya	1976	Mexican	43	40
6. CONGELADOS DON JOSE	León	1985	Mexican	18	24
7. FRESCOS DE EXPORTACION	Irapuato	1986	Mexican	12	15
8. LA ESPERANZA DE MIRANDA	Dolores Hidalgo	1990	Mexican	5	11
9. PRODUCTOS FRUGO	Salamanca	1989	Mexican	10	10
10. FRIENDLY NATURE	Irapuato	1996	Mexican	10	10
11.LA HACIENDA	Silao		Mexican	3	8
GUANAJUATO TOTAL				272	450

Source: Interviews; Agriculture Department of Mexico; Bivings and Runsten (1992)

*The industries are those located in Guanajuato. The strawberry industry is not included
**The numbers for this year are from Leigh Bivings and David Runsten, *Potential Competitiveness of the Mexican Processed Vegetable and Strawberry Industries*, prepared for the Ministry of Agriculture, Fisheries and Food, British Columbia (July, 1992:71)

In 1992, one of the Mexican companies (Marbran), today the largest not only in Guanajuato but also the largest in Mexico, established an association or joint venture with the huge US food consortium JR Simplot, which bought over half of Marbran's shares.[4]

Establishing a typology for the eleven frozen food companies according to their sources of capital, the picture is of an agro-industry currently comprising two large transnational companies; one company that is an association of both domestic and foreign capital, and the majority (8) supported by domestic capital (Table 3). The largest of the latter is more relevant than the two transnational companies, given the volumes the company processes. Furthermore, the Mexican companies now dominate

the business, making for a process of "nationalization" of the capital within this sector of the agro-industry.

IV. THE INDUSTRIAL PROCESS: LABOR-INTENSITY AND HIGH VALUE-ADDED

Although the companies studied for this paper basically freeze broccoli, the majority have in recent years diversified enormously into processing a wide variety of vegetables (cauliflower, spinach, carrots, zucchini, sweet corn, okra, yellow squash, celery, asparagus, green pepper, strawberry, *etc.*). There are companies which freeze 12 or 13 different products (some of these products in a variety of cuts and presentations), as well as vegetable mixtures.

When the produce reaches the plant from the field, the quality is checked and then it goes to the trimming areas. These areas are made up of a series of elongated tables where female workers, young women for the most part, cut the produce manually in several different ways according to the clients' specific requirements. At certain stages in this process, the work is so sophisticated that workers have to even use special instruments to measure the width of the broccoli florets.

Once cut, the produce goes to the oven or "blancher", where it is pre-cooked. After this, the produce is submitted to one of the two different freezing procedures. The more modern and costly involves freezing the product rapidly and, in individual pieces, by means of the so-called IQF tunnels ("individually quick frozen"). Alternatively, in the block-freezing method, the pre-cooked produce goes to the "wet-pack" line on conveyor belts where the produce is once more "selected and packed manually" in ready-for-consumption packages, whether in small cardboard boxes or in plastic bags. Subsequently, the produce is frozen in blocks and stored in refrigerated chambers awaiting shipment on refrigerated containers that transport the produce to Mexico's northern border.

In contrast to the process just described, the produce coming out of the IQF tunnels is packed in bulk, whether in large cardboard boxes or "totes" or in smaller containers, which are destined mainly to the food service industry. To a lesser degree, some produce is also sent to the so-called polybag areas where it is packed in presentations ready for consumption, containing only one product or containing a combination of various products (broccoli, cauliflower, carrots, *etc.*) that have been previously mixed. This mixing process used to be carried out manually. However, in recent years, the larger companies have automated the procedure by installing sophisticated machinery. This modernization is the result of an expansion in the demand for mixed vegetables (as determined

from the export figures), and thus the need to carry out the procedure more rapidly.

While some stages of the industrial process like those mentioned above have been partially mechanized in recent years, the stages of trimming, selection and packing of the main products (broccoli and cauliflower) continue to be carried out manually. This is why one of the central characteristics of the industrial branch studied here is labor-intensive. Not even in the United States has it yet been found possible to mechanize those steps in the procedure, which is where Mexico has the comparative advantage of cheaper labor. The differences are enormous: whereas in Mexico the average wage earned by a trimmer is USD 0.76 per hour (and USD 0.61 for other workers), in the United States the industrial minimum wage ranges from USD 6.50 to USD 7.00 per hour (almost ten times greater).

Because of this difference, even though the plants in Mexico employ a large number of workers (the six biggest companies employing between 720 and 2 500 workers each), the average labor cost represents only 15 percent of the total production cost; raw materials accounting for 40 percent, and other categories (maintenance of equipment, packaging, services, depreciation, *etc.*) making up for the rest of the cost. This reveals another aspect of the industrial chain with regard to its high value-added index.

V. The Defining Elements: US Retail and Food Service Sectors

The enormous range of products ready for consumption and coming out of the frozen food companies, have as their end-destination the retail sector (supermarkets), and the food service (restaurants, fast-food chains, *etc.*); and to a lesser degree, the institutional sector in the United States (schools, hospitals, the military service, etc). The two transnational companies are the only companies having their own brand name, the rest package produce under a wide range of brand names belonging to different agents from north of the Mexican border ("brokers", marketing companies, retailers, fast food chains, *etc.*).

Even today, however, the majority of frozen vegetables produced by Mexico are exported in bulk, to be mixed with other vegetables in the United States and/or repackaged in different ways and/or distributed among final consumers. Distribution channels are the same for the ready-for-consumption products, those products aimed at satisfying growing consumer demand for fresh or semi-fresh fruits and vegetables, and for convenience and quick-to-prepare foods.

Green Giant and Birdseye send their produce in bulk to their headquarters where it is mixed with other vegetables and packed. The mixtures are also used in combination with pastry and meats and packed in ready-for consumption presentations, or the so-called "TV dinners" which contain vegetables and meat, ready to be heated in micro-wave ovens. JR Simplot handles produce sent by its Mexican associate, Marbran, in a similar fashion.

Produce exported in 'bulk' by Mexican companies is destined to the large US frozen food companies (Green Giant, AgriLink, NorPac, Heinz, *etc.*), where it is dealt with in much the same way as described above, to canning companies such as Campbell's and Nestlé, which also pack the so-called TV dinners (the former company also uses the produce in canned soups), to wholesale distributors (Sysco, for example); and to supermarkets and restaurants.

In general, however, Mexican firms do not sell directly to the different destinations mentioned above but they do so through "brokers" (Superior Foods, Inn Foods, Pepsico, etc,.), even though five of these firms have established marketing companies in the United States (some in various parts of the United States) which allow them direct contact with some of their end clients. In some cases industries established associations with some of the mentioned "brokers", thus committing themselves to selling only through the mentioned agents or associates.

The relationship between companies and their "brokers" is regulated by means of contracts. The brokers being the agents responsible for contacting buyers, and charging between 3 percent and 5 percent of the value factored in pounds weight for their services. Some of these intermediaries manage their own brand names that have earned prestige among self-service outlets and restaurants. Therefore, they supply the packing and the labels to the companies.

The US industries, marketing companies and "brokers" frequently send inspectors to check the installations of the Mexican supplier plants and the hygiene involved in the procedures. These inspectors sometimes put forward "suggestions" which the companies are obliged to implement if they wish to retain those clients. Sometimes the companies receive financing for different purposes, mostly for plant modernization.

The Mexican plants receive orders or requirements made by the buyers, specifying the characteristics of the produce (size, type of cut *etc.*), and of the packaging (boxes and/or bags, weight *etc.*). These instructions determine the organization of work within the frozen food plants. The orders are, in turn, drawn up according to the specifications of

supermarkets and restaurants. The supermarkets constantly design new products and presentations, which are often made known to consumers through costly advertising campaigns (discount coupons, free sampling in the stores *etc.*).

As noted earlier, while it is true to say thatthe increase in demand for quick-to-prepare products is behind this practice, it is also true that demand is intentionally stimulated by distribution channels. Thus, the retail and food service sectors in the United States are the leading actors in this commodity chain which extends beyond Mexico's borders since the specific demands of these sectors determine not only what happens within the plants operating in Mexico, but also further back in the chain to the agricultural link controlled by the industry. This will be analyzed later further on.

The organization of the productive chain studied here thus resembles what Gereffi (1994) defines as "buyer-driven commodity chains", referring to those industries in which…

> "the large retailers, brand-named merchandisers and trading companies play the pivotal role in setting up decentralized production networks in a variety of exporting countries, typically located in the Third World. This pattern of trade-led industrialization has become common in labor-intensive consumer-goods industries, such as garments, footwear, toys, consumer electronics, housewares, furniture *etc.*, which production is usually carried out by independent Third World factories that make finished goods. The specifications are supplied by the buyers and branded companies that design the goods …. the organization of consumption is a major determinant of where and how global manufacturing takes place".

"Buyer-driven commodity chains" are the alternative type of what Gereffi (1994) describes as "producer-driven commodity chains". The later refer to those industries in which large industrial enterprises play a central role in controlling the production system (including its backward and forward linkages). This is most characteristic of capital- and technology-intensive industries, such as automobiles, computers, aircraft, and electrical machinery.

VI. The Subordination of Agriculture to Industry: Contracts and/or Vertical Integration

Vegetables from the fields reach the exporting companies by various means, depending on the ownership of industrial capital. The two transnational corporations are supplied exclusively on the basis of contract farming. Contracts, often legal, are drawn up between companies and growers. The contracts lay down the obligations and rights of both parties, as well as the price the company will pay for the produce according to the

quality criterion.

Basically, the grower provides the land, watering, machinery, electricity, fuel (petrol, diesel), maintenance of the equipment (pumps, tractors *etc.*), transport fleets, and the labor required for the agricultural part of the production process. In return, the company supplies the producer with seedlings[5] and agro-chemicals (fertilizer and pesticides), but the cost of these is discounted from the producer in the final liquidation. Supplying these elements by the companies to the growers, as well as technical advice, are the means by which companies ensure product quality.

The two transnational firms have neither bought nor rented land in Mexico with which to guarantee their own supply, alluding to various reasons such as the current insecurity regarding foreign investment in agricultural land. Nevertheless, by instituting a system of contracts ("vertical co-ordination"), both companies together control7,800 hectares, on which they grow basically broccoli and cauliflower.

By contrast, the remaining exporting companies simultaneously, but in differing proportions, employ two supply mechanisms: contract farming (with the same characteristics as those already described), and their own production. The latter which constitutes a clear case of vertical integration is what happens both on farms legally owned by the companies themselves, as well as on land leased to producers. In both cases, the agricultural division of the company assumes responsibility for the production process, maintain complete control by employing teams of supervisors stationed in the different production zones.

In the case of contract farming, the company also determines what, how and where to cultivate, making the contracted producer to follow instructions given by the companies' technicians. In several interviews, the Mexican companies indicated that they plan, among other things, to increase their own arable landholding. This would guarantee them a more secure supply, not only where product quality is concerned but also quantity, given the fact that contracted producers often sell part of their harvest on the fresh produce market whenever this would give better prices, thereby defaulting on their established contracts.

With the aim of supplying the necessary seedlings, both to their own fields as well as to the fields of contracted growers, the majority of companies have advanced still further in their degree of vertical integration by setting up their own greenhouses. This is to say that there is a high degree of vertical integration among the majority of the companies, taking them from the seed stage through the agricultural production phase, to the

processing of the vegetables. This degree of vertical integration is showing a trend of increasing, albeit slowly. This is particularly the case for the bigger companies who are trying to control the final phase of this commodity chain, namely the marketing of their produce on the US market.

VII. Integration and Restructuring of the Mexico – The US Commodity Chain

As already indicated, the frozen vegetable industry in Mexico is closely integrated with the United States through commercial flows (input and end-products), movements of capital and the transfer of technology. Within the framework of this integration, which has grown in importance since the mid 1980's, the global commodity chain studied here has undergone a process of restructuring, denoting a particular "division of labor between Mexico and the United States". This division has been based fundamentally on Mexico's comparative advantage with regard to cheaper labor, which has resulted in lower production costs, both agricultural and industrial. Thus, in the United States the trend is towards the freezing of certain vegetables which, in contrast with broccoli and cauliflower can be produced with more mechanized processes, towards the preparation of vegetable mixes in a wide variety of presentations; and towards more sophisticated processes as those with a higher value-added factor, such as the combination of vegetables with pastry and/or meats. In comparison, Mexico specializes mainly in producing for bulk supply (broccoli and cauliflower) where the processing is labor-intensive. Mexico, however, has also diversified its production including other vegetables and mixtures.

Consequently, the production of both broccoli and frozen cauliflower has collapsed in the United States. In the case of broccoli, the processed volumes decreased by almost two-thirds during 1986-1998 as they decreased from 309 to 130 millions of pounds, while those of cauliflower fell from 77 to 44 million of pounds (American Frozen Food Institute 1998). The increase in domestic US consumption of broccoli (58 percent) has been met by imports, which have almost tripled during the same period. However, increased production of other US frozen vegetables (sweet corn, carrots, potatoes, spinach, snap beans, onions, etc,.) has caused a positive evolution for this sector as a whole and the total volumes produced increased by almost 50 percent during 1986-98.

The division of labor between Mexico and the United States has brought about different regional effects in the latter country. In California where 90 percent of the land under broccoli and cauliflower cultivation is

to be found, as well as the majority of vegetable freezing plants, one effect has been the closure of several plants (JR Simplot, Green Giant, Nor-cal Crosetti). While at the same time, other plants have reduced their activity (Patterson Frozen Foods) or else the plants have been converted to the packaging of fresh vegetables or to the processing of other frozen vegetables[6]. All of this has meant a restructuring process and a greater concentration of capital inside the frozen food industry itself.

Among the adjustments made within the US industry, and as an example of the above mentioned concentration of capital, there is the buy-out of Dean Foods Vegetable Company by AgriLink Foods Inc. As a result, it has acquired prestigious brand names such as "Birdseye" and 13 plants located in California, Minnesota, New York, Texas and Wisconsin.

The adverse effect that increasing Mexican exports have had on the industry in California is undeniable. In contrast, the industry in Mexico has undergone a process of expansion, with new companies emerging and a strengthening of already existing ones. This expansion has been determined by external factors already mentioned, but also by the economic policy implemented in Mexico like government promotion of export activity, devaluation of the Mexican peso against the US dollar, wage control, liberalization of trade and transport, lax regulation of environmental protection, the development of infrastructure and communication, and the active discouragement of basic grain production. A moderate increase in domestic demand for frozen vegetables within Mexico has been important for certain industries.

Such a policy environment, combined with the favorable physical conditions for broccoli-cultivation in the central region of Mexico, constitute the advantages that have persuaded US companies to invest in Mexico. Another factor that could add a future advantage to Mexico is the reduction of the export tariffs to the US market under NAFTA. Prior to this agreement (1994), frozen broccoli and cauliflower had an export tariff of 17.5 percent. This tariff is expected to slowly phase out by 2003. For okra and carrots the tariff were eliminated immediately, whereas for vegetables mixes the duty was removed in 1998.

The agricultural and industrial restructuring processes discussed illustrate new landscapes in the geography or localization of agricultural and industrial production within the frozen vegetables commodity chain. This is true not only with regard to North America. Diversification in supply and processing zones has included Central America, specifically Guatemala, where low wages have also proved to be the comparative cost advantage. In 1996, by means of a joint venture with Dutch capital, the

Mexican-US company Marbran-Simplot opened a plant in Guatemala (Bon Appetit S.A.), whose production is destined for exports mostly to Europe. The Californian firm, Patterson Frozen Foods, also established a plant in Guatemala in 1996 for processing of a variety of produts (broccoli, okra, *etc*.) destined to Europe and the United States.

J.S Simplot has gone to China and Australia to consolidate its processed potato business and Green Giant has established a freezing plant in Spain. These cases demonstrate the combined strategies that the same firm can implement: it can open plants in developing countries for exporting to its own country, as well as to establish new businesses in developed countries to supply their markets.

VIII. CONCLUSIONS:

The global commodity chain examined in this paper constitutes a case study from the perspective of the productive sector of the Mexican economy. It illustrates an industry that is entirely dependent on the characteristics of, and changes in, the consumption in the US market, and the working and strategies of supermarkets and restaurants there. These mechanisms clearly respond to the logic of a "buyer-driven" commodity chain described by Gereffi.

These changes in consumption, expressed as the demand for a greater variety of healthy foods that are easy to prepare and with a high value-added component, have paved the way for a process of expansion among frozen vegetable companies located in Mexico; and an ever greater integration between the Mexican and US companies.

Unfortunately, Mexico's principal comparative advantage is based on the low wages paid to agricultural and industrial workers, both by the transnational as well as by Mexican companies. If we add to this the ecological deterioration that these companies have brought about – impoverishment of the soil and depletion of the underground water supply (all the vegetables are irrigated from wells) – then the result of the productive activity studied here is not very sustainable in the long run. Similarly, the productive sector under study does not indicate the development of an integrated national industry. Apart from labor and the vegetables, almost everything else is imported – from the seeds sown in the greenhouses to the costly machinery employed in the processing plants. In other words, very little has been done to enhance backward linkages in this commodity chain.

Analysis of the frozen vegetable industry beyond Mexico's borders confirms that in certain branches of the food industry movements of capital

at the global level are a function of cutting down production costs, seeking geographical regions where the wage and labor union conditions are more favorable. The arrival of three transnational companies in Mexico and the displacement to Guatemala, among others, corroborates the fact that those conditions can have matter more than the closeness of the supply market.

Both, the supermarket chains operating through food brokers and the wholesale distribution companies that supply US restaurants are developing global sourcing strategies. For the products studied here, Mexico offers certain advantages, mainly in terms of labor costs. The decisions of those distributors define not only the production in the agro-food sector, but also at the level of the farm. This increasing predominance of the food distribution system is also evident in the case of countries like Australia (Burch & Goss: 1999), and some European countries like France and U.K.

Notes

1 This research was possible thanks to the financial support of CONACYT (Consejo Nacional de Ciencia y Tecnología).

2 In 1967, Birdseye was taken over by General Foods (owned by Philip Morris), and in 1996 by Dean Foods. Its vegetable branch, Dean Foods Vegetable Company, to which Birdseye belongs was bought at the end of 1998 by the U.S. consortium AgriLink Foods Inc.

3 Green Giant has operated under this name since 1950. In 1979, it was acquired by the US company, Pillsbury, manufacturer of products such as flour, bread, biscuits and ice-cream. In 1989, Pillsbury was bought over by Grand Metropolitan PLC (UK), which subsequently, at the end of 1997, merged with the company Guiness PLC (UK) to form Diageo.

4 JR Simplot is a leading company in the US food industry, which processes, packs and markets a variety of food products, principally potatoes (fresh and processed) and, to lesser extent, avocados, fruits and vegetables (both frozen and dehydrated).

5 The broccoli and cauliflower seeds are sowed in greenhouses. Four weeks later, on an average, the seedlings are transplanted to the fields in the areas to be cultivated.

6 Information regarding California was provided by Dave Runsten, North American Development and Integration Center, UCLA, California.

References

Aguiar, M, Rodrigues, J, Noeme, C. (1998), *Portuguese Agro-Food Industry: Trends and Perspectives*. Paper presented at ‘Simposio Internacional sobre Globalización y

Sistemas Agroalimentarios' (15-17 julio). Caracas: Venezuela.

American Frozen Food Institute (1997), *Frozen Food Pack Statistics.*

Bivings, Leigh and Runsten, David (1992), *Potential competitiveness of the Mexican processed vegetable and strawberry industries.* Prepared for Ministry of Agriculture, Fisheries and Food. British Columbia, Canada.

Bolling, Chris, Calderón, Javier, and Handy, Charles, (1999), "U.S. Firms Invest in Mexico's Processed Food Industry". In *Food Review*, Vol. 22, No. 2.

Burch, David and Goss, Jasper (1999), "Global Sourcing and Retail Chains: Shifting Relationships of Production in Australian Agri-foods". In *Rural Sociology*, Vol. 64, No. 2, pp. 334-350.

Buttel, Frederich (1996), "Theoretical issues in global agri-food restructuring". In Burch, D, Rickson, R, and Lawrence, G. (Eds), *Agri-Food Restructuring.* London: Averbury.

Cook, Roberta (1990), "Challenges and Opportunities in the U.S. Fresh Produce Industry". In *Journal of Food Distribution Research*. (February).

Cook, Roberta (1992), "The Dynamic U.S. Fresh Produce Industry: An Overview". In *Post-harvest Technology of Horticultural Crops*. Publication No. 3311. University of California, Division of Agriculture and Natural Resources. pp. 3-13.

Cook, Roberta (1998), *Production Agriculture in Transition. The Fresh Fruit and Vegetable Sector*. *P*aper presented at the Food System of the Future Conference (September). Purdue University.

FAO, (1998), *Faostat Database Results, 1998.*

Friedland, William (1994), "The New Globalization: The Case of Fresh Produce". In Bonnano Alessandro *et al*. (Eds) *From Columbus to Conagra: The Globalization of Agriculture and Food.* Lawerence: University Press of Kansas.

Geriffi, Gary (1994), "The organization of the Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks". In Gary Gereffi and Miguel Korzeniewicz (Eds), *Commodity Chains and Global Capitalism*. Westport, Connecticut, London: Praeger Publishers. pp. 95-121.

Goodman, D, and Watts, M, (Eds) (1997), *Globalazing Food. Agrarian Questions and Global Restructuring.* London and New York: Routledge.

Gordon, Alan (1998), "Changes in food and drink consumption and the implications of food marketing". In *The future of food. Long term prospects for the Agro-food sector.* Paris: OECD.

Haubert, Maxime, (1997), "Introduction: Sociétés Paysannes et Développement". In *Les Paysans, L\Etat et le Marché***.** Paris: OECD.

Henderson, Dennis (1998), "Between the farm gate and the dinner plate: motivations for industrial change in the processed food sector". In *The future of food. Long term prospects for the Agro-food sector.* Paris: OECD..

Henderson, Dennis, Handy, Charles and Neff, Steven (1996), *Globalization of the Processed Foods Market.* Report No. 742. Economic Research Service, U.S. Washington, D.C.: Department of Agriculture.

Islam, Nurul (1990), *Horticultural exports of developing countries: past permormances, future prospects and policy issues.* Research Report No. 80. Washington, D.C.: IFPRI.

Lawrence, Geoffrey (1999), "Agri-Food Restructuring: A Synthesis of Recent Australian Research". In *Rural Sociology,* Vol. 64, No. 2, pp 186-202.

Llambi, Luis (1994a), "Comparative Advantages and Disadvantages in Latin American Nontraditional Fruit and Vegetable Exports". In McMichael, P (Ed), *The Global Restructuring of Agro-Food Systems.* Ithaca and London: Cornell University Press,

_____ (1994b), "Opening Economies and Closing Markets: Latin American Agriculture's Difficult Search for a Place in the Emerging Global Order". In Bonnano Alessandro et al. (Eds) *From Columbus to Conagra: The Globalization of Agriculture and Food.* Lawrence, Kansas: University Press of Kansas.

McMichael, Philip (1998), "Globalización monetaria y estatal: reestructuración agroalimentaria al fin del siglo". In *Globalización, Crisis y Desarrollo Rural en América Latina*. Memoria de sesiones plenarias del V Congreso Latinoamericano de Sociología Rural, Universidad Autónoma de Chapingo, México.

Moulton, Kirby and Runsten, Dave (1986), *The frozen vegetable industry of Mexico.* Berkeley: University of California, Cooperative Extension.

Raynolds, L. (1997), "Restructuring National Agriculture, Agro-Food Trade and Agrarian Livelihoods in the Caribbean". In Goodman and Watts (Eds.), *Globalising Food. Agrarian Questions and Global Restructuring.* London and New York: Routledge.

Reza, Lahidji (1998), "The Agro-Food Sector in the 21st Century". In *The OECD Observer* 210: 28-31.

SAGAR (1998), Dirección General de Asuntos Internacionales, México.

Teubal, Miguel (1998), "Globalización y sus efectos sobre las sociedades rurales de América Latina". In *Globalización, Crisis y Desarrollo Rural en América Latina.* Memorias de las sesiones plenarias del V Congreso Latinoamericano de Sociología Rural, Universidad Autónoma de Chapingo, México.

The World Trade Atlas (1995, 1998). Compact disc version.

USDA, Economic Research Service (1996), *Farmer´s Use of Marketing and Production Contracts* (AER-747). Washington, D.C..

Watts, Michael (1994), "Introduction". In Little and Watts (Eds.), *Living under Contract. Contract Farming and Agrarian Transformation in Sub-Saharan Africa.* Madison: The University of Wisconsin Press.