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C E D E P L A R

SOME THEORETICAL ASPECTS OF THE RELATIONSHIP BETWEEN THE AGRO-FOOD SYSTEM AND MARKET STRUCTURES

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TABLE OF CONTENTS

1. INTRODUCTION

The purpose of this work is to review the literature which we consider most relevant for the establisment of new analytical categories about the recent development of world agriculture, specifically its industrialization. We hope this will provide the framework needed to approach the determinant role of the industrial structures in shaping modern agriculture.

The significant temporal gap between theoretical approaches and the real process of agricultural "industrialization" reveals once more the lagging behind of theory in relation to the practices inherent in Social Sciences as a whole. In this respect, the social practices of the economic and political agents involved in production and distribution of food has been the subject of radical change since the World War II, as part of structural transformations of the new "regime of accumulation" in world capitalism (Aglietta, 1979). At the same time, the analytical attempt required to understand such changes has come to fruition. In fact, only in the 1970s did there appear some approaches better able to explain the new political, social and economic phenomena in the post-war world agriculture

Probably one of the most relevant contributions in this field is "the sociology and political economy of agriculture" approach. As noted by Buttel and Goodman (1989:86), the early years of this new approach (from the middle of the 1970s to the middle of the 1980s) "were dominated by a search for theories appropriate for understanding modern agrarian structures. This era consisted of rediscovering a number of classical approaches to agrarian development, particularly those of Marx, Lenin, Kantsky and Chayanov (Newby, 1983)" (Ibid.:87), who, through a deductive approach, focused their analyses "on identifying a singular logic of the development of agricultural systems" (Ibid.). Even though the authors recognize that those classical theories about the development of capitalism in agriculture "still have value for setting the broad parameters of inquiry" (Ibid.), they argue that deductive theories of agrarian structures "have also encountered their limits" to explain the recent transformations of agricultural systems, criticizing a"tendency to teleological "necessity" arguments", which have a "lack of robustness in explaining variation in agricultural systems across time and space (Monzelis, 1976; Goodman and Redcliff, 1982), and the tendency to focus on only endogenous, national-level sources of change" (Ibid.)[1].

Since the second half of the 1980s the prevailing tendency has been to establish more nuanced analyses in order to understand agricultural systems in the context of economic-social structures

[1] For a review of the 'deductivist wave' in recent years, see Buttel and Newby,eds., 1980.

undergoing rapid transformation (both in the central countries and in the peripheral ones). Thus, rural social structures and the agricultural productive system have acquired, particularly in the post-war period, shapes and dynamics that are difficult to be included in the classical models of the development of capitalism in agriculture. This has stimulated a concentration of effort to redefine categories and broaden the analytical field about the dynamic of capital in the incorporation process of agricultural activities under its control. In the light of recent approaches, the so-called movement of capital in agriculture does not introduce, *inevitably*, capitalism in the productive sphere. In several cases, capital has been finding different forms of "penetration" which change the route of "agrarian transition"[1].

Hence, it has increased approaches reconceptualising agriculture as a sector, even if it was seen in a different way from the classical economists of the XVIII and XIX centuries,that is, isolated (Physiocrats) and autonomous views (Smith and Ricardo). Marx's conception of the transformation of agriculture into a branch of industry has been contradicted by the real movement of industrial capital. Instead of the hypothetical classical path, some authors have argued that industrial capital by means of "scissors effect" has assimilated agricultural activities, and transformed farmers into a mere growers of crops and keepers of livestock. Kenney et al.(1989), for example, emphasizes that "the farmer was integrated into the circuits of capital, in a double sense, as producer and consumer" (136)[2]. According to Goodman, Sorj and Wilkinson (1987), the movement of capital transforms agriculture into a residual category "consisting of the activities implicated in natural production processes that do not lend themselves to large-scale industrial production" (Buttel and Goodman, 1989:87). In another path but in the same direction, Friedmann (1982, 1987, 1989) has developed the idea of international food regimes[3],"which links international relations of food production and consumption to forms of accumulation broadly distinguishing periods of capitalist transformation since 1987" (Friedman and McMichael, 1989:95).

In a broader sense all these contributions can be related to the "commodity system" approach first developed by Friedland (1984). According to Buttel and Goodman (1989), Friedland's pioneering formulation defines agricultural commodity production as "system in which technical and manufactured inputs are incorporated into a labour process in which commodities are

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[1] About the debate between "transition" and capitalist development" see D.Goodman and M.Redcliff, 1981.

[2] Despite an over concern with the uniqueness of farming as a production system these authors stress that "there has been little effort to understand the current financial crisis from a political economy perspective" (Ibid.:134).

[3] This concept is a variant of the theory of international regimes, closely linked with the "new wave" of concepts in the political science field. About the controversies offered by the three main approaches to the issue of regime significance see Krasner,ed.,1983.

produced, processed and marketed in distinctive industrial structures" (Ibid.:87-88). Further consideration by those authors points out the increasing spread of that framework, which "is now no longer confined to the neo-Marxist perspectives" (Ibid.:88).

Taking this as our point of departure, the central purpose of the first part of this work will be to examine recent formulations which have displaced the ***centre*** of capital accumulation in agriculture from farm to industrial capital. Firstly, it will be pursued a link between earlier contributions on this subject and those of the recent years. It was Davis and Goldberg's pioneer contribution in the late 1950s in the USA that first established the idea of analysing agriculture from the point of view of industrial capital, introducing a new term to the agricultural industrialization phenomenon: "agribusiness".

In the following section it will be reviewed briefly the contribution of Goodman, Sorj and Wilkinson, who suggest a new theory of agroindustrial development, coining the terms "appropriationism" and "substitutionism". Finally, the last section introduces the agro-food system in the context of the post-war international division of labour. We will put special emphasis in the Friedmann's concept of "international food order".

The second part of this work has the purpose of building a framework that incorporates the theory of oligopoly into the agro-food system approach discussed in the second part. This framework will assume the displacement of the ***analytical unit*** from farming to industry as a basic analytical condition for the understanding of the agricultural industrialization. The purpose will be the introduction of ***market structure*** as the central category to understand the agro-food system dynamics. Furthermore this will enable the transformation of the concept of "industrial complex" into a useful analytical tool in establishing patterns of development in agriculture.

2. CONCEPTION AND THEORETICAL APPROACH OF THE AGRO-FOOD SYSTEM

2.1 The concept and its development

By definition, according to Davis and Goldberg, ***agribusiness***[1] "means the sum total of all operations involved in the manufacture and distribution of farm supplies; production operations on the farm; and the storage, processing and distribution of farm commodities and items made from them" (1957:2). From this first definition of "agribusiness", at the beginning of the second half of this century until now, at its end, several concepts have emerged in the literature to explain the same phenomenon observed at that time in the American economy: the technological revolution in farming, that has brought about a narrowing in the function of agriculture. "The modern farmer is a specialist who largely confines his operations to growing crops and livestock" (Ibid.). The other functions have been transferred in large measure to "off-the-farm business entities" (Ibid.:3), urbanized and industrialized. The agribusiness economy has been constituted "by the gradual dispersion of functions from agriculture to business" (Ibid.:6). Thus, "agribusiness essentially encompasses today the functions which the term agriculture devoted 150 years ago" (Ibid.:2).

The authors stress the technical progress on farms as the genesis and evolutionary path of the agribusiness, which has been a result of a "combination of forces actively at work for a century and a half" (Ibid.:6). It is "the product of a complex of evolutionary forces more or less spontaneously at work without central guidance or direction" (Ibid.). This discontinuous but systematic process that characterizes the technological revolution in the American agriculture was first developed on the farm and afterwards, off the farm: "the textile industry led the way in this field, progressing for several decades even well ahead of farm mechanization" (Ibid.:5). At the level of farm production process, the technological advance was centred in mechanization to overcome the main bottleneck of American economy, the labour force shortage. The pressure of rapid industrialization on the labour market certainly induced the replacement of manual labour force by machinery specially in farming, as a result of the development of the farm machinery industry.

Beside the discontinuous but systematic characteristics of technical progress, two more ideas can be drawn from Davis and Goldberg's formulations, which were to be analytically articulated further by others. First, it is the "residual character" of agriculture within agribusiness, this residual character arising from the gradual process of "transference of functions", which

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[1] A word first used publicly by J.H.Davis in a paper presented at the Boston Conference on Distribution, October 1955, Boston, Retail Trade Board, Copyright 1955 (Ibid,1957:2).

increasingly reduces the farmer to just a producer of primary natural products. The second idea is related to the "dispersion character" of agribusiness, not only because of the natural dispersion of millions of farmers but also of the dispersion of industry itself. On both sides of the original rural activity separate branches of manufacturing were developed, creating out of joint industries.

Davis and Goldberg describe the sum total of operations involved in farming products as a "primary agribusiness triaggregate"[1], with an endogenous tendency towards increasing transference of functions from the agricultural aggregate to industrial aggregates, respectively located at the upstream and downstream ends of agribusiness.

The most important analytical advance of the above concept, in terms of analysing the food system as a ***commodity system*** was to displace the centre of analysis from agriculture, as an isolated productive sector, to a new analytical unit constructed at the level of intersectorial relations.

However, the idea of ***agribusiness*** is conceived as a ***static*** concept rather than either ***dynamic*** or ***historical***. It is not dynamic because technical progress is put outside its internal analytical framework. The crucial role of technology in the "function transference process" (from farming to manufacturing) comes to an end as soon as it develops a new centre of the food system, that is, agribusiness. Thus, under these circumstances, it is as if the role of technology were restricted to being a mechanism of transition of the food system, from an equilibrium point, the self sufficient agricultural sector, to another, that of sectoral interdependence. With regard to the historical question, it is related to the conception of agribusiness as a production and distribution food system of ***industrial society***, which has a supply capacity to cater to mass consumption. The sociological point of view of the agribusiness concept by Taylor and Jones Jr. sheds light on that point: "from the point of view of social organization, agribusiness and vertical integration have become the specific mechanisms by which mass production has been achieved from the many small commercial family farms" (Taylor and Jones Jr., 1965:344). According to these authors, that commodity system "represents a response of the food and fibre industry to its new roles in the urbanized society" (Ibid.:340). Implicit in this concept of urbanized society is the idea of the apex of the social development, which breaks down the historical specificity of that social organization, and consequently the dynamic character of the structural change. In our discussion point, it suggests a notion of agribusiness as a rigid and ordered aggregation of productive branches.

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[1] The "secondary agribusiness triaggregate" includes only farming and processing food and fibre.

Accepting its static character, it can be affirmed that the agribusiness concept is compatible with the "systemic analysis" perspective, since the productive system is constituted by rigid subsystems interrelated through exchange flows. Davis and Goldberg define three primary aggregates: agricultural input, agricultural output and agricultural processing/distribution. In the first are included, beside the industrial branches, all the support activities, including institutional ones (credit system, prices and trade policies, etc.). Another definition is the secondary "triaggregate", which excludes the agricultural input aggregate. It is formed by agriculture, food industry and fibre industry. The first reason for this downstream "triaggregate" stems from the input-output methodological difficulties of accounting for the investment flows (sales of farm machinery to farmers). The second is due to distinct levels of dependence of food and textile manufactures on rural products, levels which can be measured by the percentage of farm raw material in the cost structure of these industrial sectors.

After the 1950's the "agribusiness commodity systems" approach was developed at Harvard Business School(Goldberg, 1980).According to Judd (1980) this School established its "Program in Agriculture and Business" in 1951, the Programme being headed first by John Davis, then by Henry Arthur and now by Ray Goldberg(200). The first publication, in 1957, of this Programme was that mentioned previously, "A Concept of Agribusiness"(Ibid.:208). Later, in his study "Agribusiness Coordination" in 1967, Goldberg established the concept of the "commodity system" approach to agribusiness industries. He examined the wheat, soybean and Florida orange systems not only in the light of the activities of the supplier-purchaser relationships, but he also considered the integral institutional influences: government, futures markets and trade associations(Ibid.:202). In a more recent work the author emphasized that such an approach is a "perception" of a problem in its broadest setting (Goldberg, 1980:13).The first aspect he considers is that "the term ***agribusiness*** includes ***all*** participants in the system, large and small, from farm input suppliers to the ultimate consumers of food and fiber products" (Ibid.). The second is that one cannot look at agribusiness development "without an overall structure of a national food system and an idea of how each new development affects the total food system"(Ibid.).

Besides agricultural economics, one of the most important development of literature on such framework in the US was in rural sociology. The wide range of literature varies from the social organization and power of agribusiness (Taylor and Jones Jr., 1963, 1964, 1965; Sower and Miller, 1964) to its impact on changes in the rural social structures (Anderson, 1959 and Copp, 1964).

In extending Davis and Goldberg's approach to other national economies, the studies of L.M.Malassis (1969) are more prominently related to the agribusiness analyses in the French national

accounts, Malassis translating as the English term "agribusiness" as the French term "complexe agri-industrial". Malassis' model of agricultural development is based on the internal composition of the final food product over period of time. The food product is constituted by : (1) value of input purchases by farmers; (2) value added by farming; (3) value added by food processing and distribution.The evolution of the food system from an economy of subsistence to "complexe agri-industrial" represents simultaneously a gradual increase of (1) and (3) to the detriment of (2). Thus, the historical phases of agricultural development are classified by Malassis according to importance of the three productive sub-systems in the formation of the final food product in a specific national economy (Fenollar, 1981).

Recently, Ghersi and Rastoin (1981) used as an equivalent term "agro-food system", which includes not only the "triaggregate" but also the consumption sphere, emphasizing the relationship between consumption patterns and the food system. These authors focus on the internationalization of food systems, stressing the active role of the transnational enterprises in reshaping the national agro-food systems. Nowadays these companies, "through their power and their capacity of growth", constitute one of the most important forces behind progress in world food systems[1]. Another important French study group in this respect (INRA-Paris) stresses the role of competitive strategies by these firms in the transformation of food systems (Green, 1988). However, such contributions extend in theoretical terms the concept of agribusiness as formulated originally.[2]

Within this literature, there are some authors who have attempted to redefine the agribusiness concept without a radical change in its original conception. Vogeler, for example, confines this concept in the farming aggregate only to the large-scale producers, arguing that even though all farmers produce some goods and services for the market, the large-scale producers "are most intimately tied to other branches of agribusiness" (Vogeler, 1981:105). In his view, small and medium family farmers are more victim than beneficiaries of the agribusiness institutions. Thus, this perspective conceives agribusiness as an agricultural system based exclusively on an entrepreneurial organization directed to making profits throughout the three subsystems. For this reason, the author qualifies American agriculture as the "myth of the family farm and the agribusiness dominance".

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[1] This approach is more fully developed in J.L.Rastoin, "Les Firmes agro-alimentaires", thesis, University of Montpellier (1975) and Ghersi at al., "Les Cent Premiers Groups Agro-industriels Mondiaux",I.A.M.,Montpellier (1980).

[2] H.Friedmann and McMichael(1989) give special attention to the J.P.Bertrand, C.Laurent and V.Leclerq work (1983:"Le Monde du Soja", Paris, Maspero) in their discussion about the "second international food regime".

Vogeler retakes, therefore, the "squeeze" idea[1], which means the family farm is "squeezed" by the agribusiness firms from two directions, as both buyers and sellers, the concentrated farm supply industry determining the price paid for essential farm inputs (oligopoly), and the concentrated food processing industry determining the prices farmers receive for products (oligopsony) (Ibid.119). He argues: "although farmers directly took the risk of uncertain weather and disease conditions and of the market, they received only $ 8 billions in net farm income from the total market value of $ 96 billions" (Ibid.).

On this view, agribusiness seems to be the vehicle for the introduction of disguised wage relations in agriculture: "by being paid a certain amount per unit of product, contract farmers have almost become wage labourers", which is characterized as "a transitional status between family farmers and agricultural workers" (Ibid.:138). Finally he concludes: "contracts give agribusiness the advantage of treating farmers as employees without the responsibilities of paying them as employees" (Ibid.). From this view he establishes the distinction between large-scale corporate farms[2] and family farms. The latter are excluded from Vogeler's agribusiness concept because of the exploitative character of the relationship between agroindutrial corporations and family farmers.[3]

This path in restricting that concept shows, however, insufficient attention to the specificity of the movement of capital in agriculture, as it seems to be the intention of the author, to whom the agribusiness is the determinant factor in restructuring USA agriculture. The basic reason for its insufficiency stems from the maintenance of a static idea of a tripartite productive system, then transformed into a "triaggregate of capital". The narrow view of this systemic notion does not allow the author to explain a simple question: why has capital followed a particular path in the process of incorporating agriculture into direct accumulation? We can derive another question: what are the reasons that explain its "discriminatory" conduct in the productive sphere of agriculture, integrating directly some activities and leaving others in the hands of farmers by a contract system? On the one hand, the literature has shown that conjunctural factors during the seventies (land price valorization, inflation, tax policies, etc.) stimulated investments by large corporations in agricultural

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[1] The "squeeze idea" is not new in the literature, as can be seen from the classic work by K.Kautsky,"The Agrarian Question".

[2] Which is subdivided by size:family-farm corporation, family-owned corporation and non-family corporation (Ibd.:126).

[3] See a critic to neo-marxist approach in Goodman et al. (1987:150-177). The same authors review the Brazilian debate in this respect in earlier paper(1985).

activities (Stanton, 1978). On the other hand, we can argue that such factors are not enough to explain structural changes in farming, such as the "factory farms" of battery chickens for example. Such changes have resulted from different strategies of industrial capitals which cannot be understood by the ordered notion of agribusiness *per se*.

2.2. Pursuing a dynamic theoretical perspective

2.2.1 Agriculture and economic dynamics

In this section we will review theoretical elements which construct a dynamic framework to deal with agribusiness concept. For this reason we will begin from the basic element of capitalist dynamics, that is, the concept of competition. From the point of view of the dynamic tradition in the political economy, competition can be seen as a basic unifying principle in the market economy. Competition, therefore, conceived as the driving force of capital accumulation, establishes specific rhythm and direction to accumulation (Possas, 1987:163).

Dealing with the dynamics of capital in agriculture it would be useful to think about the historical way that the "rural" has been incorporated by capital. In general the instrument used by capital to subordinate particular parts of social production to the direct capital accumulation is technical progress, which is a structural element for defining strategies of capitalist competition. Hence, technical progress establishes the technological pattern within which accumulation will develop in a specific historical moment. Thus, from a general point of view, technical progress sets up the limits and possibilities on capital accumulation. For agriculture, however, it takes a particular conduct, considering that nature per se establishes the limits and possibilities on accumulation, at the same time that capital utilizes technical progress to overcome them. Accepting that premise, the dynamics of capitalism in agriculture could be thought as an interaction between intercapitalist competition and the constraints imposed by nature. The economic development resulted from that interaction will set up the general conditions for accumulation movement in an economic space dominated by a process of production based on nature itself.

The most generally known approach with regard to nature as a constraint on the development of capitalism is the classical one, rooted in the economic thought of the Eighteenth and Nineteenth centuries, particularly the evolutionary line from Physiocrats to David Ricardo.

The physiocratic "natural state" represents at the same time a superior stage of capitalist development and an absolute limit

to accumulation determined by the extension of capitalism in all agricultural territory (Napoleoni, 1974).

In Adam Smith's conception regarding the transition from agrarian capitalism to industrial capitalism, land, together with labour, occupies a central place in the origin of the wealth of nations (Ibid.).

At the heart of Ricardo's profit theory is the "stationary state" of capital accumulation as a result of the increasing proportion of social product spent on wages. This tendency would originate from a permanent rise in cereal prices caused by the incorporation of marginal lands into the agricultural extensive margin. The theory states that even though a rise in cereal prices would be temporarily delayed by technical progress in agriculture, such a rise would in the long-run cause the rate of profits to decrease to a limit level which would prevent accumulation in absolute terms (Ricardo, 1951). Therefore, the raising of real wages originating in the natural process of production in agriculture establishes a relative and, at last, an absolute constraint on accumulation (Napoleoni, 1974). In this more elaborated classical thought, represented by Ricardo, the point where the motive for investment would cease arises from interaction between the general law of competition - given by general rate of profits - and nature - given by decreasing labour productivity in agriculture (Ricardo, 1951).

Two distinct paths were followed in overcoming the classical approach about the constraints of capitalist development by nature. On the one hand, the neo-classical paradigm solves the contradiction between capitalism and nature by developing the concept of the production function. In this way, use of land as a means of production was included into the "factor substitution" scheme. On the other hand, the Marxist paradigm faced the question by taking concept of technical progress as the main instrument of capital to overcome nature. Even though Marx had recognized that capital's domination over the agricultural production process would be slower than in other branches of activity, which would be easier to industrialize[1], his general perspective on the development of capitalism in agriculture was its transformation into a branch of industry (Marx, 1984).

Certainly, the agribusiness phenomenon is difficult to incorporate those theoretical models in relation to the contradiction between capitalism and nature. Thus, the next step will be to discuss recent approaches which have directed their efforts towards overcoming the contemporary impasse in the literature dealing with this subject.

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[1] Particularly his theoretical solution to the determination of absolute rent of land, which departs from the assumption of an organic composition of capital lower than the average composition of economy (Marx, 1984).

2.2.2 Theory of agroindustrial development: an alternative approach to the industrialization of agriculture

Goodman, Sorj and Wilkinson (1987)'s theory of agroindustrial development rescues the approach about the relationship between capitalism and nature from classical tradition. In the light of the dynamic "agribusiness" vision, they conceptualise agroindustrial development as a particular path taken by industrial capital to incorporate agriculture into the process of capital accumulation. The authors argue that, rather than handicraft activity, "agriculture confronts capitalism with a natural production process" (Ibid.:1). For this reason the industrialization path in agriculture "was determined by the structural constraints of the agricultural production process, represented by nature as the biological conversion of energy, as biological time in plant growth and animal gestation, and as space in land-based rural activities. Unable to remove these constraints directly by devising a unified production process, industrial capitals have responded by adapting to the specificities of nature in agricultural production" (Ibid.:1-2).

This approach establishes a new definition of agriculture's industrialization which is called "appropriationism": a "discontinuous but persistent undermining of discrete elements of the agricultural production process, their transformation into industrial activities, and their re-incorporation into agriculture as inputs" (Ibid.:2).

At the same time, the characteristic of agricultural products as human food sets up constraints to their replacement by industrial ones from other alternative sources. "Substitutionism" thus represents the strategy of capital to break down its absolute dependence on rural products for human consumption: "the emergence of the food industry (...) represents a similarly discontinuous but permanent process to achieve the industrial production of food" (Ibid.). This process consists not only of a reduction of agricultural products to the status of industrial inputs but also an increasing tendency to eliminate them as the principal source of raw material for food.

Therefore, the trajectory of industrialization in agriculture has followed two distinct paths. One has been the industrialization of the means of production through industrial appropriation of both rural labour (mechanization) and biological production processes (agrochemicals, hybrid seeds and now, biotechnologies). The other is given by the industrial production of food which tends to substitute the original rural products by creating industrial ones (processing: separation, fractionation, preserving, "fabrication"). From this point of view, the emergence of agribusiness represents an historical result of the appropriationist and substitutionist strategies adopted by industrial capitals to incorporate agriculture into the process of

direct accumulation.

The rigid division of labour between agriculture and industry is broken down by technical progress which has a crucial role in this approach. Technical progress determines the rhythm, limits and possibilities of capital movement in agriculture.At a specific period, technical progress models the patterns of competition of agroindustrial capitals according to the technological stage of appropriationist process. This process is delimited by a discontinuous and partial character of technical progress in the rural activity, which defines a particular dynamics of capitalist development in agriculture. This particularity is due to the incapacity of science and technology to dominate natural production process as a whole. As a result, capital has been "unable to subsume the rural production process in *toto*". This implies that "selected rural activities have become sectors of accumulation for different fractions of industrial capital" (Ibid.:7).In concrete terms, these fractions have organized the farm input industries located at upstream of agriculture.

Historically, these discrete industrial branches mentioned above came from technological "turning points" of rural production, marked by mechanical, chemical and genetic innovations. Until the 1930s those agroindustrial capitals had followed relatively autonomous paths, concentrating on the mechanical appropriation of the rural labour process in the United States and chemical appropriation of the biological production process in Europe (Ibid.:11-12). After the 1930s, genetic innovations provided the technical base for an interdependent accumulation mechanism. The focal point of innovation was the introduction of hybridization techniques in seeds which, at that time, represented the major advance in the subordination of biological production by industrial capitals. The technological pattern of the post-war agriculture stems from this breakthrough. In this respect, Goodman emphasises that with the seed as the bearer of technical progress, "industrial capitals were forced to adopt strategies of technological convergence, leading to increasingly integrated "packages" embracing high-yielding, fertilizer-responsive hybrids, plant protection chemicals, mechanization and other advanced management practices" (Goodman, 1987:4).

In maintaining nature as the "processing agent" and land as "principal machine"(Goodman et al., 1987:10), the "industrialization" of agriculture was characterized by umbilical dependence of upstream industries on farming. Goodman,Sorj and Wilkinson suggest that nature has a paradoxical role as the basis and limit to accumulation by appropriationist capitals."The same constraints which have inhibited the unified capitalist transformation of rural production have simultaneously dictated and consolidated strategies of industrial appropriation" (Ibid.:10).

Considering their common technological base in agriculture,

industrial structures emerged from a relatively interdependent accumulation strategy. This was the departure point of the modern agro-food system developed after the World War II. The arrival point, in its turn, was its internationalization. The Green Revolution created the technological conditions for the industrialization of agriculture in the Third World. There is now a vast and growing body of literature which suggests that the present interdependent food system will be ruptured by the new biotechnologies. These are creating a new technological base for food production, with a consequent restructuring of appropriationist capitals (Goodman, 1987).

Following a more contradictory trajectory, the movement of substitutionism suggests three distinctive paths.The first stems from the industrialization of non-food products, process that was closely linked to the substitution of agricultural raw-materials by non-renewable products. In this case, raw-material dependence shifted away from agricultural sources to industrial feedstock, mainly produced by the chemical industry[1]. This radical substitutionism set these industrial branches apart from the core of agribusiness.

An opposite path has been followed in food-primary processing. Instead of a radical substitution of agricultural produce, the substitutionism was partial and conservative. Here the basic strategy of capital has been to maintain and reinforce agriculture as a unique feedstock base for the food industry. The industrialization path was centred on an evolutionary technological change (OECD, 1987), which was basically developed before the First World War. "In this early period, the essential first step of substitutionism in the food industry was to interpose mechanized industrial processing and manufacture between the source of field production and final consumption" (Goodman et al., 1987:60). For this reason, these agroindustrial branches have developed structural dependence on agriculture, which are closely linked to specific agro-commodity chains. As Goodman, Sorj and Wilkinson observe, "their power and future expansion are tied umbilically to the prospects of individual agricultural commodities such as grains, sugar or milk" (Ibid.:9).

The third path can be considered a variant and a further development of the second one after the 1950s. Despite maintaining the "evolutionary and adaptative" nature of technical change in food processing (OECD, 1987:8)[2], the modern food industry has been distinguished by innovatory technologies in fractionation,

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[1] This is the notorious case of the textile industry which since the 1920s has displaced cotton as the main source of raw-material.

[2] In general, the food industry is given to cautions improvement-oriented approaches rather than revolutions in food production" (Ibd.:8).

preserving and dehydration methods. These techniques have meant "the transformation of primary processing firms into suppliers of generic intermediate food ingredients, such as glucose, syrups, proteins, carbohydrates, fats and flavours, which downstream firms reconstitute into food products for final consumption" (Goodman et al., 1987:87). Thus, the emergence of final processing industrial branches specialized in "fabricated" foods has undermined dependence of food production on specific agricultural products. The diversification of sources of agricultural feedstock sources has increased product interchangeability and undermined the economic hegemony of primary processing inside the food industry.

However, advances in biotechnologies in the 1980s tend not only to widen the range of feedstock interchangeability but also to challenge agriculture itself as the principal source of food raw-material. Goodman suggests that biotechnology tends to eliminate the structural dependence of the food industry on agriculture: "the technological constraints arising from the nutritional characteristics of food which cemented the alliance between agriculture, primary processing interests and final food production have been breached. There is now scope for a truly industrial food system independent from agriculture and therefore primary processing" (Goodman, 1987:4). From this point of view, the agro-food system would be reduced to being one raw-material source among others supplying a broad "bio-industrial" food system. Instead of the strategic role of primary processing, the new food system would be centred on a "science-based technology-driven bio-industry characterized by the increasing interaction between biotechnologies and microelectronics" (Ibid.:18)[1].

The theoretical approach summarized above could be used for the integration of the concepts of agro-food system, agribusiness and industrial complex. The *agro-food system* could be regarded as a commodity system comprising the full range of the socio-economic activities of production, distribution and services linked with agriculture, leading to the satisfaction of population's food requirements. In this case, agriculture means food and fibre production processes based on natural biological process and land-based activity. Appropriationist and substitutionist movements of capital have characterized the industrialization of this commodity system. The gradual redivision of labour between farming and manufacturing has resulted in the upstream and downstream industrial branches.

The *agribusiness* concept could be used to describe the more developed shape of the permanent function transference from farming

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[1] In this perspective, "biotechnology and micro-electronics would mark the end of the pre-history of the Food industry and its incorporation within the broader dynamics of the industrial system and post-industrial society"(Goodman et al., 1987:189).

to industry. In the post-war modern agro-food system, agribusiness has developed as an interdependent accumulation model, which has usually been measured by "agribusiness literature" through the input-output exchanges among the three major economic aggregates. The relatively autonomous dynamics of accumulation before the 1930s gave way to increasing intersectorial relations. Insofar as technical progress is not a static variable, the technological pattern established at that time has undergone constant partial reshaping, thus redefining industry-agriculture relationships. The concrete movements of industrial capitals in the rural activity tended to transform farming, even in a contradictory way, into a minor part of the productive activity within the total value added of agribusiness. Consequently, the industrial sectors located at the upstream and downstream of agriculture have constituted the main forces behind agribusiness dynamics. The emergence of a new technological base in food, however, may not only reinforce this weakness of farming within the original "triaggregate" but may also challenge all interests in the present food system. Thus, agribusiness per se could become a smaller part of the emerging bio-industry[1].

The *industrial complex* is regarded elsewhere as the self-reproduction of a bulk of inter-related productive activities. In this case, self-reproduction means the *endogenous capacity* of this cluster of economic activities to create an internal dynamism of accumulation irrespective of other sectors of economy. In terms of exchange flows such an endogenous capacity can be measured by the proportion of internal sales to total inter-sectoral sales of the complex. Thus, the external independence of a specific complex means the *autonomy of purchase* of goods and services from other productive sectors, that is, the internal production of each sector of this cluster does not need to be sold outside the complex. Theoretically, the nearer the proportion of sales is to 1, the greater will be the endogenous capacity of reproduction of a complex. Such a level of closeness among sectors occurs with the achievement of a common technological base able to organize a technical-productive interdependence between sectors.In technological terms, the dynamic agents of a specific complex are the industrial sectors that supply the capital goods for connecting the cluster of productive activities. In economic terms, the dynamic agents are those industrial sectors which organize the final demand of the complex, that is, these sectors "create" the demand for expansion of the inter-sectoral purchases of the productive chain.

The so-called *"agro-industrial complex"* can be associated with

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[1] As Goodman (1987) emphasises, strong interests have mobilised to maintain this system, including National States. If restructuring appears to be inevitable, "the real question is to determine the relative weight these two broad tendencies will have in the reorganization of the agro-food system"(Ibid.:18).

the concept of "industrial complex" in the modern agro-food. The former resulted from the development of an interdependent model of accumulation in this system. The interaction between the technological pattern based on hybrid seed and competition among agroindustrial capitals tended to establish inter-linked strategies of accumulation through close purchase flows. Beginning with the contract farming system, moving through vertical integration and culminating in conglomeration and internationalization, the "complex" phenomenon can be considered the most important form of capital integration developed by business interests in agriculture. These well-closed chains of accumulation have been established by capital branches closely related to specific crops. That is the reason why the branches of primary processing are at the core of the existing agribusiness. The hegemony of the international "grain complex" in the world agribusiness has been determined by the increasing control of primary processing capitals in all sub-systems along a specific production chain, from input supply industry (animal feed, seed, etc.) to export (international market control).

2.3. International division of labour in the agro-food system context

2.3.1 Internationalization of agriculture: historical roots

"Grain is the only resource in the World that is more central to modern civilization than oil" (Morgan, 1979:vii). This statement is no less eloquent than that of Lenin, who defined grain as "the currency of currencies". These ideas do not seem at first sight self-evident. In fact they appear strange in the light of the role of a rural product in an industrialized society, where farming has shifted away from the centre of productive life in the industrial-urban world.

It can be said, however, that the transition from ancient to modern civilization did not reduce the status of this vital product, which has resisted time, boundaries and ideologies. The essence of change in grain has been its social function to people.

During mercantilism grain played two key social roles. First, it was a decisive element for the security of the nations, since a self-sustainable supply of food was considered essential. Second, taken as a currency of trade, grain, besides metal,contributed to accelerate the flow of commodities.

But it was only with the "great transformation" (Polanyi, 1957) that the modern trade converted grain into a mass consumption commodity. The Industrial Revolution, which drew tens of thousands of European farmers, peasants and labourers into factory towns and away from their food supply, created an insatiable demand for wheat" (Morgan, 1979:3). The Industrial Revolution needed wheat to

reproduce its vital force, that is, the wage labour force[1]. Owing to the lack of its own grain, the modern working class was no longer self-sufficient and, as a consequence, it had to enter into the commodity world. This resulted in a paradoxical historical situation: the oldest commodity of civilization - grain - still occupies a central role in modern urban-industrial society.

The beginning of capitalism brought about two basic changes to staple foods. On the one hand they were transformed into commodities[2]. On the other hand their trade was organized within a structurally international market. The first change can be explained by the nature of wage labour as a commodity. At the same time it forced a separation between workers and the means of food production, and created the need for people to buy a subsistence commodity basket[3]. The second one resulted from the nature of the accumulation law, which not only required an extensive extending of labour force but pursued constantly its cost reduction (Marx, 1984: Vol.I, XI).

The international grain trade was the mechanism used by capital to meet these two needs. By means of imports, industrial capital was able to stabilize the supply to face an increasing demand for food and to lower the reproduction cost of labour force via cheap food (Friedmann, 1982). Accumulation imperatives were, therefore, behind the development of the modern international grain trade[4], which over-shadowed the ancient trade in luxury items for the rich by basic necessities for the poor (Morgan, 1979:3)[5]. The resulting international division of labour was centred in the trade between wage-foods[6] and capital goods (mainly transportation). Friedmann argues that "European imports of wheat and meat from settler states and exports of capital and people to organize production were the core of the first food regime, geared to *industrial* capitalism" (Friedmann, 1989:100). She stresses that the base for specialization was competitiveness between wage-foods and capital goods, according to Ricardian comparative advantages[7].

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[1] "Workers in Paris, London and Manchester paid half their wages for bread alone"(Morgan, 1979:27).

[2] "The commodification of food is a crucial aspect of proletarianization"(Friedmann, 1982:255).

[3] "Bread was a staple food for the working man and his family detached as he was from his village or farm" (Morgan, 1979:27).

[4] The immediate condition was the abolition of the "Corn Laws" in Britain in 1846, which was preceded by the Irish "potato famine" in 1844 (Morgan, 1979:24-25).

[5] Wheat for bread, cotton for cloth and tallow for candles (Morgan, 1979).

[6] Temperate products came from "settler states" - U.S., Canada, Australia and New Zealand - and tropical products came from colonies and semi-colonial countries (Friedman, 1987).

[7] The advantages of simple commodity production in settler states, once established, "led to the displacement of both capitalist and peasant agriculture in Europe. The result was a spiralling number of displaced Europeans available for recruitment as settlers in the New World"(Friedmann, 1987:251).

By contrast, the distinctive factor in trade between the colonies and metropolitan countries was complementarity, that is, the former exporting tropical products to central economies (Ibid.)[1].

2.3.2 Regime of accumulation and international food order

Friedmann's concept of *food order* derives from the "international regimes" approach[2], which created a widespread interest in Political Science during the 1970s[3]. In economics, it has shifted to international economic regimes. Moving away from its normative character, Friedmann defines an *international food order (or regime)* as "a stable set of complementary state policies whose implicit coordination creates specific prices relative to other prices, a specific pattern of specialization and resulting patterns of consumption and trade" (Friedmann, 1982:248).

It could be emphasized three aspects of this definition: the idea of hegemony, price policies and structural changes. The first is implicit in the setting of complementary policies by national states, considering that those policies institutionalize international patterns of domination, subordination, accumulation and exploitation[4]. As a result, the institutionalization of a specific system of prices forces productive specialization which implies certain consumption and trade patterns. The third aspect is an interaction between political and economic power (first and second aspects), which induces changes in social and productive structures within nations. The conclusion is that these three aspects determine the main characteristics of a specific international food order. However, its general significance depends on "the specific place that it will occupy within the dynamics of global accumulation"(Ibid.:255).

The economic concept of food order stems, therefore, from those abstract premises. Thus, it "links international relations of food production and consumption to forms of accumulation broadly distinguishing periods of capitalist transformation since 1870"

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[1] Friedmann's view (1987) suggests an articulated but unbalanced international division of labour. On the one hand, competitive exchanges based on comparative price/cost advantages.On the other, unequal exchanges, imposed by metropolitan political power.

[2] In a broad way Krasner defines regimes "as sets of implicit and explicit principles, norms, rules and decision-making procedures around which actors' expectations converge in a given area of international relations"(Krasner, 1983:2). The author distinguishes three principal theoretical approaches;"regime defense", "structural", "modified structural" (Ibid.).

[3] According to Puchala and Hopkins (1983), similar to that which occurred with the "international system" in the 1950s.

[4] "All regimes are biased. They establish hierarchies of values, emphasizing some and discounting others. They also distribute rewards to the advantage of some the disadvantage of others..." (Puchala and Hopkins, 1983:66).

(Friedmann and McMichael, 1989:95). In order to develop that concept, the above authors take as their point of departure the theoretical approach of the French "regulation" school.

According to Aglietta (1979), social regulation under capitalism consists of a system of norms and laws which regulates the reproduction of the structure of society[1]. An intermediate concept, less abstract, for the purpose of analysing the forms of social regulation is the "regime of accumulation". This is defined as "a form of social transformation that increases relative surplus-value under the stable constraints of the most general norms that define absolute surplus-value" (Ibid.:68)[2]. In concrete terms, the author divides the historical development of capitalism into two distinctive regimes of accumulation .

The 1870-1914 period is classified as a *"predominantly extensive regime of accumulation"*. Without a radical transformation in the traditional way of life and consumption by wage-earners, there was, for a certain period, an incomplete separation between productive and domestic activities. Consequently, at this time, the mode of consumption was characterised by a dominance of non-commodity relations over commodity relations.In the sphere of labour process relative surplus-value was mainly obtained by changing the organization of labour *per se*, which provoked a relatively slow growth of productivity. In this case accumulation occurred as a result of numerical and spatial increases of workers under wage regime and commodification of wage-goods. That is, accumulation was predominantly extensive.

By contrast, the post-second war accumulation regime has been *"predominantly intensive"*. It "creates a new mode of life for the wage-earning class by establishing a logic that operates on the totality of time and space occupied or traversed by its individuals in daily life (Ibid.:71). Now the mode of consumption is characterized by the complete domination of commodity relations over non-commodity relations.At the same time, the drastic transformation of the labour process has resulted from a brisk technical change combined with a profound reorganisation of labour. This "intensive regime" of accumulation was made possible by rapid labour-productivity growth and its partial incorporation into real wages (by bargaining). Therefore, a simultaneous increase occurred

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[1] "... we can accept here that if the class struggle produces norms and laws which form the object of a theory of social regulation, it is itself beyond any "law" "(Ibid.:67).

[2] Absolute surplus-value understood as the economic effect of general regulation norms of the wage relation in the field of value - the fixing of the legal duration of labour, regulation of trade union practices, the determination of wages, the socialized management of the reproduction costs of the wage-earning class-. In contrast, relative surplus-value originates from wage relation which structure the concrete organization of the production and reproduction of the wage-earners - output norms for the work of specific collectives, systems of grading skill,etc.- (Ibid.:68-71).

in both relative surplus-value and real wages. From this material base, a "social consumption norm is formed" (Ibid.), which has established the link between mass production and mass consumption, the two latter being a process of standardization which integrates productive and consumption spheres with accumulation[1].

The "first international food order" emerged in order to face two critical features of the "extensive regime" of accumulation: the rapid growth of demand for wage-food and the need to reduce the cost of the labour force. By this means the stable food supply and cheap food prices guaranteed the extended reproduction of the wage labour force. Such an order was built on three main foundations. In the productive sphere, nationally based agro-food systems were organized around family farms in the New World economies. In the market sphere, trade was structured by merchant companies. In the consumption sphere, basic staple food with limited processing constituted the consumption pattern of wage-food. This "tripod" scheme - family farm , merchant capital[2] and wage-food consumption patterns - formed the dynamic centre of this order (Friedmann and McMichael, 1989).

After World War II the new food order emerged in a very different accumulation regime. The "intensive regime" established standardization as the principal characteristic for food production and consumption. This simultaneous process was based on the internationalization of the agro-food system, which acquired a new "tripod" shape: "industrialized" agriculture - industrial capital - mass food consumption patterns. The dynamic element of this modern food system has been international agroindustrial corporations (Ghersi and Rastoin, 1981), which are supported by strong state intervention (Friedmann, 1982).

2.3.3 The post-war state regulation regime

There is now a growing body of literature which suggests that the chronic food surpluses in the international market are the most distinctive feature of the so-called post-war state regulation

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[1] Emerging from the accumulation process of advanced capitalist economies, the notion of a regime of intensive accumulation should be altered in order to be applied to semi-industrialized economies. The dichotomy relating "intensive regime" to advanced countries and "extensive regime" to backward countries is not the best procedure to deal with this notion of regime of accumulation, although this seems to be Friedmann's view (Friedmann, 1987:251-254). Considering that capitalist development of the latter countries is very articulated to that of the advanced industrial countries, it would be useful to consider an analytical mixture between the two "regimes" in order to analyse the "periphery". Lipietz (1987), for instance, suggests the term "peripheral fordism".

[2] "The five enormous companies that controlled the global grain trade in the summer of 1975 all had their origins in that period a century ago when the cities of Europe, and of England in particular, needed foreign wheat" (Morgan,1979:4). Nowadays, they are: "Cargill Inc., of Minneapolis"(USA); "The Continental Grain Company of New York City"(USA-France); "André of Lausanne" (Switzerland); "Louis Dreyfus Company of Paris"(France); "Bunge Corporation"(Argentine-France).

regime, which is the "second international food regime" in Friedmann's theoretical scheme. The specificity of that agricultural crisis is not surplus *per se*, which is a cyclical and general economic phenomenon in a market-regulated system. In fact, the typical feature of this crisis of over-production is its ***structural*** character arising from the contradictions of modern agriculture in the post-war industrialized economies (Goodman and Redclift, 1989). These contradictions have determined chronic agricultural commodity surpluses in world markets[1]. A strong apparatus of state intervention has been constructed during this time to attenuate this crisis. Two key interrelated variables underlie these surpluses: a great jump in crop yields per acre and a wide range of domestic policies to promote agricultural modernization. State intervention was devised to deal with a paradoxical reality of modern agricultures in O.E.C.D. countries. On the one hand, the increasing levels of labour productivity[2] in farming and, on the other, the maintenance (USA and Canada)[3] or increase (EEC)[4] of agricultural domestic prices in order to support farm incomes.

The international market has been the main channel used to absorb agricultural surpluses generated by productivity/price mechanism. This world outlet for grain has played a key role in reconciling the conflicting policies adopted among "metropolitan" governments (Morgan, 1979:129-136). An overview of the export flows of agricultural commodities until the early 1970s would show two distinct markets: the wheat market predominantly constituted by the Third World countries[5] and the grain "complex" market (maize/soybean/meat) directed towards Developed countries (Europe and Japan). That market segmentation reflected the world

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[1] Which is paradoxical in the context of world starvation.

[2] In the United States maize yields increased from 20.5 bushels per acre in 1920 to over 120.0 in 1986 (Kenny et al., 1989:139). During the sixties "production increases of 2.7% per year in developed capitalist countries and of 3% per year in centrally planned economies were mostly due to increased yields(...) By contrast, production increases of 2.7% per year in Africa and Latin America were due almost totally to increased acreage"(Friedmann, 1982:267).

[3] Under the New Deal aegis, the American government after 1933 developed a broad agricultural programme. Three were more important: Agricultural Adjustment Act (AAA) - price support system, Commodity Credit Corporation (CCC) - credit, insurance and trade systems, Public Law 480 (PL480) - foreign aid policy. See details in Kenney et al. (1989:136-141).

[4] The "Common Agricultural Policy" (CAP) was a huge programme of restructuring and modernization of the European agriculture. Morgan observes that "critics argue that the CAP was expensive, wasteful and responsible for high European food prices, and in terms of pure economics, they had a point. The high European price supports did encourage overproduction and wasteful farming practices" (1979:131).

[5] "Gross imports of the countries of Latin America,Asia and Africa, excluding Argentina and Japan, had risen to more than a third of the world total by 1959. These accounted for almost half of world imports in 1971, on the eve of the first Soviet purchases" (Friedmann, 1982:265).

agricultural division of labour developed during the 1950s and 1960s: disruption of the Third World agrarian societies as self-provisioning food producers; diversification of the productive structure of American agriculture (soybean/maize); and increasing wheat self-sufficiency in European agriculture .

One consequence of the shift in the direction of wheat exports from Europe to Third World was depress prices on international markets. There was an increasing spread, between domestic wheat prices of Developed countries and current prices in the international trade[1]. The low price of wheat in world markets resulted from the interaction between chronic over-production on the supply side and low purchasing power on the demand side. In spite of potentially large numbers of buyers, their weakness as importers was structural. With this demand restriction, the American conquest of new markets for the "wheat agribusiness"[2] occurred at a cost of a highly expensive governmental programme which was centred in the bilateral *Food Aid* policy[3]. The "price" paid by beneficiary countries was their transition from self-sufficiency to staple-food import dependence[4]. In terms of social cost, it contributed to undermine the "subsistence complex" of the rural economies of Third World countries[5].

It is not surprising, then, that the experiences of partial industrialization in these underdeveloped economies has been described elsewhere as a *disarticulated accumulation* in respect to the relation between agriculture and industrialization. The classic roles of agriculture in industrialization (Mellor, 1966; Castro, 1969; Johnston and Kilby, 1975) have been restricted to supply a labour surplus. The function of supplying a cheap staple-food has been transferred to the external sector. As a direct effect, this

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[1] As Friedmann's estimate suggests, the spread between the internal wheat price in the United States and average price in the international market increased from $0,18 in 1951/52 to $0.70 in the 1953/64 period (1982:266). Despite Johnson's consideration, that European protection worked as a secondary force to depress world prices, he calculated that soft wheat internal prices in Europe stayed at a level almost double the world price during the sixties (1973:46-47).

[2] Convergent interests incorporating the mid-western farmers' lobby and American grain conglomerates that control the grain world market. See specially Chapters 5 and 6 of "Merchants of Grain" Op.cit..

[3] During 1961-65, American Food Aid reached more than 36.5 percent of the wheat world trade (Friedmann, 1982:264).

[4] Asia (except Japan) and Middle East (three biggest importers) increased their wheat imports from 117 million bushels in the 1950-54 period to 446 million in 1972-74 - 281% - (Friedman, 1982).

[5] In terms of consumption pattern there was a displacement of traditional diets by the wheat-based western diet. During the 1950-70 period consumption per capita of wheat increased by 60 percent in the underdeveloped world (excluded socialist block). Simultaneously, consumption per capita of domestic grains and root crops decreased by 15 and 31 percent respectively (Friedmann, 1987:252).

function transference has caused an outflow of foreign-exchange[1] and, as an indirect effect, it has limited agriculture as a foreign-exchange generator. From the point of view of industrialization, we could say that the benefits of importing cheap food has been exceeded by the costs of the disruption of domestic agriculture as the principal supplier to the emergent urban market. Instead of making industrialization easier, the imports of cheap food has probably constrained it. In effect, imports work as a negative force undermining the classic mechanism of agriculture as a "resource generator" in the "import substitution" process.

However, we must be cautious in dealing with the idea of "disarticulated accumulation", mentioned above, as a basis for constructing a general framework to analyse the industrialization of Third World countries. Considering that these countries have experienced a wide range of different forms of industrialization, we should take into account the role that the social agents have played internally during this process in each country, as is suggested by Cardoso de Mello's framework for the industrialization of Latin American countries (1982). Thus, levels of internal articulation between industrialization and agriculture vary according to the economic basis from which industrial development begins, particularly the endogenous capacity of accumulation in "export agriculture" in the earlier period of that process.

With regard to this point, we consider that Friedmann's idea suffers from a "food-aid centric" view of Third World industrialization, from which she judges its viability. This is historically a weak approach for the understanding of such a process, since it omits the role of internal endogenous forces. The Brazilian industrialization path is a distinctive example of the opposite course. We might draw other intermediate examples.

The second route of food in international markets was based on the restructuring of agricultural commodity trade among developed countries. Basically it was organized around three rural products which have been the principal raw-materials in the establishment of the pattern of world diet: maize, soybean and meat[2]. In this case, expansion of demand originated from a pattern of mass consumption. Transformation of rural products into generic feed-stocks of "fabricated" foods stimulated the intensive consumption of food, and this demand has been the principal force of trade between developed country.

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[1] The gravity of the foreign-exchange drain was less in the 1960s, despite changes in the American food-aid (PL-480). During the 1970s and 1980s, however, it became dramatic due to three interactive changes: the end of food-aid, the commodity price shock, and the external shock of interest rates.

[2] Soya bean plus maize produce animal feed to livestock.

As pointed out in the literature, soybean has been the key crop in developing this trade route, promoting both productive integration among basic products of world diet and replacement of traditional tropical oils. Beside the appearance of cereal-based sweeteners as substitutes for sugar, soybean was crucial in the "import substitution" of oils in the core countries. As two key components of manufactured foods, sugar and oil were also two key tropical exports (Friedmann and McMichael, 1989:110). For this reason, this replacement process has undermined the old tropical crop trade, and reinforced the agricultural self-sufficiency of developed countries. Behind this dual movement of crop displacement and crop integration have been the agro-industrial capital interests, which have promoted the internationalization of the agro-food system. As Friedmann and McMichael suggest, "analysis of national, regional and international restructuring must focus on the organization of capitals for the buying of inputs and selling of increasingly complex and diversified products to consumers differentiated by income, but nonetheless standardized across regions"(Ibid.).

The disarray of the existing food order during the last two decades has facilitated the development of a third trade route in international food markets. Since the 1960s, the Newly Industrializing Countries (NICs) have experienced a huge process of agricultural modernization based on Green Revolution technological patterns. Mainly the Latin American ones, Brazil and Mexico, have entered into the international grain/meat markets, which have been looking for new commercial partners. If these new sources of supply contributed to the relief of the provisional shortage of grain in the international market in the 1970s, they had the opposite effect in the 1980s, when a new over-production crisis emerged and the competitiveness for markets was aggravated.

Describing the Latin American experience, Sanderson argues that "the new internationalization of agriculture in the Americas takes place at the level of production itself and is not a simple product of commodity circulation through trade"(1985:47). From this point of view two interactive aspects of this "new internationalization" can be stressed. First, the predominance of international capitals in the productive sphere, that is, transnational agribusiness corporations have had a leading role in the agro-food industry in Latin America. This leadership occurs both in intra-sectorial competition in specific markets and in intersectorial competition through multiple markets. The latter is centred in the control of agro-industrial structures that are linked with the core of world agribusiness, that is, the grain/meat complex. The second characteristic of internationalization is based on transnational productive integration. Sanderson (1986) illustrates this with his analogy between the "world steer" and the

"world car"[1]. Food manufacturing has reached a world scale through a new international division of labour. This means that regions in the world specialize in specific phases of the productive process, the final product resulting from "transnational integration".

It can therefore be suggested that the location of international corporations in the agro-industrial structures of national economies has followed global strategies of accumulation. These strategies aimed not only at consolidating their competitive position in old markets of the industrialized economies but also at conquering new ones in newly industrializing countries. In both cases, cost comparative advantages in establishing relatively autonomous productive chains around the world are decisive in raising barriers to entry and consolidate market leadership.

In these circumstances, conglomerate competition tends to establish a new logic of international division of labour in the agro-food system, restructuring hierarchies among national economies. Contradictorily, at the same time as the regulation mechanism of grain trade based on national policies opened the way to the internationalization of agribusiness, the product of this process, food conglomerates, has undermined the capacity of the "nation-states" for defining their own domestic policies for food. As Friedmann and McMichael observe, "transnational integration in the agro-food sector undercut national policies not only in peripheral economies but also in the centre countries" (1989:110).

[1] As Sanderson emphasizes, in the case of cattle such a term has special limits: "component parts do not enjoy the easy mobility of other manufacturers..." (1986:124).

3. OLIGOPOLY THEORY AND AGRO-FOOD SYSTEM: A NECESSARY LINK BETWEEN THE MICROECONOMICS AND THE MACROECONOMICS OF FOOD

3.1. Analytical integration between agriculture and market structure

Traditionally agriculture and industry have been distinct fields in economic analysis: agricultural economics and industrial economics. After the Industrial Revolution, the displacement of material production centres from the rural economy to an urban-industrial context established a well defined division of labour between the country and the town. That was the objective condition for developing two fields of economic investigation. Further advances in achieving an integrated analysis have been made by *economic development* theories. Emphasizing the role of agriculture in economic development, these approaches represented a progress from static to dynamic analysis. Agricultural development and industrialization were thought of as interdependent elements in the process of capitalist development, with the transformation of one (urban) being able to induce the other (rural). In this case, global economic dynamics would be a result of specific forms of intersectorial interaction.

There is a wide-ranging literature on this subject. Two of the most important publications were the classic works of K. Kautsky, "The agrarian question", and of V. Lenin, "The development of capitalism in Russia". These classic theories assumed the increasing social division of labour to be the dynamic force in the development of the internal market in a specific social structure. Thus, the commodification of rural production was interpreted as an integral part of the development of capitalism. As a logical deduction from this development, industrialization in agriculture would be similar to that of other branches of productive activity, that is, with the complete establisment of wage relations and radical transformation of the labour process. This idea of an *endogenous industrialization* in agriculture originated from the Marxist hypothesis about the transformation of agriculture into a branch of industry.

However, as Goodman, Sorj and Wilkinson (1987) have pointed out, the industrialization of agriculture has historically occurred to the detriment of rural activity. The propelling force of capital accumulation was directed more to transforming rural activity into a residual activity than to promoting it to the status of industrial activity. Strategies of industrial capital based on "appropriationism" and "substitutionism" have reinforced an *exogenous pattern of agricultural industrialization*. If this reinterpretation of capitalist development in agriculture as the development of agroindustrial capital is accepted, it can be concluded that the analytical centre of capital accumulation should be moved from agriculture *per se* to industry.

While agriculture was able to preserve relative autonomy from industrial accumulation, changes in farming might have been analysed in terms of internal forces in agriculture. However, the emergence of agribusiness in industrialized economies has definitively discredited the sectorial method. Even though mutually conflicting, the relatively articulated strategies of capitals in the agricultural industrialization have bound rural development closely to the dynamics of industrial capital. Recent advances in the modern agro-food system have further narrowed the scope for autonomous sectorial investigation. Nowadays, it is quite difficult to clearly identify what is typically a rural activity and what is an industrial one. The modern beef, poultry and pork industries are good examples of the revolution in farming that has been occurring.

One consequence of changing the analytical unit of accumulation in agriculture from *farming* to *industry* is the necessity of considering the concrete forms of industrial organization. The next step would be to link these industrial structures with specific agricultural activities. Thus, we could analyse the concrete forms of agricultural development under the aegis of the industrial capital.

To do so is necessary to adopt a theoretical approach in industrial economy which will extend beyond the firm as an analytical unit. The market structure approach seems to be the most widespread method for going beyond behavioural theories of the firm. Instead of individual firm behaviour, market structure characteristics are seen as determinants of firm strategy and performance. In adopting this approach, the point of departure is the assumption that agribusiness is an oligopolistic form of industrial organization of the modern agro-food system. In short, oligopolistic industrial structures are the core of this system.

The market structure approach can, therefore, permit the introduction of the "micro" analysis of industrial organization into the "macro" context of the food system organized around the three productive aggregates (already described) mediated by state regulation (credit, taxation, price and technological policies). To examine this articulation it will be necessary to pursue a dynamic analysis of oligopoly able to explain the interaction between changes in market structures and the macroeconomic level. Thus, dynamic analysis can establish the link, absent by theory, between the microeconomics and macroeconomics of food.

3.2. Patterns of competition within agribusiness

3.2.1 Interdependent system of accumulation

Leontieff's input-output methodology is the traditional way used in the literature to deal with agribusiness as an analytical category. Since Davis and Goldberg's work (1957), the magnitude and exchange flows of agribusiness have been measured by using input-output matrices (Goldberg, 1967; Malassis, 1969; Fenollar, 1980; Muller,1981). However, this methodology is not sufficient to understand the content of that exchange system. In addition to the quantitative expression of exchanges, supplied by the input-output matrix, we have to look for the qualitative expression hidden behind these flows. This qualitative feature of exchanges within agribusiness is the interdependent mechanism of accumulation among the industrial and rural activities forming the productive sphere of this system. The following section will analyse the movement of intersectorial exchanges as an interactive process resulting from particular units of accumulation, these units being constituted by industries and markets, that is, market structures.

Three basic assumptions would be needed for the adoption of this analytical procedure. The first is that the technological pattern of agribusiness is already established and then could be treated as a restriction on the *current operation* of this productive system. Two historical aspects of the trajectory of capitalist development in agriculture are important in this respect. On the one hand, that the industrial base of the agro-food system is organized by several productive branches. Each of them corresponds, in terms of productive structure and patterns of competition, to a specific industry or market. On the other hand, empirical experience show that there is a technical convergence among productive branches within agribusiness. In the upstream industries, this convergence has been effected by packages of inputs and capital goods bought by farmers. At the farm level there is an agricultural pattern of production, land-based but technologically dependent on industrial supply. On the downstream side, the modern processing techniques of the food industry have elicited a *mass production* by agriculture. This implies greater product homogeneity, supply regularity and lower prices per unit of agricultural inputs. It would be worthwhile to distinguish between technological patterns, which are established by technical progress at some given time, and product innovation, which derives from more or less qualitative changes in industrial products as part of the normal activity of an enterprise or industry. In the case of the food system, the assumption is that genetic innovation is the driving force behind the technological pattern, both in developing and in transforming it.

The second assumption is the oligopolistic nature of agribusiness, which necessitates recognition that oligopolistic

industrial structures are at the core of the macro-food system. Thus, *oligopoly* is to be understood as a class of market structures characterized by the existence of important barriers to entry, these barriers being intended to prevent the entry of all types and sizes of enterprises in a specific market, or at least the entry of such a class of competitors that can threaten the leadership of established large enterprises (Possas, 1984:161). This definition means that oligopoly will be treated within the theoretical perspective developed by Steindl(1952). For him, the central characteristic of oligopoly is not the small number of enterprises in contrast to the atomistic structure of competitive markets, but is the existence within a specific industry of an asymmetric structure of large and small firms, with a corresponding hierarchy of profitability (Ibid.). The development of such a theoretical paradigm will also incorporate the contributions of Bain and Sylos-Labini[1], which transform barriers to entry into a theory of competition under oligopolistic conditions (Possas, 1984:144)[2]. According to this theoretical tradition, the industrial organization of agribusiness could be considered as being constituted by distinct patterns of competition characterized by specific strategies of both barrier formation and accumulation.

Last, but not least, the third assumption is that state intervention is the main regulatory agent (Graziano da Silva, 1988) of this interdependent accumulation system. State regulatory function embraces policymaking (credit, taxation, price and technology); production regulation (domestic supply and export policies); and international trade legislation (supragovernmental agencies)[3]. After the World War II the system of state regulation constructed the present international food order, which has been the institutional support for agroindustrial accumulation (Puchala and Hopkins, 1983). Despite its contradictory aspects, state intervention has been enthroned not only as a key element in restructuring agribusiness but also as a permanent factor in its reproduction, expansion and transformation.

Given these technical-economic and institutional assumptions, the next step will be to understand the industrial structures which constitute the core of this interdependent system of accumulation. Further more, the development of an integrated analytical treatment for the productive chain of agribusiness will be pursued.

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[1] Especially Bain's works "Barriers to the new competition"(1956) and "Industrial organization"(1959), and the Labini's work "Oligopoly and technical progress"(1956).

[2] About the contributions of J.Steindl, J.Bain, and Sylos-Labini see Possas,op.cit., especially pages 89 to 116 and 142 to 160.

[3] There are extreme cases, as the Brazilian, where the public sector has added to its role as productive agent and direct "manager" of margin of profits between agroindustrial capitals (Delgado, 1985).

3.2.2 Patterns of competition

The patterns of competition which will identify the market structures of agroindustry will now be examined. Resulting from specific capital strategies associated with either the appropriation or substitution of rural activity, agroindustrial branches tend to exhibit industrial structures whose particular attributes involve determinate patterns of competition. Two basic elements establish a pattern of competition, the position of firms in the productive structure, and competitive strategies (Possas, 1984). By position is meant the range of market and productive characteristics which give distinction and particularity to a productive sector within the industrial structure of an economy(Ibid.:164). These characteristics can be summarized as follows: type of product (destination, durability, etc.); demand characteristics (product differentiation, use-diffusion, consumption patterns); types of input and capital goods (cost structure and intersectorial dependence); technological requirements of the productive structure (types of scale economies). In its turn, competitive strategies embrace a set of different price, marketing and expansion policies by leader enterprises, which is able to define profit margins and rate of planned expansion (Ibid.:166). This latter defining element of the pattern of competition of an industry reflects the level at which the decision-making autonomy of firms is greater (Ibid.:166). Nevertheless, the strategy of firms has to take into account the restrictions imposed by structural characteristics of the market in which these firms are included.

Following the contributions by Bain, Labini and Steindl to the theoretical literature, Possas considers the ***magnitude of barriers to entry*** to be the synthesis of the patterns of competition. Under given conditions in the productive process, the magnitude of barriers in an industry can be measured by profit margins (or mark-up), which determine the rate of ***internal accumulation***. According to Possas(1984), the ***patterns of dynamic behaviour*** of market structures regard ***barriers to entry*** and ***internal accumulation*** as the two foundations of micro-economic dynamics in respect to the expansion of the firm and the market. With the magnitude of barriers to entry[1] taken as the starting point, the scenarios of modes of expansion in which internal accumulation will occur can be established.

Given this idea of patterns of competition, Possas (1984) suggests a dynamic typology of market structures. His starting point is Labini's classification of oligopolistic structures (1957), which was later extended by Tavares (1982) to semi-industrialized economies. Such a typology is justified by the

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[1] Concentration, differentiation, diversification, conglomeration and internationalization. The two latter are considered the most advanced stages of capitalism competition (Ibd.:168).

need to achieve a dynamic approach to market structures under oligopoly. From this point of view, markets are classified according to the basic criteria that constitute competitive processes, that is, the technical and productive conditions of production, and the forms of competition that these technical-productive conditions allow. Each type of market classified will correspond a specific pattern of competition among real or potential competitors. Thus, the *competitive process* establishes the *microeconomic* basis for the development and transformation of the *market structures*.

Of the classification proposed[1], those types which are in some way representative of industrial structures found in the agro-food system will be focussed. Without trying to reproduce here all the abstract characteristics of each type, and even less to exhaust all taxonomic possibilities, an attempt will be made to identify concrete market structures in agribusiness.

Among agroindustrial branches, those located upstream of agriculture present more difficulties in being identified by market structure typology. The most problematic is the dual identity of those industrial branches. At the same time that they are exclusively linked with agriculture as suppliers, most of them are inserted into broad and diversified industries. Examples include the links of agri-chemicals with the chemical industry, veterinary medicine with pharmaceuticals and agricultural capital goods with mechanical engineering industries. On the one hand, supply dependence clearly demarcates agriculture as a unique market. On the other hand, "external" links do not identify them as purely agroindustrial capitals. Especially in the case of chemical and pharmaceutical capitals, their strategy of vertical integration introduces a strong exogenous factor in changing market structures. For this reason, it is difficult to study those branches in isolation from their vertically-integrated structure.

Two difficulties of classification can be stressed. First, the diffuse location of the capital goods industry inside the four basic market structures, "concentrated", "mixed", "differentiated" and "competitive". The agricultural capital goods branch is a specific case of a more general problem[2]. The second difficulty refers to market size of agricultural inputs *vis-à-vis* market size of basic industrial inputs, which are located at the intersection point of industrial matrix. These size differences establish distinctive market structures between industrial branches. As a consequence, it is not possible to classify farm input sectors in

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[1] "Concentrated oligopoly", "differentiated/concentrated oligopoly", "differentiated oligopoly", "competitive oligopoly" and "competitive markets" (Ibid.:108-182). On the empirical use of this typology, see Tavares (1978).

[2] On methodological problems encountered in the Brazilian case, see Tavares (1978).

the pure structure of "concentrated" oligopoly[1].

By contrast with the problems of classifying upstream industries, the downstream sectors can be clearly identified within the market structure typology. They are constituted by purely agroindustrial capitals.

Taking into account such observations, a less rigid classification will be attempted, which is more compatible with the particularities of oligopolistic structures in the agro-food system.

3.3. Agroindustry classification according to market type

3.3.1 Concentrated oligopoly with limited product differentiation[2]

Sectors: Farm machinery and plant-protection industries

I - General outline

a) Productive structure.
-product type: limited product differentiation, mass production with some standardization; non-basic inputs for general use.
-demand characteristic: some specificity; final product for investment and current inputs.
-cost structure: low operational costs; labour cost higher(than average).
-intersectorial dependence: little.
-technological requirements: high capital intensity but lower than "concentrated" oligopoly; M.O.S. (minimum optimal scale) higher than average with technical economies of scale; technical discontinuities between large and small plants.
b) Forms of competition.
-concentration: high technical (plant) and economic (firm)concentration; strong barriers to entry.
-price/profit margins: price inflexibility, price leadership; long run: margin of profit stability by leading firms.
c) Strategies of expansion.
-profits/internal accumulation: higher profit margins (and mark-ups), increased internal accumulation, undesired excess capacity extended.
-external expansion: horizontal and/or vertical integration, internationalization.

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[1] Given a lower technical and economic concentration. The technical discontinuities of scale are less relevant, reducing barriers to entry level.

[2] Similar to subtype of "concentrated oligopoly" proposed by Tavares (1978:88-90).

II - Specific characteristics

The tractor, harvester and farm equipment industries fit this oligopolistic structure. In the present study they will be treated as similar industries or markets which can be called *farm machinery industries*. Even though these products are distinct, they tend to converge into similar market structures. These sectors are organized around the same demand structure -farming investment, and converging competitive strategies -vertical integration. While the tractor and harvester industries can be classified as national markets, the wide range of farm equipment can more properly be classified as regional markets. The following discussion will be focussed on the tractor industry, considered the biggest market of farm machinery.

A defining factor in the expansion strategy of the tractor industry has been a typically evolutionary technical development "which has relied heavily on adapting improvements made in the automobile industry and on the firms supplying it" (Kudrle, 1975:51). According to Kudrle, the only identifiable "quantum jump" in product innovation occurred in the pre-second war period with the revolutionary development in the tractor design known as "Ferguson system"[1]. Since the war, product innovations have been limited, being confined to engine size and type, four-wheel drive, and power steering. In the early sixties, there was a convergence of tractor design and product lines, this convergence establishing a static technological basis from then onwards[2]. This represents an exhaustion of the technological frontier in the *evolutionary era* of agricultural mechanization, as represented by the tractor. The roots of this era originate from the adaptative character of such machines. According to Goodman et al.(1987), "instead of restructuring the production process, mechanization effectively represented an implement adapted to the spatial and temporal characteristics of agriculture" (21)[3]. As a result, mechanization of the production process was typically "adaptative" because land, to the detriment of machine, was maintained as the principal means of production.

The structural constraints of innovation towards product differentiation have reinforced the homogeneous character of traditional farm machinery. This has limited the capacity of supply for creating its own demand, given the slow process of product

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[1] A special hitch for automatic hydraulic control of integrally-mounted implements.

[2] The recent introduction of turbo engine and the eminent adoption of hydraulic system with electronic remote control (BNDES,1988:9) do not characterize a radical change of the technical base.

[3] "Rather than the Copernican revolution of manufacturing whereby nature must circulate around the machine, nature in agriculture maintains its predominance and it is machine which must circulate" (Ibid.:21).

technological obsolescence and the constraints towards intensification of consumption of this machinery. Certainly world agricultural modernization in the post-war period had a contradictory impact on the demand level. There were two simultaneous expansionist and contractionist movements. The former occurred through the vertical (phases of production) and horizontal (acreage) diffusion of mechanization. The latter arose as collateral effect of agricultural modernization, since its high-yielding technological packages have displaced land from production, with acreage stagnation or even contraction in absolute terms.

The technical and demand characteristics discussed above have permeated the expansion strategies of leading firms in the tractor sector, which has reinforced the already high level of barriers to entry typical of such oligopolistic structures. The severe contraction of European and American markets since the early seventies has accelerated restructuring in this industry and has thus raised the level of concentration. However, the pattern of competition within the industry, which can be identified with Steindl's (1952) study of an industry where entry is difficult, reduces the scope for increased concentration via displacement of "marginal firms". For this reason, the principal result of *competitive pressure* within the industry is an increasing undesired excess capacity, including plant closures. At the same time, other possibilities of market expansion have been exhausted, particularly horizontal integration (among tractor and harvester capitals) and internationalization[1].

Inclusion of the pesticides/herbicides industry in this oligopolistic market modality seems to be atypical since this industry is not a capital goods class. Despite being an input supply industry, this agri-chemical sector exhibits in relative terms a high degree of product differentiation, for this is the innovative capacity of this sector for the intermediate consumption of its products by agriculture. Owing to significant and continuing product innovation in the competitive struggle among leading firms, this oligopoly is quite different from the "pure oligopoly" of widespread intermediate goods. Certainly, its proximity to the case of "concentrated oligopoly with limited product differentiation" stems from the form of competition. This form is centred on high technical barriers to entry, which permit leading firms to pursue inflexible price policies and maintain high profit margins. Specifically with regard to barriers to entry, in some way these reproduce the interaction between high profits and high barriers stressed by Steindl in the case of concentrated markets with few number of small firms. In these markets, the magnitude of the ruling profit margins is "a measure of the height of the wall which

[1] In Brazil, concentration rate of shipments by the four leaders (CR4) is around 92 percent. Three of them are international firms: Massey Perkins, Ford and International Harvester (BNDES, 1988).

has to be scaled by the competitive sales effort of the newly entering firm, if it wants to eliminate existing firms" (Steindl, 1952:54).

One technical characteristic has been crucial in building the competitive "wall" in this agri-chemical industry. The forward technical integration with the "chemical complex" facilitates the technological control over pesticides and herbicides production. (Kageyama, 1987; BNDES, 1988). In fact, this agroindustrial branch of the chemical industry has occupied an expanding space for accumulation opened up by hybridization techniques in the 1950s[1]. Control of technological base mentioned above is the main difficulty confronting newcomers, this difficulty being at least as great as that of expansion by one of the existing firms at the expense of the others. In this case, access to the technological matrix is the starting point of competition. With short-term product technological obsolescence, market share among leading firms depends on speed with which new products can be introduced.

For this reason, with the depletion of product innovation capacity and stricter regulatory legislation during the 1980s, the technological pattern of chemical-based pesticides/herbicides has shown signs of exhaustion. The development of new markets by the "Green Revolution" has not been enough to avoid a slump in world markets. The imminent restructuring of this industry is in prospect with the breakthrough in biotechnologies, which set new technological frontiers for plant control[2]. To the development of new products, such as biological pesticides, dominance of the seed sector has become a crucial factor in the competitive struggle.

3.3.2 Differentiated oligopoly

Sector: Final food-processing.

I - General outline

a) Productive structure
-product type: product differentiation, mainly horizontal differentiation; product innovation, product proliferation and advertising; non-durable consumer goods.
-demand characteristic: final mass consumption; low price/income elasticities.
-cost structure: low current costs; high selling costs.

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[1] With the development of hybrid seed varieties adapted to higher plant populations: "higher plant populations were subject to insect, disease and weed build-up, and this in turn encouraged the use of insecticides, herbicides and fungicides" (Kloppenburg, 1984:303).

[2] Goodman stresses that "the introduction of new plants varieties incorporating BNF capacity or biological pest-and disease-resistance (...) would provide alternative accumulation strategies for the agri-chemical corporations" (1987:7).

-intersectorial dependence: significant backward dependence.
-technological requirements: low capital intensity, without plant economies; multiplant economies; pecuniary economies, especially economies of scale in advertising.
b) Forms of competition
-product differentiation: high advertising expenditure, low R & D (research and development).
-barriers to entry: depends on level of product differentiation and marketing capacity; instability of market structure.
-concentration: low technical (plant) concentration (lack of technical barriers); moderate to high economic (firm) concentration.
-price/profit margins: non-price competition; some price flexibility; high gross profit margins (and mark-ups).
c) Expansion strategies
-profit/internal accumulation: increased profit margins, higher internal accumulation, extended productive capacity of leading firms, growth in concentration, changing structure, small firms expelled.
-investment: affected by selling forecasts.
-global strategy: expansion depends on economic cycle (exogenous variable) and product innovation (endogenous variable).
-external expansion: horizontal integration; conglomeration; internationalization.

II - Specific characteristics

As an alternative to the subdivision between intermediate consumer goods and final consumer goods[1], the food industry will be divided into homogeneous products - primary processing - and differentiated products - final processing. The criterion for this segmentation of the food industry is focussed on the characteristics of the productive structure and the resulting forms of competition. It is supposed that market structure in primary processing is rather different from that of final processing. The former is organized around a specific product basis, while the latter tends to replace dependence on a specific product by a wide range of products which are transformed into generic raw-materials. As a result, the predominant forms of competition are, respectively, production-driven, with vertical integration forward and backward along the agricultural commodity pipeline, and market-driven, with innovation establishing high product differentiation.

Therefore, markets in food manufacture will not be classified according to the degree to which goods at the disposal of consumers are complementary or substitutes. The bias of this criterion of classification is the consideration of only the ***demand*** side of the

[1] This subdivision, for example, is suggested in a recent paper "Structural changes in agricultural activities - an analysis of intersectorial relations in the Brazilian agroindustrial complex", Banco Nacional de Desenvolvimento Economico e Social (BNDES), 1988.

market concept, that is, the similarities or complementary nature of products from the point of view of consumers. However, the ***supply*** side of this concept should be taken into account, that is, the technical-economic organization of production, which determines plant size, plant concentration, technical characteristics of products, and the consequent forms of competition. Thus, demand and supply can be unified under the broader concept of ***market structure*** (Possas, 1984).

There is now a considerable literature which suggests that product differentiation is a pivotal characteristic of market structures in final food-processing industries. Differentiation is central to structure because not only does it influence the character of competition among established firms but it also raises the height of entry barriers (Comanor and Thomas, 1967:279). In the food industry, the type of differentiation is not *vertical* (Shaked and Sutton, 1984); that is, centred on technological product innovation (typical of R & D-based industries). By contrast, food manufacture has been characterized by ***horizontal*** product differentiation (Ibid.), where the innovation process is basically ***market-created*** innovation relying upon product proliferation and advertising[1]. These two factors are decisive to market growth inasmuch as they are directed to changes in both consumer expenditures and purchasing patterns.

Certainly the final food-processing industry is one of the best examples of the type of consumer goods industries with high levels of advertising expenditures as described by Comanor and Thomas (1967). Here the high level of advertising is itself an important determinant of the level of differentiation which is realized by established firms *vis-à-vis* potential newcomers. In this sense, "advertising is a source of product differentiation" (Ibid.:281). For this reason, advertising has been enthroned in literature on food manufacturing, not only as ***one source*** but also as ***the main source*** of differentiation.

With regard to competition, Comanor and Thomas stress that advertising "has a strong impact on entry barriers" (Ibid.). Competitors "are forced to sell at a price below the established brands or else incur heavy selling costs" (Ibid.). In general, "marginal" established firms[2] follow the first path; that is, they choose the "competition" form based on price differentiation. This "survival conduct" gives rise to the so-called phenomenon of unbranded products selling at prices substantially below those of

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[1] "Measured as R & D expenditures per unit of output, R & D intensity in the OECD food industry averages 0.8% as compared to 4% for the manufacturing sector as a whole and 10.4% for industries such as electronics" (OECD, 1987:22).

[2] In principle in that type of industrial structure "marginal" firms are "plenty of small producers" (Steindl, 1952).

highly advertised products (Ibid.). The second path is more common among newcomers, an outside large competitor following "expansion conduct".

The market segmentation phenomenon occurs between advertised brands and unbranded products (generics or private label) within the same product class. It has led in a theoretically identical market to great price differentiation (Connor et al., 1985:292)[1]. These authors suggest three possible "survival conducts" by small producers. The first shows a market structure with weak product differentiation and moderate concentration rate, where survival of a large number of small firms along side the leading ones is possible at a moderate price spread. The second possibility is a combination of a high level of differentiation and a relatively lower degree of concentration. In this case, leading firms' conduct is intended to establish a significant price spread at the cost of reduction in barriers to entry in the unbranded sub-market[2]. The third situation is typical of highly concentrated markets: strong product differentiation combined with high concentration rates. In general, CR4 (sales percentage of four leaders) is over 80 percent, and a "squeeze effect" occurs on small firms, that is, these firms are pushed out from the market. This is the case where branded products occupy almost all market spaces, leaving only a residual market to unbranded products[3].

Newcomers in final food processing generally come from other business branches. Their "expansion conduct" into the food industry derives from a business diversification strategy typical of large conglomerates. This phenomenon has been increasing since the early 1970s mainly in the United States[4]. That conglomerate nature of newly-established competitors has lowered barriers in highly differentiated markets. The height of the barriers to entry created by substantial advertising advantages of leaders in branded

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[1] Connor et al. calculated for 145 food product classes in the USA an average price discount among brands and non-brands: it averaged 17 percent and 31 percent below the leading brand price in private label and generic label products, respectively (1985:292).

[2] Perhaps that has been an important space to entry by retailer oligopsonies through supply contracts and upward vertical integration. Considering that in general "manufacturers of advertised brands generally do not sell private labels and generics of the same products" (Ibid.:220), that space can be the way by which a direct confrontation between manufacturing and retail giants is avoided. Connor (1983) estimated in 1977 that the eight largest retailers in USA produced 9 percent of their own sales.

[3] Sales market shares by manufacturer brands and CR4 respectively in selected food products (USA:1980-81): canned baby food - 99.3% and 100.0%; RTE cereals - 97.0% and 87.0%; frozen dinners: 95.8 and 86.0% (Connor et al., 1985:222).

[4] See for example the case studies of industrial restructuring in the American food industry: beer industry (Phillip Morris-Miller Brewing Company); coffee industry (Procter and Gamble Company); baking and grocery products (ITT-Continental Baking Company). In Connor et al.(1985:244-272).

product categories can be drastically lowered if the new entrant is also a large advertiser. In this sense, market power represented by conglomeration overcomes short-run profit-based competitive strategies. In contrast to specific industry-based businesses, conglomerates can afford heavy financial losses derived from selling costs to entry[1]. As a result, the conglomeration process has led to a highly unstable oligopolistic industrial structure in food manufacture (Hoffman, 1985).

Empirical studies have shown a positive relation between product differentiation, individual concentration (specific market), aggregate concentration (several markets) and conglomeration. In general, highly differentiated markets are those where "absolute concentration", as described by Steindl(1952), is more frequent. In this concentration type the leading enterprises extend their productive capacities not only above market growth but also to a level that reduces absolute market share of "marginal" firms. The USA is a good example of this trend in concentration. During the period 1947/77, concentration reached an alarming level within food markets. The food manufacturing's data in the US show that more than 70 percent of industrial branches classified as highly differentiated markets are included in type I ($CR \geq 65$) and type II ($50 \leq CR4 \leq 65$) of Bain's concentration typology (1968:124-133). Coincidentally, this has been the privileged locus of food conglomerates. According to Connor et al., the 100 largest American food corporations have a special dominance in more concentrated product classes with high rates of advertising per sale, where they control an average of more than 75 percent of market sales (Ibid.).

Thus, the patterns of competition in final food processing is regarded as a classic type of differentiated oligopoly. Based on empirical studies, the rise in the profit margins of leading firms can be described by the following chain effect: increase in internal accumulation, expansion of productive capacity, increase in concentration, change in structure and elimination of small firms. With an internal dynamism based on market growth through the mechanism of product innovation, such an oligopolistic structure faces serious restrictions on the demand side. With a trend towards low income elasticity[2], this industry faces a demand constraint on growth (OECD, 1987:28)[3]. The outlet for food-based capitals has been external expansion through horizontal industrial

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[1] Conglomerates "(...) absorb losses that would consume the entire capital of a smaller rival" (Edwards, 1955:334).

[2] About the price and income elasticity trend in the United Kingdom's food industry see Howe (1983).

[3] "Food demand has grown at an average of 1.1% per year in real terms in OECD countries in the past decade. Despite income growth and population increases in the OECD area, the size of the food market has been relatively stable" (OECD, 1987:28).

conglomeration[1] and internationalization.

3.3.3 Competitive oligopoly

Sectors: primary food-processing and fertilizers.

I - General outline

a) Productive structure
-product type: homogeneous products or slightly differentiated; non-durable consumer goods, intermediate goods for consumption, farm inputs.
-demand characteristics: intermediate or final mass consumption; price inelasticity and low income elasticity.
-cost structure: high operational cost (raw-materials);raw-material dependence.
-intersectorial dependence: high.
-technological requirements: low capital intensity; non-technical (plant) economies of scale; significant firm economies of scale: multi-plant and distribution.
b) Forms of competition
-competition: some price competition; distribution capacity.
-barriers to entry: control of raw-material sources and distribution network (shipping inclusive).
-concentration: non-plant concentration; low firm concentration.
-prices/margin of profit: small profit margin (and mark-up); price flexibility in reducing margins.
c) Expansion strategy
-profit/internal accumulation: cost advantages of leading firms, profit margin increased, low accumulation rate by leaders, small room to expand productive capacity,
-relative concentration[2] without change in market structure; maintenance of small firms.
-investment: relatively small, avoiding undesired excess capacity or price competition.
-general strategy: selling effort (endogenous variable); dependence on cyclical trends (exogenous variable).
-external expansion: vertical integration; conglomeration; internationalization.

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[1] Given enormous advantages in pecuniary economies of scale, the non-durable consumer goods sector has been the centre of convergence for mergers in the food industry. On mergers and pecuniary economies of scale, see Scherer(1982). For a discussion of conglomerate strategy, see Connor (1983) and Connor et al.(1985).

[2] Small firms maintain absolute market share while leading firms growth is at the same level or above market growth.

II - Specific characteristics

(i) Primary processing

Little attention has been given in the industrial organization literature to specific characteristics of the market structure of primary food-processing. In contrast to other agroindustrial branches, economic power of primary processing stems largely from marketing sphere, considering the strategic location of this agribusiness sector in the post-war agro-food system. As a "commodity-led" system instead of a "technology-led" system, the present food system reinforces the role of distribution channels, both for raw-material supply and marketing. For this reason, the especial location of primary processing in the food system provides their capitals with opportunities for backward and forward integration[1]. This type of vertical integration enables large corporations obtain absolute cost advantages, and pecuniary and multi-plant economies of scale. The first, at the product level, are attained by widening the gap between buying and selling prices. The second, at the distribution level, arise through economies of physical distribution (Scherer, 1980), supply stability and sales expansion. In this case, firm size is crucial to control the whole pipeline of a specific "commodity complex"[2].

In spite of the increased attention to the food industry in the literature, difficulties have arisen in measuring plant economies, in view of the "mix" of commercial and industrial capitals found in this sector. In this respect, industrial concentration levels can obscure the real economic power hidden in control of distribution channels. In the grain business, for example, the trade segment dominates the processing branch. The height of barriers to entry in this conglomerate structure can only be understood if we shift the analytical point of reference from industry to trade. By doing so, barriers can be thought of as an element of the expansion strategy of commercial capitals. That is, backward vertical integration, starting from the marketing or trade branch and integrating back into processing[3]. Considered in another way, the absolute cost advantages of the "new" entrants, although "old" commercial capitals, enabled these grain conglomerates to

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[1] Including vertical coordination via contract systems with farmers. See USDA-ERS (1972) on the differences between "vertical integration" and "contract system" in American agriculture.

[2] Given the international level of agricultural commodity trade, firm size advantages depend on heavy investments, which would be impossible not only for small firms but also for non-conglomerate ones. Morgan (1979), for example, describes Cargill's shape as a "tree", which starting from the "agricultural trunk" develops diversified business branches: food processing, seed and animal feed industries, trade network (warehouses, communication system, etc.), transportation (railways, ships, trucks, etc.), financial system.

[3] Only in the early 1970s did the five "big sisters" effectively became industrial corporations, diversifying out of the grain trade, mainly by entering heavily in upstream and downstream agroindustrial branches. Two to five, Cargill and Bunge and Born, already had important industrial branches in the 1960s (Morgan, 1979).

eliminate barriers and restructure markets.

In concrete terms, barriers to entry in primary processing sectors have a dual meaning. On the one hand, the ***oligopolistic*** character of market structure allows stable leadership by large corporations. At the same time that the conglomerate and international basis of these oligopolies represents enough economic power to avoid the entry of large competitors into the markets[1], this basis gives them the economic prerequisites necessary to occupy new areas of market growth (national or international levels). On the other hand, the ***competitive*** character of these oligopolies means the possibility of establishing a ***modus vivendi*** between large and small enterprises. This is the principal source of stability, considering the existence of a cost and profit margin hierarchy (Steindl, 1952). In conclusion, the two aspects stressed above can explain the relatively low concentration level (CR4) in such a market structure. Thus, relatively low barriers in national markets[2] are contrasted with the conglomerate and international nature of leading firms[3].

(ii)Fertilizers

The classification of the fertilizer industry under "competitive oligopoly" can be justified by the form of competition it faces. Emerging as a result of ammonia synthesis and the consequent growth of the heavy-chemical industry during the inter-war period, technological basis of the fertilizer industry underwent little further development. However, this process occurred under the aegis of an oligopolistic industrial structure.

According to Reader (1975), "the Nitrogen Cartel" formed to control the world market dated from 1930. After 1945, the five "chemicals giants" continued "right up until the 1980s to run their markets much as they always had" (The Economist, 28April-4May 1990:22-23). Thus, "ICI sold to Britain and ex-empire, the Germans

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[1] Considering food manufacturing in its strict sense (without trade), primarily primary processing companies, Unilever and Nestlé, have been the world's two largest food firms since the 1930s. However, the recent mergers in the United States (Philip Morris-General Foods and Reynolds-Nabisco) "have altered the line-up of the top world companies engaged in food processing. Philip Morris and Reynolds, which were primarily non-food firms, have edged past Nestlé in the world ranking based on annual turnover" (OECD, 1987:26).

[2] Based on Bain's typology (1968: 124-133), the market concentration of the U.S. primary food-processing presents the following distribution. TypeII, High-moderate concentrated oligopolies (50>CR4<65): 7 product classes (43.7%); TypeIII, Low grade oligopolies (35≤CR4≤50): 3 product classes (18.7%); TypeIV, Unconcentrated (CR4<35): 6 product classes (37.5%). The TypeI, Highly concentrated oligopolies (CR4≥65) was not represented in primary processing. In contrast, 10 percent of highly differentiated product classes the in U.S. food industry were included in this type. These data are drawn from Connor et al (1985).

[3] To give a rough idea of economic power of international conglomerates in leading food national markets, figures show that the hundred largest food corporations in the World concentrated 28% of processed food turnover in 1978 (Ghersi and Rastoin, 1982:7).

(Bayer, BASF and Hoechst) to continental Europe and Du Point in the Americas" (Ibid.). By 1980, however, after the second oil shock, "the chemicals industry found itself being dragged into recession", and things had to change (Ibid.:23). The tendency observed since the 1980s has been an industrial restructuring. The chemical conglomerates have tended to move out of the productive sphere of most "commodity chemicals" and concentrated on the service sphere in generating new processes and technology, as did Monsanto on biotechnology-based products (Ibid.:21). One result has been the proliferation of joint-ventures between international chemical leaders and nationally-based enterprises, especially in the Third World.

Without entering into industrial segmentation based on N, P and K components, the fertilizer sector is nowadays organized in large and small firms, existing a correspondence between firm size and firm location within the industry[1]. Technological dominance of the basic chemical raw-materials by few large conglomerates has constituted the main source of advantage in terms of the cost and profit margins. However, conglomerate dominance over the first stages of fertilizer production allows small firms to survive on the fringes of the final stages, that is, basic and NPK compounds (Kageyama, 1987).

3.3.4 Competitive markets

Sectors: diversified branches of the food industry and by-products (cotton fibres, leather, etc.).

We will not go further into this market type. These branches are not part of the agroindustrial core. Instead, they are located on its fringes. Their common market characteristics are price-based competition and unconcentrated industrial structure, without stable leadership. At the same time, these sectors have heterogeneous origins within the agroindustrial structure. These vary from decadent industries, which have lost competitiveness in final processing[2], to processing industries linked with traditional crops, which are marginal in the prevalent pattern of accumulation in the agro-food system[3].

3.3.5 Seed and animal genetics industries

Given the distinctive nature of genetic-based industries, it is difficult to classify them in any market type. Since biological factors are at the centre of food production, genetic innovation

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[1] The phases of the fertilizer production are: raw-material control and processing, intermediate products, basic fertilizers and NPK compounds.

[2] For example, the observed trend of canned product classes in developed economies (Howe, 1983).

[3] Typical cases are those of rice and bean processing in Brazil (Tavares, 1978).

is the mainspring of technical progress in agriculture and a major influence on the technological patterns in the food system as a whole. Thus, "genetic" products constitute the point of intersection of technical relations in the food production chain. In the upstream sectors, genetic innovation determines the degree of subordination of the biological production process by capital. Downstream, the impact of genetic innovation tends to be felt on the technical-economic conditions of accumulation, particularly on the raw-material supply and cost structures.

In a broad sense, progress in animal and plant genetics may be considered the basic technological constraint on agroindustrial accumulation. However, this does not imply that the seed and animal genetics industries should be considered as the core of that accumulation. In fact, the chemical industry has been the hegemonic force of appropriationist capitals in agriculture, despite the fact that hybridization techniques define the technical base of the current agribusiness accumulation model.

The above suggests the need to conceive of genetic innovation and industrial accumulation relation from a dual analytical perspective. One would be to analyse genetics-based industrial structures *per se*; that is, from the market structure point of view. The other refers to the dynamic impact of genetic innovation on mechanisms of intersectorial accumulation. In principle, the internal dynamics of "genetics" industries are not enough to understand the process of genetic innovation and its implications, especially in the long run. The aversion to risk principle has determined a cautionary conduct by capital in relation to basic agronomic and biological research. Industrial capitals tend to transfer to the public sector the cost of basic research, and subsequently attempting to appropriate the benefits of scientific advances through their transformation into industrial technology (Goodman and Wilkinson, 1990).

In fact, the central importance of "genetics" industries as the main locus of technology generation in agribusiness has imparted these sectors a permanent instability to industrial structure. Such vulnerability stems from the unbalanced weight of chemical, pharmaceutical and food industries in the competitive struggle within the food system[1]. The conglomerate and international nature of the leading firms in these industrial branches has facilitated the systematic acquisition of firms in the "genetics" industries, especially seed enterprises. Three consecutive waves of mergers and acquisitions have led to the continuous restructuring of the seed industry since the 1960s, with approximately 120 seed firms being taken over by transnational corporations (Goodman, 1987:7). The first wave in the mid-1960s centred on the vertical integration of primary processing

[1] Which undermines barriers to entry as defined in the Bain and Labini's models.

conglomerates[1]. The second wave during the 1972-76 period, led by pharmaceutical capitals[2], involved predominantly horizontal integration. It "already reflected growing recognition of the potential of plant biotechnologies, as well as the flattening curve of agrochemicals" (Ibid.). The last wave in the 1980s was dominated by chemical capitals dominance[3] and was fulled by market competition to gain control over the new biotechnologies. As a consequence, the profile of the "genetics" industry shape has been a result of the competitive struggle for hegemony in the food system.

3.4. Agribusiness dynamics

3.4.1 Superstructure of the food system: pattern of consumption

By increasing wage-earners' purchasing power, "fordism" provided the material base for the mass consumption of food. Simultaneously, large scale food manufacturing opened up the path for mass production. This dual phenomenon created the possibility of expanding food markets based on standardization and intensification of consumption. Achievement of standardized production was based on extending the consumption of processed food to a wide range of wage-earners.

In the literature, there is agreement that "fabricated" foods have been the main force behind the growth of the OECD food markets. In addition, kitchen mechanization and the diffusion of "white goods" have created the technological conditions for consumers to store foods. Despite this, the ***absolute*** growth of demand has been limited. Instead of representing a newly-created selling space, post-war food markets have in fact been restructured. Their dynamism has derived from the shift from low value added to high value products. Accordingly, the broad meaning of standardization in the food habits of developed countries is the permanent reshaping of demand, characterized by the substitution of "convenience foods" for basic staple-foods (Burns, 1983)[4].

However, there are constraints in extending to food the

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[1] Notoriously two of the five "big sisters" in the grain business: Cargill, Inc. Minneapolis and Continental Grains, which were interested in rationalizing their trade systems (Silveira, 1988).

[2] There was an average of 11.2 acquisitions per year, above the first wave. The distribution of acquisitions by capital origin is the following. Pharmaceutical: 17; petrochemical: 13; chemical: 9; agroindustrial: 10; seeds: 12 (Ibid.:6-9).

[3] Chemical capitals realized 13 acquisitions, followed by agroindustrial capitals with 11 acquisitions (Ibd.:9-10).

[4] In the United Kingdom, expenditure on convenience frozen foods increased by 280 percent compared with a figure of 93 percent for all foods during the 1963-74 period (Howe, 1983:106).

intensive consumption pattern that modern capitalism has established for durable consumer goods. The major constraint originates from the nature of food as the nutrient of human reproduction, whose physiological capacity places an objective restriction on the expansion of consumption. In contrast with the "cumulative effect" on consumption per capita of durable consumer goods such as cars, food consumption per capita soon faces human satiety. This biological limit sets a structural limitation on demand.

The interaction between such demand weakness and the "trading-up" phenomenon[1] has hit traditional foods, less processed and natural products strongly. Their demand tends to vary inversely with disposable personal income (DPI), moving to a low or negative income elasticity (Howe, 1983:106). By contrast, convenience foods, during an initial stage, represented an increasing percentage of personal consumption expenditures (PCE) on food, with a high income elasticity (Ibid). However, after reaching a peak in PCE share, the demand for convenience foods tends to stagnate and income elasticity tends to fall (Ibid.). According to the OECD, "studies show that overall income elasticities of demand for food fall close to zero with any rise in living standards" (1987:29). Figures for all OECD countries confirm this statement: "average OECD food-related expenditures have declined as a share of private final consumption expenditure from 35% in 1966 to 26% in 1985" (Ibid.:28)[2].

Certainly decreasing population growth[3] has reinforced constraints on the expansion of food markets. In a sense, it can be suggested that this restriction has, mainly in the long-run, counteracted rising incomes. This factor has contributed to the depressed markets and exhaustion of the post-war pattern of food consumption.

The last superstructural aspect that will be emphasized is that of exogenous impacts on effective demand. In this respect, the literature identifies the level of global economic activity as the most important macroeconomic indicator affecting food consumption. Theoretically, as a wage-goods industry, food manufacture is supposed to be dependent on the short run economic cycle. However, increasing disposable personal income (DPI) in industrialized economies has reduced the impact of variations in global activity on the food industry. Connor et al.(1985), for example, explain the limited influence of the U.S. global activity on food demand by examining the declining PCE for food and tobacco in DPI, which

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[1] Shifts in the composition of food purchases toward items that have higher real prices per pound.

[2] The United States has led that tendency: 1966 - 19.6%, 1976 - 17.3% and 1985 - 13.9%.

[3] In the United States "population increases (...) average 1.2% per year, falling from almost 2.0% per year during 1946-59 to only 1.0% per year during 1970-82" (Connor et al, 1985:35).

decreased from 35 percent in 1949 to 20 percent in 1982 (Ibid.:34-35). Thus, empirical studies suggest that the smaller the proportion of food expenditure to DPI, the less significant will be the impact of variations in economic activity on demand for food.

In the case of semi-industrialized economies, the relatively significant income elasticity for food reflects enormous disparities in income distribution. Such social inequalities not only exclude many people from food markets but are also a source of structural instability in demand. In this case, global economic activity is decisive in determining the behaviour of food demand. Considering the chronic inflation and great variability of economic growth, wages and employment tend to be highly unstable. For this reason, the growth of wage-goods industries is umbilically linked to conjuncture economic trends, which are a decisive exogenous variable influencing the dynamism of these industries (Tavares, 1982).

Another result of income inequality is the clear stratification of food markets. In such peripheral societies, "the social conditions which make mass production and consumption possible in the developed countries just do not exist(...) Only the westernized part of population can have access to western-type mass consumption" (Ghersi and Rastoin, 1982:29). These markets are seen to be extending to populations "who can no longer be considered privileged or who definitely belong to socio-economically disadvantaged groups" (Ibid.). Finally, parallel to a more westernized pattern of food consumption, there exists an only partly satisfied demand for socially traditional products or for products which local processing could adapt to the new requirements of a diversifying demand (Ibid.).

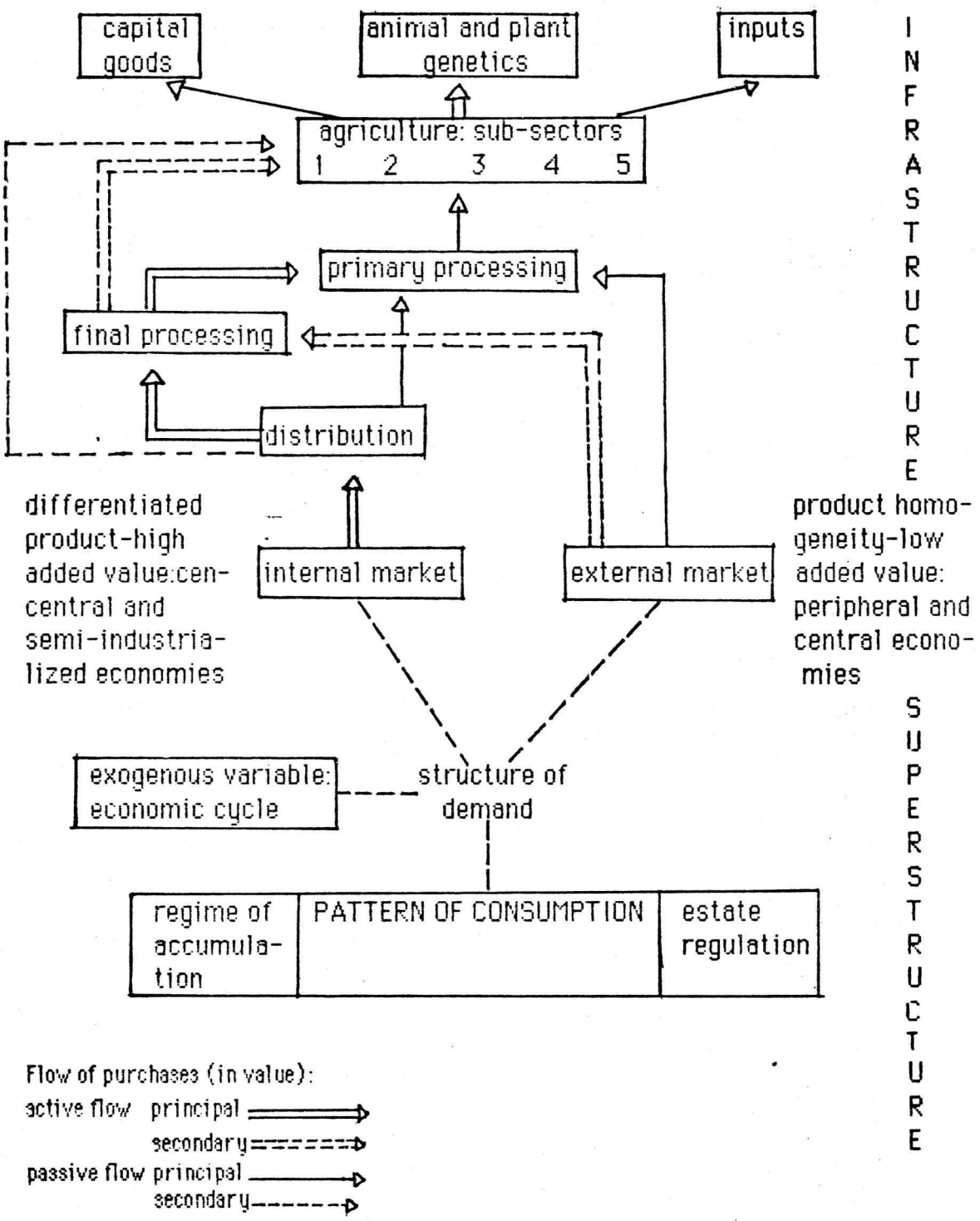
The other side of the superstructure of food-system is state regulation. Without entering this discussion, it will only be stressed the vital role of the state in financing the standardization of world food consumption. Internal policies financed the restructuring and modernization of national agricultures while the international markets were expanded by external policy via foreign aid programmes and their role in market formation.

3.4.2 Infrastructure of the food system: industrial structures and farming

In this section an integrated analytical treatment for the productive chain of agribusiness will be pursued. This method permits the establisment of an analytical model for explaining how the oligopolistic structures organized according to market types determine the growth and reproduction of this macro system as a whole.

AGRO-FOOD SYSTEM

Flow chart: the upward impact of intersectorial purchases



In approximate terms, agribusiness economic dynamics can be visualised by means of flow chart showing the backward impacts of intersectorial purchases, which establish the amount of sales of inputs -intermediate and capital goods- in the opposite direction. With a given technical structure, agribusiness dynamism depends on the impact of ***final food demand*** on the productive activities comprising the food system. The determinant role of final demand in expanding the whole system originates from the nature of agribusiness as a productive "cluster", closely linked to its exchange flows and loosely linked to other economic activities. Consequently, as a supplier of goods, agribusiness has a certain autonomy in buying from outside sectors, since it is constituted by an intersectorial selling chain directed to final consumption. Since purchases within the "cluster" are relatively closed, these flows can be used as a quantitative indicator of impacts throughout the "triaggregate" chain.

The general assumptions of which this growth model is based are the capitalist regulation regime and state intervention in agriculture, which organize the material and institutional basis for standardization of consumption. The most important exogenous variable is the level of global economic activity. The conjunctural phase of the economic cycle at any given time affects final food demand, positively or negatively.

Taking the national economy as an abstract spatial unit, food demand is constituted by internal and external markets. Such an open system reflects its considerable dependence on foreign buyers. The domestic market is predominantly based on differentiated products with high value added, and the external markets on homogeneous products with low value added. Concrete analysis of the structure of food demand in a specific national economy should take into account the position of the national food system in the international division of labour in food production, this position being related to the level of agricultural industrialization of this economy and the role of this economy in the international trade.

The next analytical step will be to understand the dynamics industrial structure. It seems clear that downstream industries occupy a central position in the current operation of the agro-food system, given the location and economic weight of these agroindustrial sectors, accounting for around 70 percent of food value added. Their internal capacity for creating demand and enlarging markets enable these sectors to "pull" the whole of agribusiness along. This backward impact is made possible by increasing the intersectorial purchases within the productive chain. By this means, processing industries became the active force for the expansion of markets, that is, the principal internal determinant of current growth in the macro-food system.

Final food-processing can be considered the "growth machine"[1] of agribusiness. Its internal dynamics can generate two extra-sectorial effects which are typical of a *differentiated oligopoly*. The first is the capacity of this oligopolistic structure to create its own demand through product innovation and product proliferation. This can be described as an *active process* of market extension. There are two extra-sectorial impacts creating an *active flow* of exchanges. The backward impact occurs through purchases, which establish a *principal flow via* primary processing industries and a *secondary flow via* agriculture. The forward impact occurs through the rationalization and acceleration of sales with the development of a modern network of marketing at the end of the agribusiness pipeline, that is, the retail sector.

The second effect originates from the intersectorial impacts of *internal accumulation*, which creates the possibility of productive capacity being *built ahead of demand*. This idea of Steindl(1952) concerning the internal dynamics of oligopolistic industries assumes that planned excess capacity is combined with investment in new capacity. Thus, despite the existence of excess capacity, investment in new capacity is anticipated by a firm in order to obtain competitive advantages in respect to other competitors in the future expansion of demand. However, the low capital intensity of differentiated oligopoly reduces the relevance of such a mechanism in the food industry, generating weak impact on capital goods sectors related to agribusiness. In effect, given the small significance of planned excess capacity, the impact of selling forecasts on internal accumulation is very limited in this market type (Possas, 1984). As a counteracting effect, product innovation introduces one of the main components of industrial dynamism (Ibid.), which tends to spread over the whole agribusiness chain.

Primary food-processing is the other key component in creating food markets. The dynamism based on internal accumulation of primary processors is severely restricted by the homogeneity of their products and low capital intensity. These factors reduce the role of internal accumulation as an important inductive force on market expansion. The attempt to extend productive capacity by building ahead of demand is confined to leading firms and not to the whole industry. Thus, the constraints of this oligopolistic structure on the expansion of its demand *via* either product innovation or internal accumulation determine a *passive process* of intra-sectorial impacts, since the limited ability of industry to create its own demand establishes a *passive flow* of purchases. To counteract such constraints on internal growth, leading firms try to open the way to external expansion by exploiting industry's privileged location. Located in the "middle" of agribusiness (see

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[1] Which is an analogy with Tavares' characterization of 'differentiated/concentrated oligopoly' as the 'growth machine' of developed economies (Tavares, 1982).

flow chart), there is a considerable space for capital to expand upstream and downstream. Upstream integration tends to incorporate agricultural sub-sectors[1] and input industrial branches in such a way as to establish vertical control of specific product lines. Downstream integration corresponds to the takeover of final processing branches linked to specific chains. Moreover, diversification through external trade is the means that primary processing conglomerates use to control the whole commodity flow of some agricultural products on a world scale.

However, the recent process of diversification of leading primary processors into new products - sweeteners, new foodstuffs and by-products, non-food products,etc. - is likely to affect the characterization described above. Industrial applications of new biotechnologies tend to trivialise agricultural crops into generic intermediate products for a wide range of uses, from food to chemicals (Goodman, 1987). Consequently, the "commodity led" strategy based on controlling businesses along with a specific commodity pipeline will be replaced by the "technology led" strategy, which bases the selling effort on product and market diversification (Ibid.). Thus, the selling effort will no longer be confined to the marketing sphere, that is, the vertical control of a bulk of low value added agricultural commodities from farm gate to intermediate user (final manufacturer or retailer). In this new competitive environment, market diversification tends to rely heavily on R&D capacity and by-product innovation, enabling primary processors to become suppliers of feedstock to large range of buyers beyond the food markets. Instead of vertical integration, new forms of horizontal integration based on technological and market synergies involving chemicals, pharmaceuticals and agri-industries have already started to be adopted by food conglomerates, such as Unilever and FERRUZZI (Financial Times, 16 January 1989).

Finally, the capital goods and input industries, as general suppliers to agriculture, have a secondary role in the current dynamics of agribusiness. Their general strategies for expanding their markets are determined not by a particular agricultural activity but by the broad productive pattern of agriculture (Kageyama and Graziano da Silva, 1987:54). The extra-sectorial impacts of farm supply sectors tend to be more significant during agricultural industrialization. After this phase, the growth of these industries will rely on the current demand of farmers, this demand being specially subject to agricultural performance and farm incomes. Given the reduced purchase capacity of farmers and moderate levels of farm suppliers in product innovation, the purchase flows are basically *passive*, depending on global credit policy to agriculture. In this respect, seed and animal genetics industries are exceptions when their product innovation capacity

[1] It occurs via contract system or vertical integration. See Malcolm (1983).

vis-à-vis other industrial branches is considered. The downstream impacts of "genetic" industries is assumed to be technological and economic, affecting strongly the level of inputs - mainly agri-chemicals - sold by suppliers to farmers.

The preceding discussion has aimed at showing how industrial structures determine the "general laws" of performance of the macro food system. On the one hand, farm supply industries establish the technological base which underlies the accumulation pattern of this system in the long-run. On the other hand, the manufacture of rural products constitutes the endogenous force of short-run growth of the food system. The final and primary processing industries carry out this process by "creating" final demand for food *via* product differentiation and market extension, which "pull" the whole productive mechanism along.

3.5. Agroindustrial complex: an intermediate category

The analytical procedure based on the category of market structure is a necessary but insufficient basis for tackling concrete forms of agricultural development. Until now agriculture has been analysed as an unique aggregate subordinated to the dynamics of agroindustrial market structures. The basic premise was the acknowledgement that innovation in farm supply industries establishes the technological pattern of agricultural production. However, this is a generic point of agricultural development. A more specific one is the importance of the unevenness of this development. Instead of creating balanced development in agriculture, industrial capitals have reshaped rural activities according to their own specific accumulation interests. As a result, particular forms of productive organization have been established in each crop or livestock activity. In order to analyse the concrete patterns of agricultural development, the *agroindustrial complex* could be considered as an intermediate category between market structures and agricultural development. This concept facilitates the understanding of the dynamics of rural activities in the light of agroindustrial accumulation.

3.5.1 Concept of industrial complex

The concept of *industrial complex* (or clustering) has been largely diffused within the literature concerning regional and industrial economics.

In regional economics, this concept has originated from Francois Perroux's pioneer studies about "economic space". His conception of "economic domination" emphasizes the idea of economic disequilibrium in opposition to the traditional approach of equilibrium (Bocage, 1985). The establishment of asymmetrical relations between large and small economic units (firms,

industries, regions and nations) assumes the principle that some units are dominated and others are dominant (Ibid.:30). In Perroux's view, dominant economic units are believed to be the dynamic agents of economic progress in a regional space. From this idea emerges a new concept of economic space as a "field of forces" made up of "unequal economic agglomerations interlinked by unequal economic flows and enjoying unequal power of decisions" (Ibid.:33). Perroux defines "propulsive industry" as the core of an "economic pole" with upstream and downstream links. Such industry tends to be the propulsive force of economic growth, which depends on industry-size and industry-innovation capacity (Ablas and Czamanski, 1979:211). According to these authors, the regional character of the above concept becomes difficult to apply directly to industrial clustering, even though this complementary idea was included in Perroux's work (Ibid.:212).

Certainly, the development of the "complex" concept in the field of industrial economics is the closest to the notion of "agroindustrial complex" that can be found in recent analyses about industrialization in agriculture. In the latter case, this category is used to study intersectorial relations, emphasizing either technological integration or economic integration. However, there is no direct link between this notion and the abstract idea of "economic space" and "geographic space". From the perspective of the inter-sectorial relations, "complex" can be defined as a cluster of productive activities which display a high degree of economic linkage among themselves relative to other branches of an economy (Possas, 1988:2; Ablas and Czamanski, 1982:213). Following this broad definition, the *agroindustrial complex* notion will be considered as a particular type of *industrial complex*, assuming that industry is dominant in the relationship between itself and agriculture.

3.5.2 Agroindustrial complex: basic ideas

To deal with this category in the agro-food system it will be assumed that downstream industries are the driving force in building up the agroindustrial complexes. The content of farming-manufacturing relations is a process of *economic domination* based on the concept of market structure. "Complex" formation represents the most advanced process of the subordination of agriculture to industrial oligopolies. Irrespective of the concrete form of control, this economic relationship is characterized by oligopsonistic dominance.

Primary-processing industries seem to be the *active force* in structuring complexes, although they do not always form the core of a specific complex. At the same time, the inter-sectorial reach of complexes can extend from upstream industrial branches to downstream ones. Thus, the definition of the productive sectors which together form a complex will be less rigid than others found in the literature, as for instance the definition suggested by

Vigorito (1978). There are four main reasons for this procedure. The first has to do with the different degrees of technical-productive integration which can be reached by capital. The second is given by the different degrees of dependence that final-processing industries maintain with specific product chains. The third reason is related to the difficulties of including farm supply industries in product specific-based complexes (except in some crops or in unbalanced agrarian structures where monoculture is a prominent feature). Finally, the increasing difficulty of maintaining a clear demarcation between farming and industry provides the fourth reason in favour of methodological flexibility in defining complexes.

The shape of inter-sectorial economic relationships is supposed to be predominantly vertical, as a productive chain based on specific commodity or cluster of commodities. However, the profiles of complex are variable depending on the quantity of products incorporated. It seems reasonable to take the magnitude of exchanges as the central feature in defining the extent of a given complex. The increasing tendency towards verticalization turn it necessary to incorporate in the totality of exchanges not only commodity exchanges but also the input/output transfers which occur within vertically integrated enterprises; that is, all inter-sectoral economic transactions should be included. Moreover, all sort of products should be considered within the exchange flows, from inputs to final goods (as well as capital goods).

Another question that Possas (1988) outstands is the classification of agroindustrial complexes. It is necessary to choose which exchange flows will be stressed: those on the "demand side" or on the "supply side". In the light of the purposes of this study, the "demand" side should be chosen to the detriment of "supply". Thus, the emphasis will be the autonomy of each complex - and of its component sectors - as supplier to itself insofar as it does not depend on buying from outside sectors (Ibid.:6). This choice can be justified by the character of agroindustrial complexes, which have a structural bias towards upstream dependence. Moreover, it privileges final demand as the main vehicle behind the economic growth of the complex, emphasizing its endogenous capacity to absorb an increase in final demand (Ibid.).

A last remark concerns the so-called static or dynamic character of such a classification. The need to include all technical-productive transactions in the definition of the agroindustrial complex justifies the emphasis on sectorial interdependence with a given technological base, independent of market structure and pattern of competition (Ibid:3). Because all structural conditions of production are considered *ceteris paribus*, this imparts a predominantly static character to the notion of complex in this classification. In fact, the difficulty of defining a complex as a dynamic concept originates in the method used to identify it, which relies basically on exchange flows. For this

reason, it is not possible to incorporate into this specific definition the dynamic impacts associated with technological changes and patterns of competition. In consequence, a complex is seen as a cross section at the time of its identification, that is, as an ordered and rigid production chain.

The apparent disadvantage of identifying a complex as a static definition has, in fact, real advantages, since complex can be clearly differentiated from the concepts of ***market structure*** and ***agribusiness***. In doing so, the agroindustrial complex is understood as an intermediate category between the "micro" (sectorial) nature of market structures and the "macro" (aggregate) nature of agribusiness. It then becomes an analytical bridge between the "micro" and "macroeconomics" of the food system. This analytical procedure avoids the trap of treating agribusiness as a ***unique complex***. It means retaining market structure as the ***analytical unit*** of agribusiness, while emphasising that agroindustrial complexes are subordinated to the dynamics of oligopolistic industrial structures. Their accumulation strategies can generate upstream and downstream impacts, which in turn, can transform the shape or profile of a specific complex. Certainly, the most advanced stage of inter-capitalist competition is based on technical innovation. As the breakthrough of biotechnologies has shown, this instrument of competition has the power to generate industrial restructuring at the global level of the agro-food system.

In conclusion, the emphasis conferred to the quantitative aspects of classifying agroindustrial complexes does not mean that it is impossible to incorporate this concept into a qualitative and dynamic analysis. In this case, its classification should be treated as a starting point to explain the concrete patterns of agricultural development from the point of view of the industrial oligopolies. The objective is to shed light on the understanding of the uneven and combined development of modern agriculture.

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