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**COORDINATION MECHANISMS IN THE AGRO-INDUSTRIAL SYSTEM.
THE CASE OF HIGH-OLEIC SUNFLOWER¹**

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Summary

The paper examines the factors affecting the way agro-industrial firms choose different coordination mechanisms to relate to the agricultural sector, mainly on the basis of transactional economy. The case under analysis refers to the introduction and diffusion of high oleic fatty acid sunflower in Italy, and analyzes the evolution of coordination mechanisms, stressing differences among agro-industrial firms and between Normal and High Oleic sunflower. The theory of transaction costs offers a helpful insight into the presence of different mechanisms observed, though further analysis is needed to include a more olistic view of the firm.

Keywords: sunflower, vertical integration, transaction costs, innovation

1) Introduction

Empirical evidence shows how, even within the agro-industrial system, the relationship between agriculture and the food-processing industry are regulated to a lesser extent on the basis of pure market forms.

As a matter of fact some forms of vertical coordination, common in the manufacturing sector, are acquiring increasing importance; these coordination mechanisms can be situated in the wide area between the pure market ("market") and complete integration ("hierarchy"), and can be defined as quasi-market or quasi-hierarchy depending on the intensity. For example, sub-supply or commercial agreements, know-how transfers (i.e. technical assistance or supply of specific factors of production), and joint-ventures fall within this category.

A relatively new aspect is that these forms of vertical coordination between agriculture and industry are gradually being extended to products traditionally considered as "standardized" (i.e. sunflower, wheat, soybean, maize), where free market mechanisms were seen as being effective.

This study constitutes an attempt to empirically explore the vast area of vertical coordination mechanisms lying between the market and hierarchy paradigms. This analysis has been conducted referring to the case of sunflower in Italy, and in particular to the introduction and diffusion of high oleic fatty acid content sunflower.

More specifically, the purpose is to provide an interpretation, mainly using the elements provided by the transaction costs theory, of the differences existing in types and in the intensity of vertical coordination mechanisms between agriculture and industry, as observed over time and in the firms considered in this study.

2) Vertical coordination mechanisms in the agro-industrial system

The diffusion of non-market forms of vertical coordination between agriculture and industry is frequently linked to the fact that product/service differentiations are spreading as a result of an increasing need for specific usage, even for standardized products. As a consequence industrial firms are, in their relations with agricultural producers, adopting forms of governance of transactions that can assure a better control of product/service appropriateness to their requirements (Sporleder, 1992; Barkema, 1994; McFetridge, 1994; Venturini, 1996; Galizzi, 1996).

In this situation price mechanism less successfully plays the role of exclusive means of coordination, and spot negotiation is gradually being replaced by alternative mechanisms, that rarely include complete integration³.

Henceforth we will refer to these intermediate forms between pure market and pure hierarchy (complete integration) as "vertical coordination mechanisms". These intermediate forms, widely analyzed by industrial economics, are often called "inter-firms cooperative agreements" (Balcer e Viesti, 1986; Albertini, 1991; Fazzi e Voce, 1994), even though some authors use the term in a more restrictive sense (Mariti e Smiley, 1982).

The vertical link that can be setup between firms at different stages of the production chain may assume various forms, duration and degree of intensity; it may be accompanied by a written contract, imply a very different degree of involvement of the parties, and it may, to a more or lesser extent, be controlled by one of the two involved in the transaction.

Much attention has been dedicated to this last aspect by agricultural economics literature, observing that often, within the agro-industrial system, industry assumes control of the transaction and decides in a more or less rigid manner the exchange conditions in view of its contractual and technological advantage.

As a consequence, a strong attention has been paid to the institutional aspects of vertical coordination mechanisms (Galizzi, 1987), in particular contractual integration, and to different forms of organisation by which the agricultural sector can re-acquire part of its lost autonomy (farmers' cooperative or associations, etc.) (Pacciani, 1992)⁴.

Another area of research aims at identifying the factors that foster the diffusion of vertical integration within the agro-industrial system, and the adoption of vertical coordination mechanisms by firms (Schrader, 1986; Scarano, 1991; Sodano, 1992; Nomisma, 1994). In this context there are contributions aimed at measuring the coordination phenomenon, and estimating the econometric relations to the factors that determine it (Kilmer, 1986). From these studies, it can be noticed that there is a growing attention towards elements connected to uncertainty and imperfect information as factors that lead firms to abandon the market for other forms of vertical coordination⁵.

In this context, particular attention has been accorded in recent times to transactions cost theory. Studies that in general terms outline the central role of transactional factors in structuring relations between agriculture and industry (Sodano, 1992; Barry, Sonka e Lajili, 1992; Sporleder, 1994; Westgren, 1994), and estimate their econometric importance (Frank e Henderson, 1992), fall into this line of research.

On the other hand studies that, following the same approach, try to observe the various vertical coordination mechanisms used by firms in practice, and to understand the factors that lead to their adoption, are, to the knowledge of the author, very limited.

For example, Valceschini (1993), in his analysis of the relations between horticultural farmers and the processing industries, identifies asset specificity and the presence of asymmetric information as elements that render forms of non-pure market coordination necessary; Weleschuk and Kerr (1995) examine the methods of coordination in Western Canada markets of special crops using a transaction approach, and making a comparison of different written contracts between agriculture and commercial firms; Cicia and D'Ercole (1995) explain vertical integration forms in Molise (Italy) biological wheat chain mainly on the basis of assets specificity on both sides of the transaction.

The present study shares the same approach and aims at evaluating the specific importance of transactional theory in determining different vertical coordination mechanisms activated by processing firms as empirically observed in the sunflower chain in Italy.

3) Vertical integration and coordination in transactional economy

The theory of transaction costs is part of neo-institutional economy⁶, and more generally, of the theory of organisation, which has as its main objectives the analysis and interpretation of the origin, the functioning and the efficiency of organisations. The theory of transaction costs refuses some basic hypothesis of standard approach (neoclassical economy)⁷ and, with respect to the other theoretical approaches, attaches particular importance to the characteristics of single inter-firm relations (transactions).

The unit of analysis is therefore the transaction, which includes costs for the negotiation and the definition of terms of the transaction (ex-ante transaction costs), and costs deriving from the execution, control, and losses due to poor performance in carrying out the transaction (ex-post transaction costs)

The notion of the firm as production function has been replaced (or widened) by the notion of the firm as governance structure (Williamson, 1987). The different governance structures (or forms of organisation) of transactions are justified by their capacity to minimize transaction costs. These costs can be explained by both the human nature (bounded rationality and opportunistic behaviour) and the nature of the transaction. Critical dimensions that characterize the transaction are the uncertainty, frequency, and asset specificity⁸ (Williamson, 1987 and 1991).

According to this approach, by comparing internal costs (bureaucratic costs plus production cost) and external buying costs (market price plus transaction costs), the firm can take the decision to *make or buy*. The increase in assets specificity, frequency and uncertainty leads to an increase in transaction costs: *ceteris paribus*, the firm gradually substitutes the market ("buy") with a variety of "intermediate" coordination mechanisms, up to the point of complete vertical integration ("make").

Some elements of the theory of transaction costs have also been used by some authors (Stigler, 1951; Richardson, 1972; Silver, 1984) who have examined problems of integration / vertical coordination in evolutive terms, that is, in the presence of innovative situations and/or development of new products or markets (Bellandi, 1995). These contributions are particularly useful in analyzing the case we intend to examine.

4) The case study

The sunflower chain in Italy represents an interesting case of analysis for investigating vertical coordination mechanisms between agriculture and industry. Previous studies (Marescotti, 1996) have shown that industrial buyers have been asking for a more detailed specification of quality characteristics of sunflower, with reference to both product (oil content percentage, acidity) and service (drying, storage, lots' concentration).

In this context the introduction of "high oleic fatty acids content sunflower" (HOS) has been an interesting new element in the sunflower chain in Italy, for its peculiar characteristics that make it very different from "normal" sunflower (NS).

Vertical coordination mechanisms activated by national milling firms⁹ for HOS supply differ not only with respect to the common mechanisms used for NS supply, but also among various firms operating in this specific market. Besides, the mechanisms chosen by firms have shown a significant evolution over time.

In order to understand the reasons that underlie different coordination mechanisms, a perspective focused on managerial aspects of supply-decisions has been adopted. As a consequence, meetings with each HOS milling firm operating in Italy have been held. During these meetings, which allowed to have a picture of each firm's structural and dynamic characteristics, particular attention was paid to identifying the role played by elements connected to transactional approach.

In the following sections we have tried to outline the various types and the evolution of coordination mechanisms, mainly comparing the introduction and the developmental periods.

5) Vertical coordination mechanisms in the Italian high oleic sunflower chain

5.1) The introduction period

Up to the middle of the Eighties, only NS was being grown in Italy. The already high concentration of processing plants and firms in NS market outlet grew continuously, both in the first processing¹⁰ (milling) and in the refining stages.

Over the years, the concentration in sunflower demand, in the face of the diffusion of sunflower into non-traditional areas and the very high number of sunflower producers, has brought to an increase in importance of first-handler (private trader, cooperative, Provincial Agricultural Consortium) role (collect-stock-trade) in assuring the link between agriculture and industry.

Agriculture and industry were linked by informal exchange engagements, usually made during the campaign or after the harvest, on the basis of habitual but not permanent relations.

Over-capacity of the milling sector and low profit margins of the oil market have led industrial firms to increase supply competition, which in turn has stimulated *gentlemen agreements* to stabilize supply areas of each milling plant in order to reduce transport costs. As a consequence, sunflower prices have been forced downward; this situation has given rise to further concentration in sunflower handling stages.

It was in this setting, characterized by strong price competition on a standardized raw material, and by erosion of operating margins in the industrial sector, that the cultivation of HOS started in 1986.

HOS cannot be properly considered as an incremental innovation but a differential one. As a matter of fact, HOS seed has a high oleic acid¹¹ content and, because of its specific market destination, it must be milled separately from NS. For this reason, and the similarities in growing techniques notwithstanding, HOS has to be kept rigorously separate from NS during cultivation, harvest and storage, to avoid "pollution".

The cultivation of HOS in Italy was introduced by a multinational breeding firm, which co-operated with an Italian firm (from now on "F firm", or "First-comer") that was already operating in the breeding sector, even though its main activity was the production and distribution of fertilizers. As part of their agreement, the multinational firm provided HOS seeds and took back HOS oil, while F firm tested and reproduced HOS seeds, collected sunflower through written pre-cultivation contracts with farmers, and managed the successive stages by delegating milling (and where necessary, refining the oil) to other firms (manufacturing account).

In the first year, the area under HOS cultivation was very low and in the following years, F firm sharply increased HOS production. It began to manage sales outlets autonomously by acquiring new customers, while continuing to collaborate with the multinational breeding firm on selection and reproduction of seeds. Since then, and up to 1996, F firm had a closed production cycle on HOS: the quantities of HOS seeds sold to farmers were limited only to match oil requirements of the firm.

In this first period, the greatest problem faced by F firm was to convince farmers to introduce a new crop. This is a typical problem facing the innovator who has to obtain the contributions of other "agents" to his project, in the face of differences in experience and skills, that is to say in the presence of an "information impactedness". In fact, this information impactedness discourages new comers (in this case the farmers) from make the necessary investments to satisfy innovator's needs (HOS growing), because the success of such investments (profitability) is rendered highly uncertain by their transaction-related specificity (Silver, 1984; Bellandi, 1995).

In this specific case, even though HOS production technique and necessary equipment do not practically differ from NS (and are very similar to other alternative crops), the high transaction specific investment for the farmer lies in the cultivation of that specific land and the connected production practices and inputs required to grow HOS, within the perspective of having only one possible buyer (F firm). In other words, there is a *dedicated asset specificity*¹², that is, investments requiring the expansion of existing plants for a specific buyer. Assets specificity is one of the most important aspects of transaction that encourages vertical integration or, more precisely, "quasi-integration", "where some firms are gaining the advantages of vertical integration without assuming the risks or rigidity of ownership" (Blois, 1972: 253).

As a consequence, F firm, in order to encourage the specific investment, must provide the farmer with some assurances, a "hostage" (Williamson, 1983), in the form of a written prior-to-planting contract, in which F firm commits itself to withdrawing HOS and to giving a fixed premium over NS price (also in order to compensate for the lower productivity of HOS seeds compared to NS, in the first years, and the possible under-utilization of total storage capacity due to the need to store HOS and NS separately); however, these contractual commitments are bound to the achievement of a minimum oleic acid content in the product (usually 80%), and to the use of HOS seeds provided by F firm itself.

Actually, the sole written contract is not sufficient to the farmer, considering the uncertainty both on the productivity and on the oleic acid content of these new HOS varieties as compared to NS; furthermore, the farmer has to consider that opportunistic behaviour of F firm may arise, and that he may incur in great legal expenses to enforce respect of the contract. So, F firm must give other "credible commitments" (besides the written contract and its *brand name capital*) (Williamson, 1983), implementing "specific investments". For this purpose, F firm decides to set up demonstrative fields in the various production areas, to charge its own technicians with giving technical assistance, organizing divulgation meetings and offering "account demonstrations" on the profitability of the new product¹³. Besides, these activities are important because - particularly where sunflower had never been introduced before¹⁴ - they permit farmers to acquire the necessary HOS specific know-how.

On the other hand, the only sale commitment by the farmer is not sufficient for F firm either, which, given the already mentioned specific characteristics of HOS, needs to obtain guarantees - besides the necessary quantities of product to match its own oil requirements - also on qualitative aspects. For this reason, in the contract F firm links its purchase commitment and the premium price to the reaching of a minimum oleic acid percentage, in order to give a powerful incentive to the farmer and to reduce control. However, F firm keeps the right to verify on-field cultivation and product status, requires the producer to inform the company of crop damage or failure, and directly provides farmers with HOS seeds.

During the introduction period, F firm has direct relations with the farmers: the fact that F firm already had an on-field network of agents for trading fertilizers and other seeds (NS, maize, etc.) has great importance in determining the choice of coordination mechanisms adopted. This means that F firm could benefit from scope economies by utilizing a pre-existing governance structure (for drawing up contracts, for on-field controls, etc.); this can explain the very decision to undertake the specific activity on HOS¹⁵.

Empirical evidence shows therefore, that the introduction of HOS made the adoption of vertical contractual integration necessary, because of the presence of high assets specificity and information impactedness. This strong coordination mechanism can be defined a "quasi-hierarchy", since one of the two parties of the transaction (industry) takes on itself a significant part of the entrepreneurial decisions of the other party (agriculture).

In other words, "vertical integration has the potential to facilitate the implementation of new ideas by reducing information transmission costs" (Silver, 1984: 17).

5.2) *The development period*

During the Nineties, the HOS oil market has recorded a reasonable growth, and shown rather good returns. These have raised the interest of other milling firms in the HOS segment, which they see (as a chance to partly get away) from the (low profit-margin) NS oil market and to increase the utilization of processing plants.

First, the leader firm in oilseed milling (L firm) enters the HOS market and, thanks to its links with user firms within the same multinational group, attains a stable and consistent position in this segment.

Afterwards, other milling firms (O firms) start to purchase HOS. O firms are characterized by higher instability and a more speculative view of their presence on this

market; they get in and out of the HOS segment on the basis of short-run expectations of profitability: usually they do not engage in long-term HOS oil-supply contracts and do not rely on stable customers, also because the HOS oil market still demands low quantities at highly unstable prices¹⁶.

In this period, possible uses of HOS oil tend to increase, and consequently different qualitative classes, based on oleic acid content, are determined¹⁷. As oil quality is strictly linked to HOS seeds, oil quality monitoring can be achieved primarily by controlling supply, the rigourousness of control then depending on the peculiarity of customers' requirements.

In short, in the early Nineties, the Italian HOS market sees the presence of two leading firms (F and L), permanently involved in this segment and with (relatively) high volumes milled, and other firms (O firms) processing smaller and more variable quantities of HOS.

The growth of the market induces a change in the attitude of HOS growers. Actually "with the passage of time, the merits of (*new*) good (and of its innovators) will be demonstrated. This, of course, will also diminish the uncertainties of independent operations producers" (Silver, 1984: 48); therefore farmers' "information impactedness" strongly declines.

Besides, the potential existence of alternative HOS buyers attenuates the specificity of farmers' investment, and leads to a further decrease in their risk sensation. This is shown by the fact that HOS, thanks to the fixed premium price given by all the milling firms, begins to be grown also without formal or informal contracts with industry, especially on the initiative of some first-handlers.

In this period, the effects of reform in Common Agricultural Policy (McSharry), and more specifically, a substantial incentive "decoupled" from production levels and tied to the amount of cultivated land, are very important too (Marescotti, 1996): on the one hand the farmer's risk sensation tends to decrease further (whatever he may produce, the incentive is the same, and a very high one), and on the other hand the share of HOS fixed price premium over NS market price is higher.

This situation allows the diffusion of forms of coordination between agriculture and industry which differ from those necessary in the previous period¹⁸: milling firms have to take into account that, with the growth of HOS demand and the extension of HOS cultivation to areas where NS cultivation is already established, the possibility of opportunistic behaviours of farmers increases too. For example, the farmer may not respect a sale commitment (either formal or informal) taken with one miller, because now there is the possibility of selling HOS to other firms; or he may use (partially or totally) HOS varieties different from those specified in the contract.

All this means, for the industrial firms, higher uncertainty on quantity and quality levels. In the introduction period, uncertainty was limited because there were no HOS seeds available but the ones provided by F firm, and the distinction between NS and HOS could be made simply, safely and using cheap control instruments.

In general, in the development period farmers obtain more autonomy in their decisions, which conflicts with the need of the milling firms for a more regular and certain relation. In other words, as the market grows, industry has less difficulties in finding HOS supply without contracts, but "pays" for all this with an increase in information asymmetry over HOS quality.

Given this general picture, it is interesting to note that F firm changes its coordination mechanisms by greatly reducing direct written contracts with farmers, and keeping quasi-integration forms (5.3); at the same time, differences remain among firms as to the strength of coordination mechanisms and the level of integration reached (5.4).

5.3) *The supply of F firm in the development period*

The overcoming of the information impactedness allows F firm to lessen vertical coordination, and at the same time to keep a rigorous control on HOS quality. F firm can reduce governance costs by relating to first-handlers instead of farmers. Anyway, the kind of relation connecting F firm to first-handlers - which sometimes maintains the written form, but more often switches to verbal agreements, also due to the numerous commercial relations (supply of fertilizers, seeds, etc.) and to the resulting trust established between parties -, also allows F firm to keep a strict control over quality characters of HOS and, consequently, over the amounts of each specific quality class of oil. As a matter of fact, generally the first-handler makes another agreement with the farmers which, in accordance with F firm, specifies also the variety of seeds to be used and the amount of the premium price, as in the previous period.

At this stage, the specification of *the* HOS varieties to be sown, besides assuring the farmer from a bad harvest due to non suitable seeds, allows F firm to achieve higher certainty on qualitative characters of HOS (oleic acid and oil content). To ensure itself against possible ex-post opportunistic behaviours of the farmer, F firm grants a higher premium price than the other milling firms, to partly compensate the higher price of HOS seeds that the farmer must buy: in this way he is more encouraged to give the HOS produced back to F firm. Anyway, F firm (with the co-operation of the first-handlers) keeps direct control over farmers (on-field visits, quality supervision and monitoring, etc.). In this period F firm's on-field presence is not only aimed to give "credible commitments" to farmers, but to obtain a more rigid control over quality requirements; any opportunistic behaviour by farmers could now have very negative consequences on quality levels (oleic acid content), and consequently on quantities of HOS processed by F firm. All this damages F-firm because of the high HOS-specialized resources by F firm.

These resources, *specialized* with respect to HOS, acquire *specificity* with respect to each supplier (farmers and mainly first-handlers), not only for their relatively low number, but also owing to the fact that the relation between F firm and suppliers, thanks to frequency, feels the effects of "fundamental transformation" (Williamson, 1987) and strengthens investments idiosyncrasy.

More precisely, F firm has:

- a *human asset specificity/specialization* (deriving from training economies and from *learning by doing*), accumulated both through breeding experiences (R&D, support to multinational breeding firm) and through managing relations with farmers, first-handlers, and customers;

- a *physical asset specificity/specialization*, built through investments on experimental and breeding selection, on extension, and seeds reproduction (which is made on the basis of formal written contracts undertaken with farmers in previous campaigns, to obtain seeds quantities strictly functional to the firm oil requirements);

- a *brand name capital*, both with respect to suppliers and to customers. More specifically, F firm has acquired a reputation on HOS oil quality, and on supply

availability and continuity; besides, the activity of this specific and high-quality segment reinforces F firm's global brand name capital¹⁹.

It is important to note that in this period F firm acquires control over a medium-size milling firm. The acquisition allows F firm to utilize the information and know-how gained from its breeding activity (especially from the selection of HOS varieties with higher oil content), and at the same time has increased the strategic value of HOS for the firm²⁰, which lets each F firm sectors to work.

5.4) *The supply of other firms in the development period*

Compared to F firm, L and O firms use "softer" vertical coordination mechanisms for HOS supplies.

The first reason for this, is that L and O firms benefit from the fact that farmers overcame information impactedness as a result of F firm's past activities²¹.

Secondly, L and O firms suffer to a lesser extent from the negative effects on quantity and quality levels deriving from possible opportunistic behaviours of farmers: L and O firms do not have high specific investments on HOS as F firm. Besides, O firms are more speculative in their HOS activities, while L firm, even though it has to supply firms of the same group with HOS oil on a regular basis, have to bear governance costs of transactions that are too heavy if compared to the benefits obtainable. This is due to the high quantities of HOS processed, and the fact that its customers demand lesser quality standards of oil supplied. As a consequence, unlike F firm, L and O firms benefit less from transaction frequency; such benefits coming from *learning by doing* during governance of relations, trust, familiarity and the common specialized language acquired (Williamson, 1989). On the contrary F firm can take advantage of frequency, and can lower governance costs thank to its already existing network of agents. In short, *ceteris paribus*, "hierarchic" coordination mechanisms are less costly for F firm than the other milling firms.

In conclusion, the overcoming of information impactedness, achieved in the introduction period by F firm, benefits also all the other milling firms in the development period, cutting transaction costs down; on the contrary, transactions governance costs tend to diminish only for the innovator firm (F firm), due to experience accumulated during the governance of tighter coordination forms.

For all these reasons, new-comer firms (L and O firms) adopt coordination mechanisms that do not require neither the provision of technical assistance nor the imposition on farmers of specific HOS varieties to be used. These firms relate to first-handlers, and build up a range of relations aimed at signalling their supply requirements (including the pre-cultivation period); purchase commitments are often formalized only verbally, and on the basis of HOS oil quantities for which they are already committed or they foresee future demand.

The low frequency of relations between L and O firms on one side and first-handler on the other, together with the non profitability of supporting relations by a direct control over cultivations, increases the possibility of opportunistic and/or speculative behaviours by both the farmers and the first-handlers, and make it difficult to select the best suppliers over a period of time and a given area.

As a result, in the development period, coordination mechanisms are still far from being "pure market". Spot, or more generally, pure market transactions are limited to a restricted portion of totally traded volumes; furthermore, in outlet markets as well,

transactions cannot be considered "anonymous", as they are undertaken within direct and consolidated supply relations, where the identity of persons plays a central role.

5.5) *HOS market expansion and future prospects*

The gradual shift in coordination mechanisms towards "pure market" forms seems to have had a strong acceleration in the current supply season. First estimates indicate further increase in HOS-cultivated area; as a consequence, all the firms surveyed have expressed the intention to continue lessening links with suppliers, partly thanks to the availability of improved and more standardized HOS seeds with regard to oleic acid contents and oil productivity. Given this framework, L firm has indicated that it intends to renounce setting up pre-cultivation supply commitments (partly due to opportunistic behaviour by farmers and by first-handlers during the previous supply seasons), while F firm has started selling its own selected HOS seeds on the market without collecting the output back.

From the ongoing supply season, milling firms tend to use coordination mechanisms that are similar to those used for NS, in other words similar to those used for a standardized product with a wide market. In Italian HOS chain, the consolidation of vertical coordination forms close to pure-market forms depends primarily on the acceptance by the consumer of food oil that contains HOS oil. So far, the high price difference between HOS oil and other types of food oil, together with the small and irregular supplies, has discouraged oil-bottling and trading companies to launch HOS oil, notwithstanding its superior qualitative characters, especially as a frying oil (fatty acid composition, high temperature and oxidization resistance).

6) Some concluding remarks

The analysis has pointed out the importance of transactional theory elements investigating vertical coordination mechanisms. As a matter of fact, the presence of asset specificity, uncertainty and frequency of transactions helps to explain, in the case examined, why coordination mechanisms that are stronger than price-based ones have been used, and why some important differences in behaviour do exist between firms and within single firms over a period of time.

In fact the analysis has shown how the relevant dimensions of transaction are not defined once and for all: as a consequence, it is necessary to view coordination mechanisms in a dynamic way, and to study the evolution of the environment in which firms operate, and the personal "history" of each firm. All these are elements that modify the determinants of both transaction and internal governance costs.

Nevertheless, the importance of transaction costs is only one of the reasons - though important - that lead firms to adopt different types of coordination mechanisms.

Firms examined tend to utilize external resources in a *strategic* way. The choice of the way to relate to suppliers cannot be always interpreted only as dictated by contingent motivations and addressed only to solve possible conflicts (as the transaction costs approach seems to suggest); the origin of the choice must be found also in firms willingness to build stable relations through an organized inter-action mechanism aiming at creating resources.

Besides, some limits of transactional approach as applied to the analysis of vertical coordination mechanisms - and more specifically the excessive emphasis put over the single transaction and the lack of a dynamic vision of the transaction - could be removed

by recognizing from the one side the analytical importance of a strategic rationality that drive firms in the choice of coordination mechanisms besides a simple calculation of the immediate profit, and on the other side the usefulness of an holistic vision - already used by other approaches such as the network one (Hakansson, 1987; Johanson e Mattsson, 1991) - to analyze the single micro-parts (in our case the single transactions) in the more general context with which they interacts.

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² This study is the result of the collaboration of the authors, and they are jointly responsible for this paper. Giovanni Belletti has written paragraphs 2, 4, 5.2, 5.3 e 6, Andrea Maescotti paragraphs 1, 3, 5.1, 5.4 e 5.5.

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³ Complete industry-agriculture integration is rare. This can be explained by many factors among which are the high differences in optimal production scale between the two sectors, the seasonal character of agricultural activity and the relative risk, the low profitability of capital investments in the agricultural sector and the relatively high amount of capital required (Galizzi, 1987).

⁴ Positive aspects for the agricultural sector deriving from the adoption of these forms of coordination are often outlined, in particular with respect to risk reduction (uncertainty in production and future price levels) and to specific know-how acquisition (Galizzi, 1984; Scarano, 1991); coordination mechanisms, in particular vertical contractual integration, are, as a result, seen as opportunities of modernising agricultural activity.

⁵ Among the principal determinants identified are: economies of technology; scale and scope economies between successive phases; uncertainty of inputs supply; risk transfer from one phase to another; market imperfections and market power; industry life-cycle; strategic behaviour.

⁶ Neo-institutional economics has given rise to a wide range of approaches, that have in common their "interest in institutional aspects ignored by traditional microeconomics; the attention paid to the causes of market failure and the related possibility of associating or substituting market mechanism with other mechanisms of coordination of the economy; the tendency to explain relevant economic phenomena by taking into account the influence of the social context on the motivations and behaviours of the agents (Franzini e Messori, 1991: 13, our translation).

⁷ In particular, the theory of transaction costs considers the presence of imperfect information and the possibility of strategic interactions between operators. All these notwithstanding, the question of the distance from neoclassical theory is still widely debated, given that it maintains some central elements such as the optimizing criterion, the rationality and the individualism (Brosio, 1989; Favereau, 1989; Franzini e Messori, 1991; De Benedictis, 1993).

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- ⁸ An investment is considered specific if it yields a high profit within a given transaction, and a much lower profit outside that same transaction.
- ⁹ Sunflower (both NS and HOS) is entirely sent to milling industry to obtain raw sunflower oil and flour; the latter is used as animal feed, while the bulk of sunflower oil, after refining, is used for cooking; non-food destination (bio-fuel) has grown of importance in recent times.
- ¹⁰ Today the firms operating in the milling stage of the Italian sunflower chain are seven and all of them process other agricultural products as well (soybean, germ maize, rape, grape seed, etc.).
- ¹¹ Compared to NS, HOS contains oil that differs in its fatty acids composition. While NS oil contains about 60% linoleic acid and 40% oleic acid, the percentage of oleic acid in HOS oil ranges from 60% to 90%. This fatty acids' composition makes the oil fit for more specific uses, both as non-food (in chemical and pharmaceutical industries, vegetable-derived fuels) and as food (as baby-foods, cocoa butter surrogate, cooking oil). Besides, as a result of its peculiar fatty acids composition, it seems that HOS oil may have been used (illegally) to adulterate olive oil.
- ¹² According to Williamson, there are five kinds of asset specificity: dedicated asset specificity, site specificity, physical asset specificity, human asset specificity and brand name capital.
- ¹³ The very obligation to use HOS seeds provided by F firm represents another strong bargaining element ("hostage") in the hands of the farmer, which can make F firm pay for crop failure if it can be proved that it was due to bad quality of seeds.
- ¹⁴ F firm has chosen these areas (Piemonte, Veneto) in order to avoid HOS / NS "pollution risks".
- ¹⁵ Besides, the entry of F firm into HOS production was facilitated by the lower level of *information impactedness* with regards to the multinational breeding firm, because the new activity was "similar" (Richardson, 1972) to the previous ones.
- ¹⁶ During the survey, O firms declared that they entered the HOS market partly to consolidate their relations with suppliers with respect to other agricultural products (NS, soybean, etc.).
- ¹⁷ Usually, low-class oils have less specific usage, such as mixed with other types of food oil, and the production of vegetal fuels.
- ¹⁸ According to EU regulations, sunflower for non-food usage (both NS and HOS) can be grown on set-aside lands only if it is accompanied by a formal written pre-cultivation contract between the farmer and the processing firm. In this case, contracts have only an administrative function, and do not involve a real coordination between the firms. So far, only a little quantity of HOS has been grown on set-aside.
- ¹⁹ The existence of a brand name capital is also testified by the fact that, recently, other multinational breeding firms have started collaborating with F firm on testing new HOS seeds in Italy.
- ²⁰ The low milling capacity of F firm's processing plant makes it necessary to diversify activities, with special reference to "niche" products (such as HOS), in order to avoid the competition of bigger milling plants, that rely on higher scale economies and price competition.
- ²¹ It is significant to note that some national milling firms, which have started purchasing HOS from areas where it was newly introduced (Hungary, Rumania, and

some italian regions), have had to recur to the same vertical coordination mechanisms (vertical contractual integration) used during the introduction period in Italy.

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