

## MARKET STRUCTURE AND VERTICAL CO-ORDINATION

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### Introduction

The object of this paper is to assess the comparative efficacy of alternative economic and organisational strategies. More specifically, it elaborates on the basic notion of vertical coordination and market transaction. Vertical coordination is a particular institutional arrangement between economic units that governs the way in which these units cooperate.

Vertical coordination relates to governance structure that can be arrayed on a continuum ranging from spot-market transactions at one extreme to vertical integration at the other. The basic distinguishing criterium that characterizes the degree of coordination seems to be the administrative aspect: ranging from no control from A on B, to complete control and ownership from A over B. The degree of control varies, depending on the nature of the contract, or transaction specific arrangements (Williamson, 1975). From an empirical point of view, however, the debate on measuring vertical coordination has not yet been terminated (Henderson and Frank, 1995).

In the agribusiness and food industries the problem of vertical coordination or chain management is discussed by many (see for example the latest two volumes of *Agribusiness: an international journal*; the Chain management congresses in Wageningen, 1992 and 1994; the NE-165 research conference in Washington 1995; Barkema and Drabenstott, 1995; Boehlje, Akridge and Downey, 1995). In this debate, predictions have been made on the conduct of firms within the agri-food value chains. In some cases vertical integration, in some other cases spot-markets or vertical alliances have been suggested as adequate governance structures.

In this paper, vertical coordination in the European vegetable industry is discussed. More specifically, the question is raised as to what governance structure the vegetable industry may expect to encounter in the years leading up to the third millennium. In view of their importance, the analysis will focus on four European countries: France, Italy, Spain and the Netherlands. More fundamentally, the question is posed as to how market structure influences vertical coordination between actors in a national agri-food industry.

To answer these questions, some theoretical perspectives with regard to the debate on vertical coordination will be introduced. Then a description will be given of the European vegetable industry. For predicting the governance structure of the industry, major forces exercising influence on the governance structure will be analyzed. The paper concludes with some generic conclusions on the debate on market structure and governance structure.

### **Vertical coordination: the choice of a governance structure**

Vertical coordination is to be defined as the process of coordinating market transactions between supplier and customer. Vertical coordination in the agribusiness and food industries encompasses several to many transactions, including the exchange of inputs from suppliers of seed or of capital to the farmer, the exchange of raw materials between farmers and processors, auctions by wholesalers or the exchange of processed and fresh produce between wholesalers and retailers and retailers and consumers. Apart from the exchange in the physical flow of goods, one may distinguish exchange of information or other valuable assets.

Vertical coordination as a governance structure entails many different forms.

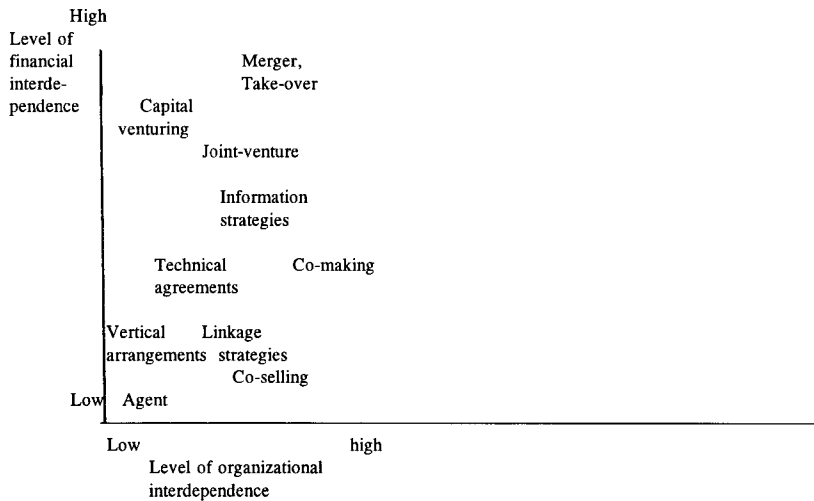
A first distinction that is usually made is between internal and external coordination, following the basic distinction of market integration and vertical integration. In the market transaction the price expresses the value of the transaction.

On the other hand, vertical integration is defined as the result of a decision by a firm to govern the activities backwards or forwards along the value chain. A firm, fully integrated on a given input, satisfies all the needs for that particular input from internal sources. Likewise, when a firm is fully integrated forward for a given output it is self-sufficient in providing internally the demand for that product. Fully integrated companies have complete ownership of their assets. Hierarchy within the firm translates the value of exchanges in internal prices. Between the two extremes many varieties exist.

Quasi-integration cover forms such as joint-ventures, strategic alliances, joint selling, co-making or minority equity investments.

Considering the extent of integration from an organisational and financial point of view, a typology can be drawn of the different forms of governance structures (Figure 1).

The problem of vertical coordination in agribusiness and food industries originates from the large number of suppliers of raw material, the length distribution channels, the perishability of fresh products and the increasing specificities posed downstream, for example by retail companies and consumers.



**Figure 1** Forms of governance structure

The increasing demands downstream exercise a great influence on the actors upstream. For those actors these demands influence the operations, delivery conditions (time, reliability, frequency), logistic decisions, enabling technologies and investment patterns.

More specifically, all the actors in the industries are in the process of deciding what courses of action are at hand and should be decided upon. More specifically among the decisions to be taken, they are faced with the question as to which governance structure could be most beneficial to them in the long run.

### **Factors to be considered**

#### **Market structure**

The degree of rivalry among firms in an industry has long been viewed in industrial organisation as largely a function of key market-structural variables (Scherer and Ross, 1990). These dimensions include industry concentration, strength of industry demand and homogeneity of firms.

Vertical coordination between firms, may well be understood from the interdependencies. Pennings (1981) categorized nine types of interdependent relationships between buyers and sellers.

Elaborating on his work, the following basic configurations may be discussed here. (table 1).

Based on the assumptions of Cohen and Cyert (1965), one assumes that oligopolist act in concert to maximize joint profits and to distribute the

incremental profits according to an equitable side-payment system. These premiums are of course very dependent on the ability of rivals to influence the price horizontally and on other contractual arrangements.

**Table 1 Basic market-structure configurations**

Number of buyers	Number of sellers	
	Small	Large
Small	Bilateral monopoly	Pure monopsony
	Oligopoly	
Large	Pure monopoly	Bilateral pure competition

However what are the performances of firms in successive monopolies, successive oligopolies and, even more complex, configurations of oligopolies, monopsonies and pure competition in the successive stages of the value system? Theoretically, hypotheses are formulated, such as the expected benefits of downstream firms in agri-foodsystems, as the result of increased sales and raw product prices, and lower economic welfare upstream, depending on the form of vertical coordination (Royer, 1995).

So, depending on the market structure and more closely, the interaction between horizontal and vertical interdependencies, one may conclude that the market structure, indicated by the level of concentration of firms, influences the process of deciding on the optimal governance structure. Vertical coordination will be a function of the degree of horizontal and vertical concentration in the industry.

The theory of the firm is experiencing a renewed interest with the recent development in **transaction cost theory**.

From a transactional cost point of view, the determining factor is asset specificity. According to Williamson (1990), this factor outweighs the other key factors: uncertainty and frequency. The notion of asset specificity helps in understanding the resource dependency assumption of the relative importance of critical resources. Considering the relationships between the three variables, one may envisage the following situations (table 2):

**Table 2: Governance structures depending on uncertainty and asset specificity.**

Uncertainty		Asset specificity		
		Low for both	Mixed	High for both parties
High	Frequency high:		Power balance:	Vertical integration
	integration		vertical integration	
	Frequency low:		Power imbalance:	
	contractual coordination or spot-market		contractual coordination	
Low	Spot-markets		Spot-market or contractual coordination	Contractual coordination/ vertical integration

In general, a high asset specificity for both partners, encourages internal coordination. However, if the uncertainty is low, both partners may opt for long-term coordination based on contracts. This situation may, in particular, be expected if the firms compete in an oligopolistic market structure, where dependencies are crucial and switching costs high.

If uncertainty is high and asset specificity is high, contractual arrangements may endanger the high dependency upon each other. Ergo, vertical integration may be beneficial to prevent, in principle, any opportunistic behaviour. However, if uncertainty is high and asset specificity is low, the firms may opt for contractual coordination if the frequency of the transactions is high, or opt for the spot-market if the frequency is low. Both firms will have the opportunity to look for best deals at reasonable prices.

In mixed situations, where parties have asymmetric relationships in asset specificity, the power balance will in many cases define the expected outcome. So, if asset specificity is high for one and low for the other partner and uncert-

ainty is low, then opportunistic behaviour may be expected from the stronger partner, at least if the switching costs are not too high. Spot-market transactions are likely to occur. If there is a certain power balance between the parties, parties may prefer a loose coupling, based on low-profile arrangements.

However, if asset specificity is high for the one and low for the other partner and uncertainty is high, partners may opt for vertical integration. If the power relationships between the partners is unbalanced, the less powerful partner may not wish to take the risk of possible distortions in the contractual arrangements, while the stronger firm may judge the contractual arrangement to be adequate.

### **Theories on strategic management**

The strategic management perspective is built on rudimentary theoretical notions. Debates on a firm's core activity and its boundaries poses the question as to what constitutes the efficient boundary. According to Porter (1980,1985), the rivalry in an industry is very much dependent on the power of buyers and suppliers, threat of new entrants and threat of substitutes. Also environmental factors, such as government interference, exercise some influence on rivalry. Rivalry, being a horizontal variable, is put in the value chain system, emphasizing the interaction between horizontal and vertical system variabilities. Once the power of buyers increases, buyers will tend to cope by favouring cooperating strategies, such as establishing joint-ventures, co-making or alliances. They are the strategic behavioural variables.

Using a game theoretic model Bettis and Weeks (1987) showed that avoiding competition results in higher profits for the firms concerned. This finding is relevant for understanding the more re-active or pro-active way firms try to coordinate the industry.

Summarizing, the decision on the governance structure may be explained by market-structural factors, transactional variables and behavioural variables. In this paper some of these factors will be used to predict what governance structure may be expected for the European vegetable industry.

### **The vegetable industry in Europe**

In 1992 total world vegetable production reached 462 million tonnes (FAO,1994). The European Union (EU) accounts for around 10% of world vegetable production. Total production in the EU in 1992 was 46 million tonnes. During the period 1988-1992, the production increased with 1.9%. The

most important vegetable growing countries within the EU are Italy which produces 28% of EU vegetable production, Spain 24% and France 13%. The most important category of vegetables grown in the EU are vegetables cultivated for fruit (45%), of which tomatoes is the most important crop. In 1992 tomato production accounted for 29% of total vegetable production in the EU (12.709 thousand tonnes).

Worldwide, tomatoes are a major component of the world's total vegetable production, accounting for 15% of total vegetable production. In 1992 the world's tomato production reached 72 million tonnes (FAO,1992).

Due to the perishable nature of vegetables, vegetable-growing usually takes place around the main consumer centres. This somewhat restricts foreign trade to a mere regional level (Zuurbier and Migchels, 1994). The two major exporters of fresh vegetables in the EU are Spain and the Netherlands. Spain exported around 13% of national production in 1992, while the Netherlands exported over 70% of their national fresh vegetable production. Of this export volume the largest share is destined for other EU countries. Germany is the largest importer of these vegetables. In 1992 Germany imported 2.692 thousand tonnes of fresh vegetables, of which 45% came from the Netherlands.

The consumption of fresh vegetables has increased over the last decades, due to rising incomes, greater health awareness, increasing demand for high-rate vitamin products and general changes in consumer preferences (OECD, 1992). The consumption of fresh vegetables in the EU is characterized by a richly varied and large supply. Vegetable production varies widely among EU countries. Tomatoes, for example, make the differences evident: in Greece they eat about 80 kilogrammes of tomatoes per capita per year. The average per capita consumption in the northern countries does not exceed 20 kilogrammes a year.

### **Comparison of the vegetable industries in four countries**

As mentioned before, four major players France, Italy, Spain and the Netherlands are responsible for a larger part of the EU production and export. To compare them, the following indicators are used: production, trade, distribution and consumption.

#### **Production**

In terms of volume, Italy and Spain are the largest vegetable producers in Europe (table 3).

**Table 3: Production of vegetables (1992)**

Country	volume (mill.tonnes)
France	7.2(*)
Italy	14 (**)
Spain	10.3
The Netherlands	3.9

(Source: Eurostat and PGF, 1993)

(\* : 5.6 is marketed; 1.6 produced in home gardens)

(\*\* : 2 million grown in home gardens)

The largest category of vegetables grown in the EU are for fruit (45%), of which tomatoes are the most important species.

### **Trade**

The two major fresh vegetable exporting countries in the EU are the Netherlands and Spain (table 4).

**Table 4: Trade of vegetables (1992) -in thousand tonnes-**

Country	Export	Import
France	634	1.044
Italy	542	230
Spain	1.350	114
The Netherlands	2.795	523

(Source: Eurostat and PGF, 1993)

About 85% of the Dutch and 90% of the Spanish exports of fresh vegetables is destined for EU member countries, of which Germany is the more important recipient.

### **Distribution**

The general vegetable distribution structure consists of several functions and actors (table 5):



**Table 5: Major actors and functions in the vegetable industry.**

Actors:	Major function:
Producers	production and internal/external distribution
Auction	collection, selling
Packer	collection, customer-made packing
Shipper	collection, transport
Wholesaler	procurement, collection, selling
Consumer-market place	selling
Retailer	selling

There appear to be major differences between the four countries in the study. In **France** production is organized, for a major part, in producer groups. These producer groups can be associations, trading unions, co-operatives or SICA's (Société d'Intérêt Collectif Agricole), being a sort of co-operative. The number of producer groups has steadily declined over the years. However, depending on the produce, they have large market shares, ranging from 85 to 90% for cauliflower to 40% of total tomato production. The producer groups are facilitated by the Comité Economique Agricole, responsible for market regulations, promotion, and research.

The shipping agent focuses on buying a large variety of unpacked produce and sells the products in homogenous amounts. For their procurement, they rely on independent producers (50%), producer groups (14%), auctions and wholesale markets (35%) and imports.

The major buyers for the shippers are wholesaler dealers (50%), purchasing offices of retail companies (25%), and export agents (20%). National distribution of fresh vegetables in the EU shows a great deal of variation. 60% of the total fruit and vegetables purchases are made in supermarkets, "suprettes" (= smaller supermarkets) and in hypermarkets, 9% in specialty shops, and 27% at market places.

In **Italy** vegetable production takes place on about 1 million relatively small farms. A large part of the produce is bought by collectors, many of them relatively small. Wholesale markets play a minor role. However, the number of wholesalers and collectors is large, estimated at 30 thousand. Auctions are not, in general, an Italian phenomenon.

The fragmented market structure in production and distribution is also seen at the retail end. The density of retail outlets is one of the highest in Europe. The number of food retail stores has fallen to 300.000 in 1990, while the number

of supermarkets has increased from 1400 in 1981 to 4000 in 1990. The hypermarkets have been getting more important lately, mainly concentrated in the northern part of Italy.

Vegetable production in **Spain** takes place on 650 thousand farms, some of them independent private farms and some co-operative organized farms. The co-operative farms are to be found in the northern part of the country. Next to the number just mentioned, many other farms are engaged in the production of vegetables on a small scale.

There are a variety of functions and actors involved in vegetable distribution in Spain. The co-operatively produced volume is sold by the co-operatives at wholesale markets. Especially the co-operative ANECOOP takes on a prominent position in the national distribution of fresh vegetables. Besides ANECOOP and two big private wholesale companies, there is a number of small wholesale companies with a limited assortment, that mainly focus on a specific region. Due to the regionalization of the Spanish market, larger and smaller regional wholesalers operate in their regions, supplying smaller and larger retail companies and shops. The supermarkets buy their vegetables at the wholesale markets or directly from the producer. Especially in the largest urban areas the wholesale markets play a dominant role.

In Spain the small traditional stores are still the major outlets for food. Slowly but steadily the number of supermarkets and hypermarkets is increasing. The total number of stores is slowly decreasing, mainly due to a decline in the number of traditional stores. At the end of the eighties the share of the small, independent traditional stores was 50-55%, the share of super- and hypermarkets was around 30%, the share of market places was 7% and the share of home-grown vegetables around 12%.

Around 13% of total fresh vegetable consumption is procured by institutions, like restaurants, hospitals etc.; most of these buy their vegetables at the traditional small, independent stores (50%). A smaller number (25%) buy their vegetables through wholesale companies.

Production of vegetables in **the Netherlands** takes place at about 17.500 farms, of which 5.500 are specialised in glasshouse production (LEI-CBS, 1994). Compared to 1988, a total decline of around 7%.

The auctionhouse has a major stake in the distribution of fresh vegetables. About 65% of national marketable fresh vegetable production is sold by the auctionhouses. The rest of the vegetables is mainly sold on contract basis. Selling by auction is an original Dutch, co-operative selling system for member growers, where the daily produce is collected and offered via the clock. Besides the original function of selling the produce, auctionhouses take care of promotion, quality control storage and facilities for delivery. In early 1966, the vegetables auctionhouses merged into one product-market oriented auctionhouse.

The main purchasers at the auction are exporters and wholesalers (55% and 27% of total turn-over). Only a small part is bought by retailers or the processing industry, 9% and 5% respectively.

In the Netherlands there are about 1500 wholesale companies and intermediaries active in vegetable and fruit. Around 700 wholesale companies focus on domestic trade, over 400 on exports and 140 on imports. The total number of intermediaries is about 260.

In 1993 20% of the total number of exporters had a market share of almost 60% and the 24 largest exporters were responsible for 54% of the total export value.

The specialized vegetables and fruit wholesale companies serve the retail specialists, supermarkets, open-air markets, catering companies and other customers. The final consumer can buy vegetables at the supermarket, the specialist shop, the open-air market or directly at the farm door. The supermarket companies have increased their market share to the detriment of the specialist vegetable and fruit shops. They first achieved a market share of 60% in 1992. Hypermarkets are not widely available in the Netherlands; they are responsible for a 2% market share. The open market place saw its market share decline to 14% in 1992.

### **Consumption**

Consumption of vegetables differ widely over Europe (table 6).

**Table 6: Consumption of vegetables and per capita consumption**

Country	Consumption (1992) (thousand tonnes)	Per capita consumption/year (kilos)	
France	1.900	42	(1989)
Italy	9.900	172	(1990)
Spain	2.600	66	(1991)
The Netherlands	933	61.5	(1992)

(Source: PGF 1993, 1995)

Consumer behaviour shows a demand for variety, sustainable quality and fair prices.

### **The vegetable industry and the governance structure**

In the introduction the question was raised as to what governance structure the vegetable industry may expect towards the third millennium. As mentioned before, the decision on the governance structure may be explained by market-structural factors, transactional variables and behavioural variables.

Comparing the four countries on the governance structure, table 7 shows the dominant governance structure with regard to the production- distribution transactions.

**Table 7 Dominant governance structure of the vegetable production-distribution transactions in EU countries**

Country	Dominant governance structure
Italy	Spot-market
France	Auction, spot-market
Spain	Spotmarket, contracts
The Netherlands	Auction

What factors may explain the dominant governance structure? To answer this question we refer to the theoretical explanations that have been mentioned before.

The **first** one, the market structure of the vegetable industry, differs between the four countries. Although in the four countries the number of growers is vast, the number of buyers differ according to the country considered. The number of buyers in the Netherlands is relatively more concentrated compared to France, Spain and, in particular, Italy. However, due to the open market in the EU, the flow of produce available for buyers may originate from member states. This is particularly true for the Netherlands, where the import and re-export of vegetables is growing rapidly. In 1994 almost half of the total import of vegetables and fruit, 2.4 million tonnes, was re-exported again.

The increasing international trade flows of vegetables enables large buyers to procure the produce more easily from different sources, giving them a better opportunity to maximize profits and squeeze out margins of producers.

In a **second** explanation for the governance structure, the transaction costs asset specificity was mentioned as a dominant variable. What are the specific assets in the vegetable industry? Not the quality of breeding material (seed, young plants): differences in qualities are shrinking, availability is high and prices are a small percentage of production costs (Zuurbier and Migchels, 1994). Not the production technologies, due to the free flow of information and expertise by state research institutes and extension agencies. Not the collection and distribution technologies as such, although investments in cooling facilities and transport are increasing. However, comparing the countries' asset specificity is of increasing importance for the larger buyers in view of their demand for larger and larger volumes of homogeneous quality within an ever shorter delivery cycle. The every-day-delivery - low prices-(EDDLP) strategy of major retailers, in some cases extended to the efficient consumer response (ECR), to achieve increasing efficiency in the food distribution by continuous replenishment, category management and total system

improvement, requires the cooperative efforts of the large distributors/retailers and producers.

In general, growers in Europe are not yet ready for this major challenge. The rather small size of horticultural holdings does not fit the new requirements. So, the fragmentation of producers will inhibit the deployment of new retail and distribution strategies, unless upstream contractual arrangements can be made to secure the delivery of larger volumes. So, the actual low level of asset specificity in the vegetable industry allows for low coordination efforts. However, one would expect that contractual arrangements would increase greatly if the new distribution and retail strategies were to be deployed.

A **third** factor explaining the governance structure is the internal rivalry in the industry and the relative power of buyers and suppliers, the threat of new entrants and substitutes. This factor could be interpreted in the following way. The spot-market, as a dominant governance structure in Italy and Spain, and to a lesser degree in France, is sustained the large numbers of sellers and buyers in a saturating market. This means a higher pressure on prices and a tendency to cut costs. Opportunities for the individual grower for product innovations are minimal; therefore he depends on the upstream initiatives of seed suppliers and breeders and downstream on distributors and retailers. The lack of transparency in the value chain and exchange of information, inhibits the innovations in the market place. So, lowering prices and cutting costs go hand in hand, jeopardizing the incomes of growers in the EU.

Adding to this, new entrants are appearing on the horizon, mainly coming from member states and in some cases from outside the EU. This only serves to increase the amount of stagnation in the vegetable industry. On the medium term, the free trade association of Poland, Czechia and Slovakia expected to start trading in 1997, as well as the trade agreement between the EU and Bulgaria and Rumania, will pose further threats to the EU vegetable producers.

The conclusion is that strategic behaviour of growers is focused on cutting costs. In the industry this behaviour can also be detected among shippers, distributors and retailers. The more capital-intensive producers, in the northern part of the EU, are at a less favourable stage compared to the competitors in the south. This challenge to the northern vegetable industry may favour the rise of collaborative strategies.

### **Conclusions**

The vegetable industry in the EU is changing towards a more tightly coordinated market structure. Vertical coordination is no longer governed by spot-market transactions. Contract arrangements are expected to increase, due

to changes in the market structure, transaction characteristics and the strategic behaviour of the players in the industry.

The transition is not affecting all the players at the same intensity and speed. Or, to put it differently, all players will be faced with the strategic question of how to position themselves in the more coordinated industry and value chains, but not all will choose to be a partner in the competitive structures in the vegetable industry in the next century.

More fundamentally, the question was posed as to how market structure influences vertical coordination between actors in a national agri-food industry. This paper has illustrated the validity of the question. More elaboration on quantitative modelling may support evidence for the conclusions drawn and support policy decisions to be taken at industry and firm level.

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