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Supply Chain Management in the Fresh Produce Industry: A Mile to Go?

P.J.P. Zuurbier

We investigate the factors that influence vertical coordination in the fresh produce industry. Elaborating on the concept of governance structure, price and non-price coordination systems will be distinguished. Under previous research, there is a specific consideration as to how market conditions and institutional considerations influence the coordination of supply chains. In my presentation for the Food Distribution Research Society in Monterey, California, I analyzed how retail companies in the United States, France, and the Netherlands coordinate their supply chains of fruits and vegetables. Differences in product category and institutional environments do not contribute directly to the explanation of differences found in supply chain coordination systems. Industry-specific factors and firm-resource-based factors may supply a better understanding of these differences.

Food means life. Food fuels the well-being of mankind. Having access to quality food for a reasonable price is a human right per se. In subsistence-farming communities, the family enjoyed the autarky of a year-round supply of food. In modern societies, the supply of food has been taken over by many institutions, such as supermarkets, growers, shippers, processors, and packers. The more this supply is differentiated, the higher the chances of quality deterioration, increasing costs, and lower customer value. Managing the supply chain deserves more and more attention from all who contribute to the value chain.

The fresh produce sector is of increasing importance in total food consumption. Consumer demand has soared to record levels. In the United States, for example, between 1967 and the early 1990s, fresh fruit and vegetable consumption has more than doubled, from 143 pounds per capita to 300 pounds per capita (McLaughlin and Pero-sio, 1994).

Fruits and vegetables are a major component of food expenditures. However, the site at which consumers buy their fresh produce varies among countries. In the United Kingdom, in 1995, 72 percent of fruits and vegetables were purchased through supermarkets (Hughes and Merton, 1996). In France and the Netherlands, in 1994, supermarkets got a market share of 54 percent and 52 percent, respectively, of total retail sales (AGB/PGF, 1995) compared to 18 percent for the green grocers in the Netherlands and 26 percent for the street markets in France.

The strong position of supermarket outlets in the distribution of fresh produce presents the enormous challenge of ensuring efficient and effective supply chain management.

The objective of this study is to provide critical information on this concept of supply chain management. We seek to answer the following questions:

- How do retail companies succeed in managing their vegetable and fruit supply chains?
- What coordination devices support supply chain management?
- What enabling technologies for vertical coordination are applied?
- How do institutional arrangements encourage or constrain supply chain management in the fruit and vegetable sector?

The methodology employed for this study relied heavily on primary and secondary data collection. The primary data were gathered from supermarket companies, their shippers, and their growers. In some supply chains, other actors—such as packers, auctioneers, and brokers—participated in the project. By analyzing the supply chains and the coordination systems, we were able to gain a better understanding of what factors may contribute to the differences between supply chains. By comparing supply chains in France, the United States, and the Netherlands, we could discover the impact of institutional arrangements on the fruit and vegetable sector.

P.J.P. Zuurbier is associate professor, Wageningen University, The Netherlands, E-mail: [Peter.Zuurbier@ALG.BK.WAU.NL].

This exploratory research design helped us to achieve our objective: to provide critical information on the supply chain management concept. This information may be a strong input for the design of supply chains in the twenty-first century.

The Fresh Produce Industry

The fresh fruit and vegetable industry has several unique characteristics, such as the following:

- The supply of plant material defines the success of the produce but takes quite some time to bring to the market.
- Fruits and vegetables are labor-intensive crops, mainly grown by family enterprises.
- Due to the large number of growers, the organization of the supply shows quite some differentiation of activities, actors, and transaction costs.
- The perishability of fresh fruits and vegetables puts a strain on logistics and quality management.
- The quality of fresh produce is dependent on weather conditions, seasonality, grower's competence, and the availability of cool-chain facilities.
- The pricing of fresh produce depends heavily on the forementioned factors, placing constraints on the transaction between the actors in the supply chain.

Demand

The share of food expenditure on fruits and vegetables in the United States and Europe varies. For fruit, the percentage varies between 5 percent and 7 percent.

Fresh fruit and vegetable consumption in these countries is still increasing. Between 1970 and 1995, fresh fruit and vegetable consumption in the United States more than doubled, from 64 kg per capita to 140 kg per capita. In Europe, the consumption of fruits and vegetables also increased remarkably by almost 10 percent per capita per year (Table 1).

Table 1. Food Expenditures on Fresh Produce as Percentage of Total Food Expenditures.

Country	% share
United States	10.0
France	12.8
Germany	10.5
Italy	24.3
The Netherlands	19.0

Source: *Fresh Fruit and Vegetables* (1996).

The demand for variety has pushed an extension of the assortment in some categories. In tomatoes, for example, the product differentiation is large. It includes mature, green, and vine-ripened tomatoes, extended shelf-life tomatoes, Roma tomatoes, cherry tomatoes, cluster tomatoes, yellow tomatoes, greenhouse round tomatoes, and all kinds of organic tomatoes. This is the case in the apple industry: In the United States, Red Delicious is the winner with 60 percent of the market, followed by Golden Delicious with 20 percent, Granny Smith with 5 percent, and Fuji and Gala with 4 percent each.

The demand for fresh produce also pushed the year-round availability of fruits and vegetables. Year-round availability in the Northern Hemisphere requires imports from the southern countries. This caused an increase in imports. The total volume of apple exports in the world fluctuated around 3.4 million tons between 1980 and 1990 but increased to 5.0 million tons between 1990 and 1995 (Rabobank, 1997). Chile, New Zealand, and South Africa were largely responsible for this increase.

The demand for convenience food runs parallel with the supply of value-added fruit and vegetable products, such as salads. Fruits and vegetables have become an important component in the foodservice industry.

The ecology aspect of fruits and vegetables has resulted in a larger demand for eco-products. According to EU statistics, ecological food items have a market share of 2.5 percent. In fresh produce, the integrated organic methods of growing are an answer to the challenge of producing eco-produce.

Supply

Fruit production increased between 1980 and 1995, from 303.6 million tons to 400.4 million tons, an increase of more than 30 percent.

For apples, the growth was 44 percent. In 1995, world apple production was 48.8 million tons (FAO, 1996). The major production countries are listed below (Table 2).

Table 2. Major Fruit- and Apple-Producing Countries, 1995 (million tons).

Country	Fruit Production	Apple Production
China	42.0	14.0
United States	29.7	4.9
Former Soviet Union	11.2	4.4
France	11.1	2.5
Turkey	9.8	2.0
Italy	17.2	1.9
Market Share of Top 6	43.2%	60.9%

Source: FAO (1996).

The development of apple production is largely dependent on two factors: the rise in demand and government support. The rise in demand is a major driving force for smaller producers to invest in apple production. The major increase in volume is, however, a consequence of large investments of governments or institutions, such as the World Bank. Adversely, as happened in the European Union, governments took measures to balance the supply and demand by subsidizing the reduction of apple production.

Fresh Vegetable Production

The production area for fresh vegetables increased between 1980 and 1995, from 9.4 to 11.0 million hectares. A relatively sharp increase took place in countries like Spain, China, Turkey, Egypt, and Mexico. The area in the other European countries almost stabilized or decreased as was the case in France, the Netherlands, and the United Kingdom. In the United States, the area increased slightly. World production increased from 360.6 million tons in 1980 to 562.9 million tons in 1995. Of this huge volume, tomatoes had the major share (75.6 million tons in 1993).

In 1996, the European Union produced 12.6 million tons of tomatoes, which is 17 percent of tomato production worldwide. Seven countries represent 99 percent of the total production in the European Union: Italy produced 46 percent; Spain, 21 percent; Greece, 13 percent; France, 7 percent; the Netherlands, 5 percent; Portugal, 4 percent; and Belgium, 3 percent (Table 3).

Table 3. Tomato Production in the European Union, 1996 (million tons).

Country	Tomato Production
Italy	5.4
Spain	2.9
Greece	1.2
France	0.8
Portugal	0.7
The Netherlands	0.6

The area for tomato production in the United States has declined slightly since 1993, from 143.7 thousand acres to 131.7 thousand acres. The yield per acre did not increase in that period while the price per cwt. increased from \$27 to \$28. The price received by U.S. growers had already shown a decrease for some years, from \$32 per cwt. in 1991 to \$26 in 1995. On retail level, the monthly price increased from 100.7 to 115.6 during that same period (USDA, 1997).

Regulatory Environment

The world fruit trade is affected by all sorts of regulations: Non-tariff barriers and tariff barriers in the form of tax and import levies are the result of policies to protect domestic producers from foreign competitors. Apples and tomatoes, for example, are products subject to the EU entry price system. The EU reform of the fruit and vegetable regime has implied the establishment of voluntary export ceilings to prevent the price from dropping below the entry price set. The restructuring of the withdrawal system, a lower level of subsidies due to the WTO Round, and a greater responsibility for producer organizations to establish offensive marketing strategies will all encourage the grower to withstand increasing foreign competition.

Within the framework of the North American Free Trade Agreement (NAFTA), the United States has opened its market for imports from Mexico. This was welcomed by U.S. apple producers but feared by U.S. tomato producers. This phenomenon has led to the regional diversification of U.S. companies (Wilson, Thompson, and Cook, 1997), to make strategic alliances across climatic regions.

Mandated marketing programs in the United States include federal as well as state marketing orders, state marketing commissions, and promotional check-offs. These programs are voluntary in the sense that initiatives for establishing a

program stem from the commodity growers themselves. Once approved, the programs are mandatory, and the legal framework prevents operators from opting out. A good example of these marketing orders is the Washington State Apple Commission: With a yearly budget of US\$55 million, a major effort is devoted to worldwide promotion, the gathering of market information, technical services, and quality control. This effort has contributed to the Washington apple brand name.

These marketing orders cover primarily quality control and market-facilitating activities, such as promotion, the provision of market information, and research. State marketing commissions have been considered more desirable than marketing orders since they display greater administrative flexibility and autonomy. Check-offs refer to generic advertising, promotion, and research to which growers are obliged to make financial contributions.

The Supply Chain Coordination Problem

Although tremendous efforts have been made to satisfy consumer's needs, the challenges for fresh produce in the twenty-first century are enormous. Due to retailing companies' larger scale of operations, wholesalers, packers, and shippers are faced with the following challenges:

- (1) perishability, which means the loss of quality after harvesting the product;
- (2) lack of speed, due to longer distances in time and space, to guarantee a year-round supply of produce;
- (3) loony logistic costs, a consequence of the costs of physical distribution, packaging at the point of harvesting, and repackaging at the point of shipment, at the distribution center, and at the point-of-sale location;
- (4) terrible transaction costs, which show increases by the large number of suppliers, the increase in assortment of produce, the traditional administrative systems, and the less than sophisticated buying offices at retail level;
- (5) the virtue of value-adding, waiting for all players in the game—however, not without investments and perseverance; and
- (6) the right of consumers and customers to know the place of origin, the production methods, the use of pesticides and insecticides, etc.—adding to higher costs.

The marketplace offers new options to face the challenges and to lower the costs. It is suggested that these objectives may be achieved by new concepts, such as category management and the use of more and better scan data, which are enabled by more and better information and communication technology infrastructures, better informed people at the buying and supply interfaces, or the improved organization of the supply chain. But in many cases, companies appear to opt for one strategy: muddling through. In order to discuss the problem properly, one should elaborate on the basic question of vertical coordination systems.

Vertical Coordination

Vertical coordination is the process of organizing a subsequent set of activities between one or more suppliers and one or more customers. Vertical covers a continuum limited on one hand by spot market transactions and on the other by vertical integration. Vertical integration is the consolidation of two or more vertically arrayed stages under the management of a single firm (Henderson, 1994).

The dimensions of scope and intensity can be combined to create a classification of vertical coordination systems based on both dimensions—that is, broad or narrow and high- and low-intensity (Zinn and Parasuraman, 1997). The scope of a vertical coordination system covers the range of services to be included in the system as the object of coordination. The intensity of the vertical coordination system covers the extent of direct involvement between partners in the system. According to neo-institutional transaction cost approaches, the intensity stems from the specific assets invested in establishing and nurturing the system. The more intense a coordination system, the higher the exit or switching costs for the partners to dissolve the relationship (Figure 1).

Integrated coordinated systems include bundles of services that underpin the system of coordination. These services support: the coordination of physical distribution and the enabling technologies and systems, such as EDI, UPC, and scanning devices.

Figure 1. A Typology of Vertical Coordination Systems.

		Intensity	
		High	Low
Scope	Broad	Integrated	Extensive
	Narrow	Focused	Limited

Source: Zinn and Parasuraman (1997).

- Coordination of production processes and physical distribution and the enabling technologies and systems, such as category management—According to Fensholt (1996), perishables are not yet managed by category management due to the priority given by retailers to dry grocery and non-food items; the lack of standardization; the variable weight of produce and the failure to apply them; naive assumptions about barriers, such as defining roles of category managers; and the lack of focus on measuring performance (Unrein, 1997).
- Coordination of enterprise resource processes (ERP) and efficient consumer response (ECR) by focusing on the optimization of information exchange on effective marketing, production, financial, and logistical decisions through efficient store assortments, replenishment, promotion, and product introductions.

These coordinated systems are broad in scope due to the comprehensive nature of the systems to be coordinated. If the comprehensiveness narrows, a focused coordination comes into place.

Focused Coordination Systems. A focused coordination system is high in intensity but narrow in scope. Such a system is characterized by a strong focus on specific resources to implement and nurture a limited set of systems to be coordinated. One example is a retailer who focuses primarily on the exchange of quality information to ensure a top-quality delivery of produce on a contractual basis from supplier to consumer.

Extensive Coordination System. The extensive coordination system covers a broad range of systems to be coordinated; however, the intensity is low—that is, the system lacks major specific assets invested in the relationship between suppliers and retailer. The object subsystems to be covered by coordination may cover a large range, such as quality control, logistic control, product introduction, fund transfer, and physical distribution.

Due to the low intensity, the partners in the system are rather loosely coupled. This loosely coupled system offers the opportunity to switch easily from customer or supplier, respectively. This, however, does not necessarily mean that the partners in the system do not invest individually in supply management systems, and information and communication technologies and devices. Consequently, the companies in an extensive system do not have to adapt their individual systems to the systems of others.

Limited Coordination System. A limited coordination system has both a narrow scope and low intensity. The basic contractual arrangements between suppliers and customer fall into this category. The time of delivery and the price are the main contract items to be coordinated. No relation-specific investments are made, no further information is exchanged. The enabling technologies of intra-company processes are not linked with the transaction processes between supplier and retailer.

This extensive coordinated system comes rather close to the spot market type of transaction (Williamson, 1985). This type assumes that the value of the transaction is expressed best by the price.

The Choice of a Vertical Coordination System

The choice of a vertical coordination system, theoretically, depends on the following factors:

- relation-specific factors;
- firm-specific factors;
- industry-specific factors;
- product-specific factors; and
- institutional factors.

Although we will not elaborate extensively on these factors, some that are relevant for the fruit and vegetable industry should be mentioned.

Relation-specific factors are trust, cooperative behavior, open communication, perceived interdependence, goal compatibility, and firm compatibility (Brock Smith, 1997; Dwyer, Schurr, and Oh, 1987; Morgan and Hunt, 1994; Young and Wilkinson, 1989; Fontenot and Wilson, 1997). In the fruit and vegetable industry, trust is the cornerstone for the relationship effectiveness due to the biophysical constraints of the produce and the frequency of interaction. One may predict

that integrated coordination will be chosen if trust has been proven over time, communication is transparent, perceived interdependence is high, and goals are compatible.

According to transaction cost theory, vertical coordination will be more integrated in scope and intensity if and when the frequency of interactions is high, the asset specificity is medium, and the uncertainty is medium (Williamson, 1979, 1985). In the fruit and vegetable industry, these conditions prevail, specifically in cases where big retail companies request high volumes and year-round supplies, despite variability of weather and other exogenous phenomena (Loader, 1997).

Firm-specific factors that may influence the choice of a coordination system are the firms' policies and strategies, its innovativeness, external orientation, resources, market share, and competencies (Harrigan, 1985; Powell, 1990; Hamel and Prahalad, 1990). In the fruit and vegetable industry, firms differ with respect to their strategies: Some opt for cost leadership; others for differentiation strategies through innovations in products and processes (Porter, 1985). Differentiation strategies require specific competencies and investments that may increase risks and transaction costs. By opting for strong relationships, these risks may be managed more efficiently, and transaction costs may decrease.

Industry-specific factors are the number and size of suppliers and buyers, barriers to entry, product differentiation, cost structures, and price elasticity of demand (Bain, 1952; Douma and Schreuder, 1998). In the fruit and vegetable industry, economies of scale are becoming a major entry barrier. The increasing size and decreasing number of customers-retailers means that a larger size of suppliers is needed to balance negotiating power (Porter, 1980). In addition, due to this horizontal collusion, the cost structures change and are expressed in pricing strategies. So, the higher the extent of collusion becomes, the more critical the decision to guarantee the supplies will be, and consequently, the higher the urgency to opt for integrated coordination will be.

Although the fruit and vegetable industry is defined here as one entity, one may question whether differences among produce categories matter for the choice of a vertical coordination system. As mentioned before, perishability is a risk-loaded factor. The more perishable a product,

the higher the risk of quality loss. Therefore, one may expect that highly perishable produce will require even tighter coordination compared to less perishable items.

Institutional factors deal with market-inspired or policy-inspired arrangements and regulations that influence the firm's strategy in a particular industry (Oliver, 1997; DiMaggio and Powell, 1983; North, 1986). Market-inspired arrangements are institutional frameworks for making transactions without any interference by governments. An example is the traditional auction in the fruit and vegetable industry. In the Netherlands, the auction has a long history based on the commitment of growers to establish and run the auction. In Spain, ANECOOP is a cooperative trader that acquired a determining proportion of shares of cooperatives operating in key producing areas.

Policy-inspired arrangements stem from governments or semi-governmental agencies that have the authority to define and implement regulations for market behavior. The more that market- and policy-inspired arrangements prevail, the stronger the necessity to opt for vertical coordination. This force, however, may be mitigated by new entrants—for example, from abroad—that circumvent national arrangements.

In short, several factors appear to influence the choice of a coordination system. The question now is what factors may influence the coordination decision in the fresh produce industry.

Research Methodology

The research setting chosen for this research comprised retailing companies and their suppliers in the fruit and vegetable industry in France, the United States, and the Netherlands. These countries were selected based on the assumption that the differing institutional arrangements in the NAFTA and in the European Union might have implications for the choice of vertical coordination systems. Next, based on the assumption that differences in institutional arrangements exist even between countries within the European Union, the two EU countries were selected.

The fruit and vegetable industry covers a huge assortment of products and varieties, so a product selection has been made. The product-specific differences in terms of perishability are expressed in the selection of two categories: apples and tomatoes.

For determining the number of firms to be included in the project, the decision originally was made to select three retailing companies per country. The number of suppliers was based on the distinction between the suppliers of apples and tomatoes. Further, the vertical chain of supplier and growers was taken into consideration by selecting one supplier of apples and two of its growers, and one supplier of tomatoes and two of its growers. This selection offers the opportunity to make a product-specific vertical chain analysis. Empirically, some deviations from this basic idea—such as the lack of cooperation, distance problems, just one preferred supplier, and the existence of intermediate firms (broker, packer, auctioneer)—had to be accepted. The selection of retailing companies and their suppliers was made by using the network of one of the financial sponsors and with the help of other research groups.

Operationalization of Variables

The vertical coordination systems were measured with respect to the two major dimensions, scope and intensity.

Scope was measured by using a variety of indicators covering a range of coordination activities, such as packaging, assortment planning, exchange of know-how, research and development, distribution, planning, cost reduction, quality control, and marketing. The higher the number of indicators coordinated, the higher and broader the scope.

Intensity was measured by relation-specific investment indicators, such as electronic data interchange (EDI), scan data analysis, category management, activity-based costing, direct product profitability analysis, forecasting, and HACCP. If the retailer-shipper-grower interfaces are coordinated overall, then intensity is high. If these interfaces are coordinated on a bilateral level, then intensity is low.

Some of the independent variables were measured quantitatively, and others were measured qualitatively. To the first category belong the firm-specific and industry-specific factors, and to the last category belong the relationship-specific and institutional factors. Due to the exploratory nature of the research, the data were gathered using open-ended questionnaires and in-depth interviews with buyers, sellers, brokers, representatives of branch organizations, academics, and other informants.

Findings

The main findings show that three of 11 retailing companies have an integrated supply chain for vegetables and fruit. Most of the 11 have an extensive coordination system, and just a few have a spot market/limited coordination system. By analyzing the data, it was found that some factors have a greater impact on the choice of a coordination system than others have. The main influencing factors are industry-specific factors and firm- and relation-specific factors. The two other factors, the product category and institutional arrangements, have small influence.

Asked for their basic motives for a coordination system, retailers mentioned the demand for high-quality produce, cost reduction, and increased efficiency. As key motives, suppliers mentioned the guarantee of sales, limited risks, and improved logistics.

What do suppliers and retailers perceive as key success factors for coordination? Ranking from most to least important, the following aspects were mentioned: trust, duration of relationship between customer and supplier, consistent behavior, reliability, year-round supply, exchange of market information, openness and honesty, a relative power balance, and direct communication.

The respondents who were considering vertical coordination had some future expectations. Retailers expect closer relationships on quality and logistics, larger volumes through larger suppliers, and an expanding role of buyers.

From increased coordination, suppliers expect better quality, more investments in distribution and logistics, more emphasis on production methods, a decreasing number of main suppliers, and less price competition.

Conclusion

The fresh produce industry faces an increase in collusion on the retail level and on the shipper level. This industry-wide phenomenon urges suppliers to provide larger quantities within the specificities of product and process requirements as defined by retailers and exogenous actors (government, lobbyists, pressure groups).

Within this context in the three respective countries that have been studied and within the value chains that have been analyzed, three major conclusions can be drawn:

- (1) In just a few cases, vertical coordination has been established in an integrated manner, covering the three functions—production, shipping, and retailing.
- (2) In most of the value chains studied, the direct retail-shipper relationships show a rather narrow scope of coordination.
- (3) Most of the respondents favor a more direct relationship to offer the best quality and to decrease transaction and other costs as much as possible.
- (3) Industry factors matter in the sense that consolidation induces a specific type of business behavior geared to a more integrated coordination of the supply chain.
- (4) Institutional arrangements matter slightly: Regulatory arrangements offer a bottom-line guarantee in the national industry for good practices.

Discussion

This study makes several contributions to the literature on coordination systems in supply chains. First, the results underpin the dynamic changes in our modern industries—changes that urge the firm to renew and redefine the boundaries of its operations. What the study has revealed is that properties of the transaction determine the efficient boundaries of firms: Site specificities determine the sustainable advantages of producers to get and keep access; physical assets set boundaries to volumes and frequencies of transactions; and human assets form the soft tones of indispensable interdependencies between the actors in the fresh produce chains.

These asset specificities and the increasing uncertainty about the access to best-quality products delivered in time will create transactional difficulties. In response, transactions will eventually be coordinated through various types of cooperative agreements between the transacting parties. By doing this, parties develop an efficient bundle of skills and incentives to realize economic opportunities. This bundle of complementary competencies is efficiently governed by bilateral or multilateral relations. Economies of integration can often be more efficiently obtained through vertical corporate agreements than through vertical integration by ownership. The question of ownership involves non-core strategic challenges that have to be countered by the owner. Agency problems occur more easily, leading to higher agency costs.

In the fresh produce industry, the complementary core competencies of the involved actors introduce interesting new opportunities for growth based on four types of economy (Figure 2).

The downstream and upstream coordination economies can be more efficiently obtained by retailers, shippers, and producers through bilateral or multilateral agreements, provided that a relative

Factors enhancing coordination in the fresh produce industry are twofold:

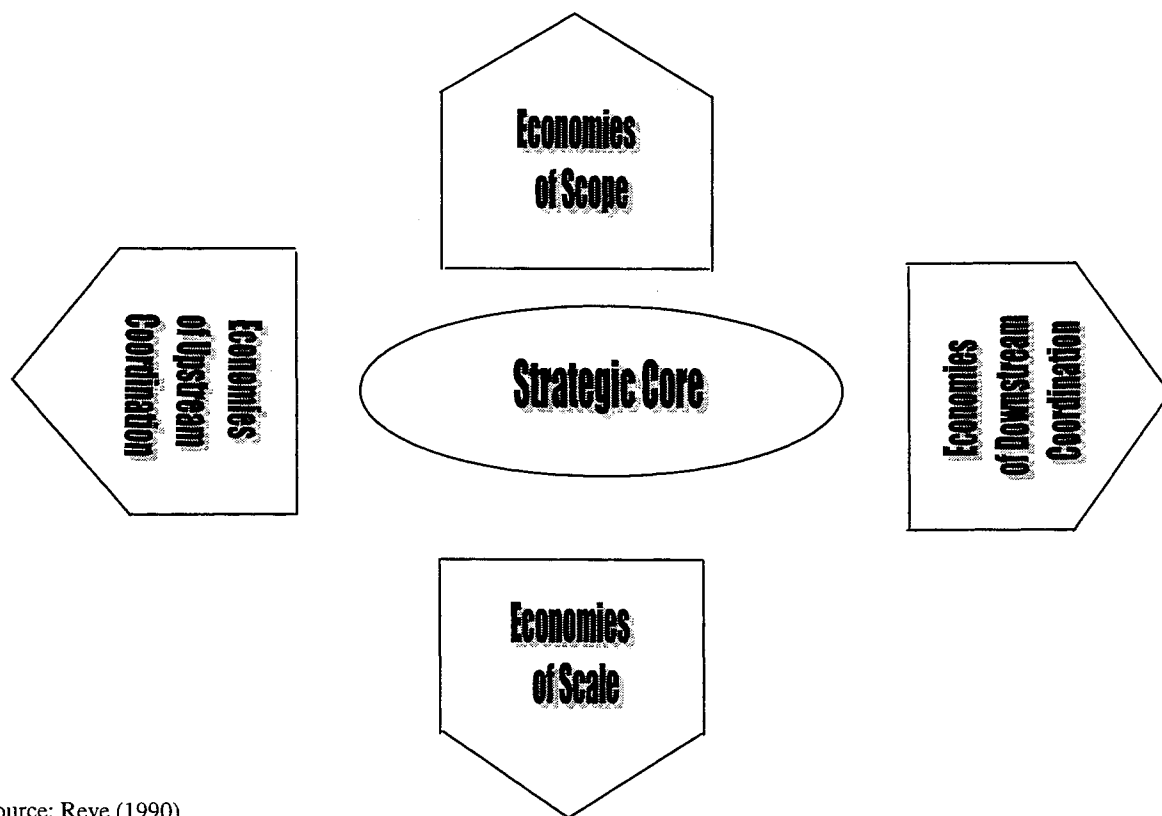
- (1) Trust—in most cases, built upon sustainable relationships between the retailer and a rather limited number of suppliers between which knowledge is shared and has become tacit.
- (2) Investments in personal relationships and better product and process performance.

Highly coordinated value chains do not exclude niche players that make use of flexible supply bases to become successful. The final performance of fresh produce in the eyes of the consumer is the real benchmark.

Conclusions on Influencing Factors

The results of this study cannot give substantial evidence or proof of which factors explain differences between the coordination system as applied by actors in value chains. However, some indications have been found:

- (1) Product differences matter slightly: In principle, product differences do not matter but they do influence the speed at which the retailer and his suppliers invest in enabling devices and technologies.
- (2) Firm- and relationship-specific factors matter: The retailers' policies and strategies imply a limited or exhaustive effort in building up an integrated coordination system as do trust and long-standing relationships between retailer, shippers, and producers.

Figure 2. Growth Opportunities Based on Types of Economy.

Source: Reve (1990).

symmetry exists in negotiating the power of the respective actors. This condition is a *sine qua non* for successful cooperation between the actors. So, by the dynamic nature of the industry, only scale economies can be obtained by one actor in the value chain; the downstream and upstream actors will have to adapt by obtaining scale economies as well. This cycle of collusion will be encouraged when economies of scope can also be obtained. Then, the other actors in the chain will provide arrangements to maintain the symmetry in the value chain system. This may be achieved by horizontal mergers or acquisitions, joint ventures, or other types of alliances. The dynamic character of the collusion model capitalizes on economies of scope and scale or downstream and upstream coordination.

The study uncovered the immense importance of trust. In agreements on collaborative actions by actors in the value chain, trust replaces monitoring and control. The increased interest in literature on trust and shared values emphasizes the meaning of trust as being part of the incentive structure in an industry. Trust basically functions

when it is based on the asset specificity of the skills involved. In the fresh produce industry, the offering of best-quality produce, in time, underlines the trust attributes spread over the value chain: retailers enhancing the trust of the consumer by offering best service, best quality, and best prices; shippers enhancing the trust of retailers by making timely deliveries; and producers enhancing the trust of shippers-packers by offering a variety of best-quality, healthy products.

Trust, as an attribute of human behavior, makes the identity of the exchange parties critical. Social ties are built up; social contracts develop; and norms—such as integrity, preservation of relations, conflict handling, and moral values—enable the relationships.

Implications

The study emphasizes the role of transactions and relationships. The model in Figure 2 clearly shows a framework for further research. Old and new questions arise. The issue of the boundaries of the firm still demands attention. For instance, what

makes internal contracts more efficient than external contracts? Do the economies of scale and scope generate the forces for integration downstream and upstream? Or do actors in this coordinated system enforce an improvement of scale and scope economies? How are strategic cores or resources interwoven with the capabilities to coordinate the system downstream and upstream? Can the resource theory of the firm be useful in explaining the development of coordination systems? And what resources do matter? Firm resources or relational resources, embedded in the relationship between actors in the chain? These and more questions fall under the category of basic economic and managerial questions, which is a category that needs further conceptual and empirical elaboration.

From a managerial point of view, some future perspectives may help to place the findings in their proper place. One may assume the constant pressure on reducing costs—by economies of scope, reduction of downstream and upstream coordination costs, and scale economies going down. This trend may sustain to a point where a more sound equilibrium between supply and demand in vertical chains and in the market structure as a whole will appear.

A second perspective is the value-adding drive, forming new bundles of attributes probably close to important claims, such as health and happiness, convenience, and the shift from meal solution to food entertainment.

A third perspective may be called the power drive. This drive forces companies horizontally and vertically to build up market share, to increase profitability, and to guard the risk profile, monitoring a portfolio of fresh produce and striving for vertical chain differentiation as the basis for sustainable competitive advantage.

The last perspective may be described as the surf drive—people searching for web-food solutions, providing the base for electronic fresh markets, and the shift from mass customization to mass individualization. This perspective will offer new entrants enormous windows of opportunity in the foodservice corner of the virtual marketplace.

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