

Comparisons of qualitative and quantitative issues in the fruit supply industries in The Netherlands, Poland, Greece, and Spain

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SUMMARY

This paper presents an overview of the fruit supply chains in Poland, Spain, Greece, and the Netherlands. The roles of the different participants in the functioning of the fruit supply chains are presented, along with their quantitative characteristics. Although apple production was most popular in northern countries (i.e., Poland and The Netherlands), while in southern countries (i.e., Spain and Greece) citrus fruit (especially orange), grape, and peach production were most important, the participants along the fruit supply chains were the same in all cases: namely, research centres and seed companies, nurseries, fruit producers, co-operatives, fruit processors, wholesalers, retailers, and the food service sector. Any differences lay mainly in the level of concentration among participants at each stage of the fruit supply chains. Despite an ongoing process of consolidation, the fruit processing sector remains fragmented. There were only a small number of large enterprises that had a considerable position in multi-national markets, alongside a large number of much smaller entities that served local, regional, and national markets. With respect to product distribution in the fruit supply chains, the most characteristic feature was the increasing concentration of the retail trade.

The development of consumer-driven, efficient, responsive, and innovative supply chains is crucial for the growth of fruit consumption in Europe, and for a competitive and sustainable fruit industry. Currently, fruit supply chains are characterised by having a relatively low level of consumer orientation. To increase this level, it is necessary to identify suitable organisational and management structures that maximise the consumer-driven innovativeness and performance of the supply chains. This study provides an overview of European fruit supply chains as a first step towards the identification of such organisational and management structures. This study concentrated on a description of the fruit supply chains in four European countries, comparing them in terms of qualitative and quantitative issues.

MATERIALS AND METHODS

In order to present the characteristics of the fruit industry in Europe, with particular attention to the functioning of supply chains in four countries: Poland, Spain, Greece, and The Netherlands; a desk study was carried out, including the use of general sources of information. The following sources were used: literature on the functioning of supply chains and the role of particular members in the supply chains, analyses of the characteristics of the fruit industry as conducted by various research institutes, as well as reports on the current state of, and developments in, fruit markets in the four above-mentioned countries. In addition,

statistical data from the National Statistical Offices of these four countries were used, as well as data from the Statistical Office of the European Communities (Eurostat), information from the United States Department of Agriculture (USDA), and others. The quantitative data collected concerned the fruit industry, as well as particular members taking part in specific fruit supply chains and their role in the system of fruit distribution. In addition to these, a Dutch fresh apple supply chain was presented in detail. An analysis of this case included detailed information on the organisation of fresh apple chains, and the roles of particular members in them. This part of the paper was prepared on the basis of secondary sources (e.g., published literature, statistical data) as well as information obtained during interviews with representatives of those companies participating in the Dutch fresh apple chain. Adding specific information on the Dutch fresh apple chain, provides a better understanding and recognition of the functioning of supply chains in the fruit industry in Europe.

RESULTS AND DISCUSSION

The Netherlands (Debaire, 2007)

Characteristics of the fruit industry: Horticulture has the highest production value in Dutch agriculture, while it represents only 8% of the total agricultural area, of which 93% is used for open-air production. Horticulture contributes to 41% of the value of Dutch agriculture. The horticultural sector in The Netherlands consists of ≥ 55,000 companies, and employs over 200,000 people. With an annual production value of €6.7 billion, it is the

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largest agricultural sector in The Netherlands (Kalaitzis and Van Dijk, 2005). The Dutch fruit sector consists of an area of approx. 21,000 ha, of which approx. 17,000 ha are used to produce apples and pears. There are 2,600 horticultural farms in The Netherlands that produce fruit, and The Netherlands is the eleventh largest EU producer of fresh fruit (CBI, 2005).

The Netherlands is the fourth leading EU exporter of fresh fruit. Leading export products are grapes (16% of total fruit export value in 2003), apples (15%), pears (12%), and oranges (9%; CBI, 2005). Most exports from The Netherlands, however, concern re-exports since the country has very dynamic and efficient ports, such as Rotterdam.

Structure of the fruit supply chains: The main participants in the Dutch fruit supply chains consist of research centres, input suppliers, nurseries, fruit producers, the food industry (mainly the beverage industry), co-operatives, fruit wholesalers, retailers, the food service industry, and consumers.

Research centres and seed companies lie at the beginning of the fruit chains. Seed companies deliver the seed for fruit plants, and often have their own research centres. They are also increasingly interested and involved in seed biotechnology and in the agrichemicals used during production. These three types of business (i.e., seed research/production, biotechnology, and agrichemicals) are increasingly concentrated in the hands of the same companies (van der Stichele *et al.*, 2006).

The nurseries have a two-fold role: they bulk up the new fruit varieties bred from the research centres in large quantities in order to supply the growers, and/or they breed new varieties themselves then bulk them up for the growers. Horticultural products are largely produced by family firms. Growers do not usually sell their products themselves, but auctions and co-operatives do. This leaves the growers free to concentrate on production, which has led to specialisation (Kalaitzis and Van Dijk, 2005).

Due to poor financial results in the fruit industry over the past decade, a changing trade structure, and more consumer-driven fruit chains, Dutch fruit growers changed their marketing behaviour. A large part of Dutch fruit production was sold through auctions, but, today, more and more fruit growers sell their fruit directly to traders, as they want to keep control of their own products and decide for themselves when the fruit is sold. This development has weakened the position of the fruit producers, because the buyers are concentrated and hence have a lot of market power (Groot *et al.*, 2004). Growers also sell directly to consumers, especially in the case of sweet cherries.

For almost a century, the co-operative auction was the most popular marketing channel for fresh fruit produce in The Netherlands. In 1990, 78% of all fruits were sold through auctions. Within the new structure, only a few auctions still operate, and their market share has dropped dramatically. It is currently estimated at 10% (Kalaitzis and Van Dijk, 2005). The response of grower co-operatives to these changes was the adoption of a mechanism for direct negotiation, instead of the traditional auctions.

In The Netherlands, 80% of the fruit trade, before retailing, is controlled by 20% of the co-operatives, wholesalers, or distributors (van der Stichele *et al.*, 2006). Wholesale is affected by developments concerning out-of-home consumption. In this respect, the wholesale sector increasingly supplies institutions such as hotels, restaurants, jails, homes for the elderly, canteens, or retailers' stores. At the moment, these activities account for 30% of the turnover of wholesalers, but it is growing at a rate of 2 – 3% per year (Kalaitzis and Van Dijk, 2005).

Among consumers, the most popular fruit species in the Netherlands are apples, oranges, and bananas and account for approx. 67% of total fruit consumption. Other important fruit species are mandarins, melons, and pears. Dutch consumers buy fruit at supermarkets, market places, specialised fruit shops, and directly from growers. During the last few years supermarkets have gained a considerable market share, to the detriment of traditional greengrocers. In 2002, the market share of supermarkets for fresh fruit stood at 69%. Open-air markets have a relatively weak position. Buying fruit in a supermarket is especially attractive for the consumer, from a convenience angle. During 2002, the market share of greengrocers for sales of fresh fruits and vegetables decreased to 8 – 9% (CBI, 2005).

Poland

Characteristics of the fruit industry: Total fruit production in Poland in 2006 was ≥ 3.2 million tonnes (MT). As far as apple production was concerned, this amounted to approx. 2.3 MT, or 72% of total fruit production. Poland is the largest apple producer in Europe, and one of the largest in the World. Apart from apples, there was a significant contribution to total fruit production by cherries (6.0%), pears (approx. 3.0%), currants (6.0%), and strawberries (6.0%). Poland is one of the largest producers of soft fruit in Europe. In 2006, the production of strawberries and currants exceeded 0.19 MT. Raspberries and chokeberries also had a significant share of soft fruit production. In 2005, fruit in Poland was grown on a total area of 387,000 ha. Apple orchards had the largest share of fruit area at 170,000 ha (44.0% of the total fruit-growing area). Strawberries (14.6%), followed by currants (11.3%), and cherries (9.6%), also covered significant areas of horticultural production.

Structure of the fruit supply chains: In Poland, there is a lack of statistical data concerning the channels of fresh fruit distribution. On the basis of partial research and expert estimations (Nosecka, 2005), it can be stated that fresh fruits and vegetables are sold mainly to consumers through local markets (40%). The share of the wholesale markets in fresh fruit selling is approx. 20%. Direct selling to traditional retailers accounts for approx. 15%, and 10% of fruit production goes to super- and hyper-markets. The remaining 15% is sold directly on fruit-growing farms (Nosecka, 2005). The structure of fruit sale channels differs in accordance with the scale of production on individual farms. Larger farms use modern channels such as wholesale markets and hyper- or super-markets to sell their products, whereas smaller farms sell fruit through intermediaries and local markets.

As far as the first link in the fruit chains is concerned, in 2001, nursery stock material was produced by 1,149 nursery gardens on an area of 1,100 ha. Fruit trees were produced on an area of 496 ha, berry bushes on 74 ha, and rootstocks and seedling rootstocks on an area of 267 ha. Polish fruit-tree nurseries have a very fragmented structure. In 2001, the majority (approx. 60%) of fruit nurseries were 0.5 ha in size.

According to the Agricultural Census of 2002, in Poland the fruit-growing area on agricultural farms was 271,000 ha, and the number of fruit-growing farms was 316,800. The average area of an orchard on an agricultural farm therefore amounted to only 0.86 ha. The fruit producer sector in Poland is very fragmented. This causes difficulties in creating partnership relations between farms and other participants in the chain. Transaction costs are high, information is scattered, and product quality in supply chains is difficult to control.

The structure of fruit-growing farms crucially affects sales. The majority of small farms are subsistence-oriented, and have only marginal contacts with the market. Small-sized farms have practically no direct relations with the large processing companies. Most of these contacts are with local markets, or with casual purchasers such as trading companies. In Poland, over 60% of fruit deliveries to processing companies are made by intermediaries. Many small-sized farms deliver their fruit to a collecting point during the harvest season. Collecting points, to which the fruit is delivered, exist for ever larger regions and are organised by private traders or processors. Delivery to a collecting point usually takes place without any contractual obligation.

The creation of a wholesale distribution system in Poland, similar to those in the rest of the EU, was introduced under a Government Programme "For the Organization of Wholesale Markets and Commodity Exchanges", in 1994. Currently, as part of this Programme, seven supra-regional, six regional, and many local markets are functioning.

As far as fruit processing is concerned, in 2003 there were approx. 50 enterprises operating in the beverage sector, including 28 small firms, 16 medium-sized ones, and six large enterprises. Sales by the large enterprises contributed 50% to total branch sales.

The characteristic feature of the fruit retail trade in Poland is the predominance of small shops with ≤ 100 m² of sales area. In 2004, the contribution of these shops to total retail sales was 95%.

Greece

Characteristics of the fruit industry: Greece is the fourth largest producer of fruit in the EU. Total fruit production in 2005 was 5.9 MT (Eurostat, 2006). Grapes accounted for 27% of total fruit production, oranges for 22%, peaches and nectarines for 15%, and watermelons for 14%.

In 2005, fruit imports were €162 million and 0.22 MT, 0.9% of total EU import value (Eurostat, 2006). Fruits with the largest import value in 2005 were bananas, lemons and limes, apples, pears, and quinces. Italy was the main EU supplier to Greece.

Greek fruit exports were valued at €339 million and 0.7 MT in 2005, 2.7% of total EU export value (Eurostat, 2006). The main export fruits were grapes, oranges,

peaches, and nectarines. Canned peaches and oranges were the major processed fruit products exported, with shares of 5.9% and 5.7%, respectively. Greek fruit production satisfies domestic demand, thus imports are minimal. Approx. 43% of fruit exported is directed to the EU, and $\geq 57\%$ to countries from outside the EU; but fresh fruit exports from Greece lack any systematic approach or proper organisation regarding supply to the large wholesale and retail centres in Europe (Reziti-Panagopoulos, 2006).

Structure of the fruit supply chains: The marketing channels for Greek agricultural products involve one or two intermediaries (e.g., agents or wholesalers). In most cases, the agents are located near to farms, buying products and selling them in large quantities to open markets or to wholesalers. Wholesalers also have a relationship with agricultural producers, and sell their products on open markets as their own product (Reziti, 2005).

Generally, the agricultural economy of Greece has undergone a gradual process of alteration since World War II. Farm numbers have been reduced, and the size of the average farm has increased, although the average size of a farm is still only 5.8 ha (Eurostat, 2005), which is lower than the average in all other European countries. The main reason for this is the fact that most agricultural work is done as a part-time job in Greece.

The four major types of fruit being produced in Greece are oranges (0.96 MT in 2005), peaches (0.82 MT), grapes (0.24 MT), and apples (0.26MT). Most of the horticultural area was devoted to orange (39,650 ha), grape (19,500 ha), apple (16,235 ha), and lemon (11,800 ha) cultivation (USDA, 2006). There are 6,350 first-degree and 118 second-degree agricultural co-operatives in Greece. The first-degree co-operatives trade farm input supplies for their members. Moreover, they provide other services such as handling the paperwork relating to EU subsidies. Many first-degree co-operatives achieve a small annual turnover of below €100,000; yet, they continue to operate mainly for the election of representatives who have an active role in shaping the leadership of the co-operative movement. Second-degree co-operatives are engaged in the processing and standardisation of agricultural products, as well as in their trade and marketing. They handle EU subsidies and trade farm input supplies and machinery. Some second-degree co-operatives own super-markets (mostly local) through which they sell some of their products. Second-degree co-operatives are characterised by significant differences in their efficiency (Vakoufaris and Spilanis, 2007).

The food processing sector is one of the most dynamic sectors of the Greek economy. The industry employs 26% of the Greek labour force for secondary production. In 2007, more than 35% of orange production was destined for processing. In the case of grape production, this percentage was $\geq 16\%$, for pears $\geq 12\%$, and for lemons approx. 10%. The juice market in Greece is divided into two main categories: long-life juices, and pasteurised juices, with juice market shares of 70% and 30%, respectively.

The internal fruit market in Greece is driven mainly by wholesalers. Producers are forced to negotiate with

wholesalers on an individual basis, and so have a weak position. Studies have shown that the essential intervention of Greek co-operatives is still not working properly. The current situation is characterised mainly by an increase in distribution costs and capital flows to unnecessary intermediaries. The number of open-air markets is increasing rapidly, since this is the only way for direct distribution without the involvement of intermediaries (Reziti and Panagopoulos, 2006).

The retail industry is characterised by a concentration of sales among ten retail chains, geographical focus of retail activity in urban areas, and the loss of competitive advantage by independent retailers (Reziti and Panagopoulos, 2006). In Greece, there are several large department stores, supermarkets, and retail chains. In 2004, supermarket sales reached €8 billion compared to €7.3 billion in 2003, with the top ten supermarket chains achieving sales of €6.4 billion. Convenience stores and kiosks constitute an integral part of the traditional Greek market. With an average area of $\leq 2 \text{ m}^2$, kiosks are particularly important. There are over 18,000 kiosks throughout Greece, and their combined sales are ? 6 billion. Over 55% of their sales are derived from tobacco products, and 15% from food products, particularly dairy products, juices, and colas.

Spain

Characteristics of the fruit industry: Spain is the largest producer of fresh fruit in the EU, and the main supplier of these products to all other EU countries (CBI, 2008). In 2003, fruit production was 19.8 MT (Eurostat, 2005). Citrus was the most popular fresh fruit, accounting for €1.4 billion in sales, and 25% of the total value of fruit consumed in 2006. Oranges, mandarins, and peaches have the highest share of fruit production at 32%, 24%, and 14%, respectively. Lemons, apples, and pears also have a significant share at 9%, 8%, and 6%, respectively (USDA, 2008).

Fresh fruit production plays an important role in the Spanish economy. Spain is one of the largest EU producers and exporters of fresh fruit, and is also one of the largest consumer markets in the EU. In 2006, Spaniards consumed 4.5 MT of fresh fruit, with a value of €5.6 billion. Fresh fruit accounted for 6.9% of the value, and 11.7% of the volume, of total food consumption in Spain.

The dominant fruits for export are oranges, tangerines, and peaches. The total export share of these fruits is $\geq 50\%$. For oranges, the majority of the volume exported goes to Germany, France, and The Netherlands. These three countries consume and process over 50% of total orange exports from Spain. The major suppliers to Spain are South Africa, Portugal, and Argentina (USDA, 2007). For tangerines, the main customers are Germany and France, with the United Kingdom or Poland in third position, year-by-year. Peaches are exported mostly to Germany, France, and Italy; and imported from Chile.

Structure of the fruit supply chains: A reorganisation of Spanish agriculture has been in progress since the 1950s, and was given momentum when Spain entered the EU. Over the last 10 years, there has been a linear trend towards the total disappearance of smaller farms, and their consolidation into larger concerns. Although these alterations have brought agriculture in Spain slightly

closer to the EU standard, farms still have a relative small economic size. Most are owned by individuals, and almost 90% of the work is done by family members.

The modern fruit industry is based on high yields. One solution to obtain higher yields is to increase planting density. The opportunity to plant more trees ha^{-1} depends on several factors such as having suitable varieties and rootstocks, with limited growth and rapid fruit production for high density orchards. But breeding and selection are slow processes. The other alternative is to use plant hormones. This has proved to be a good technique to control tree growth and enhance yields in commercial orchards.

The principal activity of the agricultural cooperatives is to use the means at their disposal to facilitate and develop their economic activities (Chloupkova, 2002). Co-operatives negotiate for better prices and working conditions, and coordinate the activities of growers. In 2000, there were 3,902 functionally operative co-operatives integrating the 983,000 farmers registered in Spain. Over 42% of Spanish agricultural production is marketed through co-operatives, 45% of citrus production, and 35% of total fruit production (Arcas and Ruiz, 2003). In 2003, there were 943 co-operatives in the fruit and vegetable sectors, with a total turnover of €3.7 million (Durán and Estrada, 2005).

According to USDA statistics, the fruit and vegetable processing industry of Spain has a global share of 7%, while the fruit and vegetable processors, themselves, have a share of 4%. Processed fruit preserves which clearly stand-out are those using tangerines, peaches, and apricots, followed by preserves of pear, strawberries, fruit salads, jams and marmalades.

As far as wholesalers are concerned, in 2005 there were 22 wholesale markets selling a total of 5.2 MT of fruits and vegetables, up 2.6% compared to 2004. Twenty-two distribution centres cover approx. 1 million m^2 , with over 3,600 companies carrying out their businesses.

Spanish consumers bought 40% of their fresh fruit from the four leading distributor chains. These chains have sophisticated purchasing and distribution systems, designed to keep consumer prices as stable as possible. As these leaders make further in-roads into the market, at the expense of smaller outlets, consumer prices and consumption may also tend to fluctuate less.

Just as in most other EU member countries, the food distribution sector in Spain has reached maturity and is becoming more concentrated and specialised, with greater market share held by fewer companies. The number of supermarkets and hypermarkets in Spain is increasing continuously, while the number of traditional food outlets is decreasing. However, many consumers still prefer to purchase their fresh fruits and vegetables at neighbourhood supermarkets and traditional outlets. In the large cities, the large grocery retail chains have their own buyers, who buy and receive fresh produce from wholesale companies, forwarding it to their supermarkets.

CONCLUSION

The aim of this paper was to provide an overview and an analysis of the characteristics of the fruit industry in

Europe, with particular attention to the functioning of the supply chains in four countries: Poland, Spain, Greece, and The Netherlands. As far as possible, a common approach has been taken to permit comparable descriptions of the structures and actors involved in the production, processing, and distribution of fresh and processed fruits for home and out-of-home consumption.

Each of the four countries differs in terms of the species of fruit which dominate its horticultural production. In the northern countries (Poland and The Netherlands) the most popular is apple production, while in the southern countries (Spain and Greece) the most important are citrus fruit (especially oranges), grape and peach production. The domestic structures of horticultural production determine the level of self-sufficiency in terms of the supply of some kinds of fruit and the amount of fruit exported and imported.

In all cases, the participants along fruit supply chains are the same: nurseries, fruit producers, co-operatives, fruit processors, wholesalers, retailers, and the food industry. The differences lie mainly in the level of concentration at each stage of the supply chain.

In Poland, there is a highly fragmented structure in terms of fruit farm production area, where $\geq 50\%$ of small farms are ≤ 5 ha. In contrast, Dutch horticulture is characterised by large fruit farms. Moreover, Dutch fruit producers are organised into large fruit co-operatives. In

the southern countries, small-area farms dominate horticultural production.

Despite a process of consolidation, the fruit processing sector remains fragmented in all four member states. Only a few large enterprises in each country have a considerable share of multi-national markets, whereas a significant majority of firms are small entities that serve local, regional, and national markets.

At the stage of fruit distribution in the fruit supply chain, the most universal and characteristic feature is the increasing concentration of the retail trade. In the four countries studied, a few of the largest food retailers are believed to account for $\geq 50\%$ of the fruit retailing market. This is especially so in The Netherlands, where 69% of fruit purchases are made in super- and hypermarkets. In contrast, in Poland, only 25% of fruit is sold through such outlets. Similar to Poland, in the southern countries, traditional retailers, local markets, and market stalls still play important roles in fruit retailing.

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