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# Vertical Coordination and Grower Organization in the Supermarket Fruit and Vegetables Supply Chain in Croatia<sup>1</sup>

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**Abstract:** The means by which fruit and vegetables growers are linked with the upstream partners in the supermarket supply chain are investigated in 15 semi-structured interviews with inter alia the managers of Croatia's five major supermarket chains.

Contrasting to existing literature we find that supermarkets vertically coordinate with larger growers directly through loose 1-year marketing contracts specifying the terms of payment, without giving financial or technical assistance to the farmers. An exception is the largest Croatian supermarket which has a dominant position in the market and sometimes provides comprehensive farm assistance or even fully vertically integrates farm production.

Wholesalers more often provide farm assistance to FFV growers. Though, in the future it can be expected that the wholesalers drop out of the FFV supermarket supply chain. The major bottleneck for farmers to directly supply to the supermarket chains is the access to a distribution facility for grading, sorting and packaging of FFV. Also, farmers need to organize to meet the supermarkets' minimum quantity requirements. Since bad experience with cooperatives in the communist era is widespread, farmers distaste cooperatives and the degree of organization of FFV growers in Croatia is very low.

We present an innovative model for a producer organization which could overcome the main challenges growers face in the FFV supermarket supply chain and secure that even small farmers participate. Also, we outline policy measures for the Croatian government and the European Commission to foster this development.

**Keywords:** supermarket supply chain, vertical coordination, fruit and vegetables, farm assistance, producer organization

## 1 Introduction

During the transition process in Central and Eastern Europe, the retail sector was privatized and relationships along the whole food supply chain - from farmers to retailers - collapsed implying serious disruptions of supply. Concurrently, international retailers and processors entered the new markets introducing their own business models and consumers' demand for food quality and safety strengthened (Hanf and Pieniadz, 2007). This required significant reforms and adjustments in the structure of food commodity chains, and food supply of higher quality and safety. In this context an increased degree of vertical coordination between transaction partners along the supply chain, became a widespread means to overcome problems of insufficient supply and minor quality particularly in the transition countries in Europe and Central Asia (Swinnen, 2005; World Bank, 2005).

Strong vertical coordination between farmers and retailers within supplier contracting is observed by Reardon et al. (2003), Dries et al. (2004) and World Bank (2005) in the FFV supermarket supply chain in Croatia. Supplier contracting of supermarkets includes the provision of farm assistance programs, as found by World Bank (2005: 8) or the establishment of outgrower schemes, as suggested by Reardon (2003: 11). Dries et al. (2004) finds that that the 2 largest supermarket chain guarantee loans for capital investment of their outgrowers to acquire greenhouses and irrigation (pg. 30). Besides, Dries et al. (2004)

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<sup>1</sup> This paper is based on data gathered within a World Bank project.

report on the acquisition of dedicated wholesalers by large supermarket chains in order to have their own preferred supplier program (pg. 29).

Before this background, our paper aims to identify the degree of vertical coordination in contracting between the FFV suppliers and the supermarket chains, focusing on the role of farm assistance and outgrower schemes. Also, we aim to identify the major drivers of future changes in the FFV supermarket supply chain and develop policy recommendations to foster its further development. Furthermore, we enlighten the challenges faced by farmers to link with the FFV supermarket supply chain. We develop an innovative model for a grower organization which could overcome these challenges and secure that even small farmers participate in this supply chain.

Transactions exhibiting the lowest degree of coordination are conducted via spot markets where a transaction is based on a price agreement only. A higher degree of coordination is achieved through vertical coordination by contract farming which might be implemented within an outgrower scheme or a preferred supplier program by providing assistance to the farmers with the aim to increase supply quantity, quality or to reduce seasonality.

The highest degree of coordination is achieved by full vertical coordination which is called vertical integration, where one firm controls different levels of the value chain, implying that market transactions are replaced by intra-firm transactions. This can be achieved by either forming a subsidiary, a merger or an acquisition.

In general, farm assistance is provided to improve farmers' access to basic production factors as capital and inputs or know-how and information (knowledge and experience). In particular, farm assistance may include the provision of extension and management advisory services, prepayment to finance the harvest, credit, leasing or rental of farm machinery, bank loan guarantee, quality control and inputs (e.g. seedlings). Farm assistance may be provided within bilateral contracts e.g. between the farmer and the processor or the farmer and the input provider. Farm assistance may be provided within complex contract systems also. For example a triangular agreement includes three partners, e.g. a farmer, a processor and a bank.

The situation in the FFV supermarket supply chain is the result of an extremely rapid growth of Croatia's retail sector, which is among the fastest in the world. Not until 2001, when foreign retailers first entered the market, supermarkets started to offer a broad assortment of FFV in their stores, which had before primarily be sold in the street markets (Reardon et al., 2003). Today, FFV is sold to Croatian consumers mainly through the stores of large national and international supermarket chains. According to experts' estimation the share of FFV sold through supermarkets currently amounts between 60-70%.

Our analysis is based on in-person, semi-structured interviews with the managers of the FFV procurement of Croatia's 5 major national and international supermarket chains Kaufland, Konzum, Mercator, Metro and Spar accounting for about 70% of the FFV supermarket business in Croatia. Also, wholesalers, grower cooperatives, individual growers and the national fruit growers association were interviewed. In addition, the Croatian Agricultural Extension Institute, the Croatian Bank for Reconstruction and Development, Croatian Postal Bank and the Ministry of Agriculture were interviewed. The interviews are conducted based on a questionnaire composed of questions on 1) the design of the firm's vertical coordination mechanism with its farm suppliers (structure of the firm's farm suppliers, contract design), 2) the farm assistance program (type of assistance provided, eligibility criteria, impact) and 3) the future development of the supermarket FFV supply chain and how this could be fostered by policy measures. The interviews were conducted in January 2009 in Croatian and English language. The length of the interviews varied between 1 to 2 hours.

The paper is structured as follows. Section 2 describes the different models of the FFV supermarket supply chain found in Croatia and section 3 gives details on how farmers vertically coordinate with their upstream partners. Section 4 addresses the future development of the supermarket FFV supply chain in the near future. Section 5 focuses on the organization of FFV growers in Croatia and presents an innovative model for a producer organization which could secure that even small farmers participate in this supply chain. Section 6 concludes, presents policy implications and outlines suggestions for further research.

## 2 The structure of the FFV supermarket supply chain

Several models of the supermarket supply chain for FFV in Croatia from the fruit and vegetables growers via supermarkets to the consumers currently exist (Figure 1).

In general, the product flow is as follows (Figure 1a): the harvested fruit and vegetables enter the distribution facility to be washed, sorted, graded and packed. Next, the packed produce is transported to a regional distribution center. The quality control is generally conducted in the distribution center before the produce is stored in a cooling facility and the individual assortment for the supermarket stores is compiled. The assortments of the fruit and vegetables are then distributed to the supermarket stores.

The distribution facility may be owned by a large farmer or a farmers' cooperative (F) or a dedicated wholesaler (WS). The regional distribution center may be owned by a wholesaler (WS) or a retailer (R). It is possible that a large farmer or cooperative delivers the produce directly to a supermarket's stores without entering the distribution center. The distribution of the assortments of the fruit and vegetables to the supermarket stores (R/C) is organized by a logistic firm, a supermarket which has an own fleet, or the farmers.

The structure of the FFV supply chain of Kaufland is very similar to Mercator (Figure 1b). Kaufland is a German supermarket chain with 22 supermarket stores. Mercator is a Slovenian supermarket with 26 hypermarkets and 11 supermarkets in Croatia. Kaufland as well as Mercator organize not only the domestic FFV procurement but also the procurement in foreign countries. Also, Kaufland and Mercator dispose over a distribution center. In both cases, the wholesaler or the farmer own the distribution facility. The produce may be delivered directly from a FFV grower or a grower cooperative to the retailer's distribution center, in case the farmer is able to deliver a minimum quantity and quality (Kaufland is working directly with fruit farmers with a size of at least 10 ha), and has access to a distribution facility also. Alternatively, the produce is delivered from the FFV grower, possibly of a farm of smaller size, via a wholesaler, which disposes over a distribution facility, to the supermarket's distribution center. Thus, smaller farmers deliver to the supermarket's distribution facility via wholesalers, and larger farmers and cooperatives may deliver to the distribution facility directly. The assortments of FFV is transported from the distribution center to each store by an external logistics firm in the case of Kaufland and by an own fleet in the case of Mercator.

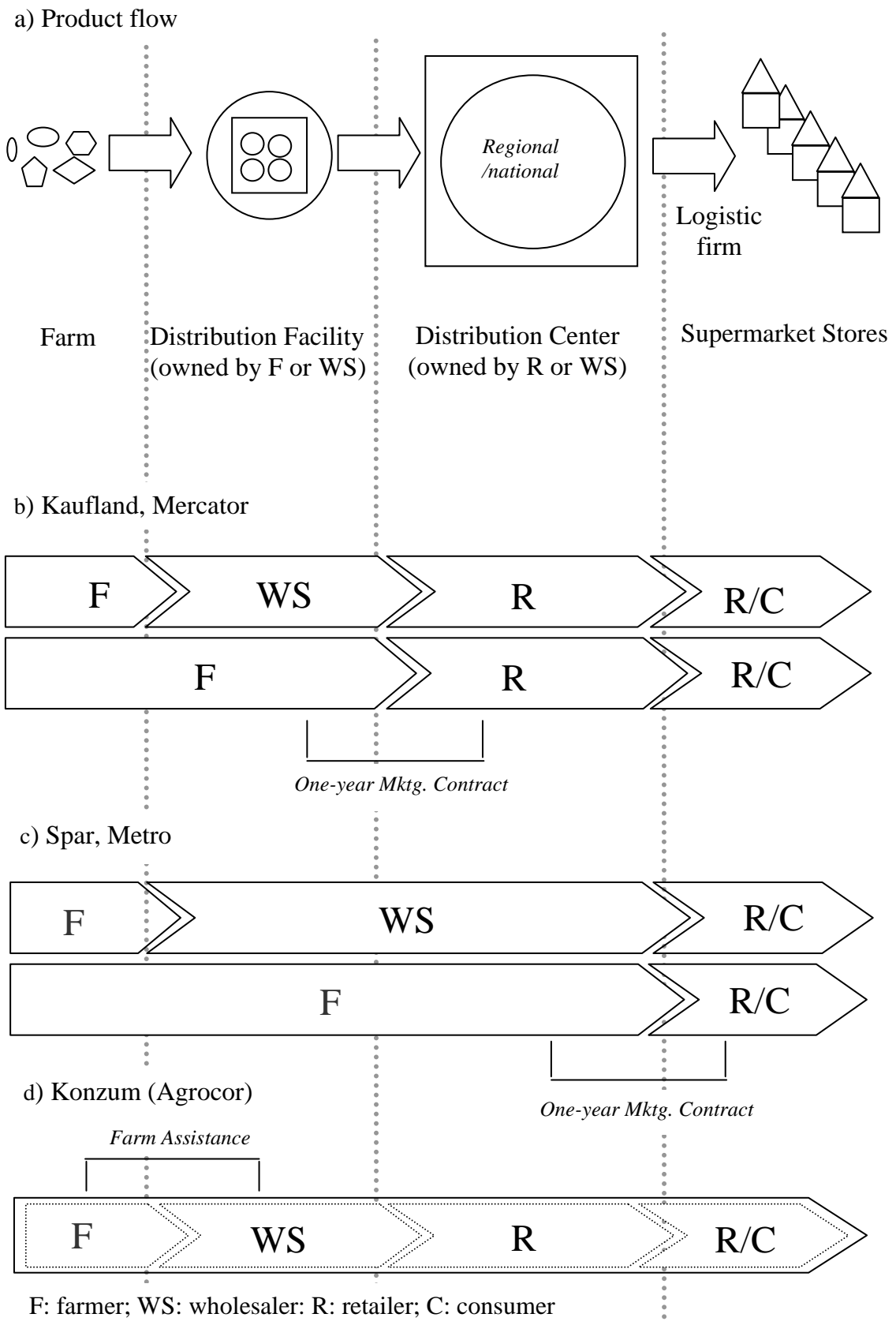
Metro is a German retailer wholesaler with 6 cash & carry stores and Spar<sup>2</sup> is an Austrian supermarket chain with 6 hypermarkets in Croatia. The FFV supply chain of Metro and Spar differs slightly to the above described, since they do not have an own distribution center (Figure 1c). Instead, Metro utilizes one of its wholesalers as its logistical partner, which compiles the assortments for the individual stores in its distribution center, and organizes the transport to the supermarkets' stores. Alternatively, large suppliers might directly deliver the products to Metro's stores. Similarly, Spar's suppliers directly deliver the assortments to the chain's stores. Metro's and Spar's FFV department do procure FFV domestically only, and the FFV imports are organized by the wholesalers completely.

Konzum is a national chain which is the largest supermarket chain in Croatia accounting for about 40% of all FFV sales according to experts' estimates. Konzum belongs to Agrokor and owns a distribution facility but also is in control of 5 distribution centers, and 650 supermarket stores of different size all over Croatia. Besides, Konzum owns fruit and vegetables production facilities. Since the beginning of 2009, the domestic FFV procurement of Konzum is mainly done by Agrofructus, a holding of packing houses and buying stations which is owned by Agrokor as well. Before, Konzum's domestic procurement was done by dedicated wholesalers which Konzum had acquired some years before. However, Konzum organizes the FFV import and is engaged in the FFV export also. Konzum is also the owner of Velpo, a special distributor for hotels and restaurants.

Konzum mainly operates in a fully vertically integrated FFV supply chain, since it has acquired and is still acquiring further individual FFV producers, producer cooperatives and specialized wholesalers which are combined in the holding Agrofructus (Figure 1d). Also, any of the models of the FFV supply chain given in Figures 1b and 1c can be found within Konzum's FFV supply chain, since Konzum procures FFV directly from large farmers or independent wholesalers which may directly deliver the distribution centers.

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<sup>2</sup> Spar Croatia is to 30% owned by Metro Croatia.



**Figure 1:** Structure of the FFV supermarket supply chain in Croatia (own illustration)

### 3 Vertical coordination of growers

Kaufland, Mercator, Metro and Spar have loose one-year written marketing contracts with 100% of the FFV growers, which directly supply their produce to the supermarkets (Figures 1b and 1c). The main element specified in the contract is the payment scheme. A supermarket orders 24-28 hours ahead of product delivery. A FFV grower under contract is expected to deliver quantity demanded by the supermarket, though a supermarket is not committed to procure FFV from the grower under contract, but may source the produce elsewhere. In general, supermarkets pay within 40-60 days whereas wholesalers' payment may exceed 100 days upon product delivery. Also, the investigated supermarkets (with the exception of Konzum) do not engage in any kind of farm assistance as e.g. providing inputs, a trade or credit guarantee, machinery rental and technical advice.

In contrast, Konzum has loose one-year contracts with 10% of its suppliers only. Also, Konzum provides farm assistance and bilateral structured finance of varying degree and kind, which may include inputs, machinery rental or technical advice, and credits. Konzum distinguishes between 3 types of suppliers: It has the strongest relationships with the "A" suppliers, followed by "B" suppliers and the relationship is rather low with the "C" suppliers with which Konzum works rarely only. The FFV growers acquired by Konzum are provided the most comprehensive assistance within outgrower schemes.

Besides Konzum, growers are assisted by wholesalers which are in fierce competition with supermarkets for the local farmers' supply. Mostly, the wholesalers provide inputs to growers, and the grower delivers produce in exchange later during the harvest season.

More comprehensive farm assistance including direct structured finance through credits, technical advice and machinery rental is given by wholesalers, which serve a domestic niche market or an export market with produce of premium quality.

For example, Fragaria is a domestic wholesaler with own FFV production and production of inputs (e.g. seedlings for strawberries) which serves a niche market in Croatia and also exports produce of premium quality. Fragaria provides comprehensive support to its FFV growers by its own consultants, which give advice in plant protection and plant technology. Also, apple growers are prepaid by 25% of their expected harvest to finance machinery rental and workers required for harvesting. Fragaria may support its farmers in investments. For example, together with a Swedish FFV importer, Fragaria gives financial support for the establishment of raspberry production of the size of 100 ha, which will be paid back by the farmers in produce within 5 years. Also, the company rents machines required in strawberry production to its farmers which may pay back the rental fee in produce.

The low importance of farm assistance and structured finance instruments has several causes. The managers of the supermarkets point out that they do not engage in farm assistance, since the margins in the FFV business are low and thus the profitability of such kind of investments is low<sup>3</sup> also. In addition, fruit and vegetables production in Croatia bears high risks with regard to drought, hail and frost due to missing protection measures as e.g. irrigation systems, hail nets and respective insurance schemes. Further, interviewees point out that the commodity price risk is very high for FFV in Croatia. Due to missing market information systems, the quantities of vegetables supplied and thus prices vary substantially between seasons<sup>4</sup>. A further factor which might explain why supermarkets do not engage in farm assistance is that supermarkets are not fully reliant on the domestic FFV supply. Supermarkets have the option to acquire FFV by imports from foreign countries.

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<sup>3</sup> One interviewee mentioned that a supermarket almost makes no profits by selling FFV. Though, the FFV department is the most important with regard to the supermarkets' attractiveness. Consumers' choice of a supermarket is determined to a high degree by the preferences for a supermarket's assortment and freshness of FFV.

<sup>4</sup> For example, an interviewee reported that this just recently happened in the case of cabbage. During the previous harvest the supply of cabbage was low, and thus cabbage prices were high. This induced the farmers to grow a lot of cabbage and thus the supply in the consequent harvest was high and the price was low.

## 4 Future developments

The future development of the FFV supermarket supply chain in Croatia is characterized by the increase in the importance of the supermarkets' domestic procurement directly from the farmers and the decrease of dedicated wholesalers providing general services to supermarkets.

All interviewees belonging to the 5 major supermarkets stated that they have planned to further increase domestic procurement. According to interviewees' estimates<sup>5</sup> domestic procurement accounted for 50-70% of all FFV sold through supermarkets in 2008. For example, the share of imported apples of all apples sold in Croatia amounted about 50% in 2007 (MAFWM, 2007; Robbrecht, 2004 and 2007).

Mercator, Metro and Spar aim to increase domestic procurement directly from the farmer, which currently accounts for between 60-70% of domestic procurement (without bananas, citrus and tropical fruits), and to decrease domestic procurement through wholesalers.

Metro and Spar have planned to establish a joint distribution center in September 2009 and to extend their FFV department. This includes the engagement in the import of FFV. Thus, the main functions of the wholesalers will be taken over by Metro and Spar themselves.

Konzum has planned to increase sourcing from its own production plants, implying that the direct business with other farmers will be reduced. Thus, Konzum aims to mainly procure FFV from its own production and from the production under outgrower scheme in the future, supplemented by the supply of its own wholesaler Agrofructus. Besides, Konzum will increasingly engage in the export of FFV<sup>6</sup>, and has already started to establish a system of buying stations throughout the neighboring countries of former Yugoslavia.

The major driving forces of increasing local procurement are consumers' strong preference for locally produced FFV and freshness, and the higher flexibility of domestic compared to international procurement. As an example, vegetables originating in Spain have to be ordered in trucks, and might have to be stored in cooling facilities for some time, whereas vegetables grown in Croatia may be ordered in smaller quantities, thus they need not to be stored and therefore the freshness of the products is higher.

These future developments will have as its consequence that the demand for the general service provided by wholesalers decreases. Therefore, wholesalers will drop out of the supermarket FFV supply chain unless they reorganize or specialize in serving a niche or the export market, e.g. with FFV of premium quality. Since primarily wholesalers provide farm assistance to growers, the importance of farm assistance will further decrease. Outgrower schemes involving comprehensive farm assistance will remain of importance for Konzum besides the wholesalers engaged in the marketing of premium quality FFV. If Konzum is successful in its export business, Konzum might further extend its outgrower scheme and thus the provision of farm assistance.

One of the major factors hindering that local procurement of the FFV supermarket supply chain increases is that the vast majority of FFV is cultivated on orchards smaller than 1 ha. Small farmers do not meet the minimum quantity requirements of the supermarkets, and investment costs of a distribution facility are prohibitively high. Therefore, small farmers remain outside the FFV supermarket supply chain unless they organize.

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<sup>5</sup> The share of domestic procurement varies depending on the product and the season. For example, bananas and oranges are imported to 100%. Apples are imported more in the time period March to the new harvest, due to missing cooled storage facilities for domestically produced apples. In general, domestic procurement is higher during summer and lower during winter time. Currently, fruit plantations account for 2.2% and vegetable plantations for 9.3% of total agricultural land (MAFWM, 2007).

<sup>6</sup> There is large potential for FFV production in Croatia which offers excellent opportunities for export to the EU, since Croatia's harvest season starts earlier than in most EU countries.

## 5 Grower organization in the FFV sector in Croatia

### 5.1 Organization in cooperatives

For small farmers to enter the FFV supermarket supply chain it is essential that they organize and invest in a distribution facility jointly which allows compiling assortments of the required quantity.

However, the degree of organization of FFV growers<sup>7</sup> in Croatia is low. According to the database of the Croatian Association of Cooperatives (2009) there are 82 fruit cooperatives, 29 vegetable cooperatives, and 41 fruit and vegetable cooperatives in Croatia. Though, according to an expert's opinion, 98% of the listed cooperatives do not professionally act in the FFV market.

Present and past experience with cooperatives in the FFV sector in Croatia shows that organizing farmers in cooperatives faces particular problems. Cooperatives have an old tradition in Croatia tracing back to the nineteenth century, but a lot of farmers have made bad experience with cooperatives in the communist era, thus the willingness of farmers to organize in cooperatives is low. There are several examples for cooperatives which failed because its members could not reach a consensus on how to manage the cooperative due to high mistrust in each other. Also, some farmers understand a cooperative as a point of last resort (retreat position) through which they sell when all other marketing channels are exhausted. There are numerous examples for cooperative members who also have individual contracts and business relationships with wholesalers and retailers and thus directly weaken the negotiation power of their cooperative.

Furthermore, interviewees pointed out that establishing a new cooperative under current market conditions is very difficult in Croatia. The investment costs of a distribution facility are high, and particularly smaller farmers lack business relationships with retailers and have insufficient management knowledge.

### 5.2 Cooperatives - a superior organization model?

In the EU it is very common for fruit and vegetable growers to organize in cooperatives. For example, in the horticultural sector<sup>8</sup> in Germany there exist 96 marketing cooperatives with about 32,000 members and a revenue of 2.3 billion Euros in 2006 (DRV 2009). In the Netherlands, the Greenery is one of the largest cooperatives in the FFV sector with 1,250 FFV growing members and a turnover of 1.6 billion Euros in 2003 (Gouveia, 2007). The Greenery is even a market dominant player (Bijman and Hendrikse, 2003). Though the organization of farmers in a cooperative is not free of problems and alternative models of organization might allow overcoming these problems.

In general, a cooperative can be understood as a user-owned and user-controlled business that distributes benefits upon the basis of use (Barton, 1989). Thus, the principles of cooperatives can be delineated by the identity of users and owners, the democratic principle of voting, i.e. each member has one vote and decisions are made in accordance with majority vote, and the non-existence of entry barriers. Additionally, the legally manifested business aim to nurture their members can be seen as a further characteristic of cooperatives (Anschhoff and Henningsen, 1986; Laurinkari and Brazda, 1990). Establishing countervailing power is regarded as the most important duty of a cooperative (van Dijk, 1997). Other business aims such as correcting market failure, guaranteeing markets, and enhancing margins can be seen as levers to implement the main business aim (Cook, 1997). In the context of vertical

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<sup>7</sup> There were 304,783 family farms producing fruit out of which 13,311 (4.36%) produced fruit with modern technology on plantations in 2003. About 44% of the family farms cultivate fruit on orchards and plantations of the size smaller than 1 ha, and 23% of the size between 1 and 3 ha. (MAFWM, 2007). Also, there are 132 legal entities of which about 90% have fruit plantations of over 10 ha under cultivation. In the vegetables sector there are 138,428 family farms of which 46% cultivate a production area smaller than 1 ha, and 41% of the size between 1 and 5 ha in 2003. Besides, there are about 300 legal entities out of which 42% cultivate more than 30 ha of production area with vegetables (MAFWM, 2007: 101-102). In the meantime, the size of the family farms might have increased to some extent due to a governmental incentive program for investments in orchards.

<sup>8</sup> This comprises fruit, vegetables, flowers and tree production with fruit and vegetables accounting for about 72%.



coordination and contract farming, Sykuta and Cook (2001) show that co-ops' governance structure and ownership give them an advantages over investor owned firms. This is a result of farmers which are more willingly to accept contracts by their 'own' cooperative, assuming that they are not cheated (Schulze et al., 2007).

However, the organization of farmers in cooperatives is not free of problems. By using a property rights approach, Cook (1995) points to five general sets of problems: free riding, horizon costs, portfolio costs, control costs, and influence cost. Furthermore, since it is not clear who is the principal and who is the agent, thus the cooperative as well as its members can be both the principal and the agent (Eilers and Hanf, 1999), it is difficult for a cooperative to enforce leadership mechanisms and selective terms of delivery. This implies that the members can deliver the products of minor quality which alternative dealers do not accept. Cooperatives that are forced to accept these commodities face the problem of adverse selection. Furthermore, applying a game theory model Karantininis and Zago (2001) show that farmers prefer to sell their commodities to investor-owned firms than to open co-ops. Moreover, member heterogeneity e.g. with regard to the farm size, can be regarded as a source of problems. Bijman (2005) deduces that membership heterogeneity could cause a number of inefficiency problems, including agency problems, commitment problems, decision-making problems, opportunistic behaviour, coordination problems, and problems regarding the strategic focus. Fulton and Giannakas (2001) show that member heterogeneity may lead to the decrease of member commitment because members do not see a strong connection between the success of the co-op and their own business.

### **5.3 Organization in an innovative model**

To overcome these deficits, we suggest that FFV growers organize according to an innovative model beyond a traditional cooperative and to invest in a distribution facility<sup>9</sup> jointly.

1. To handle the possible mistrust between the FFV growers, a more hierarchical model of organization should be chosen. For example, an external manager should be hired to manage the producer organization.
2. To avoid that farmers weaken the power of the producer organization by selling through direct contracts with retailers, the members of the producer organization could be forced to supply a yearly minimum quantity through the producer organization. Thus, the members have not only the right but also the obligation to deliver their products to the producer organization, which might be legally enforceable (Drescher and Ratjen, 1999).
3. To overcome the above explained cooperative inherent quality problems in order to comply with the quality requirements of the supermarkets the producer organization could implement a particular quality enhancing program. This should enable the growers to deliver produce of the required quantity to the cooperative and avoid the negative effects of penalizing growers for non-compliance with quality standards.
4. One interviewee suggested that the ability of a new producer organization to build relationships to the supermarket chains could be facilitated by gaining an existing company involved in the provision of wholesaling services to supermarkets as a member of the cooperative. Also, by becoming a member of the cooperative, the company could bring in its management knowledge and in case it is also involved in the production of FFV provide technical advice to the cooperative's members. Besides, this would increase the producer organization's credibility vis-à-vis banks. The above described heterogeneity of the members might be a minor challenge since we have a fit of the strategies as well as the goals of the different members.
5. To make a new producer organization attractive for an existing company which is successful in the FFV wholesaling business, it might be more favorable to organize the cooperative as a trade company than as a cooperative. This model of a producer organization would allow benefiting from EU pre-

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<sup>9</sup> The distribution facility should provide storing and cooling space, and facilities for e.g. cleaning, sorting, packaging and labeling of fresh fruit and vegetables, which enable growers to directly supply their produce to supermarkets.

accession funds like SAPARD and IPA-RD. This is one more advantage of this innovative model of a producer organization in comparison with establishing a new cooperative. Also, the producer organization could apply for an investment grant within the capital investment program of the government.

The currently established joint venture between the domestic wholesaler Fragaria, which is also engaged in the production of FFV and inputs, and the fruit cooperative Velika Ludina (50 km east of Zagreb) exhibits several features of the suggested alternative model of grower organization. Velika Ludina comprises about 50 fruit growers out of which 25 are professional producers with orchards larger 1 ha. The main produce is apples, supplemented by strawberries and other berries. Some of the cooperative's members have established business relationship with Fragaria, and thus are already supplying their fruits to Fragaria.

With this joint venture, Velika Ludina and Fragaria follow two main objectives:

(1) To create a unique apple production system based on Fragaria's technical know-how and experiences. This should allow producing high-quality apples which are sold as branded products. The production system requires the usage of not only inputs, in particular young trees, but also production and transport technology of superior quality. Fragaria has agreed to provide the cooperative's members with the required knowledge.

(2) To establish a joint cooling facility with controlled atmosphere of a capacity of 2,000 t and a storage facility. The investment is expected to amount to about 1.35 million Euros. This would allow storing the apples so that they can be supplied to the supermarkets almost year-round via Fragaria's existing wholesaling channel.

This project is beneficial to the apple growers of the cooperative as well as to the wholesaler Fragaria: The apple producers can increase their revenues due to increased quality of their produce and cooled storage, which allows selling the apples during time periods when higher prices prevail (particularly at the end of February until the beginning of the new harvest). The apple producers could either sell their produce during the harvest at a fixed price or they could take over the risk of storing the produce and might realize a higher price by selling the produce later in the season. Fragaria could become more appealing to supermarkets and might realize higher prices if it can offer a year-round supply of high-quality products. Fragaria might even qualify for the export business, which demands produce of superior quality.

## 6 Conclusions

Previous studies argue that vertical coordination is important in the FFV sector and that FFV contracting is increasing rapidly with the development of a modern retail sector in countries of Eastern Europe. Studies on the FFV supermarket supply chain in Croatia argue that supplier contracting of supermarkets includes the provision of farm assistance programs or the establishment of outgrower schemes.

The conclusions of our study are different. We find that the degree of vertical coordination is rather low. In particular our findings suggest that the leading model of vertical coordination between FFV growers and supermarkets is restricted to loose one-year contracts which mainly specify the terms of payment, without providing any kind of farm assistance by the supermarket. An exception is the largest Croatian supermarket Konzum/Agrocor which has a dominant position in the market.

We further find that dedicated wholesalers are in general stronger vertically integrated with their supplying fruit and vegetable growers by granting farm assistance in addition to entering into a contract. Some specialized wholesalers which serve a domestic niche or the export market provide even more comprehensive farm assistance thus offering better chances for small farmers to be integrated in the FFV supply chain<sup>10</sup>.

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<sup>10</sup> This result is in line with BURMA AND SARANARK (2006) on the FFV supply chain in Thailand finding that a supply chain around an export company offers better chances for smallholder involvement than the FFV supermarket supply chain.

Also, our results do not confirm the finding of a previous study that the largest supermarket chains fully vertically integrate with dedicated wholesalers by acquisition to have their own preferred supplier programs. According to our results, this holds for Konzum only and other large supermarket chains in Croatia have not acquired dedicated wholesalers. Instead, large supermarket chains and the dedicated wholesalers are in fierce competition for obtaining produce from the FFV growers. Our findings suggest that it can be expected in the future that the wholesalers drop out of the FFV supermarket supply chain, unless the wholesalers specialize in a niche or the export market. This implies that the share of smaller farmers in the FFV supermarket supply chain will decrease further, in case supermarket supply chain participation of smallholders is not especially promoted.

Also, supermarkets have a strong interest to further increase local procurement of FFV, especially directly from larger farmers. One of the major factors hindering this development is that the vast majority of FFV is cultivated on orchards and plantations smaller than 1 ha. For FFV producers to directly link to the supermarkets they need to a) meet the minimum quality and quantity requirements, and b) have access to a distribution facility. Smaller farmers generally do not meet these requirements and therefore have to supply their produce via wholesalers to supermarkets, implying that a part of the margin is attributed to the middleman and reducing the farmer's revenue.

To foster the further development of the FFV sector in Croatia we encourage the Croatian government, the European Commission and international lenders to promote the organization of farmers and their joint investment in a distribution facility.

We suggest farmers to organize beyond a cooperative in a producer organization which has an established successful wholesaler as one of its members. This increases the chance of the producer organization to be successful since the wholesaler's existing relationships with supermarkets and the management knowledge can be utilized, and the credibility vis-à-vis banks might be higher. It would be optimal if the wholesaler is also engaged in the production of FFV such that technical advice can be carried forward to the other members of the cooperative.

This model of a producer organization would allow not only the even smaller FFV growers but also the wholesalers to benefit, since the latter are expected to drop out of the supply chain unless they reorganize.

Therefore, the Croatian government should create a legal framework for producers to organize not only in cooperatives, but also in more hierarchical models as e.g. a trade company in the form of a limited liability company or a joint stock company. Also, this would make it easier to win an established wholesaler as a member of the producer organisation since the cooperative's rule one-member-one-vote does not necessarily apply.

In addition, the European Commission could best foster the organization of FFV growers in Croatia by speeding up the process for Croatia to become a member of the EU. First, this would put additional pressure on Croatian FFV growers to overcome their distaste to organize since the EU market organization for FFV allows financial support to be attributed to FFV growers only through grower organizations. Also, since EU legislation allows farmers to organize beyond a cooperative in producer organizations according to EU regulation 2200/96, EU accession puts pressure on the Croatian government to create a legal framework for producer organizations.

If the aim is to keep even smaller farmers in the FFV supermarket supply chain, then investments of organized FFV growers in a distribution facility, which is the primary bottleneck, should be supported financially by e.g. credit guarantees or the provision of investment funds.

Also, technical assistance should be provided to the FFV growers regarding managing production and commodity price risk. The insufficient availability and affordability of efficient risk sharing instruments in Croatia restrict efficient risk management and generate a highly uncertain business environment. There is a high potential for upgrading the currently offered agricultural insurance in Croatia, particularly concerning vegetables production and greenhouse insurance. To tackle this issue, the Croatian Agricultural Extension Service should give education and advisory support to the fruit and vegetable growers. In lowering production risk, FFV growers might become more attractive for supermarkets providing farm assistance programs.

In future research it should be more comprehensively investigated why the farm assistance provided in the FFV sector is particularly low, and is significantly lower than in other sectors as e.g. in the sugar or

the grain sector in Croatia. This should particularly account for the role of governmental market interventions in the different sectors.

Our conclusion should be further tested by investigating vertical coordination in the FFV supply chain in neighboring countries, especially Serbia and Macedonia, which similarly to Croatia has excellent conditions for FFV productions.

Also, the features of the above suggested innovative model for a producer organization should be defined more in detail based on the experiences gained in existing cooperatives and pilot projects.

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