System Dynamics and Innovation in Food Networks 2013

Proceedings of the 6th International European Forum on System Dynamics and Innovation in Food Networks, organized by the International Center for Food Chain and Network Research, University of Bonn, Germany
February 18-22, 2013, Innsbruck-Igls, Austria
officially endorsed by

EAAE(European Association of Agricultural Economists)
IFAMA (International Food and Agribusiness Management Assoc.)
AIEA2 (Assoc. Intern. di Economia Alimentare e Agro-Industriale)
CIGR (Intern. Commission of Agric. and Biosystems Engineering)
INFITA (Intern. Network for IT in Agric., Food and the Environment)

edited by

U. Rickert and G. Schiefer

© 2013, Universität Bonn-ILB, Germany,
ISSN 2194-511X

Published by
Universität Bonn-ILB Press, Bonn
(Rheinische Friedrich-Wilhelms-Universität Bonn,
Institut für Lebensmittel- und Ressourcenökonomik)

Order Address:
Department of Food and Resource Economics, University of Bonn
Meckenheimer Allee 174, D-53115 Bonn, Germany
Phone: ++49-228-733500, Fax: ++49-228-733431
e-mail: uf.ilr@uni-bonn.de
Printed by
Universitätsdruckerei der Rheinischen Friedrich-Wilhelms-Universität Bonn

Opportunities for Local for Local Food Production: A case in the Dutch Fruit and Vegetables

Jurriaan Visser[1], Jacques Trienekens[2], and Paul van Beek[2]
[1]SuikerUnie – Agrarische Zaken
[2]Wageningen University, Management Studies, The Netherlands
Jurriaan.Visser@Suikerunie.com ; *Jacques.Trienekens@wur.nl ;* Paul.vanBeek@wur.nl

Abstract

This paper investigates the opportunities for farmers to produce for local consumers, based on a case study in the Dutch horticulture sector. Main requirements for the set-up of a local chain of supply chain actors are investigated. Producer requirements are added value, availability of time, infrastructure and training. Retailer requirements are quality of food, purchasing volumes, food safety, communication to consumers and traceability of products. For consumers taste/freshness, sustainability, health benefits and authenticity are important attributes of local foods. Based on literature review and interviews with stakeholders four possible strategies for local food chains are defined. The 'keep it local' strategy means that the local food supply chains will not make use of the current infrastructure of the marketing coop that acts as chain coordinator. Deliveries are directly between farmer and retail outlet. The local products - conventional supply chain strategy implies that current (non-local) supply chains are used to distribute local products. The supply chain planning will be more complex since products need to be separated per grower and distributed to several local supermarkets. In the 'enabling producers' strategy the marketing coop/chain coordinator is going to enable its member producers to sell their products locally. The marketing coop can support producers in for instance, billing and payments, marketing, logistics. The fourth strategy aims at strengthening current consumer communication strategies. It is argued that connecting producers and consumers, regardless of where they live is advantageous.
Conclusion is that strategy 3; 'Enabling producers', in combination with strategy 4; 'Strengthening current consumer communication strategies' are the most promising options in setting up local food supply chains. Strategies 1 and 2, where the marketing coop/chain coordinator itself takes on the challenge of setting up local food supply chains meets too much resistance from the retail companies (head-office level) and offers too little opportunities for providing added value to both producers and retailers.

Keywords: *Food supply chain, local production, consumer preferences, producer requirements, retail requirements, chain coordination*.

1 Introduction

A local food supply system is intended as a network of food producers and consumers that directly interact in a specific geographical and social context. These systems are often defined as alternative food supply systems, to indicate that they have an alternative organization if compared to mainstream food supply systems such as large-retailer-based ones. Another often used definition refers to short supply chains to emphasise the social and geographical proximity of food producers and consumers. Such direct market venues as farmers' markets, community-supported agriculture, vegetable box schemes, and other cooperative distribution and delivery programs have proliferated, especially in the last decade, in many advanced industrial countries (Festing, 1998; Groh & McFadden, 1997; Pascucci, 2010).

If relations between producers and consumers are distant and anonymous in more global food systems, in local, direct markets, they are immediate, personal and enacted in shared space (Lyson & Green, 1999). When local food systems are implemented, in general the number of intermediaries between farmers and consumers is also reduced. As a result, relationships that are developed in local food systems emerge from face-to-face interactions, potentially leading to a stronger sense of trust and social connectedness between actors (Hinrichs, 2000). In this perspective local food supply systems often rely on informal agreements and less on formalized safeguard devices (i.e. private quality certification). Another main feature of local food systems is that they can rely on decreasing transportation costs with beneficial outcomes for the environment. When supply can be organized within a certain region, food may have a smaller ecological footprint and may be less damageable for the environment.

Although the literature mentions efficiency considerations, economies of scale, food safety as pros of global production and distribution of food, local food production has various benefits:

- Local employment: localized food systems can deliver economic benefits, specifically in employment. The argument therefore is that it fosters job creation through direct employment as well as backward linkages, which encompass industries that enable agricultural production such as farm tool repairs, and forward linkages that involve the processing of raw agricultural output into consumer products (Roberts, 2008).
- Low carbon footprint: the environmental benefits of local food systems are held to be multi-faceted. Producing local should, in theory, emit less greenhouse gases than producing all over the world when climates are the same and the production is as well. According to a study conducted by Stockholm University, a basic diet including some meat, grain, fruits and vegetables composed of imported ingredients can require up to four times the energy and greenhouse gas emissions of an equivalent diet from local sources (Halweil, 2004). This is not necessarily so (Saunders et al., 2006) and not all products can be grown everywhere (Strahler & Strahler, 1989), but a working local food system will in many cases be more environmentally friendly, just by reducing travel miles.
- Community commitment: trust and social connection characterize direct agricultural markets and distinguish local food systems from their global counterparts. These social benefits are referred to as “social embeddedness” which includes social ties, assumed to change and improve human economic interactions that are often seen as the hallmark of direct agricultural markets or small scale, local, supermarkets. This embeddedness then becomes an important part of the “value-added” product offered in the farmers’ market experience that can generate valued societal ties, familiarity and trust between consumers and producers (Hinrichs, 2000).
- Economical multiplier: money spent on local food has significant multiplier effects on the community’s economy. For example, a dollar spent locally “is usually spent 6 to 15 times before it leaves the community. From $1, you create $5 to $14 in value within that community” (Mitchell, 2008). Farmers and other market vendors buy their raw materials, equipment and other goods and services locally as well as other goods and services. Consumers who purchase directly from farmers at farmers’ markets also typically spend more money at the nearby stores and restaurants, which furthers the local economic growth.

This paper presents a literature review and case study with a multi-stakeholder perspective on the pros and cons of the set-up of local food chains. The case is situated in a region around a large city in The Netherlands with fruit and vegetable producers who consider local production for local consumption, thereby supported by a large fruit and vegetables marketing and distribution cooperative (*further in this article to be named marketing coop*). The marketing coop investigates its role as chain coordinator of the chains to be set up. Main requirements for the set-up of a local chain by the various supply chain actors: farmers – distributing company – retailer – consumer, were investigated. Interviews were performed with 4 supermarket managers (3 managers of retail outlets of two different retailers and one head-office manager), two fruit growers and three vegetables growers and six department managers of the marketing coop (logistics, food safety, marketing, product quality, ICT and sourcing). In total 15 interviews were performed and business processes such as logistics and quality control were observed. Four scenarios to enhance local food production for local consumption were derived.

2 Consumer requirements related to local food production

Consumer requirements were drawn from literature as there is a large literature on this subject.

Taste and freshness

Freshness is a decisive attribute for the consumer choice of fruits and vegetables (Ragaert et al. 2004; Péneau et al. 2006). Literature describes the taste and freshness of locally produced food products as one of the main reasons for consumers to buy local products (Pearson et al. 2011). In a survey amongst urban consumers Kahn et al. (2010) find freshness the most important reason for buying locally produced food products. Wolf et al. (2005) found that consumers perceive local produce to be fresher looking and fresher tasting.

Supporting the local community

Next to the better perceived product characteristics of locally produced food, consumers also buy these products because of social reasons. Through buying locally produced food products, consumers feel they support the community (Pearson et al. 2009; Pearson et al. 2011). The British Institute of Grocery Distribution (IGD) found as second most important reason to buy locally produced food products, the support of local food producers (IGD, 2010). Support for the local economy is a reason for 75 per cent of US shoppers for buying local food at direct markets or in conventional grocery stores (Food Marketing Institute, 2009). Bean et al. (2011) also picture a strong appreciation of local agriculture and a desire to support local farmers, whose loss is perceived as having negative consequences for local communities and their economies, as one reason identified as motivating consumer support of local food systems.

Sustainability

The environmental impact of food production and transportation has affected the opinion of consumers towards locally produced food products. Consumers believe locally produced food products are more sustainable than conventional produced food products (Pearson et al. 2009, Born et al. 2006; Pearson et al. 2011; IGD, 2010). Environmental impact of

transporting foods across great distances is a reason for 35 per cent of US shoppers for buying local food at direct markets or in conventional grocery stores (Food Marketing Institute, 2009).
Although consumers believe locally produced food products are more sustainable, questions are raised to whether this is true. The popular view is that greater food miles equate to higher levels of greenhouse gas emissions for food items. A problem with this viewpoint is that transport is only one part of the overall food system. All other parts of the food system are also responsible for producing greenhouse gases, and without further analysis it may be wrong to assume that the transport element of the food system is dominant in terms of greenhouse gas production' (Edwards-Jones, 2010).

Provenance

Knowing where food products come from is regarded as a quality attribute. In many cases, regional provenance is recognized as providing social, economic, environmental and health benefits for producers and consumers (Delind, 2006). Consumers better trust local food because the source is known (Pearson et al. 2009; Pearson et al., 2011). Barling et al. (2009) finds for the wheat industry the provenance of products becomes more important for consumers for the perception of food safety and as a communication tool. Consumers need to feel a connection with the food they eat; therefore a main task is conveying this through marketing strategies (Hingly et al. 2010).

Health benefits

Consumers in general perceive local food as healthier over non-local food. Personal health benefits may arise from local food networks as they increase the availability and diversity of seasonal foods that may encourage the purchase of more fresh and unprocessed foods (Pearson et al. 2011).

Authenticity

Last motivation for consumers to buy local food is their aversion from the 'industrialised' conventional food supply chains. The authenticity (not being associated with mass production) is one of the reasons for consumers to buy locally produced food products (Pearson et al. 2011). The growing consumer interest in product attributes such as authenticity has fuelled the demand for regional foods (Teuber, 2011).

2.1 Barriers for local consumption

Next to the motivations of consumers to buy locally produced food products, literature also describes reason or 'barriers' why consumers do not buy these products.

Price

The first barrier is the price or perceived price of local food. 'An obvious obstacle for local food is the perceived price premium' (Hingley et al. 2010). In a questionnaire spread under urban consumers Kahn et al. (2010) mentions barriers which hold consumers from buying locally produced food products. Most important barrier is the higher price. In a research aimed to find ways to get local food out of the niche market affordability is one of the two barriers for local food to become more popular (Little et al. 2010).

Availability

/Local foods may be more difficult for consumers to find than mainstream food due to seasonal constraints and limited accessibility (Hardesty, 2008). Little et al. (2010) and Kahn et al. (2010) find the limited access to local food the second barrier for local food to become more popular. Interestingly, another barrier withholding urban consumers is the fact that locally produced food products are not available in supermarkets.

3 Producer and retailer requirements

3.1 Producer requirements

Added value

Many farmers recognise that, if they are to remain profitable, they cannot just be commodity producers but must find ways to add value (Moverley, 2007). Farmers recognise that selling their products more directly to consumers would be an opportunity to become more profitable. 'Local food marketing offers opportunities for producers struggling to remain competitive in a global market space' (Morris et al. 2003). For the producers, a key motivation to participate in local food supply chains is therefore to retain more of the 'added value' of their products (Ilbery et al. 2005).

All growers interviewed indicate that getting a higher price for their products is important for participating in local food supply chains. One fruit grower indicates that the price premium depends on the volume times the price, this should make up for the extra costs of local sales. When the volume is higher the price premium can be lower and vice versa. Some growers are sceptic about getting higher prices from retailers. One of the interviewed soft-fruit growers has experience in this. 'We have a special raspberry for one retail chain. Because of improved quality and higher labour cost, the retailer payed a higher price than the normal raspberry. After a while the retailer indicated my price was too high because he could get 'ordinary' raspberries for a lower price. So in the end retailers a most concerned with the price and stop to value the added value in quality I deliver'.

Most growers also indicate other reasons why local food chains or shorter supply chains would have benefits to their company. An interviewed lettuce grower indicates for example that the lettuce he sees in shops is sometimes of very poor quality while it is of hight quality when growers sell it. 'This hurts, I would like it if in the local concept the product quality would be optimal in the shops'. Tighter relations between growers and customers like supermarkets are also seen as positive. The growers work together with the customers to improve the quality of the products and reduce the time between harvest and shops. A pepper grower indicated that his company is active in social media and has a web shop. The primary goal of the internet activity is not making more money but making connections between consumers and growers and making food production more transparent. In the long term this could have positive consequences for the financial position of the company but this is not the primary goal.

Time constraints

The second condition producers set to local food chains is the time it costs to participate in them. Recruiting producers to participate in local food supply chains will be challenging as 'producers do not have the time to market their products' (Hardesty, 2008). Interviews with farmers in New York (Uva, 2002) and California (Kambara et al. 2002) indicated that shortage of labour specifically related to marketing activities is consistently reported by farmers as being a barrier to direct marketing.
Most growers in our case, however, indicate that time constraints is not an important barrier for participating in local food supply chains. All growers that were interviewed have one or many people working for them making it possible to take on some extra duties. However, an interviewed field vegetable grower has a clear opinion on this matter; 'everything is possible as long as the extra labour is paid for'. Many growers indicate that more and more is asked from them while prices have gone down. 'this can't go on for ever'. The extra cost for the local food chains depend on what extra activities need to be done in order to sell the products. One of the growers indicates that he is supplying to Freshweb which picks up the products daily. Freshweb is supplying our products mainly to restaurants., these are not necessarily local. 'Freshweb is still in a start-up phase and I am willing to invest time in this project because I hope it will work'.

Infrastructure

Farmers who do find time to sell their products locally run into the problem that the current food supply chains and supply chain actors are not arranged to deal with local food. 'Lack of

infrastructure related to distribution of local and regional food is reported as a barrier to local food market development' (Shipman, 2009). Customers like retailers need consistent deliveries of uniform products. For this, the local food supply chain lacks mid-scale, aggregation and distribution systems that move local food into mainstream markets in a cost-effective manner (Day-Farnsworth et al. 2009).
All growers in the case study are worried about the additional logistical costs of local food supply chains. They indicate that the current supply chains are designed to get the products from the farm to the consumer as quick and low cost as possible. Local supply chains will make the logistical costs higher.
About the ordering system everyone agrees that an email or some electronic ordering system would be the best option. Combining the electronic orders with a text message or a call is preferred as most growers don't spend all day behind the computer. The growers also agree on how the products should be picked up. Most growers already have several buyers of their products so multiple trucks come each day. They are used to make the orders including the needed documentation. The truck drivers then loads the ordered products themselves.

Role of the marketing coop/ chain coordinator

About what role the chain coordinator (the marketing coop in the case) should play in local food supply chains and whether or not it should set-up the local food supply chains the opinions differ. Especially one of the growers is strongly in favour of this. 'I think producers themselves can contact clients. A small producer can adapt much easier to changes than a large organisation. I would opt for an easy system of [the marketing coop] enabling producers to sell local, with an easy billing system. The GMO[1] an NMA[2] rules should be covered. The marketing coop should also play a small commercial role in setting prices. I see a lot of producers which are shy in asking a fair price. This drives down prices and destroys the market'.

[1]GMO is a subsidy mechanism offered by the European Union. Growers which are a member of a sales organisation (like The Greenery) can apply for the subsidies. Precondition of the subsidies is that all products from growers are sold through the sales organisation.

[2]The NMA, (Dutch competition authority) is responsible for guarding fair competition on the Dutch markets. NMA rules prevent companies from making price agreements.

3.2 Retailer requirements

Literature describes the increasing interest of retailers in local food. In an American survey, Dunne et al. (2010) finds that 'the widely observed increase in demand has made carrying local food a customer-driven practice in many stores'. Also Dutch retailers are interested in local food. The largest retailer in The Netherlands; Ahold, mentions in its corporate responsibility report, the effort it makes to offer locally produced food products (Ahold, 2011).

Intrinsic product quality

The first condition retailers set is the product quality of local food. High product quality is one of the reasons for selling locally produced food products (Dunne et al. 2010). Product quality in this respect is the intrinsic quality of the products, especially taste and freshness.

In a survey among Small and Medium Enterprises (SME's) working in the agri-food sector, 65% identified freshness as the most essential attribute in local product positioning (Hingly et al. 2010). In a survey amongst Swedish retailers, five out of twelve retailers indicated they will increase their local food sales because consumers perceive their quality as superior (Ekelund et al. 2009).
All supermarket managers believe that the intrinsic quality attributes are more important than the extrinsic quality attributes of local food.
One of the reasons the cooperative retailer has a limited number of producers is that it wants to assure high product quality as uniformly as possible. 'For example, for our regular supply we have only one cucumber grower, we can monitor quality closely, offer uniform products and make direct agreements with the grower'. The sourcing manager of the cooperative retailer agrees that shorter supply chains are favourable with regard to intrinsic food quality, he however indicates that this is already the case because of the limited number of producers and fast logistics. 'Local supply would mean that for all product categories we would have a number of growers, this is unmanageable'.

Sourcing

Sourcing local food is perceived challenging by retailers. Inconsistent supply and delivery are among the factors that make local food purchase difficult for some conventional retailers and wholesalers leading to additional transaction and logistics costs for the buyers (Abatekassa, et al. 2011). King et al. (2010) also comments on the challenge in sourcing local food by retailers. 'The current retail sourcing systems are ideally suited for sourcing consistent quality products at low cost from wherever they are available and so has been an integral part of an increasingly national and global food system'. The local products have to be delivered in the right quantities and the right quality in order for retailers to participate in local food supply chains.
The supermarkets that were visited are supplied with fresh vegetables daily. They strive to keep the shelf time of fresh produce as low as possible. For products with high turnover the shelf time is usually not more than one or two days. Products with low turnover usually have a longer shelve time. The ordering of fruits and vegetables is done through an internet-based ordering system in both supermarkets investigated. The supermarket managers indicated that they would prefer to order the local products through the ordering systems which are currently used.
In the questions regarding sourcing the difference between the cooperative supermarket organisation and the private retail company becomes clear. The cooperative supermarkets are owned by independent entrepreneurs who have much more freedom in what they sell than the private retail organization. Individual ''coop'' supermarkets are allowed to source ten per cent outside the central retail organisation.
According to the manager of a cold store it wouldn't be a problem if local products are supplied outside regular deliveries as long as it would fit the supply schedule. He indicated that he would prefer to receive the locally produced products in the regular retail truck which comes every day. 'Extra deliveries distort the processes in the shop and take up much time'.
The sourcing manager of the cooperative supermarket chain was very resolute about if local food supply, directly from producer to supermarket is possible within a national retail chain. 'Local food supply chains in that way are impossible'. 'A local grower around Rotterdam is not local around Maastricht. This would mean we need hundreds of growers, this is

unmanageable for a central retail organisation. The local concept doesn't fit the brand strategy. The costs of local distribution will be much higher than regular distribution'.
A second option of selling local food would be that products from growers all over the Netherlands are aggregated in the current DC's and from there distributed to the region they are produced. The sourcing manager indicated that this option is also impossible to manage and very expensive. 'This would mean we still have way too many growers and all kind of practical problems would arise. For example we would need separate pallet places for all products from all growers. This means we would need thousands of pallet places, we would need an enormous DC.

Purchase volume

A more specific sourcing condition is the purchase volume required by retailers, which is an important issue in marketing local food through supermarkets. 'The supermarket's general preference is for purchasing high volume food products from fewer, larger producers or through local food aggregators in order to remain price competitive and to ensure product quality and quantity minimizing product safety related risks' (Abatekassa et al. 2011). For many producers in the local food sector, their production volumes are insufficiently large to meet the requirements of supermarkets and wholesalers (Morris et al. 2003). Therefore, supplying adequate volumes is the key challenge for local food supply chains.
All supermarket managers in the case indicate that they are striving to sell products as uniformly as possible. Because of this, supermarkets work with preferably one or a limited number of producers.

Food safety

Next to the logistical conditions food safety conditions are essential for selling local food to retailers. 'The retailers have an increasing liability and food safety related concerns to establish direct relationships with potential local food producers' (Abatekassa, et al. 2011). DeLind (2010) finds several regional US supermarkets which stopped sourcing locally produced food products because of food safety regulations. Contrary, Dunne et al. (2010) finds that one of the reasons for retailers to source local food products is their perceived higher food safety.
Large European retail companies are very rigorous in their criteria for traceability (Schwägele, 2005). Retail enterprises take an increasingly dominant position in the entire supply chain, and put pressure on upstream enterprises adopting traceability system (Jinshi, 2011). Remarkable in this sense is that products in supermarkets often end up in one large bin. The growers can then no longer be identified, while until that stage the products are in many cases 100 per cent traceable (Aramyan, et al. 2007)
One of the retail managers addresses the topic of food safety in relation to the marketing coop. If an organisation like a chain coordinator is responsible for the local food supply, they must be able to assure the safety of the supplied food. In the current situation he expects food safety and tracking and tracing not to be an issue on local food supply chains set up by The Greenery.

Communication to the consumer

Literature finds communication to the consumer to be important for the success of local food. Ilbery et al. (2005) even view this as the most distinctive attribute of local food.

Carrying this information has several advantages over non-local food. 'It is perceived that successful communication with the end-consumer will help develop mutual trust and differentiate local products from other conventional and non-local products' (Sage, 2003). The information which is carried with the products should be trustworthy since, 'maintaining a product's credibility and reputation is essential to keep consumer demand for local products (IGD, 2010). This is not yet the case with local food. 'Especially the communication of what 'local' means is inconsistent and most of the times unclear to consumers' (Dunne et al. 2010).

Communication and information provision efforts can have an impact in terms of changing consumers' knowledge, shaping their attitudes and redirecting their decision making, including food choices and dietary behaviour (Verbeke, 2008). Ways to attract and inform consumers are:

- *Certification and labelling* systems belong to the most effective instruments that can induce positive changes in consumer behaviour. Empirical research findings, showing that consumers prefer information attached to products and labels, support this conclusion (Koszewska, 2011). An example of certification is the EKO certificate indicating products are produced organically.
- The *product packaging* also plays a major part in providing information to consumers. Numerous market trends suggest a growing role for product packaging as a brand communication vehicle (Underwood et al. 2001).
- *Communication through websites* is an important way for companies to communicate there environmental and social responsibility (Biloslavo et al. 2009). Currently almost all corporate websites have a section regarding sustainability and corporate social responsibility. From the top 50 American companies 80% has a fully functioning corporate social responsibility website (Gomez et al. 2011).

What the supermarket managers also indicated was that they believe consumers are not willing to pay a whole lot more for their fruits and vegetables if they are locally produced. Especially when the locally produced food products would replace the current assortment of non-local food products, the supermarkets are not willing to ask a significant higher price.

One of the outlet managers indicates that for his supermarket a benefit of local food sales would be able to differentiate from other supermarkets. He indicates it is hard to differentiate a supermarket on ordinary products like soft drinks, toilet paper etc. 'With distinctive products like local fresh products a supermarket can really offer their customers something unique'. Both other supermarket managers indicate similar motivations for their interest in local food, they are seeking ways to differentiate their assortment form other supermarkets to attract consumers.

The methods of communicating to consumers which are mentioned all supermarket managers are: hanging posters in the shops and communicating via product packaging. One of the outlet managers suggests organising trips to the local growers. He has experience with taking consumers to producers and he has noticed that consumers get a certain positive feeling about products, which causes consumers to stick with certain products.

Table 1. Summarises requirements from producers, retailers and consumers for local food production for local food consumption.

Producer requirements	Retailer requirements	Consumer motivations
Added value	Food quality	Taste/ Freshness
Time availability	Sourcing	Support community
Infrastructure	Purchase volume	Sustainability
Training and education	Food safety	Provenance
	Communication to consumer	Health benefits
	Tracking and tracing	Authenticity

4 The role of the marketing coop/ chain coordinator

Time between producer and consumer

The superior taste and freshness of local food products is the most heard argument from consumers to buy locally produced food products. Consumer studies show the concept of freshness to be determined primarily by time from harvest/production to the consumer (Cardello et al. 2003). This indicates that the speed of the supply chain is vital to delivering fresh products to consumers.

According to the manager of the logistics department, the time between harvest and display on the shelves is around two days. With direct deliveries from producer to customers this time can be reduced.

The manager of the product quality department indicates that the time between consumers and producers is an important determinant of freshness in supermarkets. The importance however depends on the type of fruit or vegetable. Especially in leafy vegetables it is vital to get the products fast from producer to supermarkets. Current supply chains manage to get the products in the supermarkets between 24 and 48 hours. For products like cucumbers, the time is much less important. When stored under the right conditions, these products can be kept fresh for days.

In the past years, the increased direct transports from producers to retailers already greatly impacted the way product quality controls are performed. ‘Past years the quality inspectors which used to work on the DC’s have been turned into mobile quality inspectors which inspect product quality at the producer companies’. As the volume of products which pass the DC’s diminishes, product quality inspection becomes more decentralized. Therefore local food supply chains would be no problem for the food quality department.

According to the logistics manager the main options for the marketing coop /chain coordinator company in setting up local food supply chains are:

- Running products over the central DC’s and then distributing them to local supermarkets.
- Setting up/hiring local DC’s where products are locally aggregated and then distributed
- Direct transportation from producer to supermarket.If the central DC’s are not used local DC’s could be set up. This is however contrary to the current strategy of the marketing coop to reduce the number of DC’s. Problem here is that because a lot of Dutch products are seasonal the local DC’s would not be used year round making

fixed costs to high. A solution for this could be using the packing stations of producers which are present in many parts of the Netherlands.

- Last option would be to not use any kind of DC at all and pick up products from several local producers and immediately transport them to supermarkets. However the problem arises that not all growers have the packing, storage and grading facilities needed to directly supply supermarkets. This problem is also mentioned by a fruit grower. He indicates that only about one quarter of the fruit growers have up to date grading facilities. This shows that if direct transportation from producer to supermarkets are used many producers will not be able participate in the local supply chains.

Value distribution

As mentioned before, the main motivation of producers to participate in local food supply chains is the financial added value to their business. To give producers a higher price for their products either the selling price to retailers must be higher or the cost of distribution must be lower.
The costs of the current supply chains will not be much lower when local supply chains will be introduced. The DC's will still be there and the trucks still have to pass all growers since the volume in local supply chains is expected to be insufficient to take up all products from individual producers. Only in the long run the marketing coop will be able to save some costs on the conventional supply chain. If due to the local food supply chains, the product volumes handled by the central DC's diminishes some costs can be saved there. In the end volume is important, when the local supply chains distribute high volumes the costs can be spread over a large number of products.

5 Strategies to set up local food supply chains

Four possible strategies are presented. The strategies are based on the information which is retrieved through literature study and interviews. In the first three strategies a product is local when it is produced within a radius of twenty kilometres. The specific distance is arbitrary however both the interviewed supermarket managers and the product marketing manager indicated that the producer should work within 'biking distance' of the consumers. In each strategy the responsibilities of the four stakeholders, producers, the marketing coop/chain coordinator, retailers and the consumers are mentioned in brief.

5.1 'Keep it local'

The 'keep it local' strategy means that the local food supply chains will not make use of the current infrastructure of The Greenery. The products are either transported directly from producers to local supermarkets or from producers to local DC's and then to local supermarkets. The 'keep it local' strategy resembles the direct shipments with milk route strategy. Supermarkets order daily, the producers provide the order the same day. The orders are distributed overnight and delivered at the supermarkets the next day.

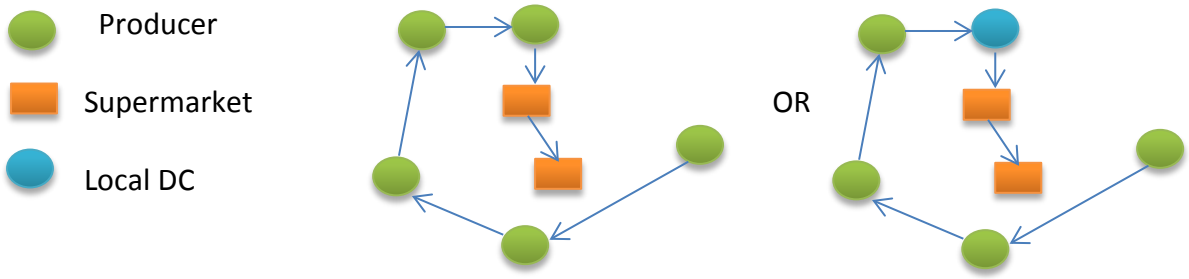

Figure 1. Keep it local chain

Producers

During the harvesting season producers daily get an e-mail and text message with the order for that day. Producers have to harvest and prepare the order before the end of the day. If necessary producers pack and label the products. The products are loaded by the truck driver.
For promotional activities the producers are asked to participate in interviews in local news media, occasional promotions on the shop floor and regularly update a web page of their company about recent activities. Once a year the participating companies have an open day where consumers can visit local producers which explain how they grow their crops.

The marketing coop

The responsibility for sales, billing, logistics and ordering is at the marketing coop. Furthermore it is coordinating the promotional activities and is monitoring food safety and product quality. If a local DC is used it can organise the packing and labelling here.

Retailers

The supermarkets separately order the available local food products in the computer system they already use for ordering. The ordered products are supplied the next day, separate from the 'normal' deliveries. The products are placed in the ordinary shelves instead of the non-local products, the local products thus replace the non-local products.

Consumers

The consumers buy product which are grown local and distributed local and harvested just hours before the products are sold, the path from seed to fork is transparent and local. Consumers can visit the places where their food is grown and can meet the people who provide their food. Most interviewees believe the costs of this supply chain will be considerably higher than conventional supply chains resulting in higher food prices for the consumers.
Advantages:

- Very short supply chain so very fresh products
- Strong marketing concept
- Unique concept, hard to copy by competitors

Disadvantages:

- Fragmentation of pick-ups at producers
- Fragmentation of deliveries at supermarkets
- Fragmentation of product streams for the marketing coop
- Central retail companies want to work with limited number of producers
- Adding costs while not saving as much costs elsewhere
- Not all producers have packing and grading equipment

5.2 Local products, conventional supply chain

This strategy implies that current (non-local) supply chains are used to distribute local products. The products are picked up at the producers and transported to the adequate DC of the marketing coop. From here, the products are distributed to the DC's of the retailers. For producers and supermarkets this strategy would mean that their way of working is not really changed. The supply chain planning and DC work will however be complicated severely since products need to be separated per grower and distributed to several local supermarkets.

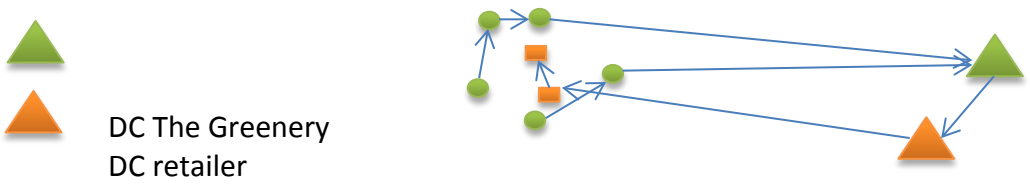

Figure 2. Conventional chain

Producers

For the producers the distribution of the products from their company will hardly change. The products which will be sold locally are picked up by the same truck which picks up the products which are sold not local. For the promotional activities, the same activities as in the 'keep it local' strategy are organised.

The marketing coop

Currently a product like tomato is separated on quality (several quality classes) and harvesting date. In this strategy, all products also have to be separated on producer, leading to an enormous variety of products.

Consumers

Supply chain transparency however is difficult to achieve. If for example a consumer buys a product in a supermarket in Lelystad. It can well be that a product which is grown a few kilometres from its house is transported to the DC of the marketing coop company in Barendrecht. Then the product is transported to the DC of the retailer in Veghel and then transported back to Lelystad. This is a journey of several hundreds of kilometres. Because of this journey the freshness of the products will not be as high as in the first strategy. The

supply chain in this strategy will be more costly than the current supply chain because of increased supply chain complexity. Therefore the prices of the local products will have to be higher than 'normal' food prices.
Advantages:

- No extra pick-ups at producers
- No extra deliveries at supermarkets
- Unique concept, hard to copy by competitors

Disadvantages:

- Product freshness is not improved
- Marketing concept is weak
- Supply chain complexity is raised a lot and costs increase
- Central retail companies want to work with limited number of producers

5.3 Enabling producers

The 'enabling producers' strategy is fundamentally different from the first two strategies presented. In this strategy not the marketing coop/chain coordinator itself is taking up the challenge of setting up local food supply chains, however it is going to enable their member producers to sell their products locally. The marketing coop can support producers in for instance, billing and payments, marketing, logistics and it can connect the assortment of producers so they can jointly offer a wide assortment of local products. The local supply chains will then look similar to figure 19, main difference is that the responsibility of running the supply chains is not in the hands of the marketing coop but is in the hands of the producers.

Producers

The producers play a key role in this strategy. The producers are enabled to set up local food supply chains alone, or together with other local members of the marketing coop. Acquiring new customers arranging logistics, marketing, quality standards etc. is all the responsibility of the producer (The marketing coop/chain coordinator can support this). In this strategy not only supermarkets could be supplied, also restaurants, specialty shops, hospitals, care homes, farm shops etc. could all be supplied by the producers. The Greenery can support the producers in the whole process of setting up and running local food supply chains.

Retailers

The supermarkets will have direct contact with the producers. Agreements about ordering and deliveries will be made between producer and supermarket. The products are delivered separately from the current product streams. Together with the producers agreements about promotional activities can be made.

Consumer

Depending on the sales efforts of the producers, local food can be sold anywhere. Patients in care-homes and hospitals could get local food, consumers can buy the products in specialty shops, at farm shops or eat it in restaurants. It is hard to predict whether the price the consumer has to pay for the local fruits and vegetables is comparable to the current prices of

these products. It is likely that prices will be comparable because less supply chain actors need to earn money of these products.

Advantages:

- Strong marketing concept
- Short supply chain, so fresh products
- Producers can use their local network to sell products
- Central retail companies do not have to be involved in local sales
- Could deliver significant added value to producers
- Producers can adapt much faster to changing market conditions then the marketing coop

Disadvantages:

- Fragmentation of deliveries at supermarkets
- Producers need to invest a lot of time and effort to set up and run the local supply chains
- Not all producers have packing and grading equipment
- Supermarkets owned by central retail companies are unlikely to buy local products because these demand central sourcing of their outlets

5.4 Strengthening current consumer communication strategy

Currently the marketing coop is mainly communicating with consumers through social media and their farmer website. All interviewed producers commented positive on the efforts The marketing coop makes to communicate with consumers. Here the discussion about what is local is relevant. Some producers and also the sourcing manager interviewed indicated that products produced in the Netherlands can also be seen as local. It is argued that connecting producers and consumers, regardless of where they live is advantageous. QR codes[1] can be used so that for each product a consumer buys, he or she can find out who the producer is and find all kind of information about how and where the products are grown.

[1]A QR code is a two-dimensional bar code which is increasingly used on packaging and in advertisement. Consumers can scan the code with their smart phone and the phone will show the website to which the code is linked. (Poot, 2011)

Producers

For the producers there will not be much change. The producers are asked to frequently update their company page on the farmer website of the marketing coop. The producers will be asked to open their company for the public and explain consumers about their growing methods.

The marketing coop

The marketing coop should expand the farmer website, increase its activities in social media and introduce QR codes on the packaging of their products.

Consumers

For consumers the supply of food becomes more transparent, on fruits and vegetables a QR code is placed with which consumers can go to a website. Here is explained who, where and how the product is produced.

Advantages:

- No new supply chain needs to be set up
- No need for retailers to increase their number of producers
- Supply chain becomes more transparent to consumers

Disadvantages:

- Marketing concept not as strong as real food sales
- No clear (financial) added value for producers, the marketing coop and retailers
- Easy to copy by competitors

6 Conclusions, discussion and further research

Based upon the information found in this research it is concluded that strategy 3; 'Enabling producers', in combination with strategy 4; 'Strengthening current consumer communication strategies' are the most promising options in setting up local food supply chains. Strategies 1 and 2, where The marketing coop/chain coordinator itself takes on the challenge of setting up local food supply chains meets too much resistance from the central retail companies and offers too little opportunities for providing added value to both producers and retailers.

Table 2. summarizes and compares the different strategies

Motivations	Strategy 1	Strategy 2	Strategy 3	Strategy 4
Added value for producers	+/-	+/-	++	+/-
Distinctive products	++	+	++	+
Small number of producers	--	--	--	+/-
Superior freshness	+	+/-	+	+/-
Total supply chain costs	-	-	-	+/-

Resistance from retail

Retail is more and more working with limited numbers of regular suppliers. Because of this, retailers are capable of providing uniform quality products to consumers and to improve product quality by interactions with growers. Strategies 1 and 2 would mean central retail companies would have to work with a great number of local producers making it impossible for them to have the same control over product quality and uniformity. In strategy 3 the producers themselves can decide what customers to approach to sell their products to. Supermarket outlets could be potential customers. However it should be taken into account that not all supermarket chains allow local supermarkets to source outside the central sourcing. The number of supermarkets which are expected to participate in strategy 3 is therefore limited.

Added value

All producers indicate that getting a higher price for their products would be the most, or an important motivation for participating in local food supply chains. Participating in strategy 1 will cost the producers extra time. All supermarket managers which were interviewed indicate that extra deliveries of fruits and vegetable are increasing costs because of extra

work. The retailers and the product marketing manager of the marketing coop agree that consumers are not willing to pay a whole lot more for local fruits and vegetables compared to non-local. The research was not able to give the exact costs of local distribution. However interviewees indicated that the costs made in local food supply chains cannot met by extra profits in the conventional supply chain. Because of the fragmented distribution the total supply chain costs (conventional + local) of marketing coop are expected to rise.
Like strategy 1 also strategy 2 is unlikely to create more value for producers. The supply chain costs will rise because the complexity is increased significantly. The prices consumers are willing to pay will be equal or just slightly higher than current prices leaving no extra value for producers. Both the cooperative retailer and the marketing cooperative indicated that strategy 2 is too complex, costly and the marketing benefits too low to be feasible.
Strategy 3 shares quite some similarities with strategy 1, however the fundamental difference is that in strategy 3 the initiative and the responsibilities are with the producers. The marketing coop is enabling producers to sell their products local and arranges services for which it is beneficial to arrange together. These could be services like, pricing, billing, marketing and logistics, this depends on the demand from producers. The benefit of this strategy is that producers are able to get a higher price for their products. The supply chain is reduced to only the producer and the supermarket. The central retail company is left out and because the marketing coop has fewer responsibilities and fewer tasks, they only get paid for the services they deliver.
Strategy 4 is different from all other strategies because it does not change the current supply of fruits and vegetables to supermarkets. The difference is that the marketing coop increases it marketing activities towards consumers. The marketing activities are aimed at creating a sort of bond between consumers and producers by enabling consumers to see who grew their food. The added value of this strategy is supposedly small, however the costs are limited as well and in the long term a bond between consumers and producers could prove to be beneficial.

6.1 Future research

The case study in this paper shows opportunities and limitations for local food production for local food consumption. Although consumers and producers are sympathetic towards local food production, major limitations are:

- Local food chains don't fit easily in in current distribution channels that are based on large volumes and demands for consistent quality
- Extra costs of local production for local consumption are possibly/probably not paid for by consumers (through higher consumer prices)

However, there seem to be opportunities for local food production for local consumption as well. This is dependent on

- The right communication to the consumer and linking producer and consumer through transparent information exchange in production, harvesting, distribution and sales phases
- Redefinition of ''local'' food production, as having knowledge of a farmer 100 km from home can be as good for a consumer as having knowledge of a farmer 20 km from home.

These are some key issues for further research on this topic.

References

Abatekassa, G. Peterson, C. (2011) Market Access for Local Food through the Conventional Food Supply Chain, *International Food and Agribusiness Management Review*, Volume 14, Issue 1.

Aramyan, L.H. Oude Lansink, A.G.J.M. van der Vorst J.G.A.J. van Kooten, O. (2007) Performance measurement in agri-food supply chains: a case study. *Supply Chain Management: An International Journal* Volume 12 Issue 4.

Barling, D. Sharpe, R. and Lang, T. (2009) Traceability and ethical concerns in the UK wheat–bread chain: from food safety to provenance to transparency. *International journal of agricultural sustainability* Volume 7 Issue 4.

Bean, M. Sharp, J.S. (2011) Profiling alternative food system supporters: The personal and social basis of local and organic food support, *Renewable Agriculture and Food Systems* Volume 26 Issue 3.

Biloslavo, R. Trnavcevic, A. (2009), Web sites as tools of communication of a 'green' company", *Management Decision*, Volume 47 Issue 7.

Born, B. Purcell, M. (2006) Avoiding the Local Trap. Scale and Food Systems in Planning Research. *Journal of Planning Education and Research*, Volume 26 Issue2.

Cardello, A. V. Schutz, H. G. (2003) The concept of food freshness: Uncovering its meaning and importance to consumers. *Freshness and shelf life of foods.* Volume 836.

Day-Farnsworth, L. McCown, B. Miller, M. Pfeiffer, A. (2009) Scaling Up: Meeting the Demand for Local Food, *University of Wisconsin-Extension Ag Innovation Center and UW-Madison Center for Integrated Agricultural Systems*, Madison, United States.

DeLind, L. B. (2006) Of bodies, place, and culture: re-situating local food. *Journal of Agricultural and Environmental Ethics* Volume 19.

Delind, L. B. (2010) Are local food and the local food movement taking us where we want to go? Or are we hitching our wagons to the wrong stars? *Agriculture and Human Values* Volume 28 Issue 2.

Dunne, J. Chambers, K. Giombolini, K. Schlegel, S. (2010) What does 'local' mean in the grocery store? Renewable Agriculture and Food Systems Volume 26, Issue 1

Edwards-Jones, G. (2010). Does eating local food reduce the environmental impact of food production and enhance consumer health? *Proceedings of the Nutrition Society*, 69.

Ekelund, L, Tjärnemo, H. (2009). The Competitiveness of Local Food Clusters – Supermarket Strategies versus Consumer Preferences for Vegetables in Sweden. *Proceedings of the XVI International Symposium on Horticultural Economics and Management*

Festing, H. (1998). Farmers' Markets. Bristol: Eco-logic Books.

Food Marketing Institute. 2009. U.S. Grocery Shopper Trends, Food Marketing Institute: http://www.fmi.org/news_releases/index.cfm?fuseaction=mediatext&id=1064 [retrieved on 19-10-2011].

Gomez, L.M. Chalmeta, R. (2011) Corporate responsibility in U.S. corporate websites: A pilot study. *Public relations review* Volume 37 Issue 1.

Groh, T., & McFadden, S. (1997). Farms of Tomorrow Revisited. Kimberton: Biodynamic Farming and Gardening Association.

Halweil, B. (2004). Eat Here: Reclaiming Homegrown Pleasures in a Global Supermarket. New York: W.W. Norton & Company.

Hardesty, S.D. (2008) The Growing Role of Local Food Markets, *American Journal of Agricultural Economics*, Volume 90.

Hingley, M. Boone, J. Haley, S. (2010) Local Food Marketing as a Development Opportunity for Small UK Agri-Food Businesses, *International Journal Food System Dynamics* Volume 3

Hinrichs, C. C. (2000). "Embeddedness and local food systems: notes on two types of direct agricultural marketing". Journal of Rural Studies. , Vol. 16 (2000): 295-303.

IGD (Institute of Grocery Distribution) (2010). Local food gains ground with shoppers. Available from IGD: http://www.igd.com/index.asp?id=1&fid=1&sid=8&tid=16&cid=1427 [Accessed 10 October 2011].

Ilbery, B. Maye, D. (2005) Alternative (shorter) food supply chains and specialist livestock products in the Scottish–English borders. *Environment and Planning A* Volume 37.

Jinshi, W. Hongjie, L. (2011) Establishing Food Traceability System based on Game Theory : from the Perspective of Retailers *Advances in Information Sciences and Service Sciences,* Volume 3, Issue 6.

Kahn, F. Prior, C. (2010) Evaluating the urban consumer with regard to sourcing local food: a Heart of England study, *International Journal of Consumer Studies* Volume 34, Issue 2,

Kambara, K.M. and C.L. Shelley. (2002). The California Agricultural Direct Marketing Study*, California Institute of Rural Studies*, Davis, United States.

King, R.P. Gómez, M. I. DiGiacomo, (2010) G. Can local food go mainstream? *The magazine of food, farm and resource issue* Volume 25 Issue 1.

Koszewska M. (2011) Social and Eco-labelling of Textile and Clothing Goods as Means of Communication and Product Differentiation. *Fibres & Textiles in Eastern Europe*, Volume 19, Issue 4.

Little, R. Maye, D. Ilbery, B. (2010) Collective purchase: moving local and organic foods beyond the niche market. *Environment and Planning A*, Volume 42

Lyson, T. A., & Green, J. (1999). The Agricultural Marketscape: A Framework for Sustaining Agriculture and Communities in the Northeast. Journal of Sustainable Agriculture , 15(2/3):133–150.

Mitchell, T. (2008). "Choices for Sustainable Living.". Northwest Earth Institute.

Morris, C. Buller, H. (2003) "The local food sector: A preliminary assessment of its form and impact in Gloucestershire", *British Food Journal*, Volume 105 Issue 8

Moverley, J. (2007) Local and Regional Foods – What Next for the Market Place? *Journal of the Royal Agricultural Society of England* Volume 168.

Olsen, P. Aschan, M. (2010) Reference method for analyzing material flow, information flow and information loss in food supply chains, *Trends in Food Science & Technology* Volume 21.

Pearson, D Bailey, A. (2009) Horticultural Supply Chains: the Case of Local Food Networks in the United Kingdom

Pearson, D. Henryks, J. Trott, A. Jones, P. Parker, G. Dumaresq, D. Dyball, R. (2011) Local food: understanding consumer motivations in innovative retail formats, *British Food Journal* Volume 113, Issue 7.

Péneau, S. Hoehn, E. Roth, H.R. Escher, F. Nuessli, J. (2006), "Importance and consumer perception of freshness of apples", *Food Quality and Preference*, Volume 17 Issue 1-2.

Poot, E. (2011), Demonstratie QR codes op Fruit Logistica, http://www.glastuinbouw.wur.nl /NL/thema/internationaal/QR-codes/ [retrieved on 15-02-2012]

Ragaert, P. Verbeke, W. Devlieghere, F. Debevere, J. (2004), "Consumer perception and choice of minimally processed vegetables and packaged fruits". *Food Quality and Preference*. Volume 15 Issue 3.

Roberts, W. (2008). No-Nonsense Guide to World Food. Oxford: New Internationalist.

Sage, C. (2003) Social Embeddedness and Relations of Regard Alternative 'Good Food' M Networks in South-West Ireland. *Journal of Rural Studies* Volume 19.

Schwägele F. (2005) Traceability from a European context. *Meat science* Volume 71 Issue 1.

Saunders, S., Barber, A., & Taylor, G. (2006). Food Miles – Comparative Energy/Emissions Performance of New Zealand's Agriculture Industry. Lincoln University. Christchurch: Agribusiness and Economics Research Unit (AERU).

Teuber R. (2011) Consumers' and producers' expectations towards geographical indications Empirical evidence for a German case study. *British Food Journal* Volume 113 issue 7.

Trienekens J. M. Wognum P.M. Beulens A.J.M. van der Vorst J.G.A.J (2012) Transparency in complex dynamic food supply chains. *Advanced Engineering Informatics*

Underwood, R. L. Klein, N. M. Burke, R.R. (2001) Packaging communication: attentional effects of product imagery. *Journal of Product & Brand Management* Volume 10 Issue 7.

Uva, W.L. (2002) An Analysis of Vegetable Farms' Direct Marketing Activities in New York State, *Journal of Food Distribution Research*, Volume 33.

Verbeke, W. (2008). Impact of communication on consumers' food choices. *Proceedings of the Nutrition Society*, Volume 67.

Wolf, M. A. Spittler, and J. Ahern, (2005) A Profile of Farmers' Market Consumers and the Perceived Advantages of Produce Sold at Farmers' Markets. *Journal of Food Distribution Research* Volume 36.