Supply Chain Design and Control Principles in Local Food Production: A Norwegian Case Study

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Abstract

Based on an analysis of four local food producers this paper explores the relation between the supply chain design and control principles, and the strategic fit. Local food has arisen as a popular supplement to the traditional supermarket product range offered by retailers and restaurants. However it has been shown that local food struggles with the market access, and that the supply chain is one of the obstacles preventing local food producers to gain a solid market position. We analyse how the supply chain of food specialties could be designed and controlled in order to fit with the competitive features of local food producers. It identifies a number of features of the local food chain, analyzes the obstacles and discusses how the characteristics could be dealt with by adjusting design and control principles. It develops generic designs and control principles for local food producers.

Keywords: *Local Food Production, Norwegian food artisans, Supply chain design and control principles*

1 Introduction

Local food has gained significant market interest, and by offering high quality food products local food producers have managed to create a niche in the traditional food sector and to widen its product range and diversity (Hingley et al., 2010; Visser et al., 2013). Local food from milk, fish, seashell and shellfish, meat, fruit and berries often include some kind of specialties features either from the raw material itself or its origin, or from the processing method which often is artisan and manual, produced in small quantities and delivered in close to “one-of-a-kind” batches to different categories of customers. Several terms are used when addressing these products such as specialties food, local food or small-scale food (Abatekassa & Peterson, 2011; Duram & Cawley, 2012; Ilbery & Maye, 2006; Pearson et al., 2011). Here we use the term local food as the joint term for products that typically are produced in small-scale production plants, with a specific recipe, production processes based on craftsmanship and where raw material and final product have a specific quality and uniqueness that add value to the customers.

Despite the growing market interest local food producers find it difficult to access the market. Bringing the products into the market and in particular the distribution of local food has been identified as a challenge (Abatekassa & Peterson, 2011; Magnus & Kvam, 2008; Visser et al., 2013). Local producers tend to perceive the traditional market channels such as retailers and food service as less profitable (Hingley et al., 2010) and many producers prefers to sell their products through alternative market channels such as farmer markets, co-operatives, farm outlets and local food schemes. Local food products which is sold e.g. through retailers have to compete on an industrialized market arena were the industrial food actors has turned into a highly efficiently and powerful systems by adapting to volume, scale and low cost as the competitive strategy. In the industrial food chain production facilities, warehouses and inventories, terminals and transport networks has all been designed and developed according to efficiency criteria’s based on volume benefits where cost, time and availability are the main performance indicators. Given the specific characteristics of the local food producers such as the volume and size, high added value products they cannot compete on scale and volume benefits as the industrial players do. Neither can they compete on well-recognized brands, high demand and turnover, or a solid logistical infrastructure. The competitiveness of local food producers needs to be found elsewhere such as in the products, location or production processes.

The strategic literature argue that in order to succeed in the market there needs to be strategic fit, that is an alignment between the companies' competitive features (the customers' requirements) and the supply chain strategy (Chopra & Meindl, 2013). For local food producers this means that the competitive features should be reflected in the way the supply chain is structured, designed and controlled (Hingley et al., 2010). In this paper we argue that the reason that distribution is challenging is that there is a misalignment in the capability of local food producers and the supply chain strategy. Thus the aim is to analyse the supply chain strategy of local food producers in order to develop design and control principles for achieving strategic fit. The assumption is that barriers in the supply chain of local food producers can be reduced and the market position strengthened by achieving strategic fit through adjusting the supply chain design and control principles.

The paper contributes to the area of local food production and supply chain design and control by identifying features of the local food supply chain, as well as by giving directions of how the local food chain should be designed and controlled to be aligned with the competitiveness of local food production. Furthermore, the study gives managerial insights to the local food sector by investigating the features of the existing practice and how this could be altered in order to strengthen the position of local food producers.

The following sections present a theoretical framework on design and control. The methodology is presented, followed by a description of the four local food producers. The case studies are analysed and discussed before a set of supply chain design and control principles are developed before the conclusion.

2 The control model analytical framework

Food is produced and distributed through a supply chain typically consisting of agriculture and primary production, processing and industrial production, and delivering and selling through intermediates, retailers and food service (Romsdal, 2014). Compared to other industries the food faces specific challenges regarding the planning and control of the resources and material flow in the supply chain (Shukla and Jharkaharia, 2013). Perishability of raw material, intermediates and final products constrains the possibilities of storage (Van der Vorst, 2000). Then the seasonality and long throughput times of the raw material lead to a risk of imbalances in demand and supply (Aramyan et al., 2007). Additionally the, the food production processes are designed for economy of scale so, the process is in conflict with the requirements that emanate from trends of increased product variety and demand uncertainty (Nakhla, 1995; Romsdal et al., 2011; Ivert et al., 2014). The main strategy in the supply chain strategy is to produce and deliver to stock based on forecasted expectation of demand and market trends in order to keep the cost level low, the service level and availability of products high (Ivert et al., 2014; Romsdal, 2014).

In order to analyse how the local food supply chain is designed and controlled we apply the control model framework which is a methodology for analysing manufacturing and supply chains (Strandhagen et al., 2010). From the perspective of product, market and production process characteristics, it provides a structured way to define the customer order decoupling point (CODP), control principles and control areas, as well as more detailed and specific planning and control issues. It stems from the MPC literature and is deeply rooted in the manufacturing models for planning and control of materials, resources and capacity such as in MRP/MRPII (Jacobs, 2011), but adapts the conceptual thinking of Toyota production system and Flow Oriented Manufacturing of the early 80´s. The basic fundament in the control model framework is that every system (production unit or supply chain) should have an operations platform or architecture which specify *how, when, were* products and information should flow. This is the specification of the design and control principles. The performance of the model should be measurable and important indicators are throughput time and lead-time, stock level and work in progress, service level and cost. A high performing model is one that is aligned with the competitive strategy and that is characterized by short throughput time, a small amount of work in progress, distinct areas of responsibility, uniform material flow and flexibility.

The design and control principles are context dependent, which means that it is the specific characteristics of the system that determine how the model should be composed, what the overall control strategy should be and the various control principles. The location of the customer order decoupling point (CODP) is the key decision followed by the selecting between MTS, MTO, ATO, etc. The lower level control principles is like the decision of the signals triggering an actions like serving a order, production start, stock replenishment and delivery frequency. When mapping and analyzing a system by the control model framework the following key characteristics that should be mapped and analyses are:

- The role of the company and the competitive context/environment
- The market and distribution channels (direct sale to customer or through wholesaler)
- The customers and their requirements, including demand patterns
- The products and their characteristics (one-to many or many to one, levels of BOM)
- The current CODP and production strategies
- The characteristics of the production and logistics processes (level of automation, flexibilities, capacities, bottlenecks)
- Current performance (delivery, lead-time, delivery frequency, stock level)

The content of the Control Models developed is illustrated by the case model shown in chapter 5.

3 Research methodology

The purpose of this paper is to analyze how local food producers operate and to propose design and control principles that allow strategic fit. To meet this objective the design science has been applied as the methodological framework in order to structure the analysis and develop propositions. Design science focus on the creation of propositions and suggestions of how problems can be solved and is suitable to explore and explain emerging operations management practices (Holmström et al., 2010). To support the design science framework an exploratory multiple case studies has been applied (Yin, 2014). The access to detailed knowledge through several case studies was necessary in order to explore the phenomenon in different contexts (Barratt et al., 2011).

The case environment is the region of Mid-Norway which is a large food region. The number of small and medium size food producers in the region is about 150 ("Handlingsplan for lokale matspesialiteter for Trøndelag," 2012-2015). The selection of the four cases in this study was based on their size, operations, products, localization, customer category and the producers' willingness to participate in the study. They represent different kind of operations and products, locations, distribution channels and customers. All producers are micro-sized and small companies and none of them have over 20 employees. Three of the cases consist of single producers and their activities, while one case consists of a network of producers, which secure that individual and collaborative models are included in the study.

In accordance with Yin (2014) an interview guide was designed and used during the data collection. Since several researchers were involved in the study, the guide helped to ensure that all had the same understanding of the basic concepts, terminology and issues. Facts and findings about the companies were collected before the case visit. The visits resulted in two types of data: explanation and observations of the main activities and operations, and quantitative and qualitative interview data and other documents from the companies. Interviews were carried out in several companies in the supply chain; distributor, store, restaurant and hotel. The interviews were recorded and notes were taken during the interviews. Directly after the visit the interviews were documented and summarized by the researcher before being sent to each company for approval and verification (Yin, 2014). The cross case analysis helped to understand the nature of the individual challenge, but also the variety in logistical challenges that surrounds local food producers (Eisenhardt, 1989). We have followed qualitative data analysis procedures (Miles & Huberman, 1984). The findings from the analysis and the propositions has been presented and discussed in workshops with the case companies. By this we have been able to more clearly specify the challenges and the strategies and the quality of the findings has been strengthened.

4 The Local food producers

An overview of the cases is given in the appendix 1. The ***shell case*** is a small producer of living seashell, which is a high quality fresh product that needs to be alive before cooking. Value is added to the product through the specific breading method and the water conditions. The customers are a few specialties food wholesalers, which resell the product to high-end stores and restaurants. Demand varies with a peak season in the summer. Production process includes harvesting, cleaning, sorting and packing. Forecasts decide the harvesting, while the rest of the operations are initiated by customer orders. After harvesting the shells are put into re-watering tanks where it can stay up till two days. Orders are packed from these tanks and shipped on the same day. A freight provider delivers the shipment to a regional transit cross-docking terminal for final shipment to customers. The challenge in this case is to be able to maintain a high and stable product quality throughout the

supply chain. The producer sees this as a problem caused by the short product shelf life and a mismatch between the volumes purchased by the intermediates and the end customer demand.

The ***cheese case*** is a small producer of awarded quality cheese. It is the quality of the raw material, the recipe and the production methods that add value to the products. The customers are a range of selected fine restaurant and stores. Production is initiated from forecasts and when orders arrive they picked from stock and shipped based on the requested delivery date. Distribution services are sourced from a diary distributor and the products are shipped within a national transport and terminal network directly to customer. The problems identified in this case are the length of the delivery time to national customers and the lack of information regarding the shipment and what will be the customer´s future demand. To some regions the delivery time can be over one week which reduces the time left to sell the product in store before it expire. Additionally, the lack of demand and stock level information restrict the producers planning flexibility and service level.

The ***meat case*** is a small producer of quality meat from sheep, deer and reindeer. It is the quality of the raw material and the receipt that adds value to the products. The products are sold as fresh, dried or frozen. The customers are a broad range such as retailers, restaurant and private consumers, but the customers' location is fairly concentrated in the local area. The demand varies and is highly seasonal. The production is made to stock based on forecasts and plans. Customer orders are picked from finish goods inventory and delivered based on the data agreed upon. The delivery frequency is quite flexible. The company deliver the products themselves due to the lack of transport alternatives. They mainly have local customers the delivery time is maximum one day. What restricts the producer is the lack of good delivery alternatives. They consider that the cost will become too high and the service level too low if somebody else should to the operations.

The ***food hub case*** consists of a set of small local food producers and a hub company that sells and consolidates a range of high quality products, which is either fresh, or frozen, or preserved. Value is added either by the quality of the raw material, the production processes and the recipe and the geographical and cultural condition in the region. All products are labelled and sold under a common product brand, but with the identity of the producer added. The customers are local, regional and national retailers, restaurants and hotels. Demand varies and most products are seasonal. Products are produced to stock and are delivered by the producer once a week to the consolidation hub for storing and dispatching. Customer orders are served from the hub. Distribution is operated by a national distributor, which collects at the hub 2-3 times a week. The delivery time varies dependent on the customer localization. Several challenges are identified in this case. First, due to the distribution network the delivery time to national customers are too long. Second, some of the dispatches are a mix of chilled and frozen products and few distributors can actually operate such a service on small volumes. Third, in order to provide a high service level (availability) and short order lead time the hub sees the need for having a better control of stock level, incoming orders and future demand and to know more precisely what, when and how much the producers will supply.

5 Analysis and thoughts of the current supply chain strategy

The characteristics of the current supply chain strategy in the cases can be summarized in Table 1.

Table 1.
The AS-IS characteristics of the case companies

Variable	Aspect	Characteristics
Product	Quantity	Low number of items per order (Shell, Cheese and Meat), medium order size (Food hub)
	Uniqueness	High price, high value, restricted shelf-life and temperature restrictions (all cases)
	Perishability	Varies between very short shelf-life (Shell, Food hub), medium (Chees) to long shelf life (Meat and Food hub)
	Variety	Low number of SKU (Shell and Cheese), medium number of SKU (Food hub and Meat)
Market	Customer	Products are sold to retailers (Cheese, Meat, Food hub), intermediates (Shell), food service (Cheese, Meat and Food hub) and private (all)
	Geographical distance	Local (all), regional (all) and national (Cheese, Food hub and Shell)
	Service level	Retailers require a high service level (over 97%) (Availability, delivery time/frequency, product range). The same do the food service customers but they are more flexible than the retailers
	Demand uncertainty	High level of uncertainty (all cases) and seasonal demand pattern (all cases)
Distribution	Distribution model	Direct to customer through a freight forwarder (Shell), to customer through distributor (Cheese and Food hub) and direct to customer through own transport (Meat)
	Lead-time	Long lead-time (Shell, Meat and Cheese), medium (Meat)
Production	Production strategy	MTS (Cheese, Meat and Food hub), pack on order (Shell). Production is initiated on forecast in all cases. CODP in finished goods inventory (Cheese, Meat and Food hub) and CODP in packing lines (Shell)
	Size and capacity	All cases have a small-volume capacity
	Demand information	Only orders are exchanged between the producer, customer and distribution service provider (all cases) No exchange of plans, forecast, stock level or demand variation

Below a generic AS-IS model is illustrates the main elements in the control model of a local food producer (Figure **1**).

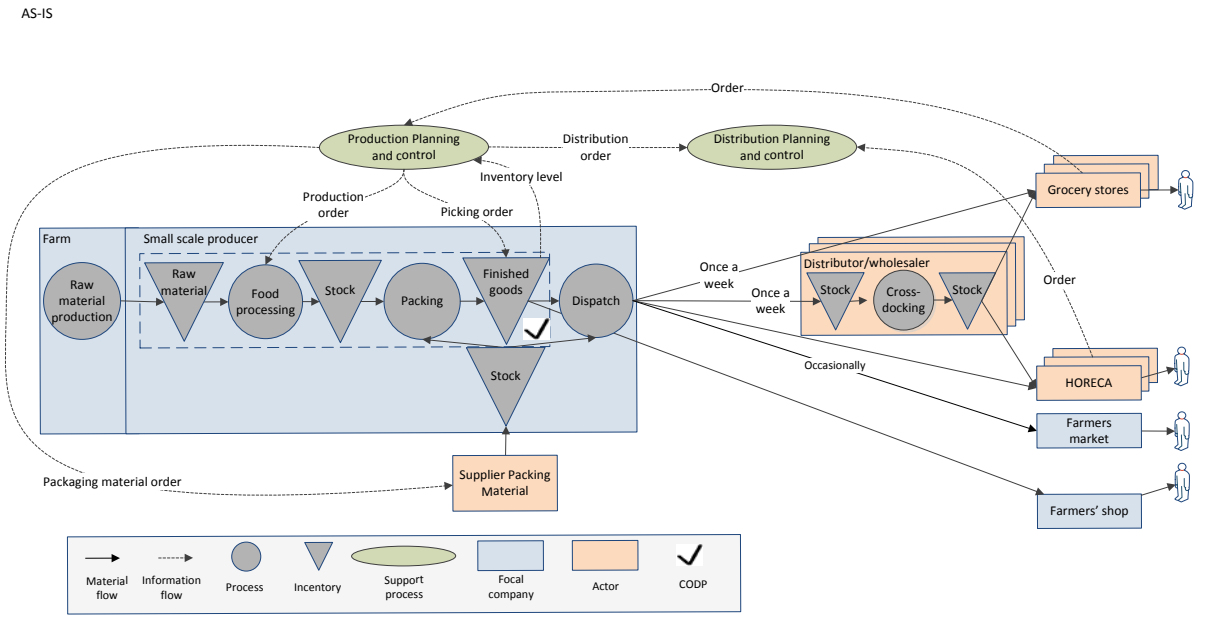

Figure 1. Generic AS-IS control model for local food producers

There are several aspects related to the current way to design and control the supply chain that should be reflected upon.

First, the low volume and capacity restrictions have a significant impact on the designed and control principles, and the local food producers try to adapt to the scale principles in the industrialized food chain. This is visible by the way the deliveries, frequencies and distribution services are consolidated. Orders are mainly accumulated during the week and shipped once or maybe twice a week. For customers that is located in the very close local area deliveries can be arranged more frequently such as in the service offered in the Meat case.

Second, the main production and operations strategy is make-to-stock (MTS) which together with the capacity limitations restricts the flexibility in the system. The customer order decoupling point (CODP) is typically placed at finished goods inventory, which means that the connection between customer orders and individual products is made at this stage in the supply chain. This affects the responsiveness to customers and the length of the lead-time.

Third, the producer runs the production with limited insight on the demand situation. Accept from the orders they receive there is no exchange demand related information such as plans, forecast, stock level, or demand changes between the producer and the customers. This has implications for the planning and control of production and sales as forecasts are based on historical sales data combined with intuition and previous experience. It is difficult to capture changes in demand when information is not shared in the supply chain. This is of special importance for the case companies since the demand varies.

Fourth, the supply chain operations are controlled separately and without considering the trade-offs between parameters such as demand, delivery frequency, stock-level and delivery time, transport and cost. This affects the product throughput time, the product quality, the volume of products being wasted and it makes it difficult for the producers to see the real product demand. Additionally the level of collaboration (horizontally and vertically) in order to reduce the scale limitations the supply chain is limited. Especially is this evident for transport and the access to physical distribution services. Since transport is sourced individually by each producer the terms and conditions achieved is poor regarding availability, price level and frequency.

Fifth, the principles of "one size fits all" are the dominant operations model for the production and supply chain. One production and distribution model applied for all products, customers and geographical areas even when we see there are differences. We could not find that any of the producers differentiated on product or customer, in the way they operate the production. Despite this the market approach is broad (all type of

customer segments and geographical regions) and not precisely defined regarding how to fulfil the market requirements. The customer segments in the study have different service requirements. Retailers are preferred because of the long-term contracts and volume. But the retailers are also the most demanding and the one with the most concerns regarding the service level given by the local producers. For the retailers' availability, product range and delivery frequency is highly important, while the restaurants are more flexible regarding availability but not on product quality.

6 What's the right supply chain for food specialties?

This section discusses the supply chain features of local food producers and relates it to the theoretical design and control aspects described by Chopra and Meindl (2013).

***Efficiency vs. responsiveness configuration principles*:** Looking at the characteristics of the local food system it fit well with the characteristics of what Fisher (1997) defines as a responsive supply chain strategy, with its variable and unpredictable demand, and the added high value and quality and specialties features (innovative products) (Chopra & Meindl, 2013). Responsiveness is the ability to react on request and particularly the speed with which a supply chain can adjust its outputs to an external request like a customer order (Reichhart & Holweg, 2007). Responsiveness is characterized by short time-to-market, the ability to scale up (or down) quickly and the rapid incorporation of consumer preferences into the design process (Christopher et al., 2004). Considering the producers´ actual situation, what they do is to adapt into an efficiency supply chain configuration scheme defined and designed by the industrial food actors. The efficiency configuration is suited for high volume, stable demand, repetitive operations, and economics of scale benefits which hardly fit for the environment the local food producers exists. According to Hingley et al. (2010) this should not be considered as a disadvantage but instead a change to a profitable differential. Thus given the characteristics of the volatile demand, specialties and perishable products and customers that´s requesting high service, the creation of responsive supply chains is the key to survival in turbulent and volatile markets where shortened life-cycles and global economic and competitive forces create additional uncertainty (Christopher, 2000).

Pull vs. push control principles: Food specialties are produced based on planned sale and made to stock (MTS) scheme, and orders are dispatched from stock. This is a typical push system, which gives little room for flexibility and responsiveness regarding customer requirements and internal needs for larger flexibility in production and inventory. Push systems is typically preferred in situations where demand is stable and economics of scale benefits could be gained. Given the characteristics of the local production system, it is better aligned with a pull system were operations are based on customer orders and driven by demand. For the local food producers, with the restrictions in production capacity and the long production lead time, a combination of push and pull principles could be applied in order to be both efficient and responsive (Simchi-Levi et al., 2008). The customer order decupling point (CODP), where the product is connected to a specific order, could either be in the production before the quality level is decided or according to customer request or it could be later in the supply chain and closer to the customer (Olhager, 2010). Rather than focusing primarily on speed or cost, best value supply chains are designed to deliver superior total value to the customer in terms of speed, cost, quality, and flexibility (Ketchen et al., 2008).

Differentiation criteria: The food producers practices the "one size fits all model" were products, shipments and customers all follow the same routes and are controlled by the same principles, even if they have different characteristics in terms of value, shelf life, order volume and demand pattern, requested by different customers, etc. Aitken et al. (2005) argue that supply chain should be designed differently and to specify the model for how segments of flows should be controlled based on the specific product/market context. One supply chain can thus consist of number different flows, each with the aim of achieve higher levels of responsiveness to the different needs of the customer. The customer order decoupling point (CODP) has a key role in differentiating supply chain operations, by making a distinct decoupling of the operations upstream and downstream the CODP, the boundary between make-to-order (MTO) and make-to-stock (MTS) (Olhager, 2010).

***Integration and collaboration*:** The operations in the local food supply chain are disintegrated (vertically and horizontally) and each echelon is separately controlled based on signals from the next or previous echelon. This weakens the position of the producer and make it vulnerable concerning operating a small-volume system and service requirements. Integration, both information and material flow, is strongly connected to operational and

business performance, and internal and customer integration are more strongly related to improving performance than supplier integration (Flynn et al., 2010; Prajogo & Olhager, 2012). For local food producers two aspects is of vital importance; collaboration and information sharing (Abatekassa & Peterson, 2011), since they are important in order to compensate for scale benefits and for providing high customer service.

Only in the food hub case we found that integration and collaboration was used to consolidate products for dispatching. Several collaboration concepts in the fast moving consumer goods sector, for example, or Vendor Managed Inventory (VMI) and Collaborative Planning, Forecasting and Replenishment (CPFR) initiatives have emerged during the last decades. The basic principles in the models are to integrate and make processes and operations seamless in order to reduce lead-time, inventory level, cost, etc. The models build on process and procedure alignment and require a stable and long term partnership. There are several variants of how supply chain members can collaborate on planning and inventory including for instance information exchange, VMI and synchronized supply (Holweg et al., 2005).

Except for the orders and order confirmation there are no regular exchange of demand information between the how much and what will be produced, stock level and customer demand, expected demand and planned ordering. Information is not sent to the distribution regarding needed transport capacity and time. Both effective information sharing and effective supply chain practices are critical in achieving good supply chain performance (Abatekassa & Peterson, 2011; Zhou & Benton Jr, 2007). It is widely accepted that the creation of a seamless and synchronized supply chain leads to increased responsiveness and lower inventory costs. Reducing uncertainty via the transparency of information flow is a major objective in external supply chain collaboration (Ryu et al., 2009). Both strategic information exchange and operational information exchange are required to enhance supply chain performance (Ramayah & Omar, 2010). ICT has major positive implications for supply chains and is associated with major potential benefits (Chopra & Meindl, 2013; Simchi-Levy et al., 2008).

7 Generic Control Models for local food

From the case studies and by applying the control model analytical framework we suggest developing three generic models for the different market and distribution strategies that might be pursued. The three being:

- Producer – to retail customers
- Producer – direct to restaurants and food service
- Producer – direct to consumers (Internet based)

For the three generic models a set of design and control principles should be applied, independent of the distribution and market differences. These principles are:

- Strategic decision making regarding customer category and principles for prioritizing customers including geographical areas must be taken first, including ambitions regarding availability, delivery times and frequency
- There is a need to integrate production planning and demand planning, both on long and short term
- Key performance indicators (KPI) must be defined and supported by a measurement system
- An e-based system for administrative as well as planning and control processes in the SC must be established, including decision support tools for order management
- Define a control model for allowing sharing of capacity and resource with local and regional companies (horizontally and vertically), and with flexibility of moving between the processes of manufacturing

For the model Producer – to retail customers, the design and control principles should specifically pursue the following:

- Define differentiated expected lead times and delivery frequency for each customer, applying a high turnover and direct delivery for sensitive and high quality products
- Seek to apply vendor managed inventory (VMI) principles where possible, supported by customer access to stock levels and demand in real-time

- Utilize distributor/cross docking operations and plan production accordingly
- Seek to place CODP in the production supported by pick and pack by order model, differentiated based on product/quality and on customer-order frequency and demand profile
- Apply electronic bidding for transport/logistics and decision support in dispatching model/transport service

The following generic model illustrates the principles (Figure 2).

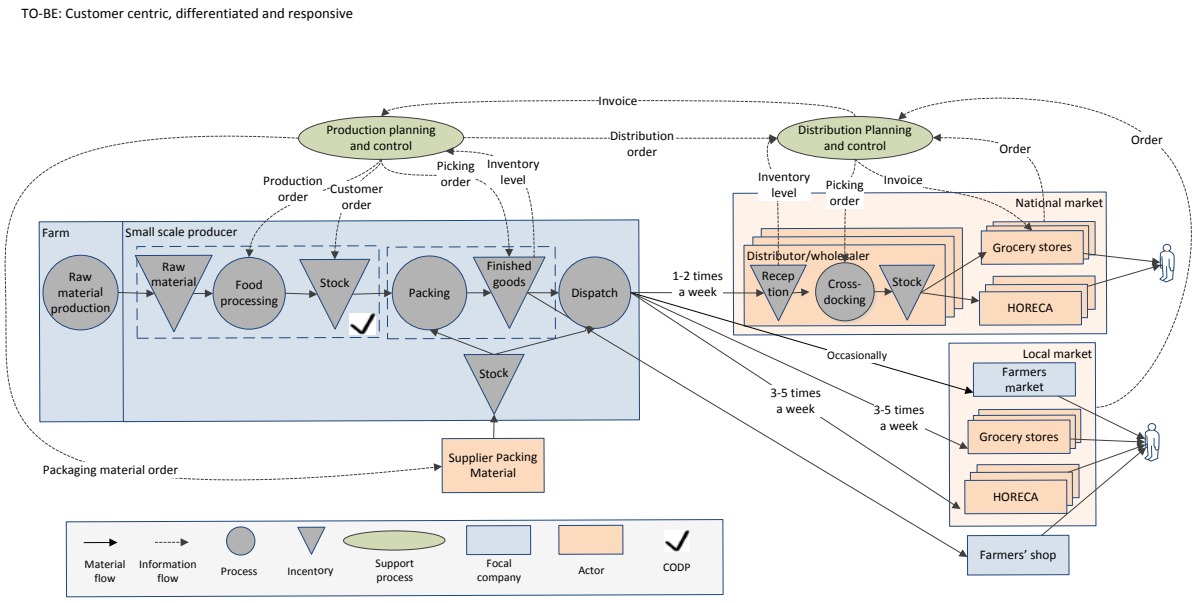

Figure 2. Generic TO-BE control model for local food producers

The main elements in the supply chain of local food producers are the unique and specialties features of the products and the production (Figure 2). This should be embedded into a responsive system which utilizes scope benefits, creates flexibility in production and distribution, compensates for scale drawbacks, builds on collaboration with partners and shares information with customers.

8 Conclusion

This paper explores how the supply chain of food specialties should be designed and controlled in order to fit with the competitive features of local food producers. It identifies a number of characteristics with the local food chain, and analyzes the obstacle regarding distributing these products to the market. Furthermore, the paper discusses how the characteristics could be dealt with by adjusting design and control principles. Based on this it develops generic designs and control principles for local food producers.

This study is the first one that at a detailed level analyzes and identifies the logistical challenges in the way the local food chain is designed and controlled. The results of the study show that if local food producers reconfigure the main design, and adapt new control principles, a better fit could be achieved between the competitive strengths of local food producers (unique products) and the supply chain.

Further, the study illustrates how the deliveries of food specialties to retailers could be designed and controlled, and likewise how restaurants and private customers could be served. For management, the implications of this research are the identification of strategies and control principles of particular importance in the local food chain; the suggestion of strategies and control principles for different customer categories should be helpful when redefining the strategies and delivery system.

This study is based on four cases and further research should continue the work on mapping the supply chain characteristics of local food systems, to investigate the relation between local food production and the market

requirements. Additionally further research needs to explore and test the strategies and principles proposed in this paper, such as demand information sharing, collaboration and consolidating models, and integrated supply chain control.

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References

Abatekassa, G., & Peterson, H. C. (2011). Market access for local food through the conventional food supply chain. *International Food and Agribusiness Management Review, 14*(1), 63-82.

Aitken, J., Childerhouse, P., Christopher, M., & Towill, D. (2005). Designing and managing multiple pipelines. *Journal of Business Logistics, 26*(2), 73-96.

Aramyan, L. H., Lansink, A. G. J. M. O., van der Vorst, J. G. A. J. and van Kooten, O. (2007). *Performance measurement in agri-food supply chains: A case study.* Supply Chain Management: An International Journal, vol. 12, no. 4, pp. 304-315.

Barratt, M., Choi, T. Y., & Li, M. (2011). Qualitative case studies in operations management: trends, research outcomes, and future research implications. *Journal of Operations Management, 29*(4), 329-342.

Chopra, S., & Meindl, P. (2013). *Supply chain management : strategy, planning, and operation*. Boston: Pearson.

Christopher, M. (2000). The agile supply chain: competing in volatile markets. *Industrial marketing management, 29*(1), 37-44.

Christopher, M., Lowson, R., & Peck, H. (2004). Creating agile supply chains in the fashion industry. *International Journal of Retail & Distribution Management, 32*(8), 367-376.

Duram, L., & Cawley, M. (2012). Irish Chefs and Restaurants in the Geography of "Local" Food Value Chains.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review, 14*(4), 532-550.

Fisher, M. L. (1997). What is the right supply chain for your product? *Harvard business review, 75*, 105-117.

Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of Operations Management, 28*(1), 58-71. doi: http://dx.doi.org/10.1016/j.jom.2009.06.001

Handlingsplan for lokale matspesialiteter for Trøndelag. (2012-2015) Retrieved 31.01, 2014, from http://www.fylkesmannen.no/Nord-Trondelag/Landbruk-og-mat/Mat/handlingsplan-for-lokale-matspesialiteter-for-Trondelag-2012-15/

Hingley, M., Boone, J., & Haley, S. (2010). Local food marketing as a development opportunity for small UK agri-food businesses. *International Journal on Food System Dynamics, 1*(3), 194-203.

Holmström, J., Främling, K., & Ala-Risku, T. (2010). The uses of tracking in operations management: Synthesis of a research program. *International Journal of Production Economics, 126*(2), 267-275.

Holweg, M., Disney, S., Holmström, J., & Småros, J. (2005). Supply Chain Collaboration:: Making Sense of the Strategy Continuum. *European management journal, 23*(2), 170-181.

Ilbery, B., & Maye, D. (2006). Retailing local food in the Scottish–English borders: A supply chain perspective. *Geoforum, 37*(3), 352-367.

Ivert, L.K., Dukovska-Popovska, I., Kaipia, R., Fredriksson, A., Dreyer, H.C., Johansson, M.I., Chabada, L.,

Damgaard, C.M., Tuoikangas, N. (2014). Sales and operations planning: responding to the needs of industrial food producers. Production Planning & Control, 2014

Jacobs, R., Whybark, C., Berry, W. and Vollmann, T. (2011). *Manufacturing planning and Control for Supply chain management.* McGraw-Hill.

Ketchen, J. D. J., Rebarick, W., Hult, G. T. M., & Meyer, D. (2008). Best value supply chains: A key competitive weapon for the 21st century. *Business Horizons, 51*(3), 235-243. doi: http://dx.doi.org/10.1016/j.bushor.2008.01.012

Magnus, T., & Kvam, G. (2008). Vekststrategier for lokal mat. *Frekvensrapport. Report, 8*(08).

Miles, M. B., & Huberman, A. M. (1984). Qualitative data analysis: a sourcebook of new methods; Qualitative data analysis: a sourcebook of new methods.

Nakhla, M. (1995). *Production control in the food processing industry: the need for flexibility in operations scheduling.* International Journal of Operations & Production Management, vol. 15, no. 8, pp. 73-88.

Olhager, J. (2010). The role of the customer order decoupling point in production and supply chain management. *Computers in Industry, 61*(9), 863-868.

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, 113*(7), 886-899.

Prajogo, D., & Olhager, J. (2012). Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration. *International Journal of Production Economics, 135*(1), 514-522.

Ramayah, T., & Omar, R. (2010). Information exchange and supply chain performance. *International journal of information technology & decision making, 9*(01), 35-52.

Reichhart, A., & Holweg, M. (2007). Creating the customer-responsive supply chain: a reconciliation of concepts. *International Journal of Operations & Production Management, 27*(11), 1144-1172.

Ryu, S.-J., Tsukishima, T., & Onari, H. (2009). A study on evaluation of demand information-sharing methods in supply chain. *International Journal of Production Economics, 120*(1), 162-175.

Romsdal, A. (2014). *Differentiated production planning and control in food supply chains*. Doctoral thesis at Norwegian University of Technology and Science (NTNU), 2014:16.

Romsdal 2011

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2008). *Designing and Managing the Supply Chain. Concepts, Strategies, and Case Studies*. Boston, Massachusetts: McGraw-Hill/Irwin.

Strandhagen, J., Dreyer, H. C., & Romsdal, A. (2010). Control Model for Intelligent and Demand-Driven Supply Chains1. *Managing global supply chain relationships*, 49.

Shukla, M. & Jharkharia, S. (2013). Agri-fresh produce supply chain management: A state-of-the-art literautre review. *International Journal of Operations and Production Management*, vol. 33, no. 2, pp.114-158.

Van der Vorst, J., van Dijk, S.J. and Beulens, A.J.M. (2001). Supply chain design in the food industry. *International Journal of Logistics Management*. Vol. 12, no. 2, pp. 73-86.

Visser, J., Trienekens, J., & van Beek, P. (2013). Opportunities for Local for Local Food Production: A case in the Dutch Fruit and Vegetables. *Proceedings in Food System Dynamics*, 417-437.

Yin, R. K. (2014). *Case study research: Design and methods* (Vol. 5): Sage.

Zhou, H., & Benton Jr, W. (2007). Supply chain practice and information sharing. *Journal of Operations Management, 25*(6), 1348-1365.