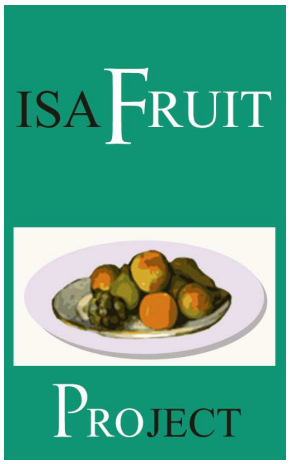

Project no.: 016279

Project acronym: ISAFRUIT

Project title: Increasing fruit consumption through a trans-disciplinary approach delivering high quality produce from environmentally friendly, sustainable production methods

Instrument: Integrated project

Thematic Priority: Food Quality and Safety

D 1.4.2: Description of the theoretical framework for a 'Consumer driven and responsive supply chain'

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PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

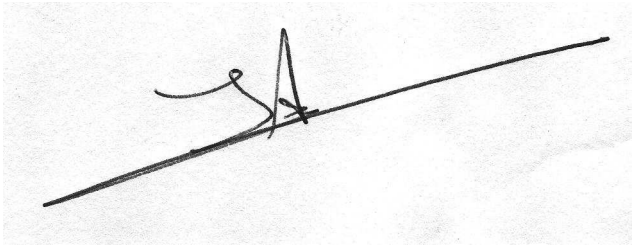
Description of deliverable

The present work was carried out within the Project 'ISAfruit'. The strategic objective of this project is to increase fruit consumption and thereby improve the health and well-being of Europeans and their environment, by taking a total chain approach and identifying bottlenecks and opportunities in the fruit chain from a consumer perspective. The report is a deliverable of Work package 1.4 (INNOCHAIN) of Pillar 1, which focuses on the area of 'Consumer driven and responsive supply chain'.

The overall objective of Work package 1.4 is to develop a conceptual framework of the mechanisms underlying innovativeness of the European fruit supply chains, in such a way that performance can be maximized. This deliverable (D1.4.2) gives a theoretical framework for analysis, design and implementation of consumer driven and responsive supply chain networks (SCN's). It is an elaboration of the work in deliverable D1.4.1; a review of major scientific publications on the rationales underlying consumer driven, innovative, and cost efficient supply chains and critical success factors for chain performance and successful supply chain management practices. The theoretical framework has been developed, tested and adjusted. It will applied in a study on European fruit supply chains investigating how the performance and innovativeness of European fruit supply chains can be maximized.

The results from Work package 1.4 can be used as guideline for a strategic transition of the European fruit industry toward a consumer-driven and responsive supply chain. As such, they are input for Work package 1.5, which will develop transition strategies for European fruit chains. The work of Work package 1.4 makes use of research output from Work packages 1.1 and 1.2 and will be carried out in close relation with Work packages 1.3 and 1.5. It will also provide valuable input to the formulation of research guidance that will be used in other pillars (3, 4 and 5).

This deliverable was made in cooperation between the partners 10 (WUR-LEI) WP-leader, 24 (UPM), 29 (AUA) and 38 (WAU).



Wageningen, January 16th, 2008

Ivo A. van der Lans
Scientific coordinator of ISAfruit Pillar 1
10 (WUR-LEI)

D 1.4.2.
Description of the theoretical framework for a 'Consumer driven and responsive supply chain'

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Acknowledgement
The present work was carried out within the Project 'ISAFRUIT '. The strategic objective of this project is to increase fruit consumption and thereby improve the health and well-being of Europeans and their environment, by taking a total chain approach, identifying the bottlenecks and addressing them by consumer-driven preferences. The report is a deliverable of Pillar 1, which focuses on the area of the 'Consumer driven and responsive supply chain'.

The project team wants to express its gratitude to Hans Maljaars (MSc.), who did a lot of work in analyzing the interviews, doing his master thesis at Wageningen University.

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Table of contents

Summary

Introduction
In this report a framework for analysis, design and implementation of fruit chain business systems is described. The objective of this framework is to support fruit companies of different European countries in the challenge of moving towards more consumer-oriented and responsive fruit Supply Chain Networks (SCN's). The framework is a conceptual model in which major elements of such SCN's are defined and elaborated (especially categorized listings and different models).

Method
The framework is developed in a design-oriented approach, performing the following research activities: definition study, iteratively development in 3 workshops with a team of 9 researchers from the participating countries Poland, Spain, Greece and The Netherlands; application to European fruit SCN's based on 15 in-depth interviews with key industry informants in the involved countries.

Results
The framework is a toolkit containing a method and 'recommended practice' model components that can be used in the following phases of a SCN innovation process:
1. Map existing fruit Supply Chain Networks ('As Is');
2. Define innovation strategies;
3. Design desired Supply Chain Network state ('To Be') per innovation strategy;
4. Implement designed innovation strategy.

In this report the framework is applied to the first two phases: mapping existing fruit SCN's and defining innovation strategies. Consequently the main results can be subdivided into:
- Definition of demand-driven fruit SCN's;
- Conceptual model of the SCN framework;
- Mappings of existing fruit SCN's;
- Innovation strategies for demand-driven fruit SCN's.

Definition
For the purpose of our research we defined demand-driven Supply Chain Networks as follows:

A Demand-driven Supply Chain Network is a SCN that senses and reacts to real-time demand information of the ultimate consumer and meets those varied and variable demands in a timely and cost-effective manner.

Conceptual model
The developed conceptual model defines the following major elements of SCN's:
- *SCN Strategy & Tactics*: generic strategies operationalized into measurable performance indicators and implementable innovation strategies;
- *SCN Business Processes*: primary (transaction and transformation processes) versus supporting processes;
- *SCN Actors*: network structure that depicts which companies are involved in the analyzed SCN and how the (especially buyer-supplier) relations in this network are formed;
- *SCN Management:* the way in which the chain processes performed by the actors in the SCN are governed and controlled, both formally and informally:
  - *Governance structures* for allocation of property and decision rights among different involved actors;
  - *Control* structures for planning and monitoring of business processes of the different actors within a certain governance structure.
- *SCN Resources*: capacities, be it people or means, capable to develop, produce and deliver the required products.

Mappings of existing fruit Supply Chain Networks
The generic framework is used to map existing fruit Supply Chain Networks for Fresh Fruit, Prepared Fruit and Processed Fruit (canned, juice, dried, frozen) in the Retail (in home) and Food Service (out of home) channels. These mappings are depicted in graphical representations of the different elements of the conceptual framework.

Innovation strategies for demand-driven fruit Supply Chain Networks
Innovation strategies consist of a general innovation principle and the performance indicators that it aims to improve. The paper focuses on Innovation Strategies for consumer-driven innovative fruit SCN's, i.e. different forms of generation, dissemination and responsiveness to market intelligence information. Examples of such strategies are replenishment via Vendor Managed Inventory (VMI), customer-order driven production, upstream value-added services (e.g. fruit producers perform processes that usually are done more downstream in the SCN, such as packaging and labeling), Point of Sales (POS) based forecasting, Collaborative Product Development, Consumer-driven Product Development.

Conclusions
The basic idea behind the developed framework is that there is no one best Supply Chain Network design ('one size fits all'). In contrary, fruit companies continuously have to decide in which Supply Chain Networks they want to participate, which role they are able to play the best and how they deliver added value in these networks. Next, they have to make new connections rapidly and employ 'up-to-the-minute' market intelligence information smoothly in business operations. The developed framework has shown to support the ability to innovate that is required for that. This, by providing a toolkit for analysis, design and implementation of multiple Supply Chain Network variants.

1 Introduction

Important intended output of the INNOCHAIN (Work package 1.4, Pillar 1) project is a framework for innovative demand-driven fruit Supply Chain Networks (further abbreviated as SCN's). The framework is a conceptual model in which the major elements of SCN's are defined and elaborated into relevant model components (especially categorized listings and models). As such it depicts the mechanisms underlying SCN performance, in particular SCN innovativeness, of the European fruit industry. The framework can be used as a frame of reference for SCN analysis, design and implementation to maximize performance. Consequently it improves the ability to innovate (innovativeness).

Basic assumption behind the framework is that it there is no one best chain network design ('one size fits all'). In contrary, fruit companies continuously have to decide in which SCN's they want to participate, which role they are able to play the best and how they deliver added value in these networks. Next, they have to make new connections rapidly and employ 'up-to-the-minute' market intelligence information smoothly in business operations. The chain framework is intended to support this by providing a toolkit for analysis, design and implementation of multiple SCN variants (also called 'configurations' in this document). This toolkit contains a method and 'recommended practice' model components that can be used in the following phases of an SCN innovation process:

1. **Map existing fruit SCN's ('As Is')**
   - Map SCN Network Structure
   - Map SCN Business Processes
   - Map SCN Management Structure
   - Map SCN Resources
2. **Define innovation strategies**
   - Define Strategy & Tactics
   - Decide on Innovation Strategy to be implemented
3. **Design desired SCN state ('To Be') per innovation strategy**
   - Design SCN Network Structure
   - Design SCN Business Processes
   - Design SCN Management Structure
   - Design SCN Resources
4. **Implement designed innovation strategy**
   - Not in scope of this document.

Using this content as a frame of reference improves the ability to innovate (=innovativeness). Strategies for a transition from the current situation ('As Is') to the desired state ('To Be') are subject of Work package (WP) 1.5. The framework for innovative demand-driven SCN's that is developed in WP 1.4, is important input for such strategies.

The framework is a 'living' knowledge base that should continuously be further developed and filled with implementation experiences. In other words: it will never be complete, but the canned knowledge of the framework should become richer and richer.

Method

The following research activities have been carried out:

a. Definition study on what demand-driven innovative SCN's are and how they can be analyzed, designed and implemented: done by studying major scientific publications in the fields of supply-chain management, marketing, product innovation, industrial organization, and organizational behavior (based on D 1.4.1);

b. Developing Generic Fruit SCN Framework: based on the definition study results a conceptual framework is iteratively developed in 3 workshops with a team of 9 researchers from the participating countries Poland, Spain, Greece and The Netherlands;
c. Application to European fruit SCN's based on in-depth interviews with key industry informants. These structured open interviews were set up in correspondence with the chain framework. First, questions are asked to map/describe the current situation of the SCN from the interviewee's perspective (according to the dimensions SCN Business Processes, SCN Actors, SCN Management, SCN Resources). Secondly, information is asked about firm's strategy and objectives in their SCN context, focusing on the past, current and future innovations. Main criteria for selection of the interviewees were: involvement of the most important chain links for both in-home & out-of-home, and fresh & processed fruit, innovativeness and feasibility. In total 15 interviews are done (see Table 1 below).

Table 1 Number of interviews in each chain link and country

Chain Link *Country*	Breeder/ Research Institute	Tree Nur-sery	Fruit Producer	Coope-rative/ Auction	Pro-cessor	Whole-sale	Re-tail	Food Service	Mar-keting Org.	To-tal
Poland		1		1	1		1			4
Spain			1			1	1		1	4
Greece			1	2						3
Netherlands	1		1	1				1		4
Total	*1*	*1*	*3*	*4*	*1*	*1*	*2*	*1*	*1*	*15*

See Appendix A for a summary of the interview results.

Document outline

In this document first some important concepts are defined (Chapter 2). After that, in Chapter 3, the generic conceptual SCN framework is developed based on literature review (Section 3.1). In next sections (3.2-3.6) the form and content of the proposed model components per category of the framework are elaborated more in detail for fruit SCN's. Chapter 4 describes how the framework can be used in SCN innovation processes. Finally in chapter 5 the conclusions on the development on framework and its usefulness are summed up.

2 Definitions

Supply Chain Network

The unit of analysis is Supply Chain Networks. For the purpose of this research we define a Supply Chain Network as:

A **Supply Chain Network (SCN)** is an integrated system of processes performed by a set of organizations working together vertically and horizontally in controlling, managing and improving the flow of materials and information from suppliers to final customers.

Based on (Aitken 1998), cited in (Christopher 2005); (Van der Vorst 2000) and (Lazzarini, Chaddad et al. 2001).

Important dimensions of Supply Chain Networks are:

- An entire SCN is viewed as a single system (a whole) of interdependent organizations;
- Shared objective is to deliver products for the final customer (mostly consumers) with competitive advantages;
- Process oriented: objective is achieved by performing integrated business processes, in stead of isolated functional chain units;
- Network coordinated: emphasis on different forms of cooperation between involved organizations;
- Vertical and horizontal relations: studied relations are collaborations of different organizations between and within specific links of the sequential chain.

Demand-driven Supply Chain Network

For the purpose of this research, it is important to stress the fundamental difference between supply-push oriented chains and chain networks that are focused on optimal demand-supply match by responsive and customized fulfillment of consumer demand. Therefore we use the term Demand-driven Supply Chain Network. We define this concept as following:

A Demand-driven Supply Chain Network is a SCN that senses and reacts to real-time demand information of the ultimate consumer and meets those varied and variable demands in a timely and cost-effective manner.

Based on several definitions from literature including (Vollmann, Cordon et al. 2000; Cecere, O'Marah et al. 2004; Qiao and Wilding 2005).

Important additional dimensions of demand-driven supply chain networks are:

- Demand-oriented: all involved enterprises are focused on end consumer demand, which implies that they are driven by market intelligence information both in fulfillment as in innovation processes; Market intelligence is information about customer demands, needs and preferences and factors that influences this like competition, regulation, technology, demography, social trends and other environmental forces (a*dapted from Kohli and Jaworski 1990).*
- Pull-based: starting point is demand-driven, responsive fulfillment of actual demand in stead of planning-driven fulfillments of forecasted demand;
- Customization: delivery of customer-specific innovative solutions in stead of standard commodity products;
- Involvement of marketing in Supply Chain Management research, no longer pure logistics.

From the definition introduced above it follows that the essential aspect of consumer-driven SCN's is that they are driven by market intelligence information. In this respect there are two distinctive approaches. In marketing literature the emphasis is on innovation driven by market intelligent information, while in Supply Chain Management literature the emphasis is on creating SCN's in which fulfillment is driven by market intelligence information. However, both market-driven innovation and fulfillment are important, so we involve

both dimensions in the SCN framework.

Definition of demand-orientation in SCN-context:

Demand-orientation is the SCN-wide generation of market intelligence pertaining to current and future consumer needs, dissemination of the intelligence across the involved enterprises, and SCN-wide responsiveness to it

Adapted from (Kohli and Jaworski 1990).

Definition of Responsiveness in SCN-context:

Responsiveness is the ability of the SCN system of responding to market intelligence in a flexible, timely and cost-effective manner.

Adapted from (Kohli and Jaworski 1990; Holweg 2005; Qiao and Wilding 2005)

3 SCN framework for market-driven innovation and fulfillment

In this section the structure and elements of the framework is introduced. Therefore in the first section the different elements of SCN's are described, by analyzing different elements of enterprise systems and then translating this to the level of SCN systems. Based on this general background information from literature, in the second part of this section the meta-model (=model of a model) of the framework is proposed.

3.1 Conceptual Model

Main elements of SCN-systems

There are many conceptual models, developed from different perspectives, which depict the major elements of enterprise systems. Based on a synthesis of some of existing Enterprise Frameworks one can distinguish the following basic elements of enterprise systems:

- Strategy: vision, mission, critical success factors and objectives, operationalized through performance indicators;
- Processes: primary and secondary processes;
- People: at individual, team and organizational level;
- Management Components: both formal (structure) and informal (culture) organization;
- Resources: human competences and technology.

In Table 2 these components are related to some broadly known conceptual models.

Table 2 Components of different enterprise models

	Enterprise Framework Components					***Perspective***
Model	**Strategy**	**Processes**	**People**	**Management Components**	**Resources**	
Congruence model of Nadler & Tushman (1979)	Strategy	Task	Individuals	Formal Organizational Arrangements, Informal organization		*Change management*
Leavitt's diamond (1965)		Task	People (actors)	Structure	Technology	*Change management*
7S model (Waterman & Peters 1982)	Strategy		Staff,	Structure Style Shared values	Systems Skills	*Business Management*
Galbraith's Star model (2005)	Strategy	Processes	People	Structure Rewards		*Organizational Design*
EFQM-model (2003)	Leadership Policy & Strategy	Processes	People		Partnerships & Resources	*Quality Management*

From enterprise to SCN level

In Chapter 2 it is argued that an important characteristic of SCN's is that they are seen as a whole, as one integrated system with shared objectives. Consequently, one could say that the basics of enterprise systems also go for SCN's. Essential difference is that a SCN system consists of several cooperating but independent firms: separate ownership and consequently no pure hierarchical decision rights. This implies that an additional dimension is introduced that exceeds the level of individual firms in which the different elements of the enterprise systems as introduced above are aligned between the involved actors in the SCN. For this dimension the enterprise framework can be translated as following to a chain framework:

1. Strategy: alignment of firm strategy with overall objectives;
2. People: focus is shifted from people within organizations to organizations within the chain network. Thus, people is no longer a good label, actors is better.
3. Processes: focus is on processes from input supplier to end consumer and integration of processes between involved organizations.
4. Management components: focus is shifted from formal and informal management structures within organizations to governance and control mechanisms between organizations;
5. Resources: focus is shifted to shared resources, including integrated information systems, and allocation of the required competences in the network.

In contrast with the enterprise level, models that depict the major components and coherence of SCN systems are not so abundant. An often cited conceptual framework for SCN's is the model of Lambert and Cooper (2000), who distinguish between SC Business Processes, SC Network Structure and SC Management Components. Their framework was further elaborated by Van der Vorst et al. (2005) as visualized in Figure 1.

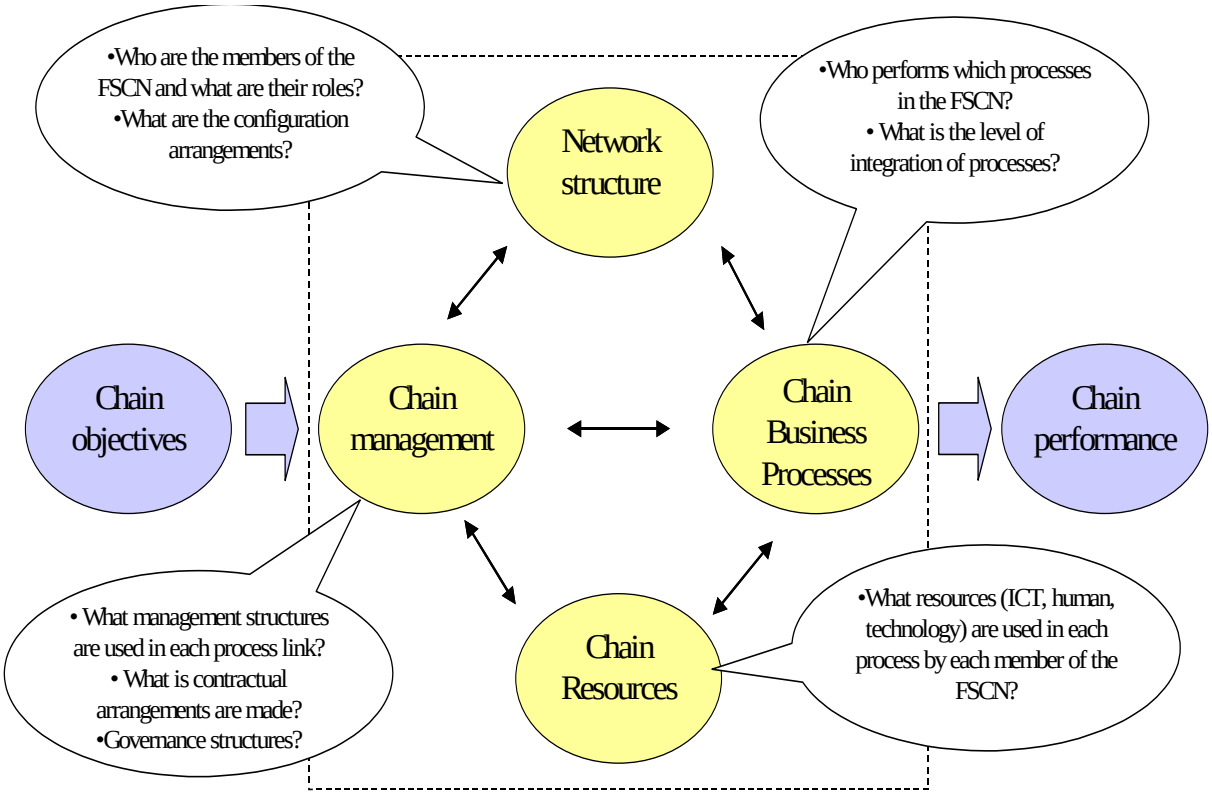

Figure 1 Framework for chain / network development

(Source: Van der Vorst et al. (2005), adapted from Lambert & Cooper (2000))

This framework is constituted of four elements:

1. **Chain Business Processes** which are structured, measured sets of business activities designed to produce a specified output (consisting of types of physical products, services and information) for a particular customer or market;
2. **The Network Structure** which demarcates the boundaries of the supply-chain network and describes the main participants or actors of the network, accepted and/or certified roles performed by them and all the configuration and institutional arrangements that constitute the network;
3. **Chain Management** which typifies the coordination and management structures in the network that facilitate the instantiation and execution of processes by actors in the network, making use of the chain resources with the objective to realize the performance objectives formulated by the SCN;
4. **Chain Resources** which are used to produce the product and deliver it to the customer. These enablers include competences, machines and Information & Communication Technology (ICT).

Meta Model of the framework

The framework of (Van der Vorst, Beulens et al. 2005) perfectly matches with our defined SCN-framework. Therefore, we adopt their model as the basis of our SCN-framework and enrich it with relevant elements of the investigated enterprise models (see Figure 2).

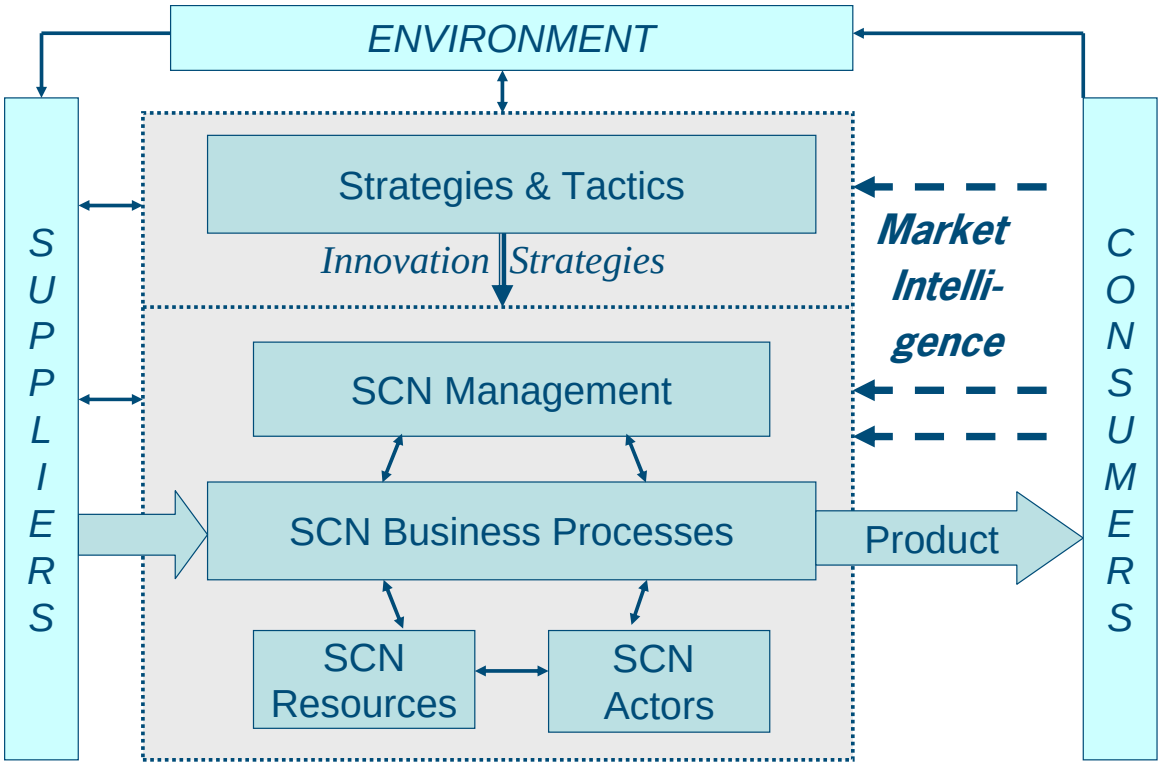

Figure 2 SCN framework *(Source: adapted from Van der .Vorst e.a.(2005))*

Below, the different categories are described in more detail, after which the relevant model components (especially categorized listings and models) of each category of our SCN-framework are described

SCN Strategy & Tactics[1]: starting point of the framework is a definition of the objectives based on strategic choices about how to achieve competitive advantage in which (ultimate) Product Market Combinations (PMC's). In order to be able to assess achieved performance, these objectives must be operationalized into measurable performance indicators. Strategy is defining the importance (relative weight) of the different performance indicators. SCN Strategy implies that Firm Strategies of the involved actors are aligned.
Finally, the way how to achieve the set strategic goals is defined in innovation strategies. Every innovation strategy contains a general innovation principle and the performance indicators it aims to improve.

For the purpose of this project we propose the following model components:
- Generic Strategies: generic strategic choices about the positioning of products in the market place to achieve competitive advantage, e.g. cost leadership versus differentiation;
- List of different Product-Market Combinations (PMC's);
- Categorized list of relevant Innovation and Performance Indicators;
- Methods to define Firm Strategy, i.e. to rank of the PIs according to the importance (relative weight) for the company;
- Methods to align Firm Strategy with Chain Network Strategy, i.e. strategy of the company's major customers and strategy of the end-customer;
- List of relevant Innovation Strategies in order to achieve the set goals, the focus in this framework is on demand-driven Innovation Strategies.

In Section 3.2 the form and content of these model components are elaborated more in detail.

SCN Business Processes: after having defined objectives based on strategic choices, the intended value must be realized by executing business processes. One can distinguish between two types of business processes:
- *Primary Business Processes:* contribute directly to the establishment and fulfillment of transactions. There are two types of primary processes: transformation and transaction processes:
    a. *Transformation Process*: primary process that contributes directly to the creation and movement of products by an actor, such as engineering, production and distribution. Transformation processes deal with physical product flows and convert input products into output products with change of form or place.
    b. *Transaction Process*: primary process that contributes directly to the establishment and conclusion of transactions between two actors, such as sales and procurement. Transaction processes deal with contractual order flows and convert order requests into fulfilled orders.
- *Supporting Business Processes* take care for the development, deployment and maintenance of resources that are required in primary processes. In this way they contribute indirectly to the value adding process. Examples are Human Resource Management, development, deployment and maintenance of the machine park, Facility Management, Financial Administration and IT Service Management.

The framework is focusing on integration of especially primary processes in the chain network.

For the purpose of this project we propose the following model components:
- SCN business process decomposition: categorized list of relevant business processes;
- SCN process model: visualized SCN processes from input to output (in different levels of detail).

In Section 3.4 the form and content of these model components are elaborated more in detail.

[1] We follow the definitions of Anthony, R. G., Vijay (2003). Management Control Systems, McGraw-Hill. in the distinction of strategic, tactical and operational management:
- Strategic: the process of deciding on the goals of the organization and the strategies for attaining these goals;
- Tactical: the process by which managers influence other members of the organization to implement the organization's strategies;
- Operational: the process of assuring that specified tasks are carried out effectively and efficiently.

SCN Actors: the SCN- wide business processes are executed by different companies. To do so, these companies should have established a relation and agreed upon activities and rewards (contracting). This part of the framework is about the network structure, that depicts which companies are involved in the analyzed SCN and how the (especially buyer-supplier) relations in this network are formed. The focus is on the primary actors (all those companies who carry out value-adding activities, Lambert and Cooper, 2000), including packaging firms. Further we include both vertical and horizontal linkages in the network structure. Not included are supporting members: companies that provide resources, knowledge, utilities or assets (Lambert and Cooper, 2000), such as banks, employment agencies, machinery suppliers or consultants.
In this project we make use of the term 'focal company'. This company can be used as the unit of analysis to study SCN's. In that case, the SCN is viewed from the eyes of the focal company: who are it's customers and suppliers, who are it's custommers' customers and its suppliers' suppliers, etc. Usually, a company having a central position in the SCN is chosen as focal company, e.g. the one who innovates in new products. This can be illustrated in a fruit supply chain network: this can be for instance a breeder developing new apple varieties, a grower growing organically, a fruit drink producer developing new drinks, a catering company making new products of fresh fruits.

For the purpose of this project we propose the following model components:
- List of different buyer-supplier relations;
- Network Decomposition: list of involved actors;
- Network Layout Diagram: figure that depicts the buyer-supplier relations between the involved actors in a certain SCN.
- Business Model Diagram: extended Network Layout Diagram in which the exchange of values between the actors are visualized; and as such describe the commercial interests of all involved actors (expenses and benefits);
- Geographic Model per network layout: depicts the geographical locations of the involved actors and specify the distance for each relation in the graph;

In Section 3.3 the form and content of these model components are elaborated more in detail.

SCN Management: define how the integration of processes between actors in the SCN (so, after establishment of the buyer-supplier relation, during contract fulfillment) is governed and controlled, both formally and informally (trust, power relations). Thus management consists of governance and control structures.

Governance is about the allocation of property and decision rights among the different involved actors. Three basic forms of network governance can be distinguished (Lazzarini, Chaddad et al. 2001):
- *Managerial Discretion*: discretionary actions by a coordinating agent, who centrally plans the flow of products and information;
- *Standardization:* standardized rules and shared mechanisms to orchestrate transactions;
- *Mutual Adjustment:* alignment of plans through mutual feedback processes and joint problem solving and decision making.

These forms correspond with three distinct governance structures, which are defined in the literature, namely markets, hierarchies and the hybrid forms of organization which include all kinds of arrangements between legally autonomous entities. The choice of a particular governance structure aims at mitigating all forms of contractual hazards found between the different contracting parties in such a way that transaction costs are minimized (Williamson 1996). When studying hybrid forms of organization such as SCN, two main dimensions should be identified: the allocation of decision rights, in other words who has the authority to take strategic decisions within the SCN, and the interorganizational mechanisms aiming at rewarding desirable behavior and preventing undesirable behavior.

Control is about the coordination, planning and monitoring of business processes of the different actors within a certain governance structure. Control is based on setting operational goals (based on the SCN Strategy & Tactics), configuring, triggering and guiding the required process execution, measuring process performance, deciding on corrective or preventive actions and adjusting process execution if necessary.

The control systems of companies in SCN's are partly planning-driven based on demand forecasts and partly order-driven based on actual demand. The so called Client Order Decoupling Point (CODP) separates that part of the supply chain geared towards directly satisfying customers' orders from that part of the supply chain based on planning (Hoekstra and Romme 1992). Upstream the focus can be on efficient production of standardized products, while downstream the focus is on flexible strategies to deliver customized (tailor-made) products. The strategic inventory at the decoupling point is filled with either end-products, semi-finished or raw material based on demand forecasts. If a specific customer order comes in, the rest of the processes are executed according to the customer-specific requirements.
On basis of different positions of the CODP, basic logistical configurations are proposed in literature. Hoekstra and Romme (1992) distinguish five configurations: engineer-to-order (ETO), make-to-order (MTO), assemble-to-order (ATO), make-to-stock (MTS) and deliver from (local) stock (DFS). However, in reality companies have multiple CODP's (Verdouw, Beulens et al. 2006). For example, particularly in demand-driven chains, customers have their specific requirements to the products to be delivered. Within one company, this can result in different CODP positions for specific products or product-market combinations. Furthermore, there exists a CODP for each collaboration interface in the chain network (Trienekens 1999), starting with the consumer order and working backward to business-to-business orders.

For the purpose of this project we propose the following model components:
- *Network Governance Diagram:* extended Network Layout Diagram in which the type of governance relations between actors is specified;
- *SCN Control Model:* diagram that visualizes (operational) control structure (especially basic distinction between planning and order-driven control) in business process diagram of a SCN's.

In Section 3.5 the form and content of these model components are elaborated more in detail.

SCN Resources: capacities, be it people or means, capable to develop and produce the required products, deliver them to customers according the performance indicators and last but not least initiate and realize attractive innovations. Most important resources are humans and technology (with special attention to information systems). At SCN level three different types of resources can be distinguished: 1) resources owned and created by the focal company, 2) own resources shared with other actors, and 3) resources, owned by other actors, which are shared with the focal company.

For the purpose of this project we propose the following model components:
- List of required capabilities in demand-driven;
- Information System Model: elaboration of the SCN Process and Control Models into detailed process and data models that specify the required functionality of information systems and that ideally driven software development and execution.

In Section 3.6 the form and content of these model components are elaborated more in detail.

Outline remainder of this document

Above the elements of the chain framework and consequently the required model components are proposed. In next sections the form and content of the proposed model components for fruit chains are elaborated more in detail per category of the chain framework. As argued in the introduction, it is important to notice that modeling chain networks comes down to combining the different model components (e.g. actor models, business process models, control models, and so forth) into coherent sets for specific SCN designs. Therefore the relations between all different components and the sequence of the configuration should be clear. Last section will elaborate on that.

3.2 SCN Strategy & Tactics

As proposed in Section 3.1, the SCN Strategy components of our framework are:
- Generic Strategies;
- List of different Product Market Combinations (PMC's);
- Categorized list of relevant Performance Indicators (PIs);
- Methods to define Firm Strategy, i.e. to rank of the PIs according the importance (relative weight) for the company; Innovation Policy is seen as a part of the Firm Strategy, i.e. the ranking of the innovation PIs;
- Methods to align Firm Strategy with Chain Network Strategy, i.e. strategy of the company's major customers and strategy of the end-customer;
- Innovation Strategies to achieve SCN objectives.

Generic Strategies

Strategy focuses on positioning companies in its environment to create a competitive advantage in delivering added value to customers. Generic strategies play an important role in making strategic choices about this positioning. They were introduced by Michael Porter in his publication about Competitive Strategy (Porter, 1980). He argued that there are three fundamental ways in which firms can achieve competitive advantage:

1. *Cost leadership strategy*: the firm sets out to become the low-cost producer in its industry. This means all the sources of cost advantages will be exploited. If a firm achieves cost leadership, it will be an above-average performer in its industry provided it can command prices near the industry average.
2. *Differentiation strategy*: a firm seeks to be unique in its industry along some dimensions that are widely valued by buyers (for example high product quality, specific product features, excellent service of proving complete product assortment ('one stop shopping'). The reward the firm receives for this uniqueness is a premium price. A firm that can achieve and sustain differentiation will be an above-average performer in its industry if its price premium exceeds the extra costs incurred being unique. A successful differentiation strategy requires that a firm chooses attributes that are different from its rival.
3. *Focus strategy*. A firm chooses to narrow the competitive scope within an industry. There are two variants;
    a. Cost focus: a firm seeks a cost advantage in its target segment;
    b. Differentiation focus: a firm seeks differentiation in its target segment.

List of different PMC's

Fruit industry comprises all companies that are involved in bringing fruit-based products to the market place. Important European fruit products include apples, pears, stone fruits (including peach and plum), citrus fruit (including orange and citron), grapes and berries (including strawberry). For these varieties markets can be segmented based on the following criteria:
- Consumer (retail or food service) or industry chain markets: ultimate end-product is delivered to consumers or as raw materials for second-order industry; in this project we focus on consumers as ultimate customers;
- Markets for processed versus fresh fruit: in contrast to processed products, for fresh products the intrinsic characteristics of the product grown in the countryside are left untouched.

Based on this we come to the generic PMC's in Table 3.

Table 3 Generic product market combinations

Market / ***Product***	**Retail (in home)**	**Food Service (out of home)**
Fresh Fruit	A	D
Prepared Fruit	B	E
Processed Fruit (canned, juice, dried, frozen)	C	F

Source: ISAfruit project Annex 1

These PMC's can further be elaborated by application of other segmentation criteria such as country (geographic), budget versus quality/service focus (market winner), and so on.

List of Innovation and Performance indicators, categorized according to related Critical Success Factor

The innovation and performance indicators used in this research are defined in 'D 1.4.1 Review of scientific literature'. Examples of innovation indicators are summarized in Table 4. These indicators are classified by type of underlying Critical Success Factors (CSF's) for innovativeness (first column) and by category of innovation (last 4 columns). CSF's are the relatively small number of truly important matters that managers should focus attention on.

Table 4 Examples of innovation CSF's and Indicators

CSF	**Classification** / **Indicators**	**Product innovations**	**Process innovations**	**Organizational innovations**	**Marketing innovations**
A Product attributes	% of environment-friendly products	*			
	% turnover invest to improve health and safety	*	*	*	
B Product assortment	% Of new products in total turnover	*		*	
	Range of products	*			
C Process superiority	% total turnover affected by process innovation			*	
	Flexibility of production		*	*	
D Top-management support and skill	% of employees involved in innovation % of employees with training		* *	* *	
E Market	Relative market share			*	*
	Sales of new to market product			*	*
F Company	Numbers of patents			*	*
Environment	Level of relationship with customers			*	*
G Strategic fit	Strategic attention for innovation			*	
	Plans to invest in innovation			*	
H Communication / organization	Number of projects with shared knowledge with other organizations			*	

Examples of performance indicators are summarized in Table 5. These indicators are classified by type of underlying Critical Success Factors (CSF's) for innovativeness (first column) by category of performance (second column), and by the performing unit, either SC network, organization or process (third column).

Table 5 Examples of performance CSF's and Indicators

CSFs	Efficiency Responsiveness Quality Flexibility	SC network Organization Process	**Indicators**	Quantita (Qualita
I Cost	Efficiency	SC	Total logistics costs	QN
II Profitability		Organization	Sales	QN
II Profitability			Return on investment	QN
I Cost		Process	Process cost	QN
II Profitability			Process yield	QN
III Lead time	Responsiveness	SC	Total supply chain response time	QN
III Lead time		Organization	Product development cycle time	QN
IV Collaboration			Horizon of business relationship	QL
III Lead time		Process	Time required to perform the process	QN
IV Collaboration			Delivery reliability	QN
IV Com../Collaboration		SC	Product availability on shelf	QN
V Food safety	Quality	SC	Product quality	QL
V Food safety			Traceability	QL
VI Com../Collaboration		Organization	Buyer-supplier partnership level	QL
VI Com../Collaboration			Mutual trust	QL
VII Environment		Process	Input usage	QN
VIII Market adaptability	Flexibility	SC	Customer satisfaction (or dissatisfaction)	QL
VIII Market adaptability		Organization	Volume flexibility	QN
VIII Market adaptability		Process	Process flexibility	QN

Methods to define Firm Strategy

The generic strategy concepts are important for they support managers to think about competitive strategies and competitive advantage. Nevertheless, they are not suitable to translate the concepts to an implementable strategy. Therefore, strategies should be linked to performance indicators. A proven way to define such actionable Firm Strategies is to rank of the PIs according to their importance (relative weight) for the company. Methods used can be conjoint analysis (e.g. Adaptive Conjoint Analysis – ACA) or Analytical Hierarchy Processing – AHP.

Methods to align Firm Strategy with Chain Network Strategy

Analysis of the degree of coherence between firm strategy and chain strategy (i.e. strategy of the firms major customers and strategy of the end-customer in the chain), by comparing performance CSF's/indicators and analyzing possible conflicts. Methods to do this should further be investigated.

Innovation Strategies

The way how to achieve the set strategic goals is defined in innovation strategies. Every innovation strategy contains a general innovation principle and the performance indicators it aims to improve. Innovation strategies can be of different categories: product, marketing, process and organizational innovations, or a combination. This SCN framework focuses on Innovation Strategies for consumer-driven innovative SCN's. This implies that we focus on different forms of generation, dissemination and responsiveness to market intelligence information.

These strategies are realized by changing one or more elements of the SCN system as elaborated next in this document. Therefore they should be developed into Innovation Designs that contains the different models that are needed to implement an innovation strategy.

Examples of Innovation Strategies are:

- Replenishment via Vendor Managed Inventory (VMI): a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer;
- Customer-order driven production: production is partly done on specification of individual customers, mostly in small batch sizes.
- Value-added services by fruit producers: they perform processes that usually are done more downstream in the SCN, such as packaging, labeling, etc.
- Point of Sales (POS) based forecasting: cash desk data of retailers is analyzed to determine patterns in demand, which are used to improve forecasting reliability;
- Collaborative Product Development: teams of people from different involved organizations that together work on new product development;
- Consumer-driven Product Development: involvement of consumers in product development processes, by using consumer data for idea generation, testing idea's and prototypes consumer panels, et cetera.

The innovation strategies will be elaborated as the VMI example in Table 6.

Table 6 Example of Vendor Managed Inventory

Vendor Managed Inventory (source: SCC 2006)	
VMI is a concept for planning and control of inventory, in which the supplier has access to the customer's inventory data and is responsible for maintaining the inventory level required by the customer. Re-supply is performed by the vendor through regularly scheduled reviews of the on-site inventory. The on-site inventory is counted, damaged or outdated goods are removed, and the inventory is restocked to predefined levels. The supplier takes responsibility for the operational management of the inventory within a mutually agreed framework of performance targets, which are constantly monitored and updated to create an environment of continuous improvement. (SCC 2006)	
Impact on Performance Indicators	
Quality	VMI helps to assure the availability of items thereby helping to ensure better on-time delivery performance as well as greater fill rates.
Responsiveness	Less time is spent waiting for items, allowing the production to operate more smoothly and quickly. With visibility of the demand cycle, you can agree to an official lead time, which can be reduced, and be predictable. Kraft, for example, realized a 15-20% reduction in lead times.
Flexibility	The supplier gains flexibility, when to re-supply, and – as a consequence – when and how much to manufacture.
Efficiency	Inventory level decreases by up to 20% leading to lower inventory costs. The supplier gets a clear view of demand and flexibility (see above), so that he can achieve lower variable manufacturing costs. Further, VMI has a focus on working capital, with the goal being both parties experiencing a working capital reduction. The effect will vary depending on the details of the VMI agreement.

3.3 SCN Actors

As proposed in section 3.1, the SCN Network Structure components of our framework are:
- List of different buyer-supplier relations in ;
- Network Decomposition;
- Network Layout Diagram: figure that depicts the buyer-supplier relations between the involved actors in a certain SCN.
- Business Model Diagram: extended Network Layout Diagram in which the exchange of values between the actors are visualized; and as such describe the commercial interests of all involved actors (expenses and benefits);
- Geographic Model per network layout: depicts the geographical locations of the involved actors and specify the distance for each relation in the graph;

List of different buyer-supplier relations in SCN's
Buyer-supplier relations can be classified in the following continuum between market and hierarchy (Webster 1992):
- Individual transactions;
- Repeated transactions;
- Long term relations (informal);
- Partnerships (formalized, contracts);
- Strategic Alliances (including & Joint Ventures);
- Vertical integration ('internal customers').

Network Decomposition
A Network Decomposition is a list of involved actors and description, categorized by role. e.g., in fruit SCN's relevant actors are:
- Input Supplier;
- Breeder;
- Research Institute;
- Marketing organization;
- Tree Nursery;
- Fruit Producer;
- Producer Organization / Cooperative / Auction;
- Processing Industry;
- Packaging Firm;
- Distributors (transportation companies);
- Wholesale, exporters, importers;
- Retailer;
- Food Service;
- Second-order Industry (uses fruits of residual products as ingredient to non-fruit products);
- Business customers (e.g. companies that are catered by a Food Service actor);
- Consumer.

Network Layout Diagrams
A network layout depicts the involved actors (and their buyer-supplier relations) that cooperate in bringing a certain product to a certain market (fulfillment) or in developing new products, markets or fulfillment system (innovation). In these diagrams each circle represents a link in the Supply Chain Network (SCN's), it may consist of multiple companies. The buyer-supplier relations are depicted by blue arrows ('vertical' cooperation e.g. from consumer, to retail/ food service, to wholesale, to auction, etc.). A shadowed circle means that the involved companies cooperate in serving their customers ('horizontal' cooperation: e.g. multiple fruit producers cooperating to assure delivery reliability for the auction).

There are many possible network lay-outs in fruit chains for each defined Product Market Combination

(PMC). See some illustrative diagrams in the Figure 3, 4 and 5.

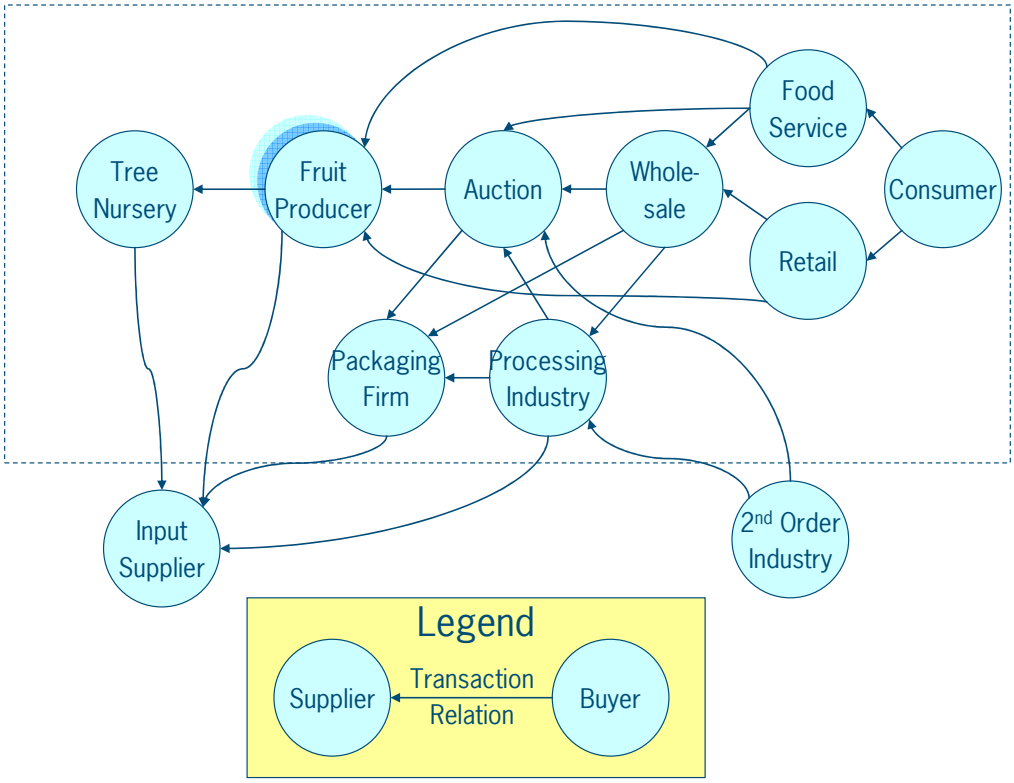

Figure 3 Example of a Network Layout Diagram (some important network layouts in fruit SCN's combined) for fulfillment

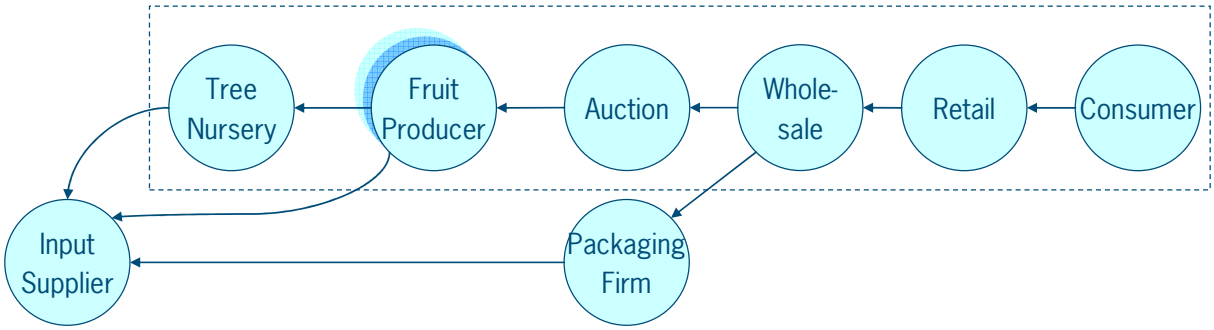

Figure 4 Example of a Network Layout Diagram for fulfillment for one PMC (fruit / retail)

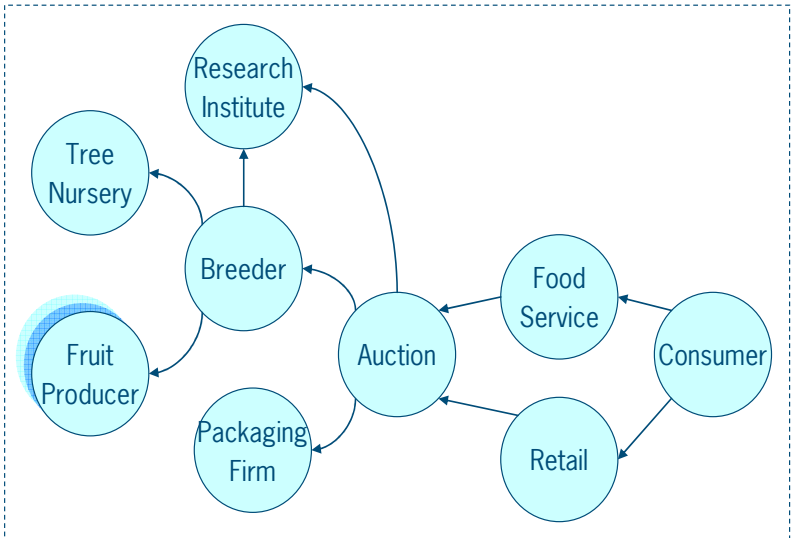

Figure 5 Example of a Network Layout Diagram for product innovation

Figure 5 is an illustrative example of a broad collaborative product innovation project. In this case, the project is coordinated by an auction in assignment of a Food Service company and a retailer. The auction hires a research institute for consumer research, a breeder for developing the new variety and a packaging firm for the new packaging. The breeder hires the technical researchers of the research institute for some specific support, a tree nursery and some fruit producers to produce test samples of the new variety. The Food Service company and the retailer ask some of their consumers to test the new product.

Business Model Diagrams

A Business Model Diagram depicts the value exchanges between different actors in the SCN. It is an extended Network Layout Diagram in which the exchange of values between the actors is visualized; and as such it describes the commercial interests of all involved actors (expenses and benefits). The idea is that for successful cooperation in each relation of the network for both involved actors the gained benefits should be higher than the expenses (multiple-win-win). Business Model Diagrams can be formalized in such way that it is possible to quantify the benefits and expenses and to check that for every involved actor the benefits are more than the costs.

For each network lay-outs in fruit chains Business Models can be defined. See a simplified illustrative diagram in Figure 6.

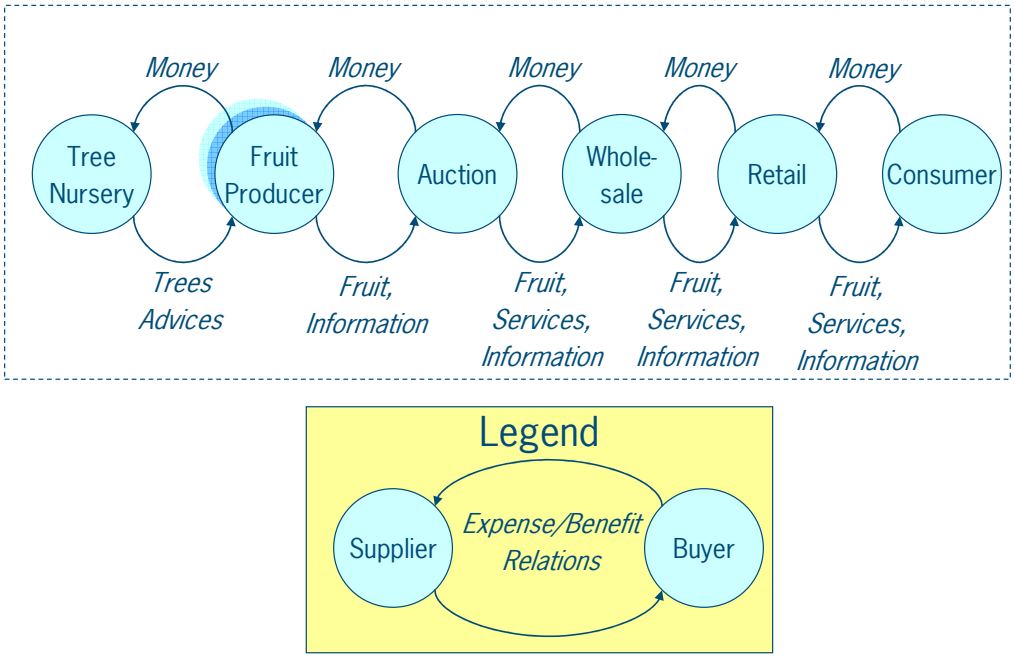

Figure 6 Example of a Business Model Diagram

Geographic Model

A Geographic Model depicts the geographical locations of the involved actors. It specifies the locations per actor and the distance for each relation in the graph. See Figure 7 for an imaginary example.

Figure 7 Imaginary example of a Geographic Model

3.4 SCN Business Processes

As proposed in section 3.1, the SCN Business Process components of our framework are:
- Process Decomposition;
- SCN process model.

Process Decomposition
SCN business processes can be decomposed from high-level to very detailed activities. First important distinction is between primary and supporting processes (Porter 1985). Further, in modeling demand-driven SCN's the focus is on continuously matching demand and supply. Therefore in decomposing primary processes is important to distinguish between what Day (1994) calls Outside-In Processes (demand-side), Inside-Out Processes (supply-side) and Spanning Processes (demand-supply matching).

As stated before, primary processes include:
- Product development and (biotechnological) research;
- Production
    - Tree production;
    - Fruit production;
    - Processing;
- Sorting;
- Packing;
- Cooling/storage;
- Distribution/Transportation;
- Replenishment;
- Sourcing/Procurement;
- Marketing and Sales;
- Customer Relations Management;
- Market Research.

Supporting processes include:
- Human Resource Management;
- Financial Management;
- Facility Management / Maintenance.

SCN Process Model
A SCN Process Model depicts the basic processes for fulfillment or innovation in a certain network layout for a certain Product Market Combination (PMC). As such it also defines the roles of each actor in the network. For each combination of network layout and PMC, one or more Process Scenario Models can be defined (more if some involved actors perform different roles). In Figure 8 and 9 high level Process Models for fulfillment and innovation are visualized.

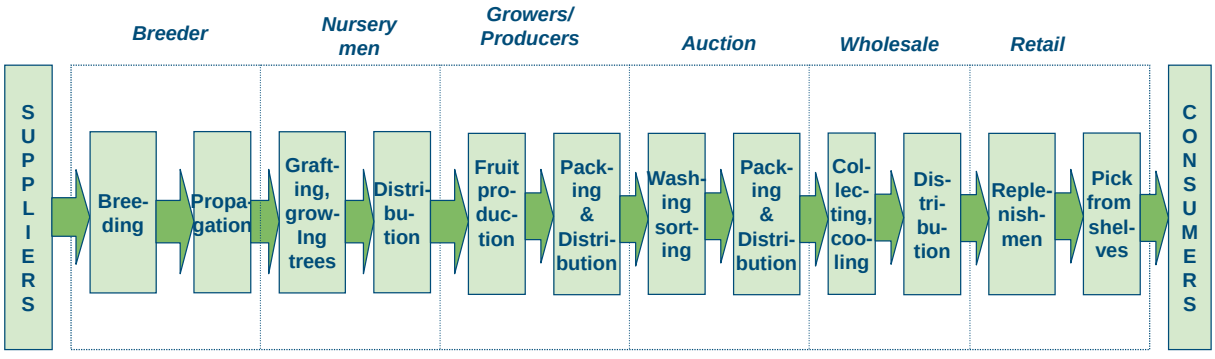

Figure 8 Example of a Fulfillment Process Model: Long Fresh Fruit SCN for Retail

This Process Scenario Model depicts the basic transformation for the PMC 'Fresh Fruit for Retail' and the Network Layout 'breeder/nursery/producer/auction/wholesale/retail' (long SCN).

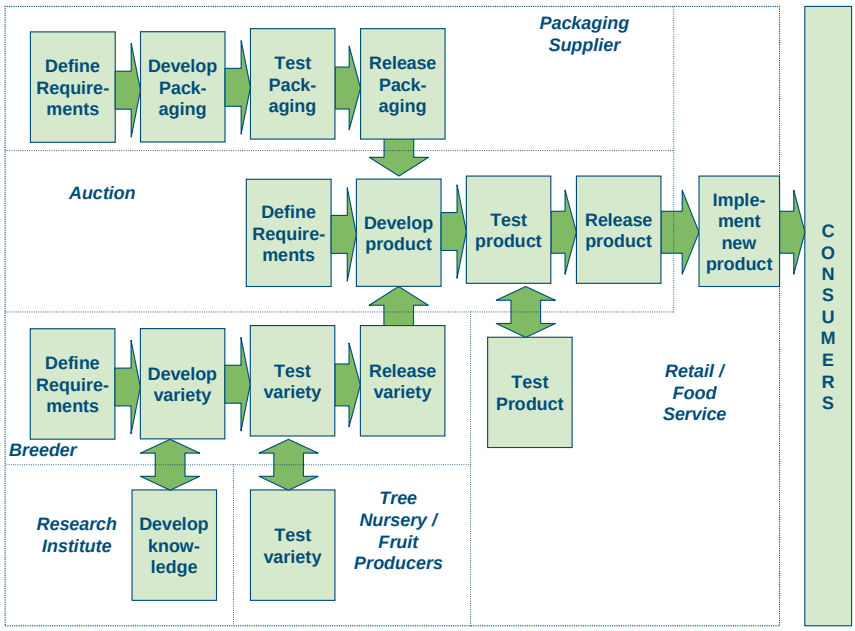

Figure 9 Example of an Innovation Process Model

3.5 SCN Management

As proposed in section 3.1, the SCN Management components of our framework are:

- Network Governance Diagram
- SCN Control Model

Network Governance Diagram

This is an advanced Network Layout Diagram, in which the different governance mechanisms between actors (see 0) are visualized by different types of arrows. See some examples in the Figure 10, 11 and 12.

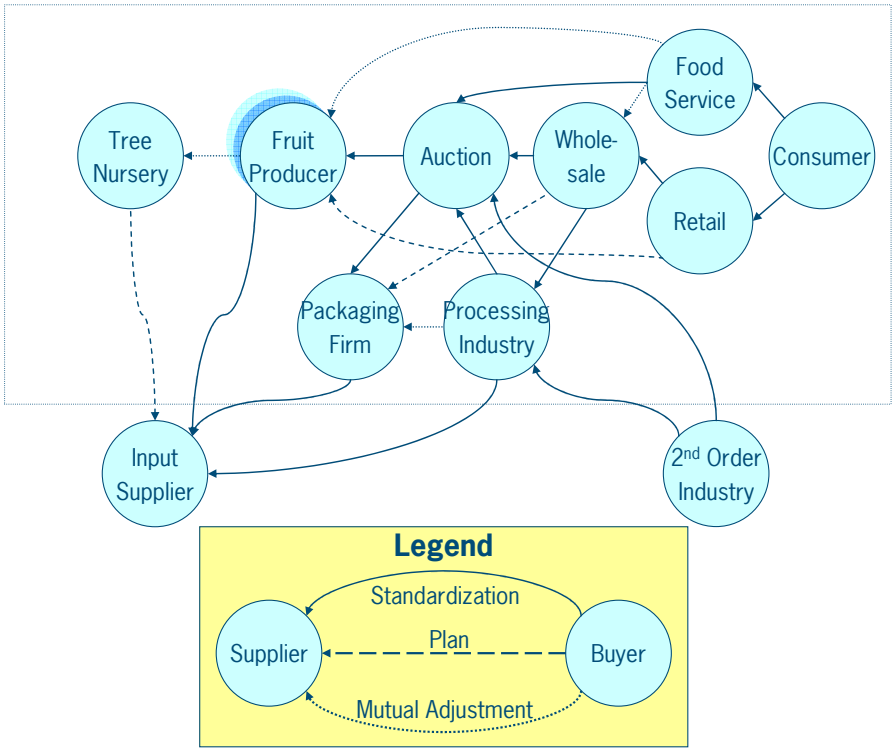

Figure 10 Example of a Governance Layout Model for fulfillment (several network layouts combined)

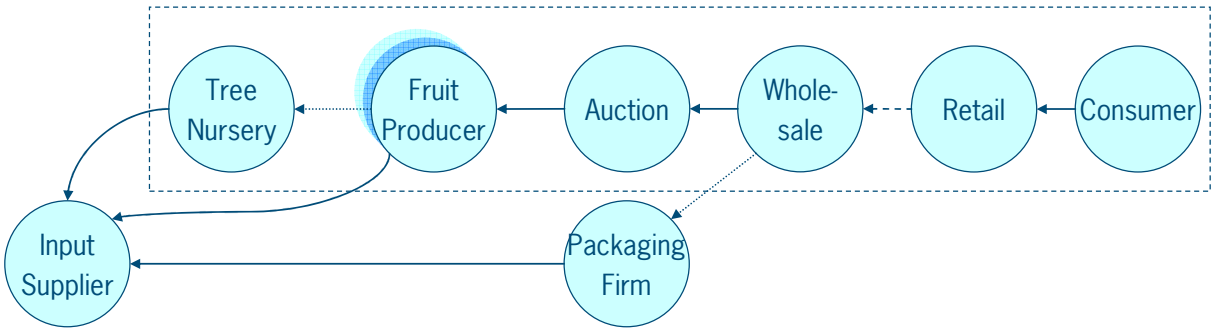

Figure 11 Example of a Governance Layout Model for fulfillment for one PMC (fruit / retail)

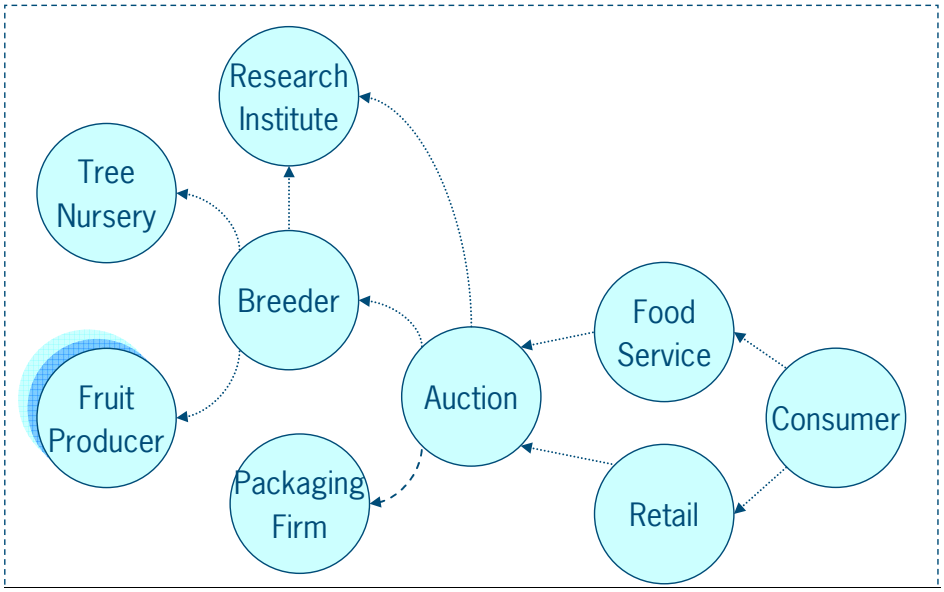

Figure 12 Example of a Governance Layout Diagram for product innovation

SCM Control Models per defined configuration

SCN Control Models visualize (operational) control structures in SCN's. It focuses on the basic distinction between planning and order-driven control and the position of Customer Order Decoupling Point (CODP) in the SCN that separates both types of control. Below some illustrative SCN Control Models are depicted in the Figures 13 and 14.

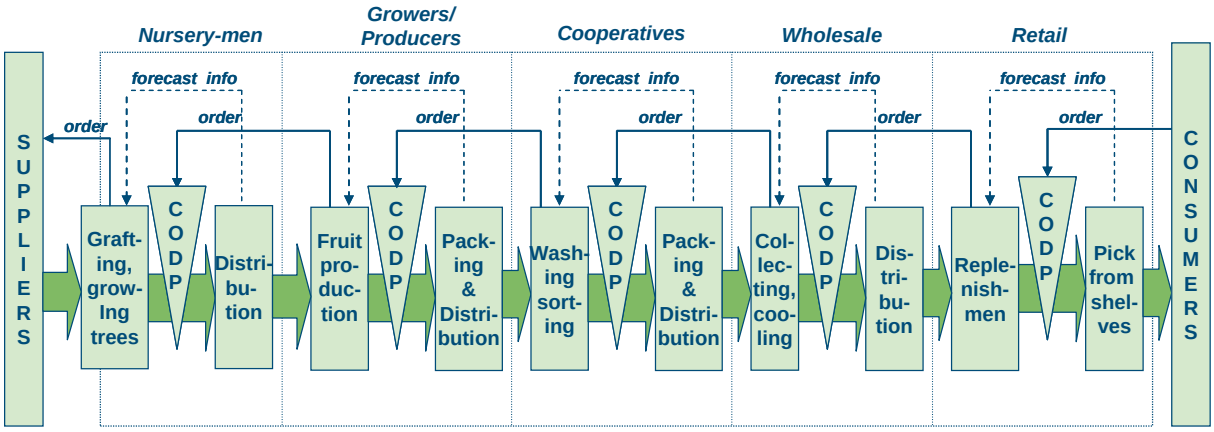

Figure 13 Baseline high-level SCN Control Model Fresh Fruit for Retail

Starting point of this SCN Control Model is SCN Process Scenario 'Long Fresh Fruit SCN for Retail'. The Baseline Control Principle is applied (so no exchange of demand information).

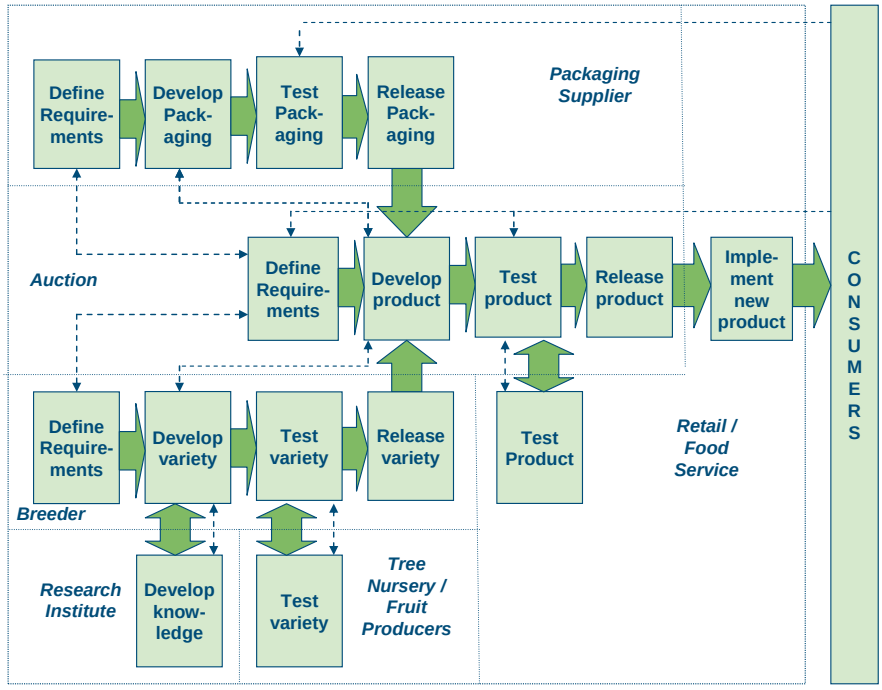

Figure 14 Control Model for Collaborative and Consumer-driven Product Development

Starting point of this SCN Control Model are the Network Layout Diagram and Process Model for Innovation as introduced above. The VMI and POS Control Principle are applied at the wholesaler.

3.6 SCN Resources

As proposed in section 3.1, the SCN Resource components of our framework are:
- List of required capabilities in demand-driven SCN's;
- Information System Model.

List of required capabilities
Capabilities are complex bundles of skills and accumulated knowledge, exercised through organizational processes that enable firms to coordinate activities and make use of their assets (Day, 1994). For the purpose of this project, the terms capabilities and competences are used interchangeable.

The required capabilities should be defined later on in the project. Likely important capabilities include:
- Human Resources;
- Management Attention;
- Corporate Culture;
- Information Systems for SCN-wide generation, dissemination and responsiveness to market intelligence information;

Information System Model
Elaboration of the SCN Process and Control Models into detailed process and data models that specify the required functionality of information systems and ideally drive software development and execution. Therefore, the format of these process and data models must follow standards, such the web-based standards BPEL (for process models that are compliant to Service Oriented Architecture, Jordan and Evdemon 2005) and ebXML (for standard eBusiness messages, (OASIS 2007).

4. Configuration of SCN designs

So far, the relations between the different components were not described. As stated in the introduction, the objective of the chain framework is to improve innovativeness by providing a toolkit for SCN analysis, design and implementation. This toolkit contains 'recommended practice' model components and supports integrated modeling for specific chain networks. In previous sections the first outline of the 'recommended practices' model components are introduced. A method to integrate these components into coherent designs for specific SCN configurations is described in this section.

As stated in the introduction, the SCN framework supports the following phases of an innovation process:

1. Map existing fruit SCN's ('As Is')
    - Map SCN Network Structure;
    - Map SCN Business Processes;
    - Map SCN Management Structure;
    - Map SCN Resources.
2. Define innovation strategies
    - Define Strategy & Tactics;
    - Decide on Innovation Strategy to be implemented.
3. Design desired SCN state ('To Be') per innovation strategy
    - Design SCN Network Structure;
    - Design SCN Business Processes;
    - Design SCN Management Structure;
    - Design SCN Resources.
4. Implement designed innovation strategy
    - Not in scope of this document.

Role of the framework in mapping SCN's

As stated in the introduction, basic assumption behind this framework is that there is not one chain design. Consequently, mapping existing SCN's starts with determining what the main Product Market Combinations (PMC's) and the main SCN-configurations[2] per PMC are. Next, for each defined SCN configuration the different model components as introduced in this document are designed. Together this coherent set of models depicts an overall design of a SCN configuration.

[2] For the purpose of this research a SCN configuration is defined as a specific variant of a SCN layout, consisting of interconnected SCN network structure, business processes, management structures and resources.

It is possible to combine these models into one condensed overall model of a SCN configuration. See Figure 15 for an example.

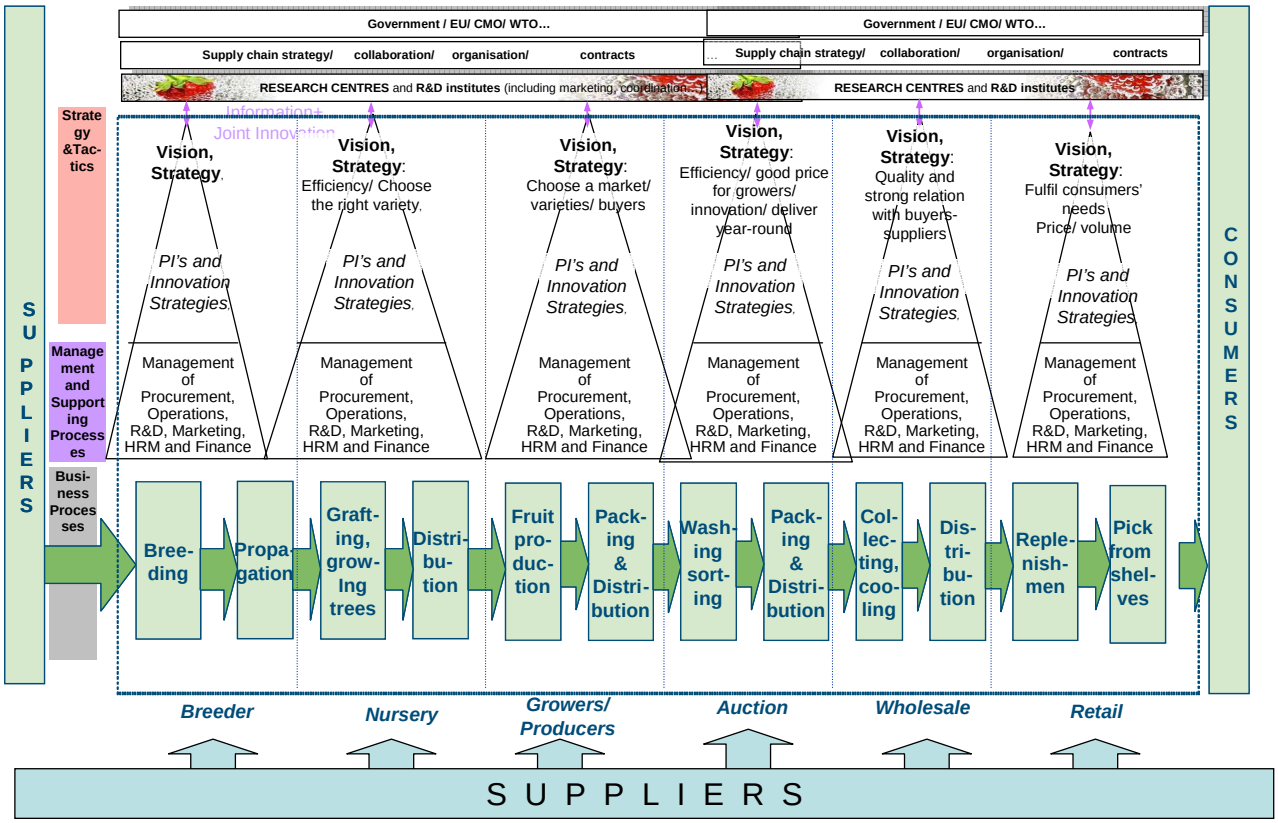

Figure 15 Example of a condensed overall model of a fruit SCN configuration

Role of the framework in defining Innovation Strategies

Having insight in the existing SCN layouts, the innovation strategies can be addressed. The model components of SCN Strategy & Tactics support this phase.

Role of the framework in developing Innovation Designs

Next, the chosen innovation strategies have to be developed into concrete designs. This can be done by changing the mapped SCN models. It is possible to do that for every implementation from scratch, but predefined models that capture recommended practices for each innovation strategy (Innovation Designs) would be valuable. Such Innovation Design describes what should be changed for a certain Innovation Strategy and it provides a consistent set of example models in which these changes are modeled. These can directly be applied to the mapped SCN models.

In this section the VMI example is used as an illustration.. As a result of the interviews and case studies, this repository of reference innovation designs should be further developed.

Table 7 Example of Innovation Design

Innovation Strategy	**Vendor Managed Inventory**
What to innovate	Major change is that the supplier takes over the replenishment process of the outlet store.
Impact on dimensison of the SCN framework	
SCN Network Structure	No impact, involved actors have other roles, but there are the same actors in the network.
SCN Business Processes	• Forecasting consumer demand moves from the outlet to supplier • Replenishment process moves from the outlet to supplier • Contracting & monitoring process and instead of purchasing process of the outlet
SCN Management Structure	• Governance model: long-term contracts and monitoring in stead of ordering per individual transaction. • Control Model: internal replenishment signal of the supplier in stead of purchase order of the outlet.
SCN Resources	• Supplier: o Replenishment and forecasting capabilities o Being a partner, instead of a commodity supplier o Information systems for exchange of inventory information • Outlet: o Partnership instead of traditional purchasing
Supporting models	
• Process model • Governance model • Control model To be developed, see example Control Model in Figure 16.	

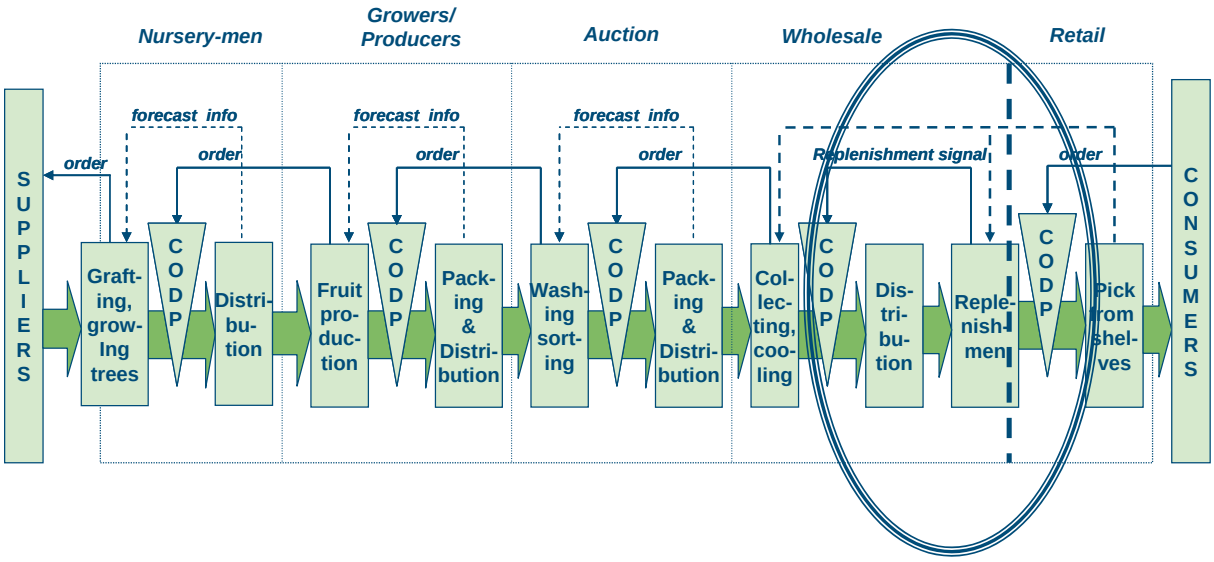

Figure 16 VMI Control Model Fresh Fruit for Retail

5. Conclusions

In this document the developed fruit chain framework is described. The basic idea of this framework is that there is no one best Supply Chain Network design ('one size fits all'). In contrary, fruit companies continuously have to decide in which Supply Chain Networks they want to participate, which role they are able to play the best and how they deliver added value in these networks. Next, they have to make new connections rapidly and employ 'up-to-the-minute' market intelligence information smoothly in business operations. The developed framework has shown to support the ability to innovate that is required for that. This, by providing a toolkit for analysis, design and implementation of multiple Supply Chain Network variants.

The framework is tested in 15 interviews with key industry informants. The interview results have been translated in adjustments (see Appendix A) and implemented in the framework. Main findings from the interviews are:

- The interviews provide good overall insight of fruit supply chain networks. **This confirms the usefulness of the chain framework for high-level chain mapping and results in some valuable refinements.**
- The questionnaire (Appendix B) is good (structure, number of questions, et cetera), some refinements should be done. However the instruction should be more detailed and better communicated to the interviewers.
- The quality of the interview reports is varying and should be more extensive and complete

The chain framework, the questionnaire and the instruction will be used in case studies, as being the next step in Work Package 1.4. INNOCHAIN.

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Appendix A Summary interview results on testing the framework

1. Introduction

The main objective of the interviews with industry experts was to assess how far the developed chain framework is appropriate to map innovative consumer-driven European fruit chains. Therefore the structured open interviews were set up in correspondence with the chain framework. First questions are asked to map/describe the current situation of the SCN from the interviewee's perspective (according to the dimensions SCN Business Processes, SCN Actors, SCN Management, SCN Resources). Secondly, information is asked about firm's strategy and objectives in SCN context, focusing on the past, current and future innovations. See for further details the questionnaire in Appendix B. In total 15 interviews are done in 4 countries. Main criteria for selection of the interviewees were: involvement of the most important chain actors for both in-home & out-of-home, and fresh & processed fruit, innovativeness and feasibility. See Table 1 (in Chapter 1) for an overview of the interviewed actors. Below the results of these interviews are summarized.

2a. Results SCN Actors & Governance

All actors mentioned in the framework are indicated to be important (see Table 8). The following additional actors are mentioned: distributors/exporters, business customers, marketing organization.

Table 8 Indicated most important SCN actors (number of interviews per link)

Own position / *Important Chain Actors*	Breeder/ Research Institute	Tree Nur-sery	Fruit Pro-du-cer	Coope-rative/ Auction	Pro-ces-sor	Whole-sale	Retail	Food Ser-vice	Mar-ke-ting Org.	T o t al
Input Supplier	1	1	1	2	1	1				7
Breeder		1	1							2
Research Institute	2	1	1	1	1			1		7
Tree Nursery	2		1	2						5
Fruit Producer		1	1	3	1	1	1	1		9
Producers Organization / Cooperative / Auction	1	1	2	2	1	1				8
Processor				3	1			1		5
Packaging Firm				2				1		3
Wholesale	1			3		1	1			6
Retail	1		2	2		1	1			7
Food Service			1	1		1	1			4
Second Order Industry				1		1				2
Consumer			1	1	1		1	1		5
Distributor/Exporter/ Importer (added)				*1*				*1*		*2*
Contractor (= business customer) (added)								*1*		*1*
Marketing Organization (license	*1*									*0*

Own position / *Important Chain Actors*	Breeder/ Research Institute	Tree Nur-sery	Fruit Pro-du-cer	Coope-rative/ Auction	Pro-ces-sor	Whole-sale	Retail	Food Ser-vice	Mar-ke-ting Org.	T o t al
exploitation, e.g. Innova Fruit)										
Specialist Shops (added)				*1*						*1*

Additional comments:

- Half of the actors indicated that they have input suppliers for supply of fertilizers, chemicals, enzymes, disinfectants, compost, and/or clothes. In all interviews in The Netherlands no input suppliers were indicated to be important.
- Breeders are indicated to be the supplier of a nursery and a grower with his own nursery. In The Netherland the situation is more complex. The auctions are shareholder of Inova Fruit. Inova Fruit selects and introduces new fruit varieties and has the main license for certain apple varieties, which were gained from breeders. Nurseries have to buy the license to produce these apple trees from Inova Fruit. For other trees they have to buy the license directly from the breeder or a spin-off of this breeder. There is also a propagator/certifier between the breeders/Inova Fruit and the nurseries. This is also true for Poland where a research institute is in between.
- Half of the actors has connections with a research institute. The institutes deliver knowledge about consumers, product technology (catering company), genomics (breeder), (organic) production methods (growers, in one case via cooperative), biotechnological and chemical processes (concentrate production plant), or qualified plant material (nursery).
- Tree nurseries are the suppliers of growers. One conventional grower indicated that he has his own nursery. An organic grower did not indicate whether the trees are supplied or bred by himself.
- Fruit growers supply to growers' cooperatives and/or wholesalers, and/or more directly to concentrate production plant, retailers, catering company, and/or consumers. The three interviewed growers have each 1-2 sales channels. The organic grower delivers besides fruit, also meals and education.
- The growers' cooperatives in the different countries supplies to all kind of actors towards the end of the chain. The different customers mentioned were wholesalers, retailers, food service, processors, exporters, second order industry, packing firms and schools. The importance of the different customers differs between the cooperatives.
- One processing company was interviewed. The fruit was supplied by individual growers and cooperatives. The final products were consumed nationally and internationally. Intermediate actors, like retailers, were not indicated.
- Three times a packaging firms was indicated as chain partner. In one case packages were supplied to a catering company. In the other case fruit was packed by a packing company and supplied to a retailer.
- Wholesalers are supplied by cooperatives or directly by growers. In the interview with a Spanish wholesaler it was indicated that the fruit goes to retailers and food service. In Greece and Spain the phenomenon wholesale market was mentioned. Suppliers (cooperatives and wholesalers) and customers (retailers and foodservice) meet each other on this kind of markets.
- Retailers sell directly to the consumers. In the interviews different suppliers were mentioned: growers, cooperatives and wholesalers.
- Suppliers of food service (e.g. catering companies, restaurants), as indicated in the interviews, are growers, cooperatives, wholesalers and a fruit and vegetable store. In the interview with a Dutch catering company it was indicated that the company has contacts with a cooperative and with growers, however the procurement and/or transport is done by a distributor.

Specific requirements

The emphasis in customer-specific requirements is related to products. The customers of almost all interviewed companies demand specific product requirements (see Table 9). The same was true for the companies themselves, demanding specific product requirements from their suppliers. In the case of two

growers and a breeding company, at the beginning of the chain, it was not demanded. Product requirements were defined as newness, certified production, standards, low residue levels, pro-ecological production and treatments, fruit size, broad assortment, best, suitable or stable quality, price, availability, pest-free trees, and/or no physical damage.
Packaging requirements are explained as environmental friendly packaging, packaging layout (logo's, colours, etc.), type of cask, newness, size, labeling, packaging material, convenience, and/or disposability.
Information requirements are explained as labeling and information about cultivation method, treatments, certificates, kind of packaging, varieties, market research, and/or chemical usage.
In a few cases service was mentioned as one of the requirements. Service was defined as delivery reliability (99.8%) availability (year round supply), delivery service for consumers (fruit store), putting products in the right cask and demand credit facilities.

Quantity (percentage of sales to be delivered to the auction/cooperative) and organization (membership of Fair Trade like organization (Polish juice producer) were mentioned as additional requirements.

Table 9 Indicated specific requirements (number of interviews per link)

Specific requirements	By customers				To suppliers			
	Product	Pack-aging	Ser-vice	Informati on	Pro-duct	Pack-aging	Service	Informa-tion
Breeder / Research Institute	1							
Tree Nursery	1			1	1			1
Fruit Producer	3	2	1	3	1	1	1	1
Producers Organization / Cooperative / Auction	4	3	1	2	4	1	1	1
Processor	1	1		1	1	1	1	
Wholesale	1		1	1	1	1		
Retail	1	1	1	1	2	1	1	
Food Service	1				1			
Marketing Organization				*1*			*1*	*1*

Type of relations
In only two cases the actor has one type of relationship with customers. In the other cases companies have 2-4 different type of relationships with their customers. With regard to the suppliers, companies in the beginning of the supply chain, from breeder to cooperative, have only one or two different type of relationships. At the end of the supply chain, from cooperative to final actor, companies have two to four different types of relationships.

Individual and repeated transactions, long term relations, or partnerships were mentioned in half or more of the cases as the existing type of relationship with customers. Strategic alliances and vertical integration were mentioned only one and two times, respectively. With regard to the relationship with supplier, all types are mentioned four or more times, except the strategic alliance.

Table 10 Type of relation per country

Country / *Type of relations*	Greece		Poland		Netherlands		Spain		Total
	C.	S.	C.	S.	C.	S.	C.	S.	
Individual transactions	2		3	1	1	1	3	3	
Repeated transactions	1		2	3	2	1	3	1	
Long term relations (informal)	1	1	1		2		3	3	
Partnerships (formalized, contracts)	1		1	3	4	3	1		
Strategic Alliances (including & Joint Ventures)					1			1	
Vertical integration ('internal customers')		1	1	1	1			2	
Cooperative (added)		1							
Total									

Type of arrangements

In half or more of the cases arrangements with customers include arrangements about quality, quantities, and delivery time and place. Arrangements about packaging, added services and information are indicated in only a few cases.

From breeder to grower almost no arrangements with suppliers were indicated, while from cooperative to final customer two to five different arrangements with suppliers were indicated per actor. In the last range of actors each actor has made arrangements about quality with their suppliers. Arrangements about quantities, delivery, and packaging are also important. Arrangements about added services and information are indicated in less cases.

The breeding company has deviating arrangements, including arrangements about territory, market introduction and paying back. Certification and price arrangements are also mentioned as additional arrangements (by other actors).

Arrangements about quality include stable quality, first quality, organic production, certified production, minimum number of supplied varieties, food safety, regular meetings, and/or product specifications.

Table 11 Type of arrangements per country

Country / *Type of arrangements*	Greece		Poland		Netherlands		Spain		Total
	C.	S.	C.	S.	C.	S.	C.	S.	
Quality	3	2	2	3	1	2	2	2	4
Quantities	2	2	3	3	1	1	1	1	
Delivery time and place	2	2	3	3	1		2	1	
Packaging	1		1	3			2	1	
Added services				1	1	1		2	
Information (including certification information)		1		1	1	2	2	1	
License fee (added)					1				
Market introduction agreements					1	1			

2b. Results SCN Business Processes & Control

All business processes mentioned in the framework are indicated to be important (see Table 12). The following additional processes are mentioned: (biotechnological) research and replenishment.

Table 12 Indicated most important SCN business processes

Own position Chain Actors	Breeder/ Research Institute	Tree Nur-sery	Fruit Produce r	Coope-rative/ Auction	Pro-cessor	Whole-sale	Retail	Food Servic e	*Mark-eting Org.*	To-tal
Product Development	1		2	4	1			1		9
Production		1	3	3	1					8
Sorting		1	2	4		1				8
Packing			2	4	1	1	1			9
Cooling/Storage		1	2	4	1	1				9
Distribution/ Transportation			1	4	1	1	1	1		9
Sourcing/ Procurement			1	1		1	1	1		5
Marketing/Sales		1	3	1			2	1	*1*	9
(Biotechnological) research (added)	1									1
Replenishment (added)				1						1

Product development is done by half of the interviewed companies. Other processes are related to the type of company. Striking things:

- A wholesaler in Spain indicated to have production of fruits or vegetables
- All growers, except the organic one, cooperatives and wholesaler indicated to have sorting, packing, and cooling/storage activities.
- Sourcing/procurement is mentioned in only four interviews, including interview with catering company, fruit store, wholesaler, and a cooperative.
- Two processes were added to the list: biotechnological research (breeding company) and replenishment (a cooperative is responsible for the replenishment of the stocks of a few retailers).
- The indication 'order driven' is not used consistently.

In most cases the own estimate/forecast is mentioned as one of the ways to make the future planning. The own estimate/forecast is based on own market research and/or historical (sales) data.

In six (out of 14) cases sales information form (end-) customer is used. Only the Dutch cooperatives and maybe also the catering company have digitalized this information channel. The information is mostly gained via meetings and talking's. Information about the market and consumer trends from market research organizations is used in only four cases. This information is gained indirectly, via magazines or an intermediate organization, and/or directly. In three cases experts are the information sources. The striking point is that these were all Polish cases.

Two different information sources were added: information about new varieties from cooperative and growers' association (grower) and information from other growers (organic grower).

Table 13 Use of demand information in planning

	Own estimate/fore cast	Sales information of (end) customers	Trend information market research organizations	Information of Universities and Research Institutes	Consumer organizations and institutions (e.g. sector associations)
Breeder / Research Institute	1	1	1		
Tree Nursery	1	1			1
Fruit Producer	2	2	1		2
Producers Organization / Cooperative / Auction	3	1	1	2	2
Processor	1	1	1		1
Wholesale	1				
Retail	2				
Food Service	1	1		1	
Marketing Organization					

2c. Results SCN Resources

In most of the cases information and expertise was shared with other actors. Order/transaction related information, shared via E-commerce, was shared by actors in the end of the chain, from cooperatives to final customers. The level of detail differs. In three cases information is shared with a rather broad range of actors in the SCN. The Greek fruit grower shares different kind of information with retailer, wholesalers, other growers, researchers, and suppliers. Dutch growers' cooperatives share information with associated growers, retailers, breeder, and institute for market introduction of new fruit varieties. Catering company Sodexho (NL) shares information with distributor, breeders, processors, technical engineers, research institutes, and partners in projects. For the breeding company sharing of expertise (e.g. biotechnology, metabolisms) is very important.

In the interviews three types of resources were seen:

- Resources shared with other actors. These resources were owned/created by the focal company. Example: catering company Sodexho has consumer/market information for new innovations. They share this information with breeders, growers, producers of ready to eat meals, technical engineers and research institutes.
- Resources shared with other actors. These resources were owned/created by the other actors. Example: growers' cooperative The Greenery (NL) receives sales data from retailers via the 'co-maker' system.
- Resources owned/created by the focal company. It is not mentioned that these resources were shared. Example: a Polish apple concentrate production plant has technological equipment for concentrate production, machines to filter the apple concentrate in order to remove certain bacteria, and machines for concentrate storing. It is not mentioned whether these machines are shared with others.

2d. Results SCN Strategy & Tactics

High product quality was for most actors part of their mission statement. Lowest price and one-stop-shopping were mentioned in none and one of the cases, respectively. Unique product and excellent service were both mentioned by half of the actors. Excellent service was, however, not mentioned by the Dutch actors. Additional competitive advantages were: high pay out price for member growers (for cooperatives), broad assortment, focus on fruit, year round supply, and strategic collaboration.

Table 14 Mission statements

Actor	Country	Lowest price	High product quality	Unique product	One-stop-shopping	Excellent service	Others
Breeding company	NL		X				X
Nursery	PL		X				
Grower	GR		X				
Grower	NL						X
Org. grower	SP		X	X		X	
Cooperative	GR (2)		X			X	X
Cooperatives	NL		X	X			X
Cooperative	PL		X	X		X	X
Concentrate production plant	PL		X	X		X	
Wholesaler	SP		X	X		X	
Retailer	PL						X
Fruit store	SP		X	X	X	X	
Catering company	NL		X				X
Marketing organization	SP					X	

The sharing of objectives and alignment of strategies with other chain actors is done in part of the cases, in the other part it is not done or not mentioned. In part of the case the sharing of objectives is viewed as imposing requirements, in the other part it is viewed as collaboration.

The measurement of the objectives product quality, costs, and responsiveness is done in part of the cases. Flexibility is measured in only one case. The cooperatives, and also the organic grower and the concentrate production plant, located in the middle of the SCN, measure more than one objective.

Most of the mentioned challenges/bottlenecks have to due with either the relationship with customers and supplier, and/or the quality systems. In some interviews the interviewees refused to talk about challenges/bottlenecks. Most changes and innovations are done or planned in the categories product and process. See Table 15 below.

Table 15 List of mentioned innovations

Mentioned innovations		**Past/ Present (P) Future (F)**
Product	New variety	P8 F8
	Adapting varieties (other shapes, size, color)	P F
	New packaging for ready-to-eat meals	F
	New prepared products in retail (salads ready to eat, some vegetables in slides, etc), including small area at the front of the fruit store for self-service	P
	New presentation plates (glass) in catering	F
Process	New production system with higher density (more trees per hectare)	F
	Implementation of (small) business software (CRM, inventory)	F
	Implementation of quality management system (Agro 21/22, HACCP, ISO, Eurepgap)	P6 F3
	Optimization of logistics and storing (FIFO system, full automatic palletizing system, digitalization).	P
	New monitoring system for controlling residue levels	P
	Renewal of the auction system: applying modern automation	P
	Implementation stricter sorting system	P
	Setting up more sorting capacity	F
	Digitalization of communication channels between, for example, growers and cooperative	P
	Employment of advisors for production optimization	P
	Implementation of barcodes	P
	New machines for concentrate filtering, which allow to remove ACB bacteria	P
	New production line	P
	Increasing of production area	P F
	Cold storage plant was built	P
	New nursery machines	P
	Establishment of own grafts orchard (by fruit producer)	F
	New cooling warehouses to increase capacity for product preservation	P
	Development and application of new breeding techniques (cisgenesis)	F
	New machines for more efficient production	P
	Combination of transport flows fresh, frozen and dried	P
Marketing	Penetration of the Chinese market (with breeding activities)	F
	New products in assortment	P F2
	Light effects in catering	F
	Implementation of a new type of promotion campaigns (press conferences, nutrition programs in schools, exhibitions and cooperation with 'Health Promotion' foundation	P/F
	Participation in fairs and exhibitions	P
	Promotion in cooperation with sector association	P2 F
	Own internet site	P2
	Tasting during local exhibitions and festivals	F
	From sales only on local market to export	F
	More direct sales from grower to retail	P

Mentioned innovations		Past/ Present (P) Future (F)
	More direct sales from grower to consumer	P
	Change of farm shape in order to attract consumers ('creating a forest in the farm')	P
	Creating a biological farm as a centre for education and entertainment	F
	Development of new brands	F
Organizational	Establishment of juice producing company	F
	Merger auction and wholesaler	P
	Split off breeding activities in spin-off company	P/F
	Take over other shops	P
	Take over of fruit salad producer by auction	P
	Establishment of research and development department	P
	Strategy development	P
	Accommodation foreign employees	P
	New catering contract system based on fixed prices	P
	Conducting activities in order to increase proportion of production from members' farms	P
Product/process	New machine for organic milkshakes	P
	Also fruit salad production	P
	Initiation of cultivation of organic production	P
	Use of disposable/recyclable packaging	P
	Kiwi's from Holland	F
Product/ marketing	New buffet for fresher salads (catering)	F
Process/ marketing	Set up a fruit juice processing unit	P
	Improvement auction system for BRC-certification	F
	Picking products by wholesaler instead of by customers themselves	P
Marketing/ Product	New commercial period (extended period of sales by adding to crop variation portfolio)	F
Marketing/ Organizational	Development of Restaurant of the Future	P

3. Suggestions for the chain framework

The interviews confirm the usefulness of the chain framework for high-level chain mapping. Some refinements can be made based on the interview results:

- Add the following actors: distributors (transportation companies), importers/exporters, business customers e.g. companies that are catered by a Food Service actor), marketing organization.
- The following additional processes are mentioned: (biotechnological) research and replenishment.
- The difference between order-driven processes and planning-driven should be made more clear.
- Three different approaches to resources could be included: 1) resources owned and created by the focal company, 2) own resources shared with other actors, and 3) resources, owned by other actors, which are shared with the focal company.
- Big changes/innovations could be a mix of product, process, marketing, and organization.

4. Suggestions for improving the questionnaire

The interviews provide good overall insight of fruit supply chain networks. The questionnaire is good (structure, number of questions, et cetera), some refinements could be done.

- The requirements, type of relation, agreements and sharing of resources could be specified for the different suppliers and customers.
- Own resources, especially those which affect performance and innovation, should be included in the questionnaire.
- For large companies with different subsidiary companies it would be nice to give an organization chart.
- Difference between producer's organization, cooperative and auction should be made clear.
- Im- and exporters could be added to the list of actors.
- Process requirements could be included. Requirements with regard to certification and other quality systems could be put in this category.
- For the different business processes it has to be indicated which are done by the focal company, by the direct customer/supplier, or by a third party (contracted out).
- Divide 'own estimate/forecast' into 1) planning without taking into account market information, and 2) own search for market information.
- A splitting of the questions is suggested: 1) What are the objectives of your company? Which one is most important?, and 2) Which capabilities could your company use to reach these objectives?
- Past and future changes/innovations could be asked after each treated element (Actors & governance, business processes & control, resources).

5. Suggestions for improving interview instructions

The quality of the interview reports is varying and should be more extensive and complete. Therefore the instruction should be more detailed and better communicated to the interviewers. Points of attention are:

- The interviewer has to ask for and report explanation of the diverse statements.
- Interviewees do not have to stick to the answer alternatives. The interviewer has to keep the interview open.
- Business processes of a company are not actors of a company.
- Take care of input suppliers.
- The relative importance of customers and suppliers has to be given in, for example, % of traded volume.
- Interviewees have to define what they mean by (product) quality and other broad concepts.
- The list with actors is not limited to customers and suppliers.
- For the packing process it has to be indicated whether it is the final package or an intermediate package.
- Own development of new products should be included in the category product development. When a company only purchases and eventually tests new products it should be included in the category sourcing/procurement.
- Interviewers have to know what is meant by order-driven.
- Processes done by cooperatives and by their associated growers should be considered differently.
- Import of fruit should be included in the category sourcing/procurement.
- Business processes have to be described well, including sub processes!
- If a diagram of a company's business processes could not be presented, it is advised to draw this diagram.
- Sharing of resources should be better explained.
- The definition of 'automated' should be clear to all interviewers.
- When objectives are not measured, it should be indicated, otherwise it is not clear whether it is not asked or not measured. When objectives are measured, it should be specified.
- Interviewers have to pay attention to differences between challenges/bottlenecks and planned innovations.
- Some interviewees do not like to talk about bottlenecks faced in their company. This could be determined by their culture. Indirect questions could help.

- Before an interview the questionnaire has to be specified to the concerned actor by the interviewer.
- The topics of the interview have to be shown to the interviewee beforehand.

6. Conclusions

Main conclusions from the interviews are:

- The interviews provide good overall insight of fruit supply chain networks. **This confirms the usefulness of the chain framework for high-level chain mapping and results in some valuable refinements.**
- The questionnaire is good (structure, number of questions, et cetera), some refinements should be done. However the instruction should be more detailed and better communicated to the interviewers.
- The quality of the interview reports is varying and should be more extensive and complete.

Appendix B Questionnaire for testing the framework

Instructions interviewer

Interview objective

- The main objective of this interview is to **get insight in the current strategies and structure of Fruit Supply Chain Networks**, including the faced challenges, past innovations and vision about future innovations.

Interview method

- Mainly qualitative, asking for supporting facts and figures
- In-depth semi-structured interviews
    - Structured set of open questions, asking for further details.
    - Ask for available documentation.
- Interview structure corresponds with the structure of the chain framework. First questions are asked to map/describe the current situation of the SCN from the interviewee's perspective (according to the dimensions SCN Business Processes, SCN Actors, SCN Management, SCN Resources). Per dimension is asked for interviewee's evaluation, to get insight in the bottlenecks, required improvements and future vision. Secondly, information is asked about firm's strategy and objectives in SCN context, focusing on the past, current and future innovations.
- It is not necessary to follow strictly the questions in the sequence of this document, but all main open questions (bold in this document) should be answered. If, unwished for, questions could not be answered, please motivate why.
- Expected duration of the interview is about 1,5 hours.

Preparation

- Selection interviewees:
    - In order to map supply chain networks, most important is that the **interviewee must have a broad insight in the different company processes (sales, production, logistics) and the company's role in the Supply Chain Network**.
- Preparation by the interviewer is very important because time is limited. So search for all available generic company information (including website) and **fill in the questionnaire as much as possible beforehand!**
- Think beforehand about priority and applicability of the questions for this interviewee, and about the best sequence of questions (top priority questions first). So **if necessary: personalize the questionnaire beforehand!**
- Preparation of the interviewee is limited. Most important: if you could take available company information with you (e.g. strategy documents, company brochures, quality manuals, etc.), that would be great.

Reporting

- If possible, the interviews are voice-recorded. Interviewer makes an extensive report of the interview according to the format of this document.
    - **Reports should be as extensive and complete as possible!**
- If, unwished for, questions could not be answered during the interview because of a lack of time, add a question for additional information (between [brackets]) in the draft report before sending it to the interviewee. Further, if provided information at one question, also answers other questions, you can refer to it (only if there is no time left, otherwise this is a perfect cross-check.
- The draft report should be reviewed by the interviewee. Corrections and additions of the interviewee are incorporated in the document. Additional comments of the interviewee are marked by [brackets].
- The interview report is confidential and will only be accessible for the research team. Other people can only get the report with permission of the interviewee.
- Due to overall analysis, the **final interview report has to be in English.**

General information

Name interviewee	Fill in before the interview.
Function	Fill in before the interview.
Company name	Fill in before the interview.
Date interview	Fill in before the interview.

Introduction

Interview objective	**Brief introduction of the research, interview objective and method**	
	See information above.	
Company profile	**Please, could you briefly introduce your company?**	
	After having answered this open question, check the following information ***which should be gathered as much as possible beforehand.***	
	• *Products, most important brands and or varieties?*	
	• *Core activities?*	
	• *Production amount per year?*	
	• *For growers: how many hectares (total plus percentage fruit/apple)?*	
	• *Organizational Structure*	If applicable: organization chart!
	• *Which locations: where and type of locations (plant, nursery, sales office, …), spread or concentrated?*	
Profile inter-vie wee	**What is your role in the company?**	
	Function, responsibilities, etc.	

SCN Actors & Governance

Which are the main organizations in your Supply Chain?		
Actor	*Type*	*Brief Explanation /Relative Importance*
☐ Input Supplier	Customer/ Supplier/ Other	
☐ Breeder	Customer/ Supplier/ Other	
☐ Research Institute	Customer/ Supplier/ Other	
☐ Marketing Organization (for promotion, brands, etc.)	Customer/ Supplier/ Other	
☐ Tree Nursery	Customer/ Supplier/ Other	
☐ Fruit Producer	Customer/ Supplier/ Other	
☐ Producers Organization or other types of cooperatives	Customer/ Supplier/ Other	
☐ Auction	Customer/ Supplier/ Other	
☐ Processor	Customer/ Supplier/ Other	
☐ Packaging Firm	Customer/ Supplier/ Other	
☐ Distributors (transportation companies)	Customer/ Supplier/ Other	
☐ Wholesale	Customer/ Supplier/ Other	
☐ Importer	Customer/ Supplier/ Other	
☐ Exporter	Customer/ Supplier/ Other	
☐ Retail	Customer/ Supplier/ Other	
☐ Food Service	Customer/ Supplier/ Other	
☐ Second Order Industry (uses fruits or residual products as ingredient to produce non-fruit products)	Customer/ Supplier/ Other	
☐ Consumer	Customer/ Supplier/ Other	
☐ ……	Customer/ Supplier/ Other	

CUSTOMERS

To what extent do your CUSTOMERS demand your company specific requirements?	
Specific requirements about:	*Brief explanation / Relative Importance; If applicable: distinguish between different (types of) customers!*
☐ Product?	
☐ Quality?	
☐ Packaging?	
☐ Service?	
☐ Information (e.g. for tracking & tracing, denomination of origin, etc.)?	
…	

What type of relations do you have with your CUSTOMERS?	
Type of cooperation	*Brief Explanation / Relative Importance (percentage of total customers) If applicable: distinguish between different (types of) customers!*
☐ Individual transactions	
☐ Repeated transactions	
☐ Long term relations (informal)	
☐ Partnerships (formalized, contracts)	
☐ Strategic Alliances (including & Joint Ventures)	
☐ Vertical integration ('internal customers')	
☐ ……	

Which type of arrangements do you have with your CUSTOMERS?	
Agreements (both formal and informal) about:	*Brief Explanation / Relative Importance* *If applicable: distinguish between different (types of) customers!*
☐ Quality?	
☐ Quantities?	
☐ Delivery time and place?	
☐ Packaging?	
☐ Added services?	
☐ Information?	
☐ …	
Do you have examples of contracts? If yes, would it be possible to view/get it for our research?	

SUPPLIERS

How far do you demand your SUPPLIERS specific requirements?	
Specific requirements about:	*Brief explanation / Relative Importance* *If applicable: distinguish between different (types of) customers!*
☐ Product?	
☐ Quality?	
☐ Packaging?	
☐ Service?	
☐ Information?	E.g. for tracking & tracing, denomination of origin, etc.
…	

What type of relations do you have with your SUPPLIERS?	
Type of cooperation	*Brief Explanation / Relative Importance (percentage of total customers)* *If applicable: distinguish between different (types of) customers!*
☐ Individual transactions	
☐ Repeated transactions	
☐ Long term relations (informal)	
☐ Partnerships (formalized)	
☐ Strategic Alliances (including Joint Ventures)	
☐ Vertical integration ('internal customers')	
☐ ……	

Which type of arrangements do you have with your SUPPLIERS?	
Agreements (both formal and informal) about:	*Brief Explanation / Relative Importance* *If applicable: distinguish between different (types of) customers!*
☐ Quality?	
☐ Quantities?	
☐ Delivery time and place?	
☐ Packaging?	
☐ Added services?	
☐ Information?	
☐ …	
☐ …	
Do you have examples of contracts? If yes, would it be possible to view/get it for our research?	

SCN Business Processes & Control

What are your most important business processes?		
Main Business Process	***Please, describe !*** *(brief explanation /what are main sub activities?) If applicable: describe whether business processes are outsourced!*	*Order Driven?*
☐ Product Development		Yes/No/Partly
☐ Production (of trees, fruit, processed fruit, …)		Yes/No/Partly
☐ Sorting		Yes/No/Partly
☐ Packing		Yes/No/Partly
☐ Cooling / Storage		Yes/No/Partly
☐ Distribution/ Transportation		Yes/No/Partly
☐ Sourcing/Procurement		Yes/No/Partly
☐ Marketing/Sales		Yes/No/Partly
☐ …….		Yes/No/Partly
Additional comments and explanation		

How far are your business processes customer order-driven? ⇒ ***In other words: which processes start after the customer order hare been received (so which processes are not executed before customers are ordering for it?***
Please, indicate in the table above how far the mentioned business processes are order-driven.

How do you make your future (production) planning? Do you use market information for it? If yes: which?	
Which type?	*Brief explanation*
☐ Planning without taking into account market information?	
☐ Planning based on own estimate of market information?	
☐ Planning based on sales information from customer / end-customer?	
☐ Planning based on consumer trends from market research organizations?	
☐ …….	
Additional comments and explanation	

Do you have descriptions/models/diagrams of your business processes (e.g. as part of quality manuals)?
If yes, could we receive a copy of it (or summary, main flows)?

SCN Resources

What are critical resources for your company? **Do you share resources with others? If yes, which, with whom and how?**

Resource Category	*Which resource?*	*Sharing with which type of partner?*	*Comments, specifications!*
☐ Staff	☐ Sales Expertise	……	
	☐ Product Development Expertise	……	
	☐ Production Expertise	……	
	☐ Transportation Expertise	……	
	☐ …….	……	
☐ Production facilities	☐ Machines	……	
	☐ Field	……	
	☐ …….	……	
☐ Transport facilities	☐ Trucks	……	
	☐ …….	……	
☐ Other: ……	☐ ……	……	
Comments, specifications!			

Do you share information with others? If yes, which, with whom and how far automated?				
Information Category	*Which resource?*	*Sharing with which type of partner?*	*How far automated?*[3]	*Comments, specifications!*
Demand-related information?	☐ E-commerce: order/transaction related information	☐ Retailer: …. ☐ : ….	Yes/ No/ Partly	
	☐ Demand information (patterns of past transactions, trends, ..) for better forecasting	☐ …. ☐ ….	Yes/ No/ Partly	
	☐ Consumer/market information for new innovations	☐ …. ☐ ….	Yes/ No/ Partly	
	☐ …….	….	Yes/ No/ Partly	
Supply-related information?	☐ Product assortment information	☐ Retailer: …. ☐ : ….	Yes/ No/ Partly	
	☐ Production planning information (e.g. expected harvesting times, quantities, qualities)	☐ …. ☐ ….	Yes/ No/ Partly	
	☐ Product traceability information	☐ …. ☐ ….	Yes/ No/ Partly	
	☐ ……	☐ …. ☐ ….	Yes/ No/ Partly	
Comments, specifications!				

[3] Automated means that the information is exchanged via Information & Communication Technology e.g. EDI, the internet or shared software systems.

SCN Strategy & Tactics

What is your mission statement? **In other words: what is the main competitive advantage of your company in the market place?**	
☐ Lowest price ☐ High product quality ☐ Unique product ☐ 'One stop shopping' ☐ Excellent service ☐ …..	*Comments?*

What are the main objectives of your company? Please, indicate priority.

Do you measure objectives in order to monitor achievement of your strategies?
If yes, which?

Objective (at least: top 3)	*Priority (1/2/3/etc.)*	*Measured? (Yes/No/Partly)*	*Comments*
☐ Product Quality			
☐ Costs			
☐ Responsiveness			
☐ Flexibility			
☐ Service Level			
☐ ……..			

Additional comments and explanation

Do you share common objectives in the chain or align strategies with customers/suppliers?
Yes/No/Partly: Please explain.

Which are the main challenges/bottlenecks[4] you are facing in your company?	
Type	*Challenge/bottleneck*
SCN Actors & Governance	☐ …….
	☐ …….
SCN Processes & Control	☐ …….
	☐ …….
SCN Resources	☐ …….
	☐ …….
Other ……?	

Which kind of changes did your company go through over the last 5 years?		
Change		*Brief explanation*
Pro-	☐ New variety	

[4] Please, be careful how to ask this question. Interviewees sometimes do like to talk about problems. Positive formulation (challenges/ desirable improvements) or indirect questions can help.

duct	☐ ……..	
Pro-cess	☐ Implementation of Vendor Managed Inventory	
	☐ Implementation quality management system	
	☐ ……	
Marke-ting	☐ New market channel (e.g. web shop, entrance in food service, …)	
	☐ Implementation of a new type of promotion campaigns	
	☐ ……	
Organi zationa l	☐ Merger	
	☐ Reorganization	
	☐ ……..	

Which kinds of changes are you thinking about or are planned to work on?		
Change		*Brief explanation*
Produc t	☐ New variety	
	☐ ……..	
Proces s	☐ Implementation of Vendor Managed Inventory	
	☐ Implementation quality management system	
	☐ ……	
Marke-ting	☐ New market channel (e.g. web shop, entrance in food service, …)	
	☐ Implementation of a new type of promotion campaigns	
	☐ ……	
Orga-nizatio nal	☐ Merger	
	☐ Reorganization	
	☐ ……..	

To conclude

Others	**Have I forgotten relevant things?**
	What further comes up for consideration.
Snow-ball	**Are you interested to become further involved in the ISAfruit research?**
	If yes, tell about the intended case studies: interested to participate?
	Do you have suggestions for other people that might be interested to participate in this project?
	If yes, ask about role and contact information.
Clo-sure	**Tell what's next and thank for cooperation**
	Report, review, acceptation,