

# FOOD-Dynamo: the challenge of demand-driven food chains

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## Abstract

Cor. N. Verdouw, dell'Università di Wageningen, è il coordinatore del subprogetto FoODYNAMO. Il suo articolo ci consente di entrare nella specifica tematica delle filiere alimentari "guidate" dalla domanda (supply chains e Food Chains) una particolare evoluzione concettuale derivata dalla Logistica (Logistic Management) a sua volta inserita nella più vasta disciplina della Economia di processo.

Le demand driven chains sono delle vere e proprie organizzazioni dinamiche tra gli operatori di filiera in grado di rispondere su misura e rapidamente alle domande (anche previste) della clientela: il tutto è misurato in termini di tempo ed economicità con lo scopo di aumentare l'efficienza stessa del sistema di produzione. Nel bilanciamento tra efficienza e flessibilità (della chain), per raggiungere l'obiettivo un ruolo centrale è svolto dai CODPs (Customer Order Decoupling Points) ossia i punti, della filiera, nei quali si sdoppiano gli ordini della clientela fornendo informazioni utili alla modificazione della stessa. Tali ragionamenti sono sviluppati anche nella filiera dell'olio di oliva ligure attraverso due esempi, riportati schematicamente nelle figure n. 4 (caso di produttori che riversano la produzione in cooperativa che a sua volta commercializza attraverso negozi specializzati) e n. 5 (caso di produttori che commercializzano sul WEB attraverso alcuni servizi offerti dalla cooperativa).

Il contributo conclude ponendo l'accento sull'importanza evidente, manifestata anche dal settore dell'olio d'oliva ligure, verso modelli di filiere orientate verso il mercato: le tecniche d'analisi proposte incontrano tali esigenze coinvolgendo gli stessi produttori nell'inevitabile cambiamento prospettato.

## Introduction

The business environment in food industries is changing rapidly. Important driving forces include the increasing unpredictability of consumer behavior, intensification of competition due to the globalization of markets, and fast developments in (information) technology resulting in more transparent markets and ever-shorter

product life cycles. These developments result in increasing volatility and diversity of demand.

In order to cope with these developments, it is widely recognized that companies more and more have to participate in agile demand-driven chains that are able to sense and react dynamically to changes in the increasingly turbulent marketplace. However, this is not easy to realize, especially for Small and Medium Enterprises (SMEs) in food chains. Furthermore, responsiveness is hampered in food chains by long production lead times among others because of seasonable production, short required delivery time due to product freshness, and lengthy processes to adapt products.

The FOOD-Dynamo project was conducted to support food SMEs of different European regions in the challenge of moving towards demand-driven chains. The name is an acronym of Food On Demand by Dynamic modeling and reflects the mission for dynamic chains that are continuously tuning to the market, within the food-specific possibilities.

This chapter introduces the FOOD-Dynamo project. Therefore, first the overall project structure is described. Next the idea of demand-driven food chains is discussed, which is illustrated with examples in olive chains in the next session. The chapter ends with some concluding remarks.

## **What is the FOOD-Dynamo project?**

FOOD-Dynamo is one of the seventeen subprojects of PromSTAP ([www.promstap.org](http://www.promstap.org)). This is an interregional program the European Union (Interreg IIIC) to promote the 'innovation, implementation and internationalisation' of the stable to table approach (PromSTAP) by jointly elaborating new policy approaches and best practice guidelines.

The overall objective of the FOOD-Dynamo subproject is to support the implementation of best practices that enable SMEs to participate in agile, demand-driven food chains. This by transfer of knowledge on demand-driven food chains from research organisations to SMEs, and cross-industry learning between SMEs in the participating regions.

In figure 1 the setup of the project is summarized.

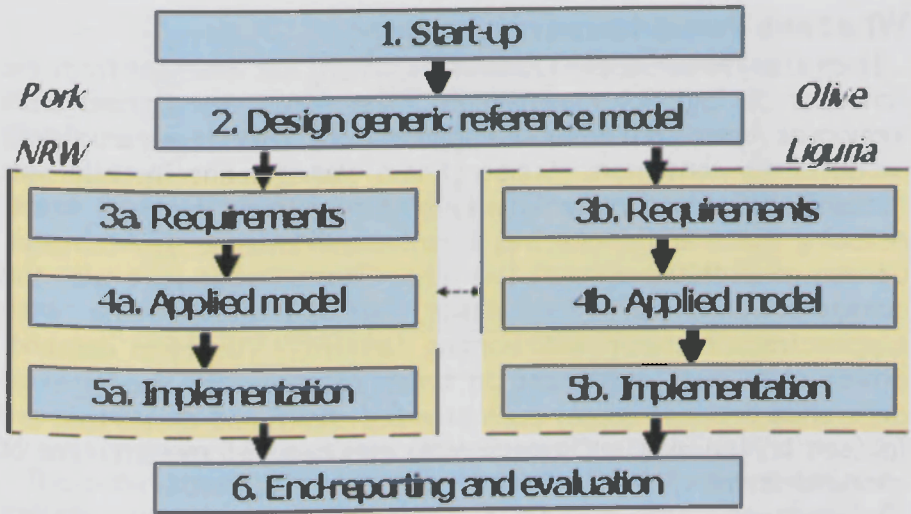


Figure 1 Setup of the FOOD-Dynamo project

The project phasing is as follows:

- Start-up: kick-off, developing project planning and other preparing activities;
- Design of a cross-industry reference model that captures generic best practices about demand-driven chains (on basis of literature and existing reference models);
- Application to two different food industries (pork chains in North Rhine-Westphalia and olive chains in Liguria) by:
  - Investigating sector-specific and region-specific requirements of demand-driven chains in pork and olive markets, with special attention to the issue of food quality and the role of SMEs;
  - Designing new, demand-driven chain configurations for demand-driven pork and olive chains, by application of the generic model in accordance with the determined requirements;
  - Validation of developed chain configurations by Proof of Principle implementations at the participating SMEs;
- End-reporting and evaluation.

Main involved project participants are:

- Project management and generic model development: LEI Wageningen UR and Wageningen University (The Netherlands), Politecnio di Milano (Italy);
- Application to pork chains in North Rhine-Westphalia: Erzeugergemeinschaft Rheinland w.V. (EGR, Germany), Chainfood and LEI Wageningen UR (The Netherlands);
- Application to olive chains in Liguria: Regione Liguria - Servizio alle Imprese Agricole and Politecnio di Milano (Italy), LEI Wageningen UR (The Netherlands).

## What are demand-driven chains?

Since the 1980s, Supply Chain Management has emerged from the concepts of logistics management. The focus was shifted from individual firms to chains of organisations that together supply products to consumers. Supply Chain Management initially was focussing on improving efficiency by streamlining material flows, reducing waste and minimizing inventories. However, as (Vollmann, Cordon et al. 2000) argued, the “chain focus should start with the customer and work backwards, instead of starting with supplier/manufacturer and working forward”. The term demand-driven chain was introduced in order to stress the fundamental difference between supply-push oriented chains and chains that are focused on the market by responsive and customized fulfilment of consumer demand.

In this project we define such demand-driven chains as:

**A Demand-driven Chain** is a supply chain 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)*

Main challenge of creating demand-driven chains is to realize rapid and customized response to customer demand. This requires a combination of efficiency to fulfil demand with minimal use of time and money, and flexibility to deal with the ever-changing amount and variety of the demand. In order to find a balance between efficiency and flexibility, the positioning of Customer Order Decoupling Points (CODPs) plays a central role (Naylor, Naim et al. 1999). The 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 products. In figure 2 the CODP concept is visualized. In figure 2 all business processes are based on demand information. The planning-driven processes are based on forecasts that are derived from market information about consumer preferences, trends in buying behaviour and more general underlying factors.

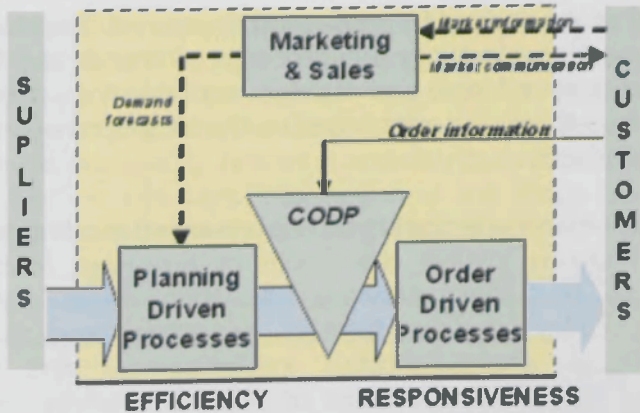


Figure 2 The Customer Order Decoupling Point (CODP)

The order-driven processes are driven by the actual demand, i.e. specific customer orders. If we apply this figure to chains of cooperating firms, there is 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. There are many possible positions of these CODPs. Consequently, there are many possible configurations for demand-driven chains. In figure 3 one possible simplified demand-driven food chain is visualized.

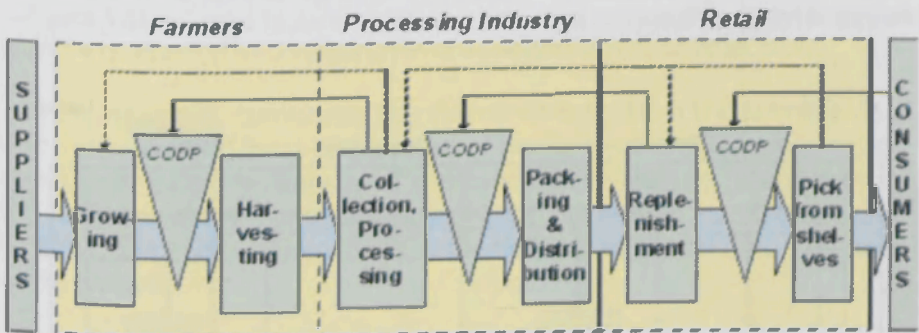


Figure 3 Illustrative example of a demand-driven food chain

In this example a retailer sells food products to consumers in a supermarket. If the shop inventory is below the ordering level, the retailer sends a replenishment order to the processing industry. This factory fulfils the replenishment order by packing the already produced food products and distributing it directly to the retailer. The processing industry produces the food products on stock based on

forecasts that are derived from sales information of the retailer. Based on his production planning, the processor demands the farmers to harvest the required crop and make it available for collection. The farmers set up their nurseries based on the long-term planning of the processing industry.

**How can demand orientation be implemented in olive chains?**

Olive oil chains involve the whole of processes from 'farmer's oliveyard to consumer's culinary art'. Main stages are growing, harvesting, collection from farmers, processing into oil, packing, distribution to wholesale/retail, replenishment and selling to consumers. Most important steps of processing olives into oil are: breaking down the olives in pieces, mixing, and separating oil, water and pomace.

The sequence and elaboration of these processes is dependent on how consumer demand is fulfilled in the chain network: which companies are involved (network structure), what are the different positions of the CODPs in this network and to what extent are the processes integrated (includes demand information exchange). There are many different possible variants, dependent on strategic choices, and sector-specific characteristics about the market and production. Figure 4 and 5 visualize two possible configurations of a demand-driven olive chains.

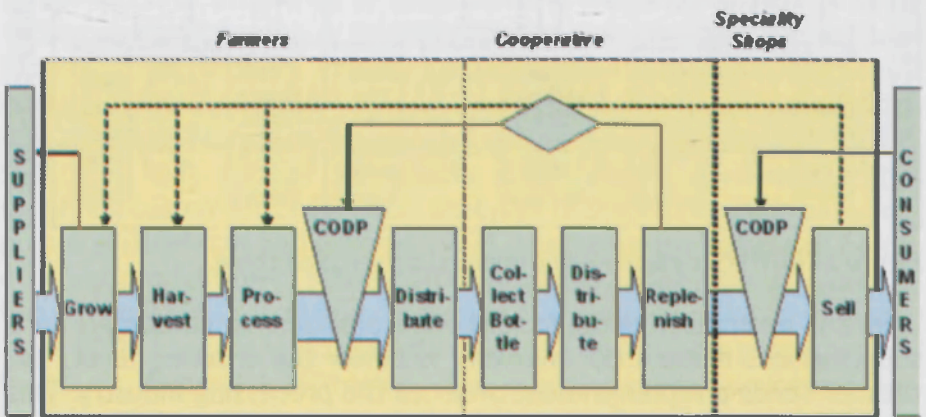


Figure 4 Category management by a cooperative of farmers for specialty shops: illustrative configuration of a demand-driven olive oil chain

In this example, a cooperative of farmers completely manages the inventory of olive oils in speciality shops. It has taken over the replenishment in the shops and has the lead in determining the assortment of oils. Further, the cooperative collects the oil from the farmers, checks the quality, bottles it and distribute it to the speciality shops. The farmers use sales information of the shops to decide on growing olives, harvesting and processing them into oil.

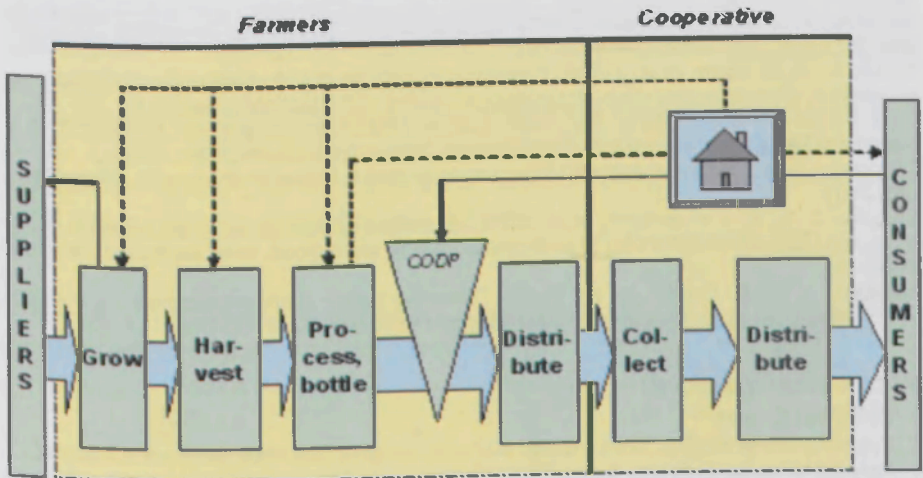


Figure 5 Direct sales to consumers via a web shop managed by an cooperative of farmers: illustrative configuration of a demand-driven olive oil chain

In this example, consumers buy the oil directly from the farmers via a website, managed by a cooperative. The farmers provide information about their oil to the website of the cooperative and use information of the internet sales to optimize growing, harvesting, processing and bottling. The cooperative manages the delivery of the oil that is ordered at the website.

## To conclude

In this chapter the FOOD-Dynamo project is introduced from the lead participant's perspective. Production orientation is a dominant approach for many olive companies in Liguria. In the project it was found that there is a strong need for new market-oriented supply chain systems to strengthen the competitiveness of Ligurian olive industry. Therefore, the focus has been on investigation of market orientation in the region and on defining new supply chain configurations for demand-driven olive

oil production. However, transition towards market-driven chains has much impact. The FOOD-Dynamo project so far has been a good start which demands for follow-up.

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## Alcune definizioni:

### demand driven

A demand driven architecture/language performs computations when the result is required by some other computation. A data flow architecture or language performs a computation when all the operands are available. Data flow is one kind of data driven architecture, the other is demand driven. It is a technique for specifying parallel computation at a fine-grain level, usually in the form of two-dimensional graphs in which instructions that are available for concurrent execution are written alongside each other while those that must be executed in sequence are written one under the other. Data dependencies between instructions are indicated by directed arcs. Instructions do not reference memory since the data dependence arcs allow data to be transmitted directly from the producing instruction to the consuming one

### Supply chain (e-commerce)

Indica l'insieme di unità organizzative che intervengono nella produzione di un bene o un servizio atto a soddisfare le esigenze di un utilizzatore finale

### A supply chain, (Wikipedia English - The Free Encyclopedia)

logistics network, or supply network is a coordinated system of organizations, people, activities, information and resources involved in moving a product or service in physical or virtual manner from supplier to customer. Supply chain activities (aka value chains or life cycle processes) transform raw materials and components into a finished product that is delivered to the end customer. Supply chains link value chains.

### Supply Chain (Raynet Business & Marketing Glossary)

the entire network of suppliers, factories, warehouses, distribution centers and retailers that participate in the process from raw materials to finished products (see distribution chain, value chain).