

Mapping decision mechanisms in food supply systems – A case of Norwegian salmon supply chain



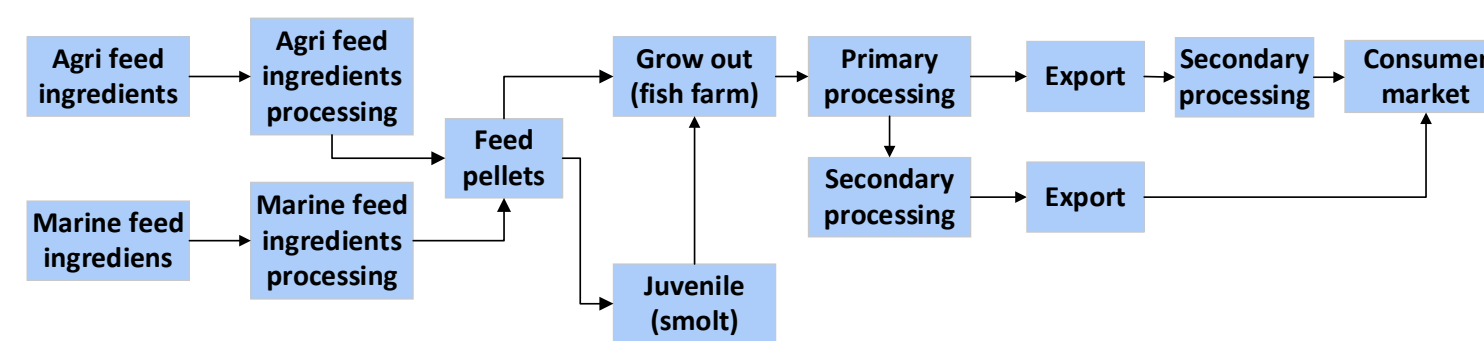
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This study presents the Event-based process chains (EPC) methodology to map the food supply systems and decision-making mechanisms. Norwegian farmed salmon supply chain is used as a case study and EPC models are developed using available secondary data and semi-structured interviews with the industry stakeholders. These models present all the stages of salmon supply chain including feed production, juvenile production, grow-out/farming, processing and distribution and outline most important factors influencing the decision making by supply chain actors. The decisions take into consideration regulatory, operational and strategic aspects. The EPC models are a tool to visualise the supply chain and decisions mechanisms in the food systems. Mapping of decisions enables in understanding the behaviour of different stakeholders in the chain and can be further used for supply chain modelling and value chain analysis. A framework is developed to identify data availability, gaps and requirements for sustainability assessment and further value chain analysis.

Introduction

The Horizon2020 VALUMICS project is based on a holistic systematic approach. A system dynamics methodology is implemented as a key driver for the overall project work and case studies on different food chains are an integral part of the VALUMICS project. One of the case studies focusses on the Norwegian salmon value chain. About 70% of the world's salmon production is farmed. Most farmed salmon come from Norway, Chile, Scotland and Canada. The total freshwater production cycle takes approximately 10-16 months (juvenile production) with the seawater production cycle (grow-out phase) lasting around 14-24 months, giving a total cycle length of 24-40 months.

Development of the model for different stages of salmon production is based on available secondary data and semi-structured interviews with the industry. The application of EPC in data collection process and modelling work in other work packages in VALUMICS has been collaboratively defined.



Atlantic salmon supply chain

Methodology

The modelling technique Event-based process chain (EPC) has been applied in this task to develop a model for salmon value chain. EPC is a process modelling technique used for modelling, analysing and redesigning business processes. It is a semiformal, graphical modelling technique used by many companies for modelling, analysing, and redesigning business processes today.

Main outcomes

- EPC models for all the stages of the salmon value chain including feed production, juvenile production, grow-out/farming, processing and distribution.
- Outline of most important factors that influence the decision making by value chain actors.
- A framework for identifying data availability, gaps and requirements for the tasks in other Work Packages in the project.

Decisions linked to the grow-out phase in the salmon value chain

Decision	Applicable Regulation	Description	Decision Level	Decision Maker
Selection of production site	The Aquaculture Act and Traffic light system	The product site is specified in the license and must meet the environmental regulations.	Obligatory, site-specific	Directorate of Fisheries and Farming company
Production Limit	Maximum Allowable Biomass (MAB)	Maximum volume of fish a company can hold at sea at all times. In general, one license is currently set a company MAB, of 780 tons (945 tons in the counties of Troms and Finnmark).	Obligatory, site-specific	Directorate of Fisheries
Harvest		The optimal harvest weight is between 4-5 Kg. However, fish is commonly marketed in the range between 3.5 and 7 kg. Volatile salmon prices make the timing of harvest an important factor for profitability. The farmer has to decide whether to harvest the fish at a known price or to continue to feed until a later harvest and market a larger fish at an unknown future price. However, delaying harvest comes at a price. Farmer have to pay to keep the fish in the pen, a cost including extra feed expenses.	Site-specific	Farming company



EPC model of the grow-out phase

