Impact hotspot analysis of Norwegian farmed salmon value chain

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Objective

The overall objective of VALUMICS project is to provide decision makers throughout food value chains with a comprehensive suite of approaches and tools that will enable them to evaluate the impact of strategic and operational policies, and enhance the resilience, integrity and sustainability of food value chains in European countries.

Project budget

The EU Grant of 6 million EURO

A four year project:

1 June 2017 to 30 May 2021

21 participating organisations

19 European partners from 14 countries, and two Asian partners, China and Vietnam
Project Structure

WP1: Project Management, ensuring effective coordination of task and delivery to the Commission on time

WP2: Causality based framework analysis

WP3: Policy, regulations and governance

WP4: Case study groundwork & secondary data analysis

WP5: Case study upstream & downstream food chain analysis

WP6: Consumer analysis, and qualitative model

WP7: New advances, quantitative theory and Modelling

Integrated quantitative model leading to future studies

WP8: FIT-FOR-PURPOSE TESTS & Scenarios

Foresight exercise, synthesis and policy recommendations to build sustainable, resilient, efficient and fair future food chains

WP9: Dissemination and communication to maximise stakeholder impact

PHASE 1

PHASE 2

PHASE 3

PHASE 4
Case studies

- Atlantic salmon to fillets
- Wheat to bread
- Dairy cows to milk (and butter)
- Beef cattle to steak
- Tomato to canned tomatoes

From Ólafsdóttir et al., 2018
Salmon case study

- Mapping of supply and decision chains
- **Environmental and Social LCA**
- Governance and market power analysis
- Price transmission models
- Logistics modelling focusing on reduced environmental impact
- Models for risk and resilience assessment
- Foresight scenarios
Objectives and Methodology

• Conduct LCA and Social LCA and identify the environmental and social hotspots

• Use LCA to model and identify areas to potentially improve the sustainability performance of food supply chains

• Develop a model for different stages based on available secondary data and the interviews with the stakeholders

<table>
<thead>
<tr>
<th>Stakeholder categories</th>
<th>Subcategories</th>
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</thead>
<tbody>
<tr>
<td><strong>Stakeholder “consumer”</strong></td>
<td>Health &amp; Safety, Feedback Mechanism, Consumer Privacy, Transparency, End of life responsibility</td>
</tr>
<tr>
<td><strong>Stakeholder “local community”</strong></td>
<td>Access to material resources, Access to immaterial resources, De-localization and Migration, Cultural Heritage, Safe &amp; healthy living conditions, Respect of indigenous rights, Community engagement, Local employment, Secure living conditions</td>
</tr>
<tr>
<td><strong>Stakeholder “society”</strong></td>
<td>Public commitments to sustainability issues, Contribution to economic development, Prevention &amp; mitigation of armed conflicts, Technology development, Corruption</td>
</tr>
<tr>
<td>Value chain actors* not including consumers</td>
<td>Fair competition, Promoting social responsibility, Supplier relationships, Respect of intellectual property rights</td>
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UNEP-SETAC guidelines: [http://www.unep.fr/shared/publications/pdf/DTIx1164xPA-guidelines_sLCA.pdf](http://www.unep.fr/shared/publications/pdf/DTIx1164xPA-guidelines_sLCA.pdf)
Social LCA indicators

- Ranking of social indicators from a list of 15 indicators selected from the UNEP SETAC guidelines
- Indicators included stakeholder groups such as workers, employers, consumers and the local communities
- Indicators related to the stakeholder group 'workers' were ranked highest
Salmon case study - LCA

- Feed production
- Juvenile production and grow-out phase
- Primary and secondary processing (Whole gutted salmon)
- Distribution & consumption

Diagram:
- Processing plant in Bergen area
  - 500km Truck to Oslo
  - 10km Truck to Warehouse in Oslo
- Processing plant in Bergen area
  - 54km Truck to Bergen port
  - 517nm Freight to Copenhagen/Malmö port
  - 10km Truck to Warehouse in Copenhagen
- Processing plant in Bergen area
  - 500km Truck to Oslo airport
  - 8090km Plane to Shanghai airport
  - 10km Truck to Warehouse in Shanghai
Results

Impact contribution for salmon supply chain in Norway

Impact contribution for salmon supply chain to China
Overall findings

• Air transport has a significant effect on total impact
• Feed production and consumption is the general hotspot in all types of farm production with a significant impact on climate change
• On-farm operation is also an important contributor to the social indicators
Feed composition

2009

Marine ingredients 60%

Agricultural ingredients 40%

Salmon feed

Source: SINTEF

2017

Marine ingredients 25%

Agricultural ingredients 75%

Salmon feed

Source: Marine Harvest
Alternative feed ingredients?

**BUT** have high energy demand for cultivation and processing.
Salmon and trout transportation logistics flow in 2013

- 4 fish feed producers with 9 plants
- 991 farms – produces > 170k fish items
- 60 slaughterhouses
- 52 active plants
- Export hubs:
  - 81% by truck (via Svinesund)
  - 11% by air (via Gardermoen)
  - 8% by boat (via Kristiansand)

• More transport by sea

• Export of fillet vs. whole fish

• Longer shelf-life of fresh salmon
VALUMICS Partners

Universities

SMEs

Research Organisations

Industry Associations

Retailer
BECOME A STAKEHOLDER!

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Salmon Case Study
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