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From Norway to the EU

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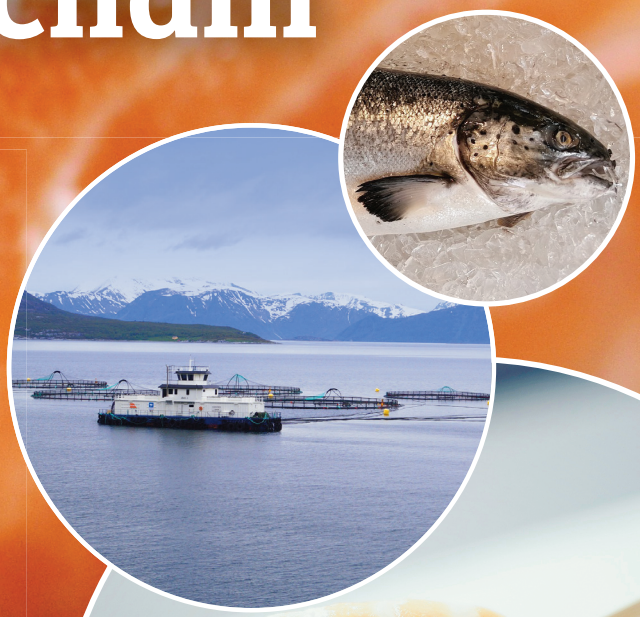

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VALUMICS
Food Systems Dynamics

GOVERNANCE OF THE FARMED SALMON VALUE CHAIN FROM NORWAY TO THE EU

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VALUMICS is developing approaches and tools to analyse the structure, dynamics, resilience and impact of food chains on food security, economic development and the environment. EAS is a partner.

This article is an analysis of the modes of governance in the salmon value chain and it focuses on inter-firm relationships and the information asymmetries and power relations between the firms (including unfair trading practices) and how these impact the distribution of value along the chain.

The first part of the report is a general description of global salmon aquaculture production and key actors. This is followed by an overview of the salmon chain case study and the regulatory framework and industry initiatives to establish and implement standards. Part two is also the governance analysis of the salmon value chain according to the Global Value Chain (GVC) governance framework to identify the characteristic relationships between the different actors in the chain. Part three includes responses of interviewees on their perceptions and opinions on these relationships.

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Table 1 . Overview of the world's 20 largest salmon producers[a]

Company	Country	Harvest quantity 2017[b]
MOWI Marine Harvest	NO	210.200 (NO) 60.200 (UK) 39.400 (Can) 44.900 (Chile)
Lerøy Seafood ASA	NO	132.000
Cermaq Norway	NO	48.000 (NO) 21.000 (NAm) 54.000 (Chile)
SalMar Farming AS	NO	135.200 (NO)
Cooke Aquaculture	Canada	57.000 (Can) 20.000(UK)
Grieg Seafood ASA	NO	40.900 (NO) 12.100 (UK) 9.600 (NAm)
Multiexport	Chile	58.700
Bakkafrost p/l	FI	
Nordlaks	NO	40.000
AquaChile	Chile	43.300
Nova Sea AS	NO	40.700
Pesquera Los Fjordos	Chile	41.000
Alsaker Fjordbruk	NO	25.000
Salmones Camanchaca	Chile	30.800
Australis Seafoods	Chile	39.100
SinkaBerg-Hansen	NO	
Blumar	Chile	27.000
Norway Royal Salmon ASA	NO	31.900
Bremnes Seashore	NO	24.000
Scottish Salmon Company	UK	25.300

Source: a) salmonbusiness.com 2016, b) Marine Harvest Industry Handbook 2018

Part 1. Overview of the salmon value chain

Aquaculture has been the world´s fastest growing food production technology and various conditions favour further increases in aquaculture production. Population growth and economic growth have led to increased demand for seafood. Aquaculture has become an important source of seafood to compensate for the stagnating global catches of fish and limited supply of wild fish. The globalization of food trade has reduced the cost of shipping products and the concentration in retail favours competitive supply chains with the ability to control stable supplies and efficient logistics. The Norwegian aquaculture industry has been leading the global salmon market and competing on the world market for seafood.

The top four of world's largest Salmon producers are Norwegian enterprises (MOWI, Lerøy Seafood ASA, Cermaq Norway and SalMar Farming AS). Norway exported 1 million tonnes of salmon in 2017 at the highest value ever for salmon which was an increase of 5 per cent compared with 2016 in value and 2.8 per cent more in volume than 2016 (NSC, 2016). Other main producing countries of Atlantic Salmon are Chile, UK, Canada, Faroe Islands, Australia, Ireland and US (Tveterås, 2016).

MOWI is by far the largest salmon producer worldwide and Norway and Chile dominate the overview of the world's 20 largest salmon producers (Table 1). Of the twenty largest, eleven companies have their head office in Norway, six in Chile, while the United Kingdom (Scottish Salmon Company), the Faroe Islands (Bakkafrost p/l) and Canada have one each. In 2016 the largest non-Norwegian producer was Cooke Aquaculture in New Brunswick, Canada.

Aquaculture salmon producers

Producers in the value chain are those that produce juveniles (smolt) (hatchery, land-based activity) and those that grow the smolt to market size (ongrowers, sea-based activity). Many producing companies do both. There has been a rise in large *vertically integrated companies* with direct ownership of production activities including hatcheries, fish processing and exporting. In Norway, large producers own the slaughtering facilities including the well boats for fish transport and the primary processing, while the small producers do not have facilities for the slaughtering and primary processing. Small farmers often use/rent or buy slaughtering services from other companies. The optimal harvest weight is between 4-5 kg although fish are commonly marketed in the range between 3,5 and 7 kg. Volatile salmon prices make the timing of harvest an important factor for profitability and hence the farmer has to decide whether to harvest the fish at a current known price or keep them until a later harvest and market larger fish at an unknown future price (Guttormsen et al. 2004). However, delaying harvest comes at a price, as this incurs feed and monitoring costs (Denstad et al., 2015).

Technology and feed providers

The high price of farmed salmon and increased demand has been the main driver of the revenue growth for aquaculture companies and this has had a spill-over effect to other companies working in the aquaculture industry (EY, 2017). Various companies providing technical solutions for the

aquaculture industry have been growing along with the high price of salmon and increased earnings of the production companies. They have focused on improved aquaculture technologies to mitigate the biological challenges and the general increase in production cost. The largest companies among producers of technical solutions and services for the aquaculture industry e.g., barges, wellboats, feeding systems, cages, mooring systems, sea lice treatments and software are Steinsvik AS, Akva Group ASA, Aas Mek Verksted AS, Optimar AS and Egersund Net AS (EY,2017). Other top equipment developers are e.g. Aqualine a supplier of net cage systems and Aquaoptima a supplier of RAS (recirculating aquaculture systems).

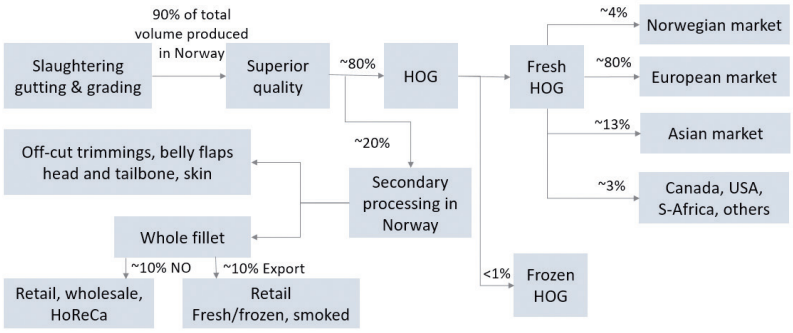

Figure 1: Flowchart of farmed Atlantic salmon showing the supply chain from slaughter in Norway, primary processing of superior quality HOG (head on gutted) and distribution of the main products to different markets (SINTEF, 2018).

During the last decade, the salmon feed industry has become increasingly consolidated. Since 2008, three feed producers have controlled the majority of the salmon feed output; Skretting (subsidiary of Nutreco which has been acquired by SHV), Ewos and BioMar (subsidiary of Schouw). Moreover, the large vertically integrated companies have established their own feed plants for example MOWI. The companies all operate globally. The top five feed producing companies are Ewos AS, Skretting AS, BioMar AS, Marine Harvest Fish Feed AS and Aker Biomarine Antarctic AS (EY, 2017).

Export from Norway

EU fish supply mostly relies on extra-EU imports and EU is the largest import market for salmon products globally (EUMOFA, 2017). Salmon is the first species traded on the European market of fish and seafood products in terms of value and the third species consumed (after tuna and cod). France is the largest consumption market for salmon in the EU. The salmon supply from Norway is imported mostly as fresh products (fresh/chilled whole (ca. 74%) and fresh/chilled fillets (15%)). Imported salmon to France from the UK is mostly fresh/chilled whole (83%), while salmon from Chile is almost entirely imported as frozen fillets (97%). Salmon from the rest of the world is imported as fresh/chilled whole (33%), frozen fillets (25%) and smoked (23%) (Pyanchenkova, 2017).

Prepared salmon in tray

About 95% of salmon produced in Norway is exported (EY, 2017). Norway is the main source of EU fish-product imports (about 60% in 2015). These imports mainly consist of fresh whole products originating from Norway, and entering into the EU through Member States that act as "trade routes", namely Sweden and Denmark. Most of the fish is exported from Norway in fresh head on gutted (HOG) form is sold to industrial customers in the EU, who further process the salmon into other products such as fillets, portions, smoked salmon or ready-meal products. A very small fraction of fish is filleted and further processed in Norway due to high production costs and custom duties for export of value-added products to the European market. Primary processing involves gutting, chilling and packaging. By-products such as guts, heads, tailbones and other fractions from slaughtering are further processed into fish oil and fish meal. The fish meal is mainly exported as a fish feed ingredient for Mediterranean species while fish oil is used both as a fish feed ingredient and as human health supplement (Richardsen, 2017)

Out of total production in Norway, some 80% is exported as whole HOG (head on gutted) mostly fresh but also frozen (Figure 1). The fresh chilled HOG salmon is typically transported in styrofoam boxes (EPS) by trucks from Norway to secondary processors and wholesale / retail markets in Europe (80%), and to Asia (13%) and other markets where fresh products are mostly transported by airfreight. The largest markets for Norwegian salmon in 2017 were Poland, France and Denmark which are the hub markets that re-export Norwegian salmon to other countries within EU (EUMOFA, 2017). Poland is the largest market (18%) followed by France (13%), Denmark (12%), Spain (9%), UK (8%), The Netherlands (8%), Italy (7%) and 25% to other countries e.g. Germany and US. Trade barriers to the EU are a particular disadvantage for Norway compared to other competing salmon producing countries. For example, UK and Ireland are currently members of the European Union, however after BREXIT the landscape for UK will change. The other countries such as Chile, the Faroe Islands and Canada have the advantage of having negotiated free trade agreements with important markets such as the USA and EU (MFCA, 2015).

Secondary processors in Norway and in the EU

About 20% of the superior quality salmon is processed further in Norway. The decision on whether the products are sold for export or domestic market are for example based on quality of the harvest. It is the superior and the ordinary quality that is exported. A small proportion is designated as 'Production quality' which by regulation does not meet the quality standard for export. This fraction of Production quality fish is often processed further and sold in the Norwegian market. However, some volume of Superior and Ordinary is also sold in domestic market. There are a few independent smoking-house/filleting plants (i.e. secondary processing units) which mostly supply to domestic HoReCa and retail. From these secondary processing factories in Norway, some 10% goes to retailers or wholesalers for HoReCA, the other 10% for export as smoked, fresh or frozen fillets, or as steaks for retail *(Figure 1)*.

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Smoked salmon on display

Seafood products in a supermarket

The most common secondary processing for salmon is smoking (EUMOFA, 2016). The ten largest producers of smoked salmon in Europe are estimated to have a joint market share of more than 60%. The processing is mainly carried out in Poland, France, the UK, the Baltic states and the Netherlands (Marine Harvest, 2018). The salmon smoking industry and the retailing sector are highly concentrated. The French market is segmented between processor's brands, mostly for high-end products, and retailer brands, mostly oriented on entry-level and middle-end products.

Retail and consumption

Retail salmon products consist of fillets, smoked, whole and value added products (VAP). About 47% of the EU market supply is of fillets, 12% whole, 28% of smoked salmon, and 13% other value-added products (EUMOFA, 2017).

Factors that are most important for consumers in France when buying salmon are product attributes (odour, taste quality), origin, freshness and price according to surveys on the "Reputation of Norwegian salmon in France" by the Norwegian Seafood Council. While Norway has a standard differentiation of quality (i.e. Superior, Ordinary and Production Quality), primary producers typically have to sell by price only. However, it should be noted that there is a trend towards differentiation of products based on an image of sustainable production, origin and organic production. According to UK producers, their focus is on the niche market and a brand of Scottish origin which is appealing also for the US market.

Irish producers have so far led the production of salmon from organically certified farms and some retail chains e.g. Lidl (Germany) have pledged to only sell products that are ASC certified or organic.

"Proliferation of ecolabelled products, a shift towards the fresh fish segment and an emphasis on convenience remain the characterising trends in salmon markets globally. On the industry side, identifying effective solutions to biological challenges, particularly sea lice, will remain a core focus".

(Globefish Market report in January 2019)

The growth in salmon aquaculture production has stagnated in recent years, which is mainly caused by biological constraints where the sea lice problem is preventing new licenses. Consequently, producers are focusing on optimum growth, integration downward in the chain to produce value added products, branding and differentiating their products on the market. The trend is from fresh whole salmon to fresh boneless cuts, convenience food and ready to eat. Filleting of salmon has become an industrial segment as seen by the increase in deliveries of filleting lines to processing companies in Europe and elsewhere. Growth in demand of fresh salmon in the consumer market can be explained by the overall trend as exemplified by French consumers who mostly consider salmon to be more suitable for weekday home occasions. This means that salmon is becoming a central part of the regular diet, which clearly contributes to the growth of salmon demand that, in turn, may influence the increase of salmon prices (Pyanchenkova, 2017). In the EU, around 70% of the Atlantic salmon supply went to retailers and approximately the same share was sold fresh. Of the different products, fillets have the largest market share of 45% followed by smoked (30%). Other VAP (15%) consists of all value added processed products, except smoked salmon (Marine Harvest, 2018).

Part 2. Policies, Regulations, Standards and Global Value Chain Governance Model

The VALUMICS case study "salmon to fillets" focuses on salmon farmed and processed in Norway into head on gutted salmon and fillets and distributed to secondary processors and retail markets in EU. In the analysis we have involved stakeholders from the salmon aquaculture in the UK and Iceland as well as from Norway. The largest salmon producers in the UK as well as in Iceland are almost all owned or partly owned by Norwegian companies.

Norwegian and EU policies, regulations and private standards pertaining to salmon cover a range of issues with a key focus on aquaculture production, fish welfare and regulations on requirements to prevent diseases and environmental impacts, transparency, and sustainable development.

In Norway, aquaculture is regulated according to the Aquaculture Act (MFCA, 2007) and environmental monitoring. There are three types of production licenses in Norway which include Regular Concession, Development Concession or Green Concession (EUMOFA, 2017). Aquaculture licenses are granted in allocation rounds determined by the Ministry. Applicants with the highest bids are granted the licenses (MFCA, 2007). The license states the maximum level of salmon the farmer can have in the sea at any time during the production process. This is the maximum allowed biomass (MAB) and is measured in tonnes. The MAB regulation is valid both on the company


Preparing salmon

level and for the specific production site (Directorate of Fisheries, 2016). The development licenses are awarded for facilitating development of new technologies to address challenges in the sector.

The traffic light system is a recent regulation scheme introduced by a Governmental Note to the Parliament (Meld.St. 16) to regulate further growth in production capacity (licences). The coast is divided into 13 production areas and into 3 colour zones (red, yellow and green) based on the environmental conditions in those areas that may limit production and biomass.

The main objective for the new regulatory framework was to promote sustainable growth in the Norwegian aquaculture sector. Although the 'sustainability' concept also includes social and economic aspects, environmental issues have been and are the main focus of the new regulation scheme. One of the key elements of the regulation is the consideration to wild salmon stocks, namely the influence that increased levels of sea lice, and escapes of farmed salmon to the open sea could have to wild salmon populations. Similar concerns and regulatory framework focused on environmental issues exists in other salmon producing countries according to a comparative analysis of the regulatory aspects of Canadian, Scottish and Norwegian aquaculture by the Standing Senate Committee on Fisheries and Oceans in Canada (POFO, 2016).

Regulatory Interventions

Salmon aquaculture is, a good example of how governance and regulation can influence industry growth. Norway's production has increased by 115% during the period 2005-2015, while production has not expanded at the same rate in Chile (53%), UK (38%), and Canada (25%) for different reasons (e.g. regulatory framework not efficient and safeguard measures inadequate towards externalities like diseases when production and stocking density increased) (Osmundssen et al., 2017). In the UK, stagnation in aquaculture growth has been explained by the constraints in obtaining further licenses to increase production capacity. The management and regulation of aquaculture is a complicated issue both from the perspective of fish farmers as well as regulators. This is because of uncertainty and lack knowledge with respect to the externalities of aquaculture production; e.g., diseases, environmental impacts, and conflicts with other user interests (Osmundsen et al., 2017).

Private standards

Salmon producers in Norway and the EU in general have been leading in the development of voluntary standards and, in recent years, the uptake of the Aquaculture Stewardship Council (ASC) Salmon standard. The ASC standard development was a joint initiative of World Wildlife Fund through the Aquaculture dialogue platform of stakeholders. ASC accreditation gives verification of environmental and social integrity of the products and this can also be communicated by a consumer facing logo. The largest aquaculture companies in Norway are all certified to the ASC standard, but smaller producers are somewhat behind on this, often lacking implementation resources. Currently 151 sites in Norway have ASC certification (many belonging to the same company) (ASC, 2019). In the UK, a number of production standards operate, such as the Code of Good Practice for Scottish Finfish Aquaculture, Label Rouge, RSPCA Freedom Food and Quality Trout UK. Further relevant standards and certification for aquaculture include IFFO, Global Gap, The Global Aquaculture Alliance, Friend of the Sea and Soil Association. The ASC standard performs well in environmental and social matters, but does not specifically address animal welfare and food safety. The GLOBALG.A.P and BAP standards contain to larger extent minimum requirements, and depend more on local regulation (Bonasaken, 2014).


Salmon appetizers

Structural changes – mergers

The structure of the industry has changed over time, from an owner-operated industry of several hundred small single farm firms to a more integrated industry of fewer but larger firms (Kvaløy and Tveteras 2008). In the mid-80s, the industry consisted of more than 800 companies. Structural change started during a 'market collapse' in the early 90s. This led to bankruptcy of many small farms (mostly small players) and the Norwegian Government deregulated strict rules for ownership and regulation preventing licenses as 'assets pledged as security'. This gave ground for new players who could finance buy-out of farms and then use the license documents to secure the debts.

By 2008 the number of active aquaculture firms had fallen to 186, with the four largest accounting for almost 50% of Norwegian production (Asche and Bjørndal, 2011). This change was driven by increased operating capital requirements and the search for economies of scale and scope in production and sales. Larger companies then influence smaller players by being the driving force of structural change within the industry. This has shaped the development of the global aquaculture industry by facilitating knowledge transfer with

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respect to aquaculture technologies, uptake of standards and access to market. There is also concentration in the sector of exporters where the number of exporters from Norway has reduced from more than 120 in the year 2003 to less than 80 in 2017. The number of exporters behind 80% of fresh salmon volume have declined from eighteen in 2003, to ten in 2017. Transportation is a significant cost and is time consuming, therefore, decisions are taken to optimise routes and avoid losses. The distribution plan depends on: shelf life, cost, transportation availability (capacity constraints), feasibility of transportation mode across the distance, demand, and customer contracts, volume & delivery times.

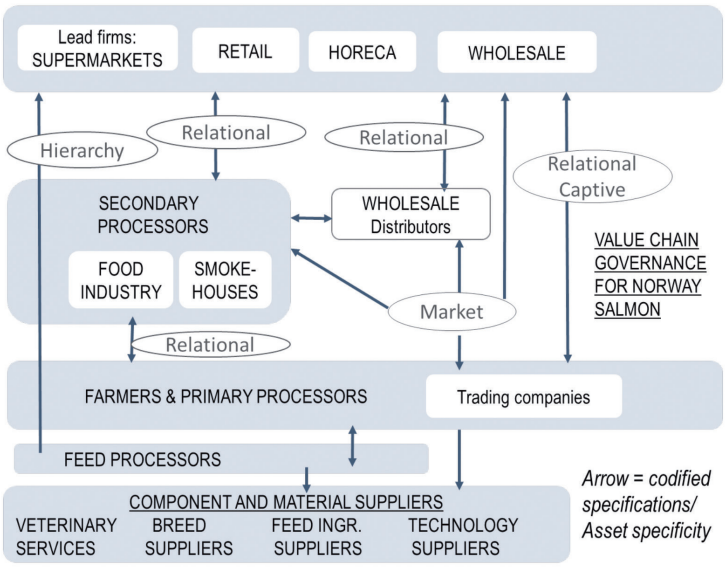

Figure 2: Governance analysis of salmon value chain according to the Global value chain governance model (Gereffi et al., 2005)

Economic and organizational co-operation, competitive market, low entry cost for traders and wholesalers, and easy accessible price/ volume information. This gives few possibilities for players in the value chain to establish oligopoly or to 'skew' level of information. So, as long as there is imbalance in supply – demand, the primary production has increased throughout the mature phase (latest 10–20 years) of the industry, compared to the first entrepreneurial phase. Consequently, there is no significant difference in economic performance between small/medium sized companies compared to large entities. The best results are often among medium sized companies.
(Norwegian salmon business expert, Nov 2018)

Asche et al (2018) investigated the impact of firm size and price variability on firm profitability in the Norwegian salmon farming industry. They used operating efficiency indicators like working capital management (net working capital/total assets) and operating leverage (fixed assets/total assets) and showed that they were positively associated with profitability. They also found that salmon price variability increases profitability, and smaller companies appeared to be in a better position to take advantage of the profit opportunities that price variability offers, compared to larger companies who are more likely to be engaged in contracts.

Selling a commodity where demand is bigger than supply and market is free and open, including effective logistic and transaction cost leaves the power to producers. The competitive edge for primary producers of global commodity products, by enlarge remains to cost efficiency in production (getting the biggest possible margin per produced unit).
(Norwegian salmon business expert, Nov 2018)

Global Value Chain Governance Model

The governance structure of a particular value chain depends on the three major characteristics of the chain: complexity of transactions, codifiability of information, and the capability of suppliers (Gereffi et al., 2005). The governance forms and interactions between the actors in the salmon value chain vary depending on the size of companies, whether they are vertically integrated or not and different markets of products. The governance structure of the salmon value chain has developed over time from **market** to **hierarchies** where the organization of transactions and asset specificity has been influenced by structural changes, including horizontal and vertical integration as well as the concentration of supermarkets (Figure 2).

The emergence of very large retailers and supermarket chains has been accompanied by consolidation in the salmon farming sector, resulting in many companies seeking a higher degree of integration as exemplified by a "**Hierarchy**" governance form which is characterized by high incentives to centralize control of strategic investments. This is exemplified by the Norwegian vertically integrated salmon firms like MOWI (Marine Harvest) who have ownership of their feed plants in Norway and Scotland and also extend downwards in the chain where they have established their own food manufacturing factories in Europe for producing value added products for the European retail and foodservice markets. The company MH Consumer Products processes fish from raw material to value-added products and sells the majority of their products to final sales points met by end consumers (retail + food service). The salmon value chain is thus "producer driven" and empowered by the vertically integrated companies which are typically owned by the producer company and have a strong bargaining power against retail. The power balance in the inter-firm relationships between producers/processors and the market remains mostly with the lead firm (retail/supermarkets) who control supply to consumers.


Asian supermarket

Salmon for the global market functions as a global commodity. There are no regulations of price between players in the value chain. Norwegian salmon products have been sold through bilateral spot transaction (on a weekly basis) or (to some degree) through long term contracts to secondary processing units - in particular in Europe (Denstad et al., 2015). A scenario of "**Market**" governance is applicable for salmon producers and primary processors selling commodity products (HOG products) on the spot market where transactions are easily codified and suppliers are capable of making products based on technical standards and there is no input from buyers. This is typical for free market exchange where **buyers respond to specifications and prices are set by sellers** (Gereffi et al., 2005). The large exporting companies can match retailers' requirements of regularity of price, quantity

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Sushi feast

and quality which are conditions that most seafood products cannot offer.

Prices have increased continuously following the growing demand in existing markets and development of new markets (EY, 2016). The main buyers are wholesalers and secondary processors (Figure 2). Some retailers who have their own secondary processing unit, buy salmon on the spot market either through wholesalers or traders on behalf of primary processors and farmers, which often are part of the same company. Norwegian-registered trading companies for farmed salmon include both independent trading companies and trading companies owned by salmon producers that have organized this activity in separate companies (EY, 2017).

Supermarkets are dominating retail fish market sales and high volatile salmon prices are currently leaving secondary processors in a tight position. The secondary processors who are independent processors and carry out filleting, smoking and other value-added processing are 'stuck in the middle' in the value chain. They have to negotiate both ways – to buy the raw material and to sell their products to retail. They are vulnerable when prices on the spot market are high and have little influence when negotiating the price with retailers, who normally operate at a fixed margin. Accordingly, the trading companies are also suffering to a certain extent under long term customer contracts at fixed prices and struggle to get acceptance for higher prices in the end markets, putting a strain on the gross margin (EY, 2017). In the salmon value chain, the retailers in Europe either have contracts with independent secondary processors based in e.g. Poland, France or with secondary processors that are owned by Norwegian enterprises. The linkages between secondary processors and retailers may be characterized as relational for example when producing a differentiated branded product. "**Relational**" linkages emerge if product specification is hard to codify, transactions are complex, and supplier capabilities are high. Mutual dependence between buyers and suppliers leads to sustained interactions and explicit coordination between both parties. Most secondary processors (in salmon) secure some part of volume as producers of 'private label' products for one or more retail chains. A few have a strategy of building their own brands – still they need to negotiate with the retail sector for shelf space. Additional product development, including cost of product innovations, largely depends on secondary processors. If supplier capabilities are not high enough to meet the buyers' requirements, governance structures tend toward the "**Captive**" type, where suppliers are subject to the extensive intervention and monitoring of lead firms and depend on resources and market access provided by the lead firms.

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Third party assessment and certification links state, market and community into an interesting and challenging hybrid form of governance (Vince & Haward, 2017). The salmon value chain governance structure can be described as "**Hybrid**", which is influenced by network governance, contracting and informal relationships. The term hybrid refers to the complex organizational forms where many stakeholders jointly perform tasks that neither the market nor the individual firm can achieve. (Carbone, 2017). The large integrated salmon firms and their subsidiaries constitute a network of firms that organize their transactions through a combination of different arrangements. This is characteristic of plural hybrid forms whereby a firm (or a network of firms) could partially produce in-house (or distribute through its own outlets), outsource other parts of its activity through contracts with specific firms, and possibly use spot markets, all at the same time (Menard, 2017).

Global Value Chain and cluster governance

The success of salmon farming in Norway in terms of innovation and industrial development is based on a close co-operation between industry players, governmental bodies and (applied) research institutes which then contribute to local or national clusters. The shared responsibility of all three parties as fellow players in the industrial development has motivated 'Government' and 'Academia' to move from passive facilitators and premise providers to being active partners in regional development processes. The Norwegian industry funds applied research by a compulsory levy on sales value to secure applied research into marine aquaculture. This is additional to financing market research and generic marketing issues through Seafood Norway, also funded entirely by a levy on seafood export.

An extended GVC governance form as suggested by Gereffi & Lee (2016) highlights the characteristics of the governance structure of the salmon aquaculture value chain, where GVC and cluster governance is combined (Figure 3). There are various influences from international organisations e.g. labour standards and trade agreements and various societal pressures from NGOs including sustainability standard settings and auditing, that shape global fresh food value chains and influence their competitiveness. Trienekens et al. (2018) studied market orientation and governance of global fresh food value chains. They found that the main contributors to market orientation in global fresh food value chains were: network governance (i.e. leadership, shared governance and facilitation), contractual agreements (i.e. type and content: price, volume, quality) and informal relationships (i.e. trust and commitment) as well as contractual incentives.

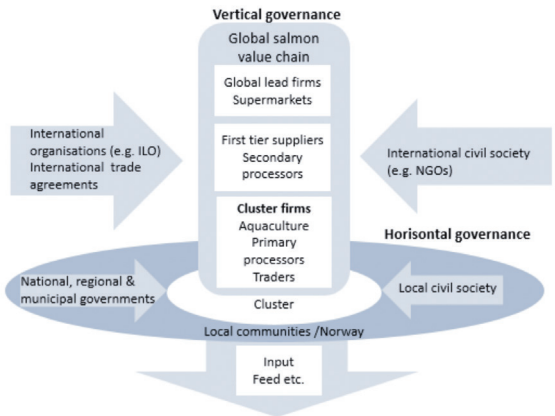

Figure 3: An extended GVC governance form as suggested by Gereffi & Lee (2016) adapted to the governance structure of the salmon aquaculture value chain

Part 3. Fairness and Relationships

This last section draws on findings from stakeholder consultation to focus on three main areas of interest: (i) the perception of power in the chain, (ii) whether the price and value distribution in the chain was perceived as fair, and (iii) the influence of the spot price and the use of contracts. The issue of fairness is mainly addressed in terms of price determination and the potential influence that large companies can have on the spot price. While perceptions of stakeholders in the salmon value chain towards power asymmetries differ across the chain, such perceptions appear to explain the decision-making for vertically integrated companies. However, it is less clear to what extent the performance of the wider chain, including the smaller aquaculture companies and secondary processors, is affected.

Fairness and Price

In the VALUMICS project fairness is defined along two main dimensions as a) distributive fairness in the context of e.g. how benefits and burdens are distributed among partners in a supply chain, and b) procedural fairness, for example where outcome of procedures linked to unequal power among partners to define prices or unequal access to relevant information, may lead to unfair treatment of different partners in a supply chain on behalf of a powerful actor. The various theoretical dimensions of fairness need to be considered in terms of their manifestation through Unfair Trading Practices (UTPs), and how these incidences can be both minimised and regulated. Although UTPs can arise in any market or sector of an economy, they have the potential to be especially problematic in food supply chains, as agricultural producers may be placed under undue pressure and have limited bargaining power in negotations with larger purchasers, such as supermarkets or retailers, given the lack of alternative buyers. The European Commission has defined UTPs as practices that "grossly deviate from good commercial conduct, are contrary to good faith and fair dealing and are unilaterally imposed by one trading partner on another" (European Commission, 2018). More recently, on 12 March 2019, the EU has agreed within the 'Directive on Unfair Trading Practices in the Food Supply Chain' a set of new minimum protection standards prohibiting UTPs, which will apply to companies with a turnover below €350 million. The new rules will cover producers, cooperatives, food processors and retails, and will also apply to non-EU suppliers. In particular, they will cover the following issues: late payments for perishable food; last-minute cancellations; unilateral or retroactive changes to contracts; forcing the supplier to pay for the wastage of products; and refusal of written contracts. Other practices, including the return of unsold products to suppliers, will only be permitted if expressly agreed in advance in writing by both parties to the arrangement (European Parliament, 2019).

Price is considered to be one of the most important factors that will increase a supplier's fairness perceptions. As far as suppliers are concerned, the impact of price on a long-lasting supply chain is complicated, due to the complexity of the relationships, the cooperative nature of relationships, and various market circumstances. In agricultural supply chains, suppliers lack pricing power because of their inferior position. Therefore, suppliers will pay more attention to retailers'

procurement pricing criteria, which involve examining product quality, purchase quantity, geographic position, and relationship age. It can be argued that the impact of price satisfaction on fairness perception is not only related to whether suppliers can fairly gain profits or not but also connected to the endurance and stability of the cooperative relationship in question. Suppliers are however, sensitive to prices and high levels of price satisfaction will effectively enhance the cooperative stability of the supply chain in question.

Price and Contractual Arrangements

Norwegian salmon (fresh or frozen, whole or fillets) is sold in B2B negotiations on weekly basis. Wholesalers from all the main consumer markets (Europe mostly) are buying whole truck loads either directly or through Norwegian wholesalers as representatives for a European wholesaler or secondary processors in Europe.

There is an emergence of long-term contractual supplier–customer relationships between aquaculture-producing companies and secondary processors or supermarket chains.

- *"Producers sell through direct orders from buyers, but also to a suit of other channels e.g. some sell to markets (wholesalers) and others sell to high end stores, in particular the large companies having long term contracts, and high end products with sustainability credentials to restaurants etc. Some sell at spot markets but ideally they would prefer to sell through long term contracts. Prices for producers / processors who target the premium end are not fixed by the spot prices".*
  (UK Salmon producer, March 2019)

- *"It is estimated that approx. 60% is sold on such spot market conditions – to the highest bidder and about 40% of the volume is contracted mostly from the largest producing companies, however, this ratio varies".*
  (Norwegian salmon business expert, Feb 2019).

- *"On average the fraction of fixed contracts varies from 40- 50% - down to 25- 30 % depending on the price fluctuations in the market. If spot market prices are high, processors are reluctant to contract big volumes for future deliveries.*
  If the spot price is low, farmers are reluctant to future contracts, hoping the (spot) price will go up again".
  (Norwegian salmon business expert, Feb 2019)

The **spot market price** is influenced by the average price the week before for fish to be delivered the following week. The price is based on information from several links in the value chain, including farmers, exporters and importers. The biomass development and seasonal factors are the main determinants of shifts in salmon supply in the short term and influencing the price of salmon on the spot market (Undercurrent news, 2019, EY, 2010). To mitigate risks associated with price and volume and to possess more predictability for future sales, producers can rather opt for long-term contracts. These enable better production planning and capacity utilization and guarantee minimum order for seller and supply for buyer. However, the contracts introduce obligations in terms of trade volumes and less flexibility when problems or opportunities arise. The contracts of producers are typically to supermarket chains in Europe or the large value-added processors in Europe. It is usually the customer that approaches the supplier with an offer. Duration of contracts is typically for 3 – 6 months, where the spot price

level is the base for the price negotiations. The contracts would typically include volume, HOG weight, delivery time, and quality where price is fixed and then usually adjustable according to spot price level (Denstad et al., 2015). Producers must thus decide what proportion should be tied-up in contracts and the type of contracts that they want to be engaged in. The main drivers for such decisions are in terms of price and volume, the delivery frequency, the time horizon of agreement and the network wanted (many small suppliers or a few main suppliers).

The **use of contracts** in the salmon industry has increased substantially in recent years with the objective to reduce risk and transaction costs (Kvaløy, 2006). The main types of contracts are fixed price contracts, adjustable contracts and partially adjustable contracts. Information about the use of contracts and their details is not normally made public by the contracting parties. To understand better the influence of contracts on price, Larsen and Asche (2011) investigated the use of fixed price contracts for Norwegian salmon exports to France based on all export transactions between the two countries. The analysis for the year 2006 showed that almost 25% of these exports were traded using fixed price contracts and contract prices were renegotiated at different intervals, including as infrequently as once a year. Some contracts allow the contracting parties to adjust contract prices when the export price moves significantly.

Contracts create a wedge between salmon export prices and spot prices in periods of price volatility, which in turn reduces price transmission. In the case of contract breach the reason for contractual incompleteness is generally two-fold according to Kvaløy and Tveterås (2008). First, there may be variables that cannot be easily verified by court in case of breach, for example if the parties sign a contract based on quality, which may be difficult for the court to assess. Second, even if parties are able to write complete contracts, it may be less costly to engage in simple contracting. This implies relying on market enforcement where self-enforcing relational contracts are designed such that the parties have economic incentives to honour it in all contingencies. A relational contract is a modelled contract on future transactions where the present value of honouring the contract vs the present value of backing out decides the contract's self-enforcing conditions

Salmon farmers have been managing the uncertainty and variability in profitability by using **price derivatives** since 2006. Fish Pool ASA located in Bergen, Norway, was established in 2005 as an international, regulated marketplace for buying and selling of financial salmon contracts. They trade derivatives contracts on the salmon spot price. Fish Pool ASA has established a synthetic market price, or reference price, named the **Fish Pool Index**™ (FPI), which is the basis

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for the settlement of all financial salmon contracts at Fish Pool. The FPI is comprised of three index elements linked to the average weekly spot price of buying and selling Fresh Atlantic Salmon: Nasdaq Salmon Index (exporter's selling prices); Fish Pool European Buyers Index (large purchasers purchase price); and Statistics Norway customs statistics (SSB) on exports (FPI, n.d.).

Asche et al., (2016) studied Fish Pool salmon futures contracts with respect to how well the market performs in terms of the futures price being an unbiased estimator of the spot price and whether the market provides a price discovery function. The results when using data for 2006–2014 and with futures prices with maturities up to 6 months showed that the spot and lagged futures prices were co-integrated and that the futures price provided an unbiased estimate of the spot price. They concluded that the salmon futures market is still immature and has not yet reached the stage where futures prices are able to predict future spot prices. However, another study by Ankamah-Yeboah et al. (2016), using a more recent data set, found a higher degree of maturity of the salmon futures. They highlighted the importance of the relationship between time to maturity and the futures price volatility when developing hedging strategies, pricing options and setting margins in the salmon futures markets.

Perceptions on trust, fair value distribution and information transparency

When asked about the level of trust and collaboration between aquaculture companies, the general perception is that there is trust and various collaborations:

- *"There has been an increased horizontal cooperation where small farmers share some resources and services as described by a Norwegian salmon business expert: First, most frequently as part owner of an export company (to secure sales when harvesting and up to date market information); Second, joint ownership of a smolt production unit (to secure enough and good quality 'smolt' (juveniles) to put into sea for grow-out phase; Third, some small producers also have joint operational co-operation (building 'economies of scale' for optimal use of labour and know how). In variants of all mentioned above we'll find cooperation in buying feed and major equipment, improved technology items, etc. Improving buying power up against major service providers". (Norwegian salmon business expert, Nov,2016)*

- *"Aquaculture is a small industry in Scotland in terms of actors and players, "if there wouldn´t be trust they would have significant problems". In other more established industries e.g. the fishing industry in the UK there is a lot more of mistrust between the fishing companies and fierce competition in the market, while the salmon industry has good relations and recognize the mutual benefits. The level of trust has always been high between the salmon farming producing companies. If there are problems with fish, the feed companies often get pointed at, but very rarely the farming companies. The producers are competitive today with good margins. When under financial pressure as was the case ten years ago, this may have influenced the trust, but today the producers are getting good margin". (UK producer, March 2019).*

According to a Norwegian feed producer, the sourcing of raw material for feed has various challenges and risks involved. In an effort to secure their supplies they have a portifolio of different producers globally. Certified producers are audited and issues like deforestation, non GMO, ecosystem concerns and nutritional content are in the spotlight. Various tools

like LCA (life cycle assessment) to monitor carbon footprint and protein and fat level analysis are applied and verification of antioxidant use, traceabiltiy and location are important. An example of a case which had a serious economic impact was the EFSA´s (European Food Safety Authority) inconclusive assessment of the safety of synthetic antioxidants (ethoxyquin) in fish meal.

- *"The S-American fish meal partners were not ready to implement alternative antioxidants (polyphenols) whereas the N-Atlantic meal producers had done so, and as a consequence their meal was in demand and this impacted high price of meal from this region". (Norwegian feed producer, May 2019)*

The access that actors have to information that helps them make decisions on production, harvest, and sales with regard to the transparency of interactions between actors in the chain is somewhat limited. However, there is an abundance of transparent metrics and data related to the farming process, through regulatory requirements and standards.

- *"For a clever person there is already a massive load of business data out there to gain an overview, they just need to work through it. For example, the feed producers (only 3 companies in Scotland) will be able to figure out the market share of the producers by their use of ingredients etc. and same for the use of equipment etc. Although there is not a government structure to make the data available there is a level of transparency in place". (UK producer, March 2019)*

The perception of fair value distribution to all actors in the chain

- *"Most actors would say it isn´t a fair value distribution „Would like larger slice of the cake". Aquaculture business is perceived as successful and producers would strive to have best price. There is always going to be a question of imbalance. In Scotland there are not so many large high volume companies as in NO, so business is very much dependent on relationships between the companies and close relations within districts. Producer organisation do have pricing data from their members and submit aggregated records to EU but they also maintain an oversight from all members, however, this is not public". (UK producer, March 2019)*

- *"No, not at all the value is not distributed fairly". The aquaculture producers hold the power and press the price from the feed producers who are competing on the market. Currently, there are three main feed producers in Norway with overcapacity to produce feed". (Norwegian feed producer, May 2019)*

- *"The price is perceived to be fair, most of the pricing is done through contracts with retailers. Some Scottish branding is retailer specific with certain producers, so they develop the pricing structure based on that. Retailers also target different quality or areas of demographics e.g Waitrose a high end retailer, target organic salmon, or high premium quality, another example is M&S. In the end the pricing is fitting to the end consumer". (UK producer, March 2019)*

The price of salmon is highly volatile and the price has evolved since the initial drop of salmon prices in Europe from 10 Euros/kg in the early 1980s to 3 Euros/kg in 2000 (approx. 26 NOK). For retailers at this time, this low price was the key in attracting new consumers. The concentration of the retail sector resulted in a new market organisation and new pricing behaviours where mark-up pricing was practiced and the fish market looked increasingly like any agricultural food market (Guillotreau and LeGrel, 2003).

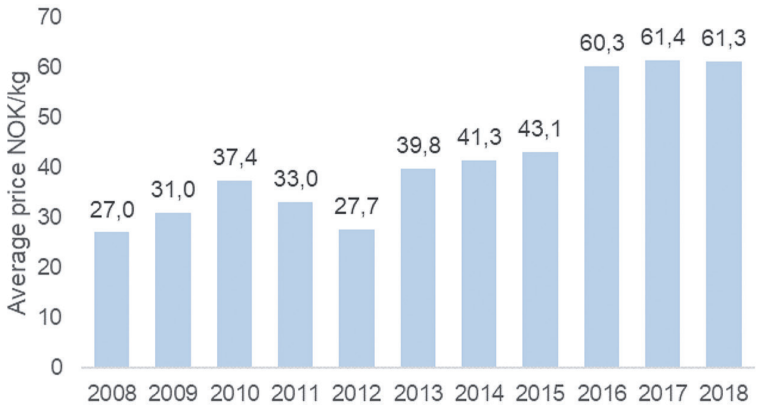

Figure 4: Average export price of fresh whole salmon from Norway from 2008 to 2018 (in NOK per kilogram) Source: Authors own calculation based on data from Statistic Norway

Between 2008 to 2012, the salmon price has been fluctuating (Figure 4). Since 2012 the volume growth has stagnated but export prices for fresh whole salmon increased annually. In 2018, the average export price of fresh salmon amounted to around 61 NOK per kilogram. In the first months of 2019 record high prices up to 70 NOK per kg were reported, but by May 2019, the prices had decreased to 55-60 NOK.

Landazuri-Tveteraas et al. (2017) measured the extent of price transmission and tested price leadership in the salmon supply chain. The data represent monthly observations (2005–2014) on export price of fresh salmon from Norway and on retail prices for a variety of salmon products in France and United Kingdom. They showed, in agreement with other studies, that price transmission lessens with the degree of value added and, specifically, that price transmission to retail prices decreases as more processing is involved and increases for packaged salmon products compared to salmon sold in the fresh fish counter.

A recent European price-fixing investigation has focused on the Norwegian salmon industry and during the last months there have been news in the media (Guardian, 2019) on these allegations of price fixing. "*The [European] commission has received information, from different actors operating at different levels in the salmon market, alleging that some Norwegian producers of farmed Norwegian Atlantic salmon participate in or have participated [in] different ways of price coordination in order to sustain and possibly increase prices of farmed Norwegian Atlantic salmon.*" Key to the alleged conspiracy was manipulation of the spot market for Atlantic salmon in Oslo. While only a small part of Norway's salmon production is sold on the spot market, with much of the remainder sold via annual contracts, the spot prices set the baseline for longer-term contract prices. A US lawsuit was based on similar allegations that Norwegian firms are engaged "*in conduct designed to raise and stabilize the prices of farm-raised salmon sold on the spot market and pursuant to contracts." (SeafoodSource, 2019)*. Media sources have furthermore reported that *"Since 2015, salmon buyers in Europe have complained that Norway's salmon producers, including Mowi, have been rigging the spot market by using subsidiary companies, including Mowi's Polish subsidiary, Morpol (a fish processor and distributor), to drive up the spot price [.....]" (Seafoodsouce.com, April 25, 2019).*

The perception of fair prices varies depending on where in the chain the actor is embedded. For secondary producers they perceive that the producers have the power to influence higher spot prices.

In the interviews with stakeholders these allegations were discussed in the context of fairness and it was stated, on the contrary, that it was unlikely that large companies would have the power to influence the spot market prices. However, it may appear unfair that the volatile prices on the spot market are not reflected in retail prices. Thus it appears that the secondary processors may be the ones that are suffering when prices are high. They have a weak bargaining position against retailers and very little power. Retail chains normally operate with fixed gross 'mark-up' (30 – 40 %). Consumers resistance of high prices then turns back to suppliers (secondary processors). Secondary processors take what they can get, i.e. when spot prices on raw material goes up, margins of secondary processors go down- because retail normally operates with fixed price contracts for 3 – 6 months. For more shelf stable goods – they have contracts of 1 year. It appears that the independent secondary processors may be at risk of being further marginalized by the retailers or the large vertically integrated production companies.

"Retail sell on fixed margins – removing products not having good enough turnover. So, the pressure is on value added processors to come up with new innovative products which become favored by the consumer. MAP packaging, however, was driven forward by English supermarket chains, mainly to improve shelf life and by that reduce spill due to best before date".
(Norwegian salmon business expert, March,2019)

The role of government and regulatory bodies is to provide a stringent regulatory framework and ensure compliance

- *"The system is transparent and everybody can get access. Regulations are the backstop. Voluntary control by the industry is favored where the standards are an important part of the industry's transparency. Standards and audit reports are public e.g. ASC, but not all standards provide monitoring records (e.g. Welfare standards). Standards and auditing is a whole business by itself and way above the regulatory requirements". (UK producer, March 2019)*
- *"So far, no single large company is dominating the market. The biggest player MOWI have a domestic market share of some 15 – 18 % in Norway, and approx. 10% in the global market. Federal regulations are introduced to prevent monopoly or oligopoly structures in the industry".*
(Norwegian salmon business expert, Feb 2019)

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The rules of the Competition Act concerning the control of the amalgamation of business enterprises represent a limit for how much market power an industry player can obtain through the merger of business enterprises, cf. Chapter 5 of the Competition Act.

Fairness to communities and social license as part of governance

In recent years, environmental challenges and conflicts linked to aquaculture production have led to the emergence of the 'social license', a form of tacit public acceptance, trust and goodwill concerning operations that must be obtained by producers (Baines & Edwards, 2018; Murphy-Gregory, 2018; Mather & Fanning, 2019). It can be considered to be a component of Corporate Social Responsibility (CSR), but has broader ramifications. Whereas CSR addresses the issues of sustainability largely as a branding exercise for the purposes of attracting and retaining consumers and suppliers, the social license is more concerned with the acceptability of socio-economic, socio-cultural and environmental impacts in a local context. As such, it is debatable whether the social license constitutes part of the structure of governance, but it is certainly a feature of 'good governance' and its manifestation may be impacted by the governance model in ways that are poorly understood at the moment. Vince & Haward (2017) contend that hybrid forms of governance have become more common in aquaculture, especially salmon production, and that the influence of community power must be considered in relation to this form of governance structure. Several examples of messages related to the strengthening of local, rural communities (maintenance of schools and doctor's surgery) with the presence of a fish farm have been posted on YouTube and other social media, most probably looking to raise awareness and increase acceptance of the activity from a "social tissue" perspective. The meeting of ambitious growth targets in salmon production is likely to require improvements to the social license and the effects on public acceptability of competing marine industries, such as tourism and renewable energy generation (Billing, 2018).

The impacts of the social license need further research in particular to gauge the social license 'negotiation' between companies and communities (Billing, 2018). A recent study by Mather & Fanning (2019) highlighted that future social license research in the context of aquaculture needs to not only understand market power, regulation and governance structure, but to explore further the social license concept and how this is negotiated. The focus should be on the following: (1) social network analysis (a form of stakeholder mapping) and dynamics over time; (2) industry sustainability initiatives and their development over time; (3) the use of quantitative and qualitative surveys to measure the social license in aquaculture; and (4) the effects of the social license on certification for farmed fish and the acceptability of these standards to local communities.

A recent study on different views of stakeholders towards acceptance of aquaculture in a small community in Norway highlights the importance of the different understandings of sustainability and insights to how different groups perceive the situation. Policy makers may not overrule the value perceptions of different interest groups and communication must be based on trust to ensure more robust and long term planning for aquaculture in local areas (Lindland et al., 2019)

Discussion and Conclusion

The salmon value chain is "producer driven" and empowered by the vertically integrated companies which are typically owned by the producer company and having a strong bargaining power against retail. This situation is prevalent where demand is more than supply. Producers have invested in technological and production competencies according to technical standards as part of the regulatory framework and industry initiatives. The inter-firm relations of producers and their buyers in the salmon value chain are characterized by free market exchanges where products are sold on the spot market. However, there is a trend of long-term **relational** contracts, in particular between large integrated companies and retail or large secondary processors. "**Market**" governance is thus applicable for salmon producers and primary processors who are selling commodity products on the spot market, where transactions are easily codified, suppliers are capable of making products based on technical standards and there is no input from buyers. The standards facilitate transactions since information about the products and their specifications according to best aquaculture practices can be codified. The essential point is that the costs of switching to new partners are low for both parties. This is typical of free market exchanges where buyers respond to specifications and prices are set by sellers (Gereffi et al., 2005).

For the vertically integrated large companies of the salmon value chain, who mainly target high-end retailers a "**Hierarchy**" governance is characterized by high incentives to centralize control of strategic investments. The large integrated firms and their subsidiaries constitute a network of firms that organize their transactions through a combination of different arrangements. The increasing number of requirements from large retail chains has been a main driver of the vertical and horizontal integration of aquaculture companies as well as the food industry globally. The objective of retailers has been to increase the negotiation power with respect to price, product, and volume. The co-ordination of retailers is characterized by a "hands-off" form, and depends on defining and managing value chain-specifics into widely accepted standards. Information on quality attributes and sustainability are embedded and aligned to broader narratives which circulate within society (Ponte and Gibbons, 2005). Transactions are facilitated by codification according to the standards and the governance of the global salmon value chain is becoming increasingly more "buyer driven". The power balance in the inter-firm relationships between producers/processors and the market, therefore, remains mostly with the lead firm (retail/supermarkets). The salmon value chain governance is influenced by network governance, contracting and informal relationships. The overall governance structure of the global salmon value chain can be described as a "**Hybrid**" where a firm (or a network of firms) could partially produce in-house (or distribute through its own outlets), outsource other parts of its activity through contracts with specific firms, and possibly use spot markets, all at the same time (Menard, 2017).

The result of the governance analysis is general for the salmon supply chain and the main outcome concerns the levels of complexity found in inter-firm relationships. Price is considered to be one of the most important factors that will increase a supplier's perception of fairness. The interviews with agents across the salmon value chain suggest that producers are satisfied with the value distribution, in particular with respect to the current high prices of salmon, while secondary producers and feed producers are less content.

Further in-depth studies on individual companies (large vs small) and their relations with buyers (secondary producers, retail, wholesale) in different countries e.g. France, Poland and the Netherlands, would be of interest to better understand the specifics and dynamics of decision making in the salmon business. The development of third party assessment and certification of fisheries and aquaculture has provided new forms of governance in sectors that were traditionally dominated by state based regulation. Emerging market based approaches are driven by shareholder expectations as well as commitment to corporate social responsibility, whereas community engagement is increasingly centered on the question of social license to operate.

Stakeholder interviews

- Norwegian salmon business expert, Nov 2018 and March 2019
- Scottish Salmon producer organisation, March 2019
- Icelandic salmon producer, April 2019
- Norwegian feed producer, May 2019
- Discussions on the key questions with stakeholders by SINTEF and University of Iceland in workshops, meetings and conferences.

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