` Adding value to the fish! ´

Business Strategies in Fish Farming and Small-Scale Fishery

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Summary

The development of values-based supply chains for fish and fish products from fisheries and aquaculture is a strategy to add value to the fish. This benefit refers to the double meaning of 'value'; premium prices for high-value products and at the same time, the incorporation of environmental, social, cultural or ethical values based on a sustainable use of resources. Although small-scale fish production and fisheries have a long tradition in many regions of the European Union, fishermen and fish farmers face strong competition with industrialized fishery fleets as well as imports from low-costs aquaculture. At the same time, European consumer surveys prove evidence that a consumers show an over-average Willingness to Pay (WTP) for fish produced locally and according to sustainability standards. With this paper, we aim to identify and discuss fish farmers' and fishermen's strategies ensuring the viability of their businesses by adding value to their fish utilizing this so far often unused market potential. Four case studies serve as the basis for the analysis. The German case studies examined traditional carp pond farming in Franconia and recirculation aquaculture systems in northern Germany. The Italian case studies focus on saline aquaculture (marine and on-shore) in Tuscany and mussel farming (inshore) in the Emilia-Romagna region. The English, Italian and Greek study cases analysed the situation of small-scale coastal fisheries in Cornwall, Tuscany and the Kavala region.

Keywords: aquaculture, fishery, values-based food chains, business development, fish sales, competitiveness

JEL Classification codes:

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1. VALUES-BASED VALUE CHAIN – A STRATEGY TO STRENGTHEN FISH FARMING AND SMALL SCALE FISHERY VALUE CHAINS IN EUROPE

Farm-based fish production and small-scale fisheries have a long tradition in many regions of the European Union. In 2015, the EU ranked fourth in world fish production, after China, Indonesia and India covering 3% of the world production (EUMOFA, 2017). However, European fish farmers and fishers are facing particular challenges. Inland or offshore aquaculture as well as rural fishery businesses experience strong competition. On the market for fresh fish, they compete with both industrialized fishery fleets operating on the high sea and imports from low-cost aquaculture production from neighbouring countries or from abroad (Feucht & Zander 2017). European fish and seafood lost market shares in 2015: the self-sufficiency (ratio between production and apparent consumption) of the European market dropped by 1.4%points to 46% compared to the precedent year (2014). This means that fish[1] volumes imported from non-EU countries were higher than quantities supplied by EU catches and aquaculture production (EUMOFA, 2017).

A survey in different countries shows that the consumer's understanding for product and process quality aspects of fish and fish products is vague with little differentiation, and that fish from aquaculture has an unfavourable image (Feucht & Zander, 2017). In 2015, consumption of wild catch still represented 74% of the total fish consumed (EUMOFA, 2017). Consumers tend to prefer fish from the catch even when processes are not made subject to pronounced sustainability standards. However, consumers' awareness and preferences play an important role for an potential increase of European fish production. The study of Feucht & Zander (2017) in different European countries proves evidence of consumers' Willingness to Pay (WTP) for premium fish produced locally or under certain sustainability standards. However, how could this so far unused potential be activated?

Feucht and Zander recommend high animal welfare standards, specific sustainability issues and/or organic production linked with an excellent communication of these quality aspects (Feucht & Zander, 2017). Stevenson and Pirog (2008) termed food supply chains that ground their strategic development on such process and product quality aspects 'values-based'. Stevenson et al. (2011) underline that successful food value

[1] In this paper, we use the term 'fish' but intend to include seafood such as crustacean, mussels and algae as well.

chains are built on three foundations. The first foundation is appropriate volumes of high-quality, differentiated, market-engaging food products coupled with value-adding stories about people, land, and practices. The second is trust-based business partnerships, and the third is an effective management of the supply chain. In this paper, we argue that these foundations are prevalent for value chains of products from European small scale fishery and fish farming. However, awareness for this potential success factor and a related communication has not yet been sufficiently spread among small-scale aquaculture and fishery enterprises.

Domestic and local-origin food sourcing is an important and common value-driving attribute in values-based fish chains. The additional quality attribute of 'locally produced' is associated with freshness, and support of the local economy as well as short transports. For many consumers, the European origin of fish is in particular associated with food safety and ethical responsible production with respect to environmental and animal welfare (Zander & Feucht, 2017). Process qualities such as improved animal welfare or fishing techniques based on the principle of care are ethical values.

The use of traditional processing without any food additives, for example, is another strong concept for the development of a values-based food chain. Moreover, benefits for the local economy of remote rural areas can be quality properties for values-based fish products. In food markets, such reconciliation of organic values or of well-established (conventional) product brands with other potentially relevant values tend to increase consumers' trust in, and loyalty to, high-value products (O'Doherty Jensen et al., 2011).

In this article, we argue that the development of values-based supply chains for fish can be an appropriate business strategy to strengthen aquaculture and fisheries even when small-scale family businesses dominate a fragmented and heterogeneous sector as seen in many rural areas. The paper aims to highlight the (challenging) conditions for small-scale fish producers and fishers and to analyse opportunities for the development of values-based supply chains for fish.

The analysis is based on data from case studies undertaken in Greece, Italy, Germany and the UK in the years 2016-2017. First, we outline the methodology employed (chapter 2.1). Then the case studies are briefly introduced (chapter 3). Chapter 4 shows a discussion of typical challenges and business strategies of fish farmers and fishers. Finally, we conclude by comparing the four case studies (chapter 5).

2. DESCRIPTION OF DATA AND RESEARCH METHODOLOGY

Data and information originate from six case studies of the European SUFISA project[2]. We studied aquaculture in Germany and Italy, and fisheries in Greece, Italy and the UK. The German case studies examined traditional carp farming in Bavaria (Middle Franconia) and the adoption of Recirculation Aquaculture Systems (RAS) in Northern Germany. The Italian case studies focus on saline aquaculture (marine and onshore) in Tuscany and mussel farming (inshore) in the Emilia-Romagna region. The English, Italian and Greek teams studied cases of small-scale coastal fisheries in Cornwall, Tuscany and Northern Greece.

The case study work is based on a multi-method concept consisting of a literature review, interviews, focus groups, workshops and an inventory of identified business strategies. The analysis puts the fish farmer/fisher in the centre but includes their background and expectations that drive strategies and decision-making in the short- and long-term (www.sufisa.org). The concept of values-based businesses and food sup-

[2] Sustainable Finance by Sustainable Agriculture and Fisheries, EU Horizon 2020 project, Grant Agreement No. 635577

ply chains provides the foundation for the analysis of 'added value' and market differentiation (Stevenson et al. 2011).

This research follows a qualitative exploratory approach. Data collection splits up in four stages aiming to collect the different perspectives of various actors from the value chain (see Figure 1). The sequential research steps are 1) desk-based research, 2) interviews, 3) focus groups, and 4) mixed workshops with stakeholders and producers.

Figure 1: Sequential research steps of the SUFISA project (Biely et al. 2018)

This cascade of data collection methods allows to validate and specify further research steps, and thereby to ensure an encompassing analysis. The final goal of these events was to identify market and regulatory issues influencing the performance of primary producers in each country, region and associated commodity; to elicit how farmers/fishers developed strategies to deal with given conditions; and to discuss their relevance for the sustainability of their farms, fishing and farming systems.

First, the research teams documented the general situation of fishery businesses in the selected study areas using a desk-based research approach. Based on this overview, interviews with experts took place aiming to uncover and identify major challenges, followed by focus groups with fish farmers and fishermen. Results of the focus groups were analysed and further discussed in workshops with representatives of the value chain. The workshops provided space for stakeholders to present recommendations for the sector. The group events aimed to enhance the understanding for policy implications of the findings. Focus groups always concentrated on the particular case-study area and the associated commodity. Thus, in-depth analyses aimed to translate observations into the design of adequate policies and/or novel institutional arrangements.

Interviews, focus groups and workshops were recorded and any findings later transcribed by national research teams aiming to ensure that results were available for the use during the life time of the project and beyond. In order to extract data and to reach the expected levels of quality, the following procedures were applied:

(1) Labelling: keywords, themes, issues, multiple labels per paragraph

(2) Analysis at the level of themes: search for commonalities and divergences

(3) Analysis across themes: generation of insights/relations between themes, development of typologies and generalisations

(4) Integration of results from literature reviews and from theory

Table 1: Qualitative research steps during the case study work

Research steps	*Fish farming*	*Small-scale fishery*
Interviews	12 semi structured face to face interviews	36 face to face semi structured interview
Focus Groups	2 with fish farmers	5 with fishermen
Workshops	1 with key stakeholders and fish farmers	2 with fishermen and key stakeholders

In total, SUFISA partner teams conducted around 50 interviews, seven focus groups, and three workshops in Italy, Greece, the UK and Germany. Table 1 gives an overview of the data collection.

3. CASE STUDY DESCRIPTION

Fish farming and small-scale fishery value chain describes processes and institutional arrangements along the supply chains, and how value is added to the fish through processes and sales of higher-value or premium products to customers. Still, each species and sector has a specific value chain depending on the production method, the qualities produced, the marketing channels established and the middle-men involved: Some fresh fish is sold directly on the local market; other products are traded, stored, processed and shipped to consumers on the other side of the world (De Silva, 2011). Analysing fishery value chains means to investigate the interlinking value-adding activities that convert inputs into outputs which, in turn, add to the bottom line and help to create a competitive advantage (De Silva, 2011).

3.1. Italian case studies on fisheries, coastal aquaculture and mussels production

The Italian case studies examine fisheries and coastal aquaculture in Tuscany and mussels production in Emilia-Romagna.

The selection of businesses studied focused on small scale fisheries and coastal aquaculture in Tuscany aiming to cover a large number of fish production in the area. The coastline represents an important tourist destination with its extensive sandy beaches carved by ragged peninsulas. Three nature conservation zones provide shelter for flora and fauna. The most important port in Tuscany is the economic hub of Livorno. It is one of the largest Italian and Mediterranean seaports. Both fisheries and coastal aquaculture affect the natural environment of the Mediterranean Sea in Tuscany. Together with habitat loss, pollution, eutrophication and incidental introduction of alien species, fishing represents one of the strongest stressors that have led to increased changes in the ecosystem structure, loss of fish stocks and marine biodiversity (Coll et al., 2011; Colloca et al., 2011; Farrugio et al., 1993; Papaconstantinou and Farrugio, 2000; Vasilakopoulos et al., 2014; Piroddi et al., 2015; Prosperi et al., 2016).

In Tuscany, the value chain for fishery products consists of 1,029 registered enterprises (January 2015), representing 3.9% of the Italian value chain for fisheries and seafood. In terms of number of companies the fish and seafood value chain is a relatively small sector compared to the whole national economy. Fish companies in Italy represent 0.43% of all business enterprises, while in Tuscany they constitute 0.25%. In Tuscany the largest share of fishing companies are located in Livorno, followed by the port of Grosseto: 46% of the fishing fleets originates from these two coastal provinces. In Livorno, in particular, nearly one third of the Tuscan fishing and aquaculture companies are registered. In 2013, the total production value of the fisheries and aquaculture sector in Tuscany has reached 72.89 million Euro while the added value (production value - intermediate consumption such as raw materials and services) was equal to 38.08 million Euro (DINTEC, 2015).

Overall, the fishery sector in Tuscany is extremely fragmented, except for the southern part of the coast where a fishing group is leading different activities across the value chain such as fishing in regional waters, fish trade (including imports) and catering. This group invested also in access to foreign waters and in shares with other companies. Concerning aquaculture, the value chain is strongly concentrated with only a few companies that are grouped in a consortium. Aquaculture represents the largest part of production and

locally invested capital. Commonly, fish is sold to wholesalers who are supplying Italian retailers but in this case, locally produced fish competes with fish from foreign and cheaper markets.

Quality standards, certifications or labels are poorly applied within the Tuscan fisheries, except for the above-mentioned powerful fishing group that obtained the international quality certification `Friend of the Sea´ for the rose shrimp and that developed a local quality label in coordination with a big retailer. A local outlet of the retailer developed a quality label for local fish in coordination with fishers from the area. In addition, there have been a number of policy-supported efforts to establish a local quality label for fishing but those projects haven not succeeded yet.

Quality labelling is more developed for aquaculture as the most important consortium obtained the `Friend of the Sea´ certification for seabream and seabass. Other enterprises use private company labels. The `Friend of the Sea´ label for both fishing and aquaculture is partly used. Even when used, the consumer will not see this label because it is only communicated between supplier and retailer on a business to business (B2B) level. Instead, private or company labels for fish from aquaculture are visible for end-consumer.

Small scale fishery businesses often face the risk of losing the value that their catches could theoretically provide. Such monetary values are based on i.e. environmental values since small-scale fisheries usually practice selective fishing. If small scale fishers sell their catches in the same channels as trawlers, the risk for the small fishery sector is that the environmental or social value related to the process will not be visible for the buyer. Cooperation is a strategy that can help to overcome the challenges of individual sales for small-scale fishers. Fisheries cooperatives represent a traditional form of horizontal coordination in Tuscany which supports local fishers when they sell their catch in common fish auctions. For aquaculture, the biggest producers built a sales consortium that negotiates with the big retailers and manages the labelling of the fish. An interesting example for small scale Tuscan fisheries realised direct sales of fish to solidarity purchasing groups that are organised and engaged in buying fish from local fishers regularly. This kind of relationship implies important social exchange focussing on information on neglected fish species or offering recipes for the fish sold.

For fisheries in Tuscany, cooperation allows trawlers to continue a relatively sustainable business. Cooperatives organise and manage auction for fish themselves, and therefor set prices instead of being price-takers of the wholesalers. The cooperation of small-scale fisheries is an efficient institutional arrangement. The main task of the cooperative are the sales but also to vertically integrate and diversify activities within the same cooperatives (diversifying sale changes, promoting pesca-tourism, supplying school canteens). Small-scale fishers who are not members of a cooperative search for an alternative way of sustainable sales options. Several fishery business diversify their activities and develop pesca-tourism and catering, or they joint a purchasing groups in solidarity so they can add more value added to their fish.

In contrast, the aquaculture sector is concentrated with a limited number of producers in Tuscany. Viable businesses cooperate horizontally. Hence, they organise their sales and relationships with the big retailers. Also, these producers guarantee environmental friendly production and use international certification labels. This way, they ensure market differentiation and realise higher prices.

In Italy, the cultivation of mussels is well developed. The country produces around 65.000 tonnes of mussels per year and comes third in the world. Mussels represent 48% of the volume of all farmed marine products in Italy. One of the core regions for mussel production is Emilia-Romagna. In 2014, producers of this area harvested 22.200 tonnes or 20% of the total Italian production. The region hosts the most important manufacturing companies and suppliers, mainly between Porto Garibaldi and Goro. The production takes

place in 34 implants, each led by up to three companies. Thus, in total there are more than 100 companies within the region. Companies are usually cooperatives or LTD. Most of them are micro businesses, employing only a small number of employees, equipped with one, rarely two boats to carry out their farming activities. In total, the aquaculture sector in Emilia-Romagna employs around 1.400 people. As most companies are co-operatives only for tax concession reasons, they do not usually work together for marketing their products. Overall, the fragmentation of the mussel sector in Emilia-Romania is a major limitation in terms of product enhancement and, in most cases, does not allow sufficient capital to cover investments and to face crises caused by natural disasters. Nevertheless, in the last five years, manufacturers developed a positive dynamic in modernizing their production sides.

The mussel is a seasonal product. The price of the product is defined by the first harvesting area which is in Goro. In this area, price is the lowest because mussels are grown simultaneously with clam, reducing total production costs. Moving to Cattolica and Cesenatico price increases, because of labour costs.

When Italian mussels are not harvested during the winter season, around 30,000 tonnes per year are imported from Spain. Spain represents one of the major competitors for the Italian mussel market. The Spanish mussel market is characterized by the presence of producer organizations and the absence of offshore implants. This allows for lower prices which are around 60-70 Cent/kg below Italian price levels. The development of Spanish producer organisations relates with the variety of the cultivated mussels. In fact, this variety requires processing before it can be sold. This is different to the Italian mussel. More competition comes from Greek where mussel producers harvest at the same time as Italian producers.

In Emilia Romany, the lack of producer organisations is a major weakness. It is difficult for the large number of small producers to compete on the Mediterranean market. The adoption of organic certification has allowed some companies to deliver their product to a major supermarket retailer (Carrefour). The final price of the product has not changed significantly but it has provided to be a good option of alternative sales. The ‘Cozza di Cervia’ label has also been developed – this is an organic product that is internationally unique because of the organoleptic flavour and texture of the local mussels. In 2013, the Fenice Company has certified its production with the logo of organic product.

Some areas of the Romagna (ex. Cesenatico, Cervia) coast have identified a common trader “Mitilicesenatico” and have applied for certification. An alternative to selling to traders are direct sales to restaurants, expanding implants or private costumers. Exports are not an option because the varieties produced in Italy do not meet the demand of the northern European markets. For mussels, environmental regulations (related to how mussel farming impacts on the coastal areas) and sanitary regulations are major challenges. Regulations related to sanitary conditions are in place at regional level. However, interpretation and implementation of the rules differs between municipalities. The introduction of new EU production and sanitary regulations has been costly for mussel producers in recent years.

3.2. Small-scale coastal fisheries in the UK

The British case study is based on 'inshore fishing in Cornwall'. Cornwall forms the westernmost part of the south-west peninsula of the UK. The population of the county is just over 530,000 people, with the city of Truro as its administrative centre. The county is noted for its long and varied coastline including Areas of Outstanding Natural Beauty. The north coast is typified by a rugged coastline, but has also extensive sandy beaches that are important tourist destinations. The south coast is more sheltered with a number of protected estuaries that have grown up as ports. Falmouth is the most important port in Cornwall and one of

the largest natural harbours in the world. Cornwall is one of the poorest parts of the UK in terms of per capita GDP. It has relatively low average earnings compared to the rest of the UK, as well as relatively high unemployment. A key factor in Cornwall's relatively low economic performance is that 88% of its businesses are micro-businesses, very often one or two man bands, that have proved very difficult to develop further (IF: Interviewee 4).

The Cornish fishing industry is integral to the county's cultural and social fabric. It is estimated that the Cornish fishing industry employs approximately 3,300 people. Perhaps even more critically, it provides vital support to Cornwall's £1.8 billion tourism industry. Tourism represents 25% of Cornwall's GDP with active fishing harbours seen as a major attraction. Smaller boats are particularly important in this respect, in that they return to the harbour every night. While most of the inshore fleet continue to sell their fish at harbourside, there is a growing recognition that in order to be sustainable into the future they need to add value of their catch in some way, not least because there are concerns that the quantity of fish (indeed quotas) available to fishers have been squeezed in recent years. As one interviewee summed it up: "you have to have a strategy in terms of marketing your fish. A degree of entrepreneurship is critical. It is not enough simply to be good at catching fish".

Although there are a number of certification schemes available to inshore fishers, fishermen using boats that are under 10m in length and managed by the Marine Management Organisation (MMO), in Cornwall, such as MSC certification and the Responsible Fishing Scheme, these are generally not considered useful. In the case of the MSC certification it is too expensive for the volumes involved; whereas the Responsible Fishing Scheme is seen as adding little benefit to fishers in terms of the price they receive. More important is the reputation of the fishers themselves in terms of landing high-quality fish. Key to quality in this respect, is that they look after the fish that has been caught, as well as making it available to the relevant market on the same day that it is caught.

Selling to local restaurants is an important market outlet ensuring higher prices for the particular qualities and additional values provided. This is possible due to the direct linkages between local supplies and the demand from consumers with a willingness to pay for additional values of the fish. In most cases, tourist come to the restaurants, which inevitably means that there is a degree of seasonality to the demand. In developing this market opportunity, it is essential to develop a personal relationship with the head chefs of the restaurants involved. This helps to develop a two-way loyalty, which in some instances has worked well for two or three generations of fishers with the same restaurant. In turn, the restaurant can promote the freshness and quality of the fish they serve, as well as the fact that it has been caught in the sea which in many cases may be directly visible from the restaurant itself. Selling in this way enables significantly better prices to be obtained, compared to simply landing fish to the harbour side markets. One issue with developing such values-based supply chains for fish from small-scale fishers is the scale at which they operate.

Cooperation between fishers would help in this regard, however by instinct most of the fishers are highly independent and jealously guard both where they catch their fish, as well as where they market it and for how much. There are, however, some notable examples in Cornwall where fishers have pooled their resources to very good effect in terms of adding value to their catch. In the case of Dreckly Fish, three fishermen have pooled their resources (and in particular their daily catches) and developed contacts in London, whereby they can provide a more regular supply of fish that enables them to get substantially improved prices for their fish. Key to this has been developing personal relationships based on trust with the London buyers, which includes communicating what fish they have available through the use of social media. The second notable example is Kernow Sashimi, which involves selling high quality, processed fish to London.

Again, the development of personal relationships has been critical, but so too has been the cooperation between approximately 10 fishermen who supply Kernow Sashimi with their raw ingredients, and the operators of Kernow Sashimi who themselves are fishermen. In return for their loyalty in supplying Kernow Sashimi, they are paid on average about 10% over the average market price for their catch.

The most significant point to note is that there is minimal horizontal coordination between the inshore fishers. Indeed, the findings from the focus groups suggest that in most cases fishers are highly independent, and indeed secretive, both in terms of what they catch, but also where they sell it and for how much. Where coordination does take place, it is likely to be within families. This latter point is of some relevance in that many of the ports include a number of fishermen from the same family. For instance, at the Padstow focus group one of the participants had a brother, uncle and father involved in fishing, out of a total of 12 inshore boats fishing out of Padstow.

In terms of vertical coordination, some of the fishers only sell their catch through the harbour markets. A range of different fish merchants then purchase the fish from the harbour markets before selling it on directly to the end user, or processing it and adding value before they do so. It is also clear that a number of fishers have established relationships directly with fish merchants, whereby they achieve a slight price premium over selling direct to the harbour market, or at least greater certainty as to the price they will receive for their catch. One example of this latter case is Kernow Sashimi, who endeavour to source their ingredients from local inshore fishermen, paying a 10% premium over the average prices received at the markets in Newlyn, Plymouth and Brixham, before selling their produce direct to suppliers in London at a better price than could be achieved locally.

3.3. Small-scale fisheries in northern Greece

The Greek fishing fleet potential registered in 2012 was of 16,063 vessels, with a gross tonnage of 79,678 GT and a total power of 462,429 kW. The overall number of jobs offered by the sector was 27,558 in 15,021 firms (Liontakis et al., 2014). The fleet decreased between 2008 and 2012 by 9%. This decrease was attributed by Liontakis et al. (2014) to the implementation of the fisheries policy to reduce the number of vessels and the fleet capacity.

There are certain features of the Greek fisheries sector that differentiate it from those of other contries, even in the Mediterranean. The main distinguishing characteristic is the prevalence of small scale (coastal) fishery with vessels of length less than 12 meters of in total 14,903 of such vessels utilizing polyvalent passive gear (2014). Thus the extended coastline of the country (13,676 km) is exploited. (http://world.bymap.org/Coastlines.html)

However, in order to be able to better analyse data concerning the type of enterprise across a temporal scale, the team resorted to the available statistical time series of the Greek statistical surveys that include vessels with motors accounting for more than 8 HP. The number of vessels bigger than this shrank to 5,783 vessels (combined gross tonnage of 27,975 GT, total engine power of 496,557 HP in 2014). These enterprises offer employment to 10,804 people which is highly relevant for the regional economies in Greece.

The Greek case study focuses mainly on purse seine fishers in Kavala. Purse seines mainly target anchovies and sardines. In northern Greece, purse seines are obliged to sell their fish in the fish auction. Kavala has18 purse seines but during the summertime more than 50 purse seines from all over Greece are fishing in the area. About 25 dealers participate in the local fish auction.

They trade fish for national market because quantities are too small for exports. However, export quantities increase when the Turkish fleet stopes fishing. Fish imported to Greece from Turkey are not subject to custom duties while those exported to Turkey are.

High-value fish show relatively high and stable prices for the last ten years but the current trend indicates falling price. Sales in the fish auction dropped since the consumption of fresh fish is declining. Purse seine fishers think that the economic crisis has been driving prices down. Best prices are paid by retailers, followed by wholesalers. Lower price is offered when sardines and anchovies are destined to be frozen and the lowest price is offered by processing units.

In these general sales channels, no extra values are transmitted to the price currently besides the fact that the fish are local, not imported and fresh. Since the catch is sold entirely to the merchant in the fish auction, he is the ambassador for the fish's quality attributes and not a member of the fishing families.

Inshore fishers sell most of their fish locally. Each fisher either has a clientele of restaurants and fish shops or individual customers buying directly from the vessel. Individual sales are the most preferred way, since they set the price, which is much higher than the merchant will give. Furthermore they are not obliged to issue invoices for individual sales hence they are not taxed for these. In case the catch is bigger they sell to wholesalers or to the fish auction.

Fishers are price takers, they have no control on the sales price for the fish and receive payments at the end of the month for all the quantities sold. All costs (e.g. the cost of the ice and of the plastic fish containers, fish auction fees etc.) besides the rent and the personnel costs, are borne by fishers. A current alarmingly frequent arrangement is that the buyer waits for his own payment before transferring the money to the fisher.

Fishery is by nature a competitive business and the explanation given by the fishermen who participated in the focus group meetings is that competition exists because essentially they are hunters and not producers. They directly admit that they don't want other fishers to know where they fish, what they fish and what money they get for their catch. This is the main explanation given by fishers for the difficulty of cooperation among them.

Since last year the total fleet of the 18 purse seines from Kavala made an informal agreement among themselves aiming to reduce competition and organise only a single landing per day of operation. The main reason for that action is that sales in the fish auction dropped due to the crisis. Purse seine fishers argue that consumers bought less fresh fish, even though small fishes like anchovy and sardines typically are considered cheap fish.

Workshop participants claimed that excessive supply drove prices down two years ago. With the arrangement, purse seine fishers hope to keep prices higher and more stable. The fish volumes offered to the auction is about one third less than it was two years ago and quantities exported fell as well. All purse seines based in the Kavala area followed the agreement. However, they realised unintended effects because much more vessels from other areas of Greece came and caught near Kavala.

Another reason they reported for the reduced sales is that most of the processing units operated in the area have been closed or moved to another area where the costs for labour cost are lower but these factories are very selective and they purchase smaller quantities.

Currently the Worldwide Fund for Nature (WWF) develops the so-called 'Fisheries Improvement Project' for purse seiners in Kavala. It was initiated by WWF Greece in 2013 in collaboration with a retailer chain and a fisheries company with the support of the local fisheries research institute. The main objective of

the global Fisheries Improvement Projects is to assist fleets in improving their sustainability and create networks with retailers and consumers interested in sustainable fishery and processing. Greek experts claim that such projects should in general attempt that the fleets involved reach the level of certification according to the principles of Marine Stewardship Council (MSC[3]) and receive this well-known certification.

Horizontal cooperation of purse seine fishers in Kavala seems strongly related to personal relationships. There is an example of an enthusiastic purse seine fisher, a third generation fisherman, who with his brother, fishes and trades with fish at the Kavala fish market. Apart from their own purse seine, the brothers also market the fish of nine other purse seiners, five trawlers and other fishing boats. He operates as a captain in their boat, and his brother runs the office at the fish market. He is the key driver for the mobilization and the involvement of the 18 purse seine fishers of Kavala in the MSC project. During 2016, he acted also as an advocate for the quality and sustainability of Kavala's fish, since he was participating as a lead protagonist in a TV commercial for the retail chain which is also involved in the MSC project.

3.4. Fish farming in earth ponds and in RAS in Germany

Although aquaculture is the global food industry's fastest growing sector and Germany seems to have the water resources and the technological capacity (theoretically) to develop a competitive sector, the German aquaculture industry has been stagnating. Small fish farmers dominate within the German aquaculture industry. Most of them produce fish alongside with other agricultural or non-agricultural activities. In total, the number of these 'part-time' fish producers numbered approximately 12,300 in 2003 (Brämick, 2004). Additionally, around 700 farms or fish enterprises produce exclusively fish. In Germany, only a few areas shows a significant numbers of fish businesses. Traditional aquaculture in Germany produces rainbow trout and common carp, which are farmed in earthen ponds, and modern indoor or outdoor facilities (Brämick, 2015).

The German case studies focus on traditional carp farming in Middle Franconia and intensive fish production in RAS in Northern Germany. The Aischgrund, located in the north of Bavaria, is one of very few specialised areas for traditional carp production. Most ponds are family owned, small size and operate at low levels of production. Due to reduced soil fertility and unfavourable farm structures, framework conditions for agriculture are difficult. Many farmers cultivate vegetable crops, cereals, maize and (for the carp) triticale-legume crop mixtures.

The level of professional education in aquaculture and/or fish marketing is relatively low. Practical knowledge is based on local traditions and on individual experiences. Many farmers work part-time in agriculture and aquaculture and earn their living in other industries. Unemployment rate in the area is very low. The majority of the typical farms are very small (<1 ha) which hampers any individual access to the fish market. Most farmers depend on a few fish wholesalers who collect, grade, process and distribute the fish to restaurants in the closer and wider area.

Compared to intensive aquaculture systems, traditional carp farming has a variety of production systems and marketing strategies. The product is strongly seasonal because sales are limited to September-April. Traditional carp farming depends highly on natural conditions. Due to the losses caused by predators, mainly the cormorant, the output from these low-intensity aquaculture systems differs considerably. The variety in

[3] http://www.wwf.gr/en/sustainable-economy/fisheries

size of carp, fat content of the meat, and taste is a challenge for a potential growth of over-regional marketing.

Fish farmers sell either to wholesale companies for relatively low prices. They are higher in direct sales to e.g. restaurants but this business is challenging. Since carp is always served freshly slaughtered, the fish is kept in tanks until consumption. One dish consists of half a fried fish with supplements and has a price of around 10 Euro. The producer's revenue of 2 Euro per fish represents 10% of the value payed by the end-consumer in the restaurant. Oversized fish will enter processing, go into direct marketing to end consumers, or leave the area through the wholesaler. In the Aischgrund, local stakeholders have been aiming for years to help farmers to increase sales revenue and to realise a producer price of 3.50 Euro/kg; without success.

Traditional carp farming is a low-intensity system with positive impacts on the natural environment. The World Wide Fund for Nature (WWF) presents the carp as the most sustainably farmed or caught fish. However, sales remain slow outside Franconia. Since 2013, the 'Aischgruender Carp' is certified via Geographical Protected Indication (GPI). Linked to this branding, the marketing agency 'Karpfenland Aischgrund' has started to promote the carp within the Aischgrund area and beyond its borders. A small but growing network of restaurants aims to foster carp sales outside Franconia. These partner restaurants are labelled as a special gastronomy for the typical Aischgrund carp menus.

Two different organisations foster the regional marketing of the typical carp product. The 'Carp Land Aischgrund association', a marketing and tourism organisation, provides member restaurants with special designation that distinguish them as supporters of local fish. So far, it enhances together with the local pond cooperative mainly the local marketing. Over-regional marketing has started only recently. Steady funding by the marketing association and the continuation of activities are challenging. Restaurants pay a fee for the use of the logo but receive support for their marketing in turn. The main effort focuses on the acceptance and the local knowledge of carp marketing according to local stakeholders.

RAS are an alternative production system that reuses the water from the fish tanks after purification. While traditional fish farming systems are closely linked to site-specific conditions, RAS are independent from landscape, soils and constant surface water supply (BMEL, 2014). Consequently, the selection of construction site depends mainly on local rules for constructions and economic aspects such as the connection to relevant markets (Lemcke, 2014). The technical implementation of RAS depends on standardised authorisation processes which often do not fit with the farms' diversity. Most of the enterprises are still pioneers in the field of intensive fish production. Production statistics show that the number of plants fell while the total production increased from 2013 to 2014 (Brämick, 2015).

RAS tend to avoid negative environmental effects because water volumes are reduced and purification improved. However, animal welfare is a much discussed issue. RAS allow for high stocking rates due to the continual treatment of the water. Strong economic pressure means that companies opt for high stocking rates, which leads to stress, aggression and injuries among the animals, and thus affects health negatively. Moreover, the structure of the habitat in the tanks is usually very poor (Tschudi & Stamer, 2012). Experts discuss whether the lack of plants, stones etc. has an influence on the animals' wellbeing (Möller, 2015). Furthermore, most killing techniques related to breeding procedures are not compliant with animal welfare (Stamer, 2009).

It is a challenge to manage a demanding technology such as RAS and to be an excellent sales person at the same time. Often, a team of two to three key persons who have different competences and responsibilities Based on different training, education and professional experiences, work and decision making is split be-

tween spouses and/or the younger generation. Although, focus group participants were aware of the required business and marketing skills, fish farmers have to be business people who seek to add value to their products, experts highlighted in the interviews. During group events, fish farmers discussed openly the extent to which they are able to add value and where their best markets are. However, if it comes to details of the marketing channels, there is an intention to keep this information to themselves, or within their own families. Competition amongst fish producers is common, in particular when selling on regional niche markets or to specialised sales companies. An advisor pointed out that many fish farmers lack the entrepreneurial courage to widen their horizon when it comes to marketing opportunities.

Technological innovations have been playing a key role in the development of and the future potential of RAS. Apart from the efficient use and treatment of in- and outgoing water, innovations in respect to the feeding regime are important and drive farm economics through daily growth rates of fish and health of fish and ponds. For several species used in RAS, breeding technologies depend significantly on innovations. In particular, the organic sector aims for new hormone-free methods because limitations in breeding methods hamper any certification of RAS fish production.

4. DISCUSSION OF EMPIRICAL RESULTS

Family owned fish farms and fishery vessels: The presented case studies on fish show structural communalities. Inland and marine aquaculture as well as the fishery businesses are mostly owner-managed. The business requires a certain capital input due to technical equipment needed for vessels and fishponds. Access to capital for investment is an issue for entrepreneurs who aim to expand their fish production or catch, in particular for the fishermen in Cornwall and Kavala. In contrast, agricultural family farmers in Germany have access to finances when they offer convincing business plans for aquaculture plants. Aquaculture businesses in Tuscany have been able to expand and develop new plants due to the (financial) support of regional economic development programmes.

Family labour: All case studies are characterised by labour input mainly provided by family members and/or a small number of employees. The family represents the core group of persons involved in the management, which covers not only the operation of processes and the marketing, but strategic planning and decision-making as well. This is an advantage when workload peaks during harvesting of carp, trout, saline species or mussels. German farmers with natural ponds often work part-time, and earn their living in agriculture and non-agricultural industries.

Viability at threat: Because of given structural conditions in the cases, family-based fish farming and fishery is mainly characterised by relatively low levels of output per business, high operating costs per unit, and relatively low sales prices (due to lacking power to negotiate prices) on a highly competitive fish market. Short and long-term profitability of the businesses is often reduced which hampers the younger generation to enter the business. In turn, this hampers innovation and a renewal of the traditional industries. Inshore fishery faces additional problems due to decreasing fish stocks and fishery policies. Fishers in the Italian region Emilia-Romagna could only survive the fishery crisis because they started to produce mussels which became an important economic activity in the area.

Communication of additional values: Usually small businesses in any sector lack training or experiences in business management. This applies as well to fish farmers and fishermen who organise well their daily processes and are experts in the delivery of high quality fish. However, they often lack capacities to engage and professionalise e.g. in direct sales to premium customers or to drive cooperation with processors

and/or vendors for the establishment of a values-based supply chain of high quality fish. All case studies show that information and training for the elder as well as the younger generation is (for different reasons in the cases) difficult to access.

Ecosystem and landscape conservation services: Inshore fishery vessels keep rural harbour sites alive where tourism is the most relevant sector that ensures income and employment in the area (Cornwall, Kavala). Even in the carp case study where wealthy towns profit from service and non-food industries, carp farming is very important for the region. It protects fresh water ecosystems and traditional landscapes. Due to the historic significance, rural tourism and regional marketing depends on the maintenance of traditional fish farming. On the other side, consumers' awareness is high towards negative impacts of intensive aquaculture. In Tuscany, aquaculture includes marine and freshwater farming. Currently the production of marine species increases with impacts on the natural environment of the Mediterranean Sea while onshore plants with a much better control of effluents are closed down. Since the numbers of active aquaculture enterprises declined and the facilities in coastal areas expanded, negative environmental effects became evident and caused disputes between the local communities and the aquaculture industry.

Legal frameworks and representation in policy: Overfishing of natural fish resources and the pollution of water bodies are negative effects of fisheries and fish farming. Various European and national laws regiment fishery and aquaculture. Participants of all fish case studies complained about legal restrictions that hamper the development of the business and reduce competitiveness compared to large-scale and international fish suppliers. Even when fish farmers or fishers agree with the necessity to control negative effects of the sectors' activities on the natural environment, they highlight opportunities for new ways of implementing the legal framework. However, this requires the support of regional and local authorities. As a small sector, producers and fishers realise poor representation in local or national governments. The work of stakeholders in Germany suffers from the reduced relevance of aquaculture production compared to important industries such as dairy or pork and poultry. Apart from challenging structural conditions, in two case studies, a very special situation challenges the fishers – Brexit in the UK, and the sea sector conflict with Turkey in Greece. In these cases, pending national policy problems are directly affecting the fishery industry and even the strategic planning and development of small-scale family businesses.

Consumers´ image of fish from aquaculture: Italy has seen a decline in recent years in its traditional fishing which, in contrast to Germany, has been counterbalanced by a growth in aquaculture. In Italy, the sector represents 48% of fish production. Alongside with Spain, France and Greece, it is one of the main European aquaculture producing countries in the marine environment. Although volumes of fish from aquaculture grow in all Mediterranean areas, information for consumers or marketing concepts were not yet able to change the (bad) image of fish from aquaculture. This is a challenge for the sector as a whole: marine, saline onshore, intensive freshwater and traditional aquaculture. However, this disadvantage for aquaculture production could be a chance for traditional fishers when they could manage to develop values-based niche markets for high quality wild fish.

Connecting primary industries with consumers: Connecting fishers and fish farmers with the consumers of the fish requires the establishment of supply chains that include not only quality management for the product but as well transparency along the supply chain. Excellent information and cooperation between chain partners is a precondition for the communication of specific values such as the regional origin, environmental or social standards. When the producers' business strategies focus on the maintenance and communication of these specific values, they are able to be established values-based supply chain as described by Stevenson et al. (2011).

Experiences with values-based supply chains for fish: Even though most small-scale producers and fishers face major economic problems, the case studies highlight as well that some fishers and fish producers were able to engage in such a vertical integration along the value chain. Their strategies clearly include the focus on consumers' expectations and result in the realisation of higher prices not only for the sales business but for the primary producers as well. In Cornwell, a limited amount of high quality fish is sold to restaurants in London. In Franconia, farmers invested in own restaurants or arranged a contractual agreement with a local restaurant specialised in typical carp dishes. Policy support shows success when Local Action Groups financed by the Fishery Fund helped to connect the primary fish sector with end-consumers. However, competition between neighbouring businesses plays a role and, in some cases, hampers chain integration significantly. Sometimes producers are able to use existing labels and brands for their product. This is the case in Franconia, where restaurants offering carp dishes can use the logo and marketing tools for their own purposes. This instrument is not suitable for individual producers but only for the communication with the end-consumer.

5. CONCLUSIONS

Our analysis shows that fish farming and inshore fishery – although located in different European regions and operating under various conditions – have a relevant communality: their businesses are threatened to compete on the conventional fish market in the long-term. The international or over-regional European market for fresh fish and fish products is driven by either cost-efficient high-tech processes or by low-cost (and often low standard) imports. We found that the profitability of case study businesses depends on both the efficient management of technical processes, and on the establishment of value chains that ensure higher sales prices for the fish. Otherwise, returns from sales often cannot cover the steadily increasing operational costs. Lessons learned from values-based food chains for e.g. organic or origin-based agricultural products can help to develop innovative marketing channels for fish sales that ensure the transmission of additional quality aspects (and values) to the consumer who (due to this information) will be willing to pay higher prices.

With our conference contribution, we aim to enrich the conference by asking if the issue of 'adding value to the fish' are similar in the fish producing and the fish-catching sector; and if yes, we want to discuss opportunities for the establishment of such values-based supply chains for fish. In this respect, the fish sector could profit from the management of well-established values-based food chains. In this context, we aim to contribute to the discussion focussing on the rivalry between sellers of fish from aquaculture and from fishery: Would cooperation for the benefit of values-based fish supply chains in general be even advantageous for the competing sectors in the long term?

Apart from those very specific issues, we aim to contribute to the conference by linking the topic of 'fish production and marketing' with food business management and agricultural economics. Due to political and historical reasons, fish suppling industries tend to be disconnected from research in the agri-food sector. However, our mixed case study approach of the SUFISA projects shows a potential for synergies and joint learning in policy and practice in fish and agri-food areas.

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