



Intelligent Fish feeding through Integration of ENabling technologies and Circular principle

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D6.7 Overview on stakeholder engagement actions - Customers

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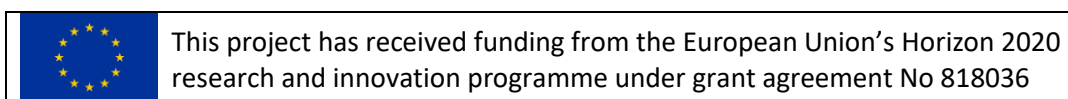
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1 Introduction

The objective of this deliverable is to describe the activities used to engage the consumers, to increase consumer awareness, perceptions and acceptability of the European aquaculture products and methods. In particular, the main aim is to enhance the awareness about the role technological innovations and novel feed ingredients have on sustainable aquaculture development and increased fish welfare, which are major pillars in the iFishIENCi project.

The activities have been conducted both digitally and in person, mostly in conjunction with other activities performed by other tasks in iFishIENCi, engaging consumers. A mapping of the existing consumers knowledge has been performed in collaboration with T4.1 on Social Acceptance.

2 Mapping of Existing Consumer Knowledge

2.1 Mapping through national questionnaires and focus groups

The mapping of consumer knowledge has been performed in collaboration with *Task 4.1 Social Acceptance Analysis*. Qualitative studies (Interviews and focus groups) have been applied to investigate the underlying deeper attitudes, values and trusts towards the dimension of the sustainability, the seafood value chain and the willingness to pay/buy for products. The complete description and analysis of the results of the Social Acceptance can be found in D4.2.

A short description of the set-up of the focus group and interviews, with the consequent results, related to the retail consumers, is given below.

The first overview about consumers attitudes and perceptions was collected in the focus group including retail consumers conducted in Germany in March 2021 (digital).

The focus group included a total of 12 people divided into 3 groups with the following characteristics:

- Age: 18-40
- Regular fish consumers
- 30% have kids in their household
- Awareness of sustainability labels: know either ASC or MSC label

In the discussions information were collected about participants' familiarity with and relation to:

- sustainable aquaculture (attitudes, knowledge, consumer needs' regarding transparency) and fish and seafood products from sustainable aquaculture
- technological aspects of sustainable aquaculture farming

In addition, knowledge was collected about participants' attitudes towards:

- new technologies: the incorporation of digital technology in aquaculture systems (knowledge, advantages, concerns, reservation, excitement)
- communication (practices/lack of): consumer demands/needs (what kind of information they need to see benefits/advantages for them/society).

The discussion in this focus group highlighted the following points:

1. Young consumers associate with aquaculture particularly: strict controls, safe processing, sustainability, animal welfare, healthier animals. They have doubts about animal welfare, space, use of antibiotics. They are concerned about the environment, have doubt about standards. Hardly any knowledge about any aquaculture other than for salmon.
2. The term sustainability is strongly associated with the protection of wild stocks and the protection of ecosystems. The trust in companies towards their sustainable and responsible actions is rather low. Sustainability labels should be revised and consumers ask for more transparency.
3. Focus on animal welfare, feeds used should be as good as the food of wild animal, strict control of sustainable standards in needed, environment should not suffer. Ideas and wishes: politically promotion of sustainable aquaculture, more education of children and consumers, possibilities to find out more about sustainable aquaculture in supermarkets

4. Digitalization is seen as an instrument to lead to more transparency for the consumer, making farm to fork visible. Digitalization could reform labels, better control and quality assurance in aquaculture.
5. Young consumers gave very positive feedback to the iBOSS technology. They see weak points for (technology) consumers: costs (especially for small companies). Their ideas and wishes are that the motivation has to come from politics (top-down influence).
6. The use of digital technologies have a positive influence on young consumers' purchasing behavior. For them, digital technologies are very positive, support sustainability, animal welfare, and control of standards. Consumers would pay more (theoretically).
7. Young consumers' ask for audits by external bodies and transparent manufacturing processes to accept products from sustainable aquaculture. They like to get information on how the aquaculture system looks like (photos and schematic drawings). In addition, animal welfare should be visible. As far as communication tools, young consumers could imagine QR-codes, eye catchers on front of the food packages.

The figure below summarised the results of the focus group discussion:

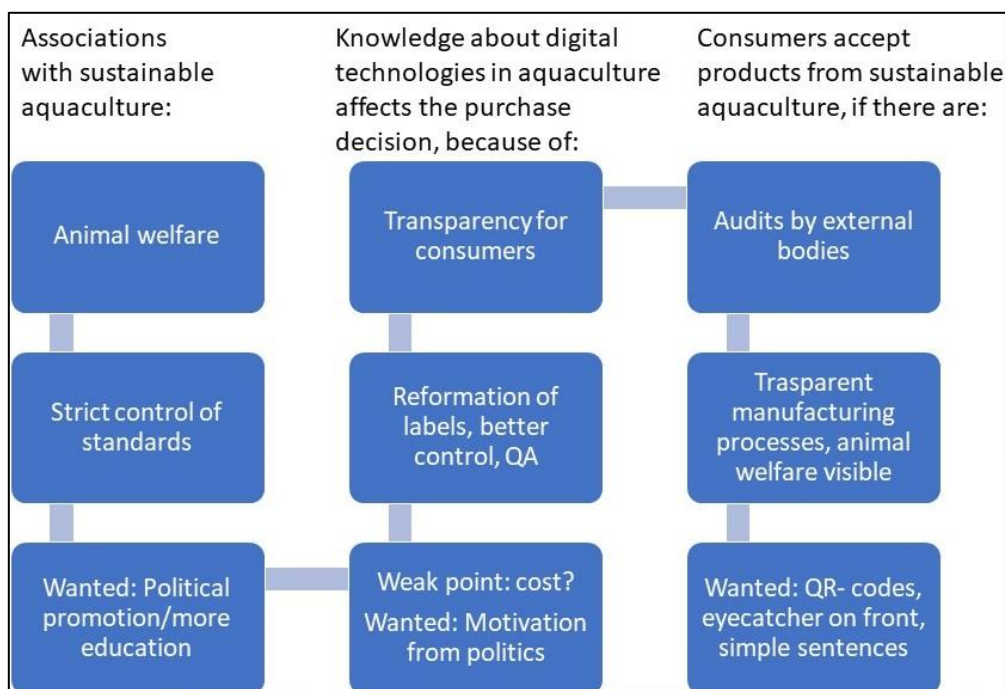


Figure 1 Summary of discussion Focus Group Retailer Consumers

Following the results of the qualitative studies, choice experiments and other activities have been designed to engage consumers on the sustainability concept and the willingness to choose sustainable products (see Deliverable D4.2).

The topics emerging from the focus group on retail consumers described above gave the basis to create the questionnaire used in Germany, Hungary, and Norway about general attitudes toward fish products, fish industry, food technology, circularity and trust in food chain actors.

The questionnaires to analyse the social acceptance and attitudes gave a good overview about the consumers preferences and trust In Norway, Germany and Hungary. The trends of answers were quite similar in the three countries regarding the general attitudes towards fish products and seafood:

- Fish is considered a healthy food.
- A low CO2-foot print production, environmentally sustainable, and respecting fish welfare is the preferred one.
- German and Hungarian consumers are afraid of contamination (chemical and/or bacterial in the fish, while Norwegian consumers have very low concern about eating fish.
- All three countries recognise (with different percentages) the value of sustainable aquaculture for the local and national economy.
- All consumers would like to be able to easily recognise sustainable products (for example through a label).
- The necessary info required by the consumers in fish products are: expiration date, storage conditions, country of origin and sustainability.
- New food technologies are considered important, but consumers are worried that “society depend on them to solve food problems” and that they are taken too quickly to the market before being thoroughly tested.
- The circularity approach (use of organic waste to produce feed or energy) is seen as beneficial especially towards the environment, even if German and Hungarian consumers are concerned by the risks that could have on human health and food safety, unexpectedly on the environment or being misled by food companies.

Additional results related to use of digital methods by fish farmers and aquaculture sector in general can be found in D4.2).

A very interesting results is given by the question about trust in the food chain actors:

Table 2-1 Trust in food chain actors

Food Chain Actors	Norway	Germany	Hungary
Primary food producers (farmers)	57%	64%	66%
Small food producers	59%	61%	67%
Food industry	19%	31%	21%
Regulatory and supervising authorities	37%	44%	47%
Food scientists	54%	59%	65%
Retailers	9%	43%	33%
Consumer associations	40%	47%	51%

Results pooled together from (a lot of trust+very much trust, the 2 higher categories)

Consumers trust the producers, food scientist and, in minor percentage, the consumers associations and the regulatory and supervising authorities. The trust lowers drastically towards the food industry in general and the retailers received a fairly positive score in Germany and Hungary, while they score extremely low in Norway.

These results indicate that the consumers, in general, are positive to products that are more sustainable, with less impacts on the environment and higher fish welfare, and trust that the producers are making an effort to improve these characteristics in their systems and products. At the same time, consumers have difficulties to recognise the more “virtuous” products in the supermarkets.

2.2 Sustainable Aquaculture Ambassador

The opinions of the young generations are important, not only because they will be the consumers of tomorrow, but also because they can foster and influence discussions on sustainability within the household.

A collaboration was established with University of Stavanger, in specific the course “Technology and design” directed to students from high school. Three students were engaged: Liv Haaland Wølstad, Jens Gyland and Oliver Skartun collaborated with iFishIENCi to identify which messages are important for the young generations in the topic of sustainability, circularity and technology applied to aquaculture.

In a series of encounters and discussions, the main topics of interests were identified:

1. Sustainability is an interesting concept but sometime too broad and difficult to identify in the everyday life. The environmental sustainability is easier to understand and considered, for the young consumers the concept of economic sustainability and social sustainability are more difficult to grasp without the appropriated explanation.
2. The circularity concept is very interesting, but it could generate barriers if not well explained. The use of “waste” from aquaculture industry to be used as feed production needs to be expressed with the right word and images, to explain the potentialities and the correct use of the “waste”.
3. The technology applied to aquaculture must be framed with the focus toward environmental protection and fish welfare.
4. The message directed to the young generations should be clear and simple, better if of infographic nature. An ideal platform is difficult to identify, it would be better a general TV campaign or ads in YouTube to attract attention. Animated videos (cartoons) or realistic videos with a clear explanation (and subtext when possible, to be seen also in noisy environments) would be the best choice.
5. In addition, the best approach to young (adult) consumers, seems to be the direct approach through physical activities that allow interactions and questions from the public.

The discussions with the students helped to frame the future work on the engagement of the consumers of tomorrow. They have received the attestations as *Sustainable aquaculture ambassadors*, showcased also in the iFishIENCi social media.

3 Development of key messages

The mapping of knowledge and needs seen in the previous paragraphs helped to identify the key messages of the project:

- What sustainability means in the context of aquaculture.
- Improve aquaculture sustainability through circularity and zero-waste.
- Use of technology to improve fish welfare and environmental monitoring.

4 Delivery of key messages

Several methods have been used to inform and engage with the consumers, given also the knowledge acquired with the perceptions mapping discussed above.

4.1 Indirect Engagement

The indirect engagement has been developed together with the project communication strategy and other project's tasks.

The project social media have been very important to reach a wide audience. Twitter and LinkedIn are platforms targeting a more scientific audience; however, they are also followed by individual interested in the topic of sustainable aquaculture. Facebook and YouTube where the platform more dedicated to the general public, hence consumers. Facebook is becoming less and less relevant, as notable by the engagement rate (147 followers).

The project YouTube channel has results in a better platform to convey the selected messages to a wider audience.

The material developed for the general public/consumers has been two animated videos:

- *iFishIENCi Innovation: What is Fish-Talk-To-Me?* to explain the how technology and digitalisation applied to fish farming allow more detailed monitoring of fish status, resulting in an increase of fish welfare and waste reduction (<https://www.youtube.com/watch?v=mcfxGLbn1Qk>).
- *Smart Solutions: Recirculating Aquaculture Systems* was developed to explain how recirculating systems represent an important way to farm fish and, when coupled with digital solutions, allow a better control of the production, animal welfare, product quality and waste reduction (<https://www.youtube.com/watch?v=5Hssq1eL2dQ>).

The indirect engagement of consumers has been conducted also with the use of digital events (webinars) addressing the main topics of the project, often in collaboration with sister and synergic projects. While these events were originally directed to a specific audience, the addition of the recording to the project's YouTube channel allowed to reach a wider a more general audience.

- *Horizon4Aquaculture Progress Towards Circular Aquaculture Webinar- (July 2021)*: dedicated to the circularity in aquaculture, from zero waste to use of aquaculture "waste" (or by-product" to produce aquaculture feed.
- *Horizon4Aquaculture - Precision Aquaculture in the Blue Economy – (July 2021)*: describe how the digitalisation of aquaculture practices results in better monitoring of water quality and fish welfare, allowing waste reduction ad better quality of production.
- *Aquaculture Going Circular (November 2021)*: the event was discussing how we understand circularity within the aquaculture and how circularity can be incorporated in the aquaculture industry. Some inspirational circular stories were showcased.

4.2 Direct Engagement

The direct engagement of consumers was performed in collaboration with events organised in collaboration with other iFishIENCi tasks.

4.2.1 Fish International Fair (Bremen, February 2020 and September 2022)

A joint stand with Bremerhaven University of Applied Sciences, Thünen Institute and Alfred Wegener Institute was the opportunity to present the project to an interested audience, raising awareness about aquaculture production in Europe and the different dimensions of sustainability: environmental, economic, and social. The consumers were also informed about the use of sustainable ingredients in fish feed production, such as microalgae and yeast, grown with the re-use of aquaculture by-product and how sludge from recirculating systems can be used as source of important components and/or as bio-energy material.

In addition, a general knowledge of aquaculture food labels has been discussed: the importance of a sustainability label in the purchase decisions; the importance of information on the packaging of fish products in the purchase process (e.g. biodiversity, CO₂ footprint, animal welfare, fish health, social responsibility of manufacturers), the influence of personal purchase decisions on developments towards sustainable aquaculture.

4.2.2 Focus groups with retail consumer (Bremerhaven, March 2021)

In a focus group dedicated to retailer consumers (young, age 18-40) it was discussed how does the knowledge about applied digital technologies affect purchase decisions and how sustainability should be communicated.

Results showed that the focus of young consumers is on animal welfare and that they would like a strict control of standards. Digitalization is seen as an instrument to lead to more transparency, making farm to fork visible, and it could reform the labels and control sustainable aquaculture more efficiently. For detailed description of the results see Figure 1 and D4.2.

4.2.3 Assessment of organoleptic and nutritional quality of fish with consumers

As sensory characteristics have a high impact on consumers acceptance, it is important to investigate the impact of fishmeal reduced diets on the nutritional value and the sensory characteristics of a fish product. Three experiments were conducted in different locations, with different species and different feed diet (more details about the trials can be found in D3.6).

- Tilapia, Sensory trial in Laos (November 2021).
- Trout, Sensory trial and nutritional value analysis (September 2022).
- Catfish, Sensory trial and nutritional value analysis in Győr, Hungary (January 2023).

In connection with these trials, consumers were informed about sustainability in aquaculture, circularity applied to production including the zero waste approach and how technology allows a better monitoring of the production of water quality and of fish welfare.

4.2.4 Eye-tracking experiments (Bremerhaven December 2022)

Eye tracking examines where and how a person is looking when buy products. The scope of the test was to determine what consumer focus on when buy fish products (details about the experiment can be found in D4.14). The presence of sustainability labels seems important for the consumers, even if the focus is also on other aspects of the package. In connection with this experiment, the consumers were informed about the projects and its main messages: sustainability, circularity and digitalisation.

4.2.5 Seafood Hackathon (Mosta, Malta, June 2023)

As mentioned in relation to the Young Sustainable Aquaculture Ambassador above (2.2), it is vital to include young people in the sustainability discussion.

A sustainable seafood hackathon was organised in Malta: a group of children from St Aloysius College, Malta, along with their two teachers, were invited to learn more about seafood, its production as wild-caught or farmed fish, health and environmental issues, transport and food safety and trust. The event was held under the FishEUTrust Malta Living Lab (<https://fishetrust.org/>) as an educational outreach activity for the project, in association with the iFishIENCi project (<https://ifishienci.eu/>) consumer engagement activities, Blue Schools Med programme (<https://www.blueschoolsmed.eu/>) and European Maritime Day In My Country (https://maritime-day.ec.europa.eu/my-country_en).

The fisheries and aquaculture expert team explained why seafood is healthy and how Fish can be caught and farm, all while considering the potentially harmful effects these activities can have on the environment.

The enthusiastic participants already had a very good knowledge of seafood through their ongoing Blue Schools Med engagement and were very active in giving their perspectives and opinions. They co-created interesting communication materials with the scientists to disseminate their knowledge on seafood issues.

Most of the students said they consume seafood and that they like it, including it in traditional and more international and contemporary preparations. Their favourite topics were seafood appearance, and the difference of it between farmed and caught fish; why bycatch is harmful to the environment; and how to sustainably catch fish using new fishing gears. The students presented their own creative communications on these topics to the expert scientists, and then have taken these back to their school to present to their other student colleagues and spread the word, successfully becoming part of the Sustainable Aquaculture Ambassador program.

After the presentations ended, the students tried seaweed chips and snacks and visit the AquaBioTech Innovia research facilities, where they could see the Recirculating Aquaculture Systems (RAS) and different fish species farmed there, followed by a prize ceremony where they all received ocean related prizes.



Figure 2 Hackathon Malta, June 2023

4.2.6 Engagement of seafood retailers

The engagement of food retailers in the discussion about fish and seafood sustainability was planned in the methodology described in D6.6. However, after several attempts, the active engagement of retailer has not been pursued.

In some private conversations (off the record), retailers said that they feel squeezed between the products that they can acquire from the producers and the demands of the consumers. As seen in the results from the various activities in T4.1 on consumers attitudes (detailed results in D4.2 and D4.14), the consumers recognise the importance of buy sustainable products, at the same time price is often one of the deciding factors in the purchase. In addition, for the sellers, it is difficult to “label” a product as sustainable, without clear guidelines from the authorities through regulations or label use.

It is easier when the consumers can buy directly from the producers, in local “farmers markets” or in systems as *reko-ringen*. Reko-ringen, popular in Scandinavia, is a sales channel for local food where customers pre-order goods via the ring's joint Facebook group. The goods are delivered by the manufacturer at the ring's announced delivery location, date and time.

REKO stands for RETtferdig KOnsum (fair consumer) and is a trade phenomenon founded by Thomas Snellman in Finland in 2013. The REKO sales phenomenon is the sale of food products without intermediaries, where the producer himself is responsible for production and sale and receives 100% of the sales price. This type of sale allows the consumers to have a direct contact with the producer and ask questions about the method of farming, use of chemicals, degree of sustainability and other specific questions that can increase the trust towards the products and the producer.

Unfortunately, this type of sale can happen only in limited realities, especially near the producers' location.

Without international standards on sustainability, such as strict guidelines for production or certification labels, the majority of the consumers buying from supermarket chains are unable to

choose between more or less sustainable products, and “reward” the most sustainable producers. It is also important to underline that certification labels must be carefully considered by regulatory bodies: besides their costs on the production chain, their number must be limited, and they should be thoroughly explained and advertised, avoiding the uncertainty present today on their value and the difference between the existing ones.

5 Conclusions

In this deliverable, the activities used to engage consumers have been described. The activities were focused on increasing consumer awareness, perceptions and acceptability of the European aquaculture products and methods.

In general, consumers have displayed a good knowledge of the concept of sustainability in aquaculture and they are positive towards the use of by-products of aquaculture for other uses (feed production or bioenergy) and consider the technology positive in the achievement of better quality and fish welfare. Consumers are also willing, with moderation, to pay more for verified sustainable products.

However, it is quite clear that consumers have difficulties in recognising sustainable products when shopping, mainly due to the lack of general guidelines, specific symbols or certification labels. They find it difficult to make more sustainable choices and reward the “virtuous” producers, especially in the major chains. The choice is easier in a small, local reality where it is possible to make a direct sale between producers and consumers, where the trust is enhanced by direct interaction.

The recommendation is to implement symbols or certification labels at the European and international levels, followed by a massive campaign to explain their significance and their use in the context of seafood sustainability. Only in this way, the trust of the consumers in fish and seafood products would globally increase.

6 Engagement in Numbers

