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AQUACULTURE BUSINESS MODELS IN THE ATLANTIC AREA REGION

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Introduction

Action Three of Work Package Six of the Access2Sea project involved Project Partners identifying and highlighting a number of innovative, sustainable business models for aquaculture farms across the project regions and providing a roadmap for each of these business models which can be used by aquaculture professionals to learn how they were developed and to implement them in their own region. The purpose of this activity is to address some of the key factors that impact on the performance and sustainability of companies in the aquaculture sector, to improve the business environment and to support growth and job creation in the sector across the project territories.

Chapter One outlines some of the challenges facing aquaculture producers in developing business models and provides an overview of the evolution of business models as well as an analysis of the nature and type of business models available to aquaculture producers. Chapters Two to Seven each contain a roadmap for the development of a key business model identified from one of the Access2Sea Partner regions. Chapter Eight gathers the learning from all the research and analysis carried out as part of Action Three – Work Package Six by outlining a range of guidelines for supporting the development of strong business models in the aquaculture sector in the Atlantic Area region.

Chapter 1: Sustainable Business Models in Aquaculture

Defining a business model

A business model describes the rationale of how an organisation creates, delivers and captures value in economic, social and cultural contexts. It is a plan for the successful operation of a business, identifying sources of revenue, the intended customer base, products and details of financing i.e., an entity's plan to make a profit.

Traditionally Business Models fell into four categories:

- Business to Consumer
- Business to Business
- Consumer to Business
- Consumer to Consumer

With the evolution of technology there are now over 100 types of business models and a view that there are almost as many models are there are businesses. Irrespective of the model there is a consensus that all business models address the key ingredients of a business model canvass.

Any business model should clearly address the following areas:

a) Key Partners
b) Key Activities
c) Value Proposition
d) Customer relationship
e) Customer Segment

f) Key Resources
g) Distribution Channel
h) Cost Structure
i) Revenue Stream

Profiling Aquaculture Producers

The report “Pro poor Business Models for Aquaculture” published by Worldfish states that “smallholder farming dominates worldwide aquaculture production with 90% of production from developing countries and approximately 20 million smallholder farmers engaged in production” This is similar in context to production activity in the Access2Sea partner region. The Inventory of Aquaculture activities shows a total of 621 participants the vast majority of which were micro or SME businesses which gives a very clear indication of scale. Their importance is however not to be underestimated as they:

- Play an important role in the food supply ecosystem
- Create employment in the most rural and peripheral regions
- Contribute positively to other sectors such as tourism, hospitality and retail

Challenges

One of the major findings of several reviews of the aquaculture industry worldwide is summarised by Worldfish as follows “Due to the characteristics of aquaculture, the organisational and economic problems aquaculture farmers have to face are very similar to those of their peers in agriculture”. While small scale farming can be economically feasible, smallholders forfeit potential opportunities from large scale production. They face constraints in accessing finance, information, management capacity and technological capability. In addition, smallholders suffer disproportionally from external barriers like market imperfections and regulations.

Reviews in Aquaculture published by John Wiley and Sons Ltd specify barriers as follows:

a) Access to inputs, technical assistance and services. Smallholders lack access to affordable and high-quality inputs such as feed and seed, technical knowledge, affordable transport and storage facilities
b) Access to finance. Smallholders lack access to capital and credit as bankers perceive aquaculture as a higher risk venture. This means a lack of financial products to facilitate the sector
c) Poor Infrastructure and inefficient institutions. Where these are lacking there are limits to growth
d) Challenges in coordination e.g., high transaction costs between smallholders and others in the value chain
e) Inability to meet standards and regulation
f) Excessive individual risk related to commercialisation

Evolution of Business Models in Aquaculture:

Like other businesses aquaculture has had to respond to multiple and changing conditions. The evolution has involved various forms of horizontal and vertical cooperation. Horizontal involves businesses engaging in some form of organisation/cooperation amongst themselves. Vertical cooperation leads to a greater involvement higher up the value chain. A more formalised/structured corporate model emerges as the business becomes engaged in more vertical integration.

The Worldfish study examined three models with the following observations:

Horizontal:

Advantages include an aggregation of needs, like input supply, better access to markets, influence and possibilities for collective management of common resources. Constraints relate to the required management capacity.

Vertical:

Focuses more on inclusion of farmers and other partners within the respective value chains with the advantage of a greater degree of market interaction and potential for improved prices and/or more secure markets. Constraints include the focus of the producer being on specific markets/species potentially losing diversity in both production and markets

Corporate:

Includes a strong element of commercial orientation of a network between farmers, a service unit and an overall management unit. This model links multiple farmers to a corporate world of high demand, high quality, uniform products on time and in large amounts. The model requires significant capacity building and organisational development.

Other research undertaken by John Wiley and Sons Ltd have categorised business models in three ways:

a) **Buyer driven models:** where contracts and agreements are driven more by market demand. Here processors, exporters and retailers maximise benefits by securing better contracts with producers. These models are facilitated through contract farming, micro franchising and joint ventures

b) **Producer driven models:** production is driven by individual or groups of producers. Their main objectives are to serve new markets, achieve better market prices, stabilise market position, supply large volumes, increase bargaining power and access inputs and services. These models are facilitated by e.g., farmer owned business coops, tenant farmers etc

c) **Intermediary driven models:** where market actors focus on food safety, consistent quality, year-round supply and innovation at a competitive price. These models are facilitated by public private partnerships, certification etc

Methodologies:

Wiley and Sons have outlined the many arrangements entered into which facilitate the operation of the various business models. These include:

a) **Contract Farming:** arrangements where larger commercial firms purchase the harvest of independent farmers based on terms and conditions agreed in advance. It often involves the provision of inputs such as seed, feed, credit, training etc. Such arrangements can address risk, mitigate market failures and reduce transaction costs. On the downside such arrangements can reduce producer autonomy while increasing their financial and production risks due to power imbalance. While this relationship is largely vertical it does not preclude horizontal arrangements between producers to counter potential imbalances and enhance negotiating power

b) **Micro-franchising:** enables new market entrants to capitalise on existing knowledge, brands, products and processes in return for a fee. They operate under a firm's trade name but retain ownership. Like contract farming some arrangements include the supply of seed and feed etc. They are perceived as more autonomous arrangements than contract farming

c) **Joint ventures:** involving co-ownership agreements between firms and producers. They overlap with other models with the key differentiating feature being the joint equity financing

d) **Farmer owned Businesses (cooperatives, associations or groups):** whereby producers pool their resources together using a formal organisational structure e.g., associations, trusts, cooperatives or collectives. Farm owned businesses differ in that they are incorporated as enterprises leading to greater focus and speedier decision making than an all- inclusive cooperative model requiring collective decision making.

There is a perception that larger businesses are averse to working with cooperative models because of their slow decision making. Cooperative/Farm owned models can include a significant level of horizontal and vertical integration

e) **Public Private Partnerships:** whereby an enabling environment is created for private **investment** and producer development. The best example are aqua parks where regional or national authorities designate a particular area for aquaculture development and offer major incentives to businesses to develop the resources, provide services and access the specialist expertise when necessary to maximise the utilisation of available resources. These facilities can also include incubators nurturing early-stage enterprises through the difficult and financially challenging start-up phase. This can also be complemented by accelerator programmes to fast-track increased management capacity, engagement with customers and interaction with financiers

Chapter 2: Co-operatives UK Community Benefit Society Model

Business Model Type	**Co-operatives UK Community Benefit Society Model**
Region	**Wales (United Kingdom)**

Introduction	The co-operative is committed to starting the first trial commercial seaweed and shellfish farm in Wales. Species on sites at present: Kelps from Rathlin Island • *Laminaria digitata*, (150 m rope 04-07 Nov 2020) • *Saccharina latissama*, (150 m rope 04-07 Nov 2020) *Alaria esculenta*, (100 m rope – due end November 2020) Bivalves • Native Oysters (90,000 individuals 1g 3rd week Oct 2020) • Mussels (150 meters of spat collection lines in spring 2021) Site size: Both trial sites are 100 meters by 5 meters in sub tidal locations with minimum water depth of 10 meters, current speeds 0.5 to 2 knots.

How it was established	**Licensing process started in 2017 – the process is long, and the timeline is outlined below:** • **2017** Start of licensing process • **2019** Registered as a Community Benefit Society 1st August 2019 with FCA - The registration as a Community Benefit Society took 7 to 8 months to obtain with the help from the Welsh Cooperative Centre • **2020** Crown Consent August (2020 – 2025) • **2020** Band 2 Marine Licenses August (2020 – 2025) No: DEML2013- issued by Natural Resources Wales • **2020** Aquaculture Production Business (APB) consent from CEFAS for the two sites including Environment Impact Assessment (EIA) and Habitats Risk Assessment (HRA) When compared to shellfish farming there is no incentive to farm seaweeds: • Shellfish developments may be issued a Marine Licence Exemption Notification (under the Marine Licensing (Exempted Activities) (Wales) Order 2011) provided the aquaculture structure does not obstruct or cause danger to navigation or is not creating, altering or maintaining an artificial reef. In contrast, a seaweed development will require a marine licence under the Marine and Coastal Access Act (MCAA) 2009. • Seaweed farms may be considered an Annex II project under the Environmental Impact Assessment Directive and so may require an EIA to accompany the marine licence application.

	A summary of the consents and licences required for sea (or land)-based shellfish and seaweed aquaculture is provided in the Aquaculture Regulatory Toolbox for Wales. NRW suggested to just set up the bivalve farm as it is cheaper and easier to get licensing. But the co-operative mission is linked with carbon sequestration, and seaweed farming is part of their vision, so they decided to go ahead with the seaweed farm licence ca. £1700 Co-operative joined the Accelerated Growth Programme (AGP) from the Welsh government, for 8 months, during this period: • had support from a business consultant • looked at land site locations for depuration and visitor centre During this process, Co-operative got dropped off from the programme because lacked the farming licenses. Once the licensing was granted it was requested to re-join the AGP, but this was rejected.
Activities	**Timeline for Seaweeds:** Seaweeds (Fertile sorus of the Kelps listed above were sent when located locally from Ramsey Sound in the following months.) • Feb 2019 • Dec 2019 • Feb 2020 These were sent to hatcheries in Rathlin Island, Northern Island and SAMS in Scotland

Only Rathlin Island hatchery managed to produce spool (10 spools in total)

- 04-7 Nov 2020
- successfully seeded the two trial sites in Ramsey sound

£60 per box of seaweed, mail lost 2 parcels on the way…

The above has costed £7500.

Monthly monitoring of stock and environmental data

Seaweed Harvests: April, June and September 2021
Identified potential buyers in England, Wales and Scotland.

Seaweeds Reseed: Autumn 2021, if summer conditions allow try summer too

Developing farming techniques throughout period

Timeline for shellfish:

- **October 2020**: 90,000 * 1gm native oyster spat in lantern nets (5 units, but 2 dropped, aim for 200, trying to recover with divers) and seabed cages (5).
- **December 2020**: grading and restocking in additional nets and cages – these farming practises will continue through the 3 to 4 years on site
- **October 2021**: second batch of 100,000 oyster spat introduced

	• **October 2021 – 2022**: Some oysters (50,000 individual potentially 2£/shell) sold for restoration projects • **October 2023**: Saleable oysters to be sold on table market **Mussels:** • **March – May 2021** Spat settlement lines deployed. • Hand graded each 3 to 6 months and restocked. • Sales of mussel seed throughout the five years. • After two years sales of mussels for table market.
Business Challenges	**Specific Business Supports and Challenges** **Support:** • Local marine skilled individuals have joined the Society and given their skills, expertise and crucial local knowledge to set the sites up and stock with first seaweed and Oyster spat. • The local interest and support have led to key opportunities been offered of boats, processing facilities and land sites and potential local markets • Support from Welsh academic institutions, NRW and Welsh Government fisheries department • Support from ASSG, and Scottish Crown - The Crown Estate consent was facilitated through the Association of Scottish Shellfish Growers, where the Director met the Scottish Crown Agent who suggested to directly contact the

	Crown in London instead of Bridgend. Scottish Crown are very supportive of aquaculture, they support the ASSG • Scottish Seaweed Association **Challenges:** Unsuccessful grant applications for various reasons e.g., too innovative, too large a Project, no track record, COVID and Brexit This has led to an inability to attract the crucial set up funding needed to be able to take up all the potential opportunities that could create a viable Community Benefit Business providing long term employment and healthy sustainable Seafood. By February 2021, the existing start-up funds will have all been used and the Project will need to be stopped. The company is however engaging with other stakeholders to gain alternative sources of funding (see section below: Cost Structure & Investment Required) Unsuccessful Grant Applications: 1. National Lottery Fund: Coastal Community Fund in Wales (round 6) 2. SDF: Pembrokeshire Coastal National Park Authority 3. FLAG funding 4. EMFF 5. Application to loans which were turned down
Resources Required	• Environmental Monitoring to show the benefits from this type of IMTA • Suitable boat work • Seaweed and shellfish processing equipment

	• Kelp hatchery • Shellfish depuration unit • Vivier tanks • Seafood kitchen and café • Refrigerated van
Key Partners	• Twenty-seven society members (individuals who joined the society) • Thirteen other partners excluding society members (do not contribute directly with funds, but may provide infrastructure, know-how and other resources):
Market Information	Local and wider communities will be offered seafood products through the shop and to local households, retail and wholesale customers using multiple online platforms and a delivery service and UK courier service. Marketing activities through the shop, online, at farmers markets and at food shows virtual and face to face.
Revenue Streams	• Direct selling, sale to wholesaler and food services, sale to Seaweed processors for other uses such as cosmetics, packaging. • Use in Seaweed baths and for organic fertilizer. • Will be also selling mussel seed and oyster for restoration projects. • Diving and educational visits to farms.

Cost Structure & Investment Required	**Costs in year 2021**: **TOTAL £153,000** **Investment:** **TOTAL £300,000**
Growth Potential	The key to being able to scale up these IMTA operations is to have local support from fishermen and the coastal community. This is why it was registered as a Community Benefit Society – to be owned and run by the local community for the benefit of all – creating quality Jobs and profit that is always reinvested. Additionally, there is continual growing demand for sustainable seafood especially Seaweed (increasing vegan/vegetarian, consumers looking for healthier products). Also, there is continual growth in the development of non-food seaweed products. People are continually becoming more supportive of local food producers Finally, the blue economy is emerging which will result in payments like carbon credits and blue bonds that can be further invested in such sustainable seafood production

Chapter 3: Limited Company (Andalucía Region)

Business Model Type	**Limited Company**
Region	Bay of Cádiz / South Atlantic Region.

Introduction	The Company is a family business and currently has one partner. The founder was a pioneer in the world of aquaculture, working on the first successful aquaculture initiatives in the southern Atlantic area of Andalusia, with experience forged in the management of natural spaces for sustainable aquaculture development. The main activity is the exploitation and commercialization of the resources of the ”estero” earthen ponds, including aquatic species, halophytes and salt. They are also dedicated to ecotourism or nature tourism. Currently, the key decision makers in the company are carrying out production tasks and offering advice to companies in the aquaculture sector in the area. After some experience in the world of consulting, they identified the possibility of setting up their own company.
How it was established	For the start-up of the company, they carried out experimental tests with oysters and the success was quite good. In fact, they

	tested the commercialization in the catering sector, where they currently carry out a part of the activity. In addition, the antecedents in the world of aquaculture and the "estero" of her family, contributed towards the idea of giving added value to the initial and family activity. The promoter considers herself a lover of the area and the "esteros" and her main objective is to protect the area to prevent further degradation, or even disappearance. Regarding the needs identified for the start-up of the business, she highlights the following: Restoration of the "estero", since it was in poor condition, deteriorated and abandoned. In addition, previous research carried out before the start of the cultivation and development of the oyster. In addition to a study of market prices. Other points to highlight are the difficulty in business advice, as well as administrative obstacles since there is no unified information.
Activities	The Company is dedicated to the exploitation and commercialization of the resources of the "estero", including aquaculture species, halophyte plants and salt in addition, they are dedicated to ecotourism or nature tourism. Regarding the needs they have found in relation to research, there is no action protocol to achieve a culture that works.

	Regarding innovation, they intend to carry out a combination of cultures of sea bream, oysters and algae in multitrophic aquaculture in earthen ponds. The main idea is, on the one hand, diversification to achieve greater profitability and, on the other hand, to make aquaculture a culture of the future. To achieve this, they have participate in several R+D projects, all of them focused in the development of aquaculture from a sustainable point of view, working in the improvement of extensive systems, waste utilization and also business diversification through the combination of several economic activities in the same facility. Regarding the processing, it is not understood as such since they do not process the products. They collect the oysters, they are transported to the treatment plant and packaged, so the product is not considered processed.
Business Challenges	The main challenge that this company has faced is the poor survival and quality in obtaining French oysters, which is what they have opted for. To do this, they have invested heavily in the purchase of seeds, assuming an additional cost, since these seeds come from hatcheries in France. The only solution to this is to switch to a native oyster culture. Both crops are carried out in parallel. In addition, they have faced technical problems in the crops, as well as many barriers at a commercial level, since the oyster has not always been in good condition. In production they can find good months and bad months, since it is likely that, today they will not find any problem and, the following month, they will obtain poor

	quality oysters. This is because it is a natural product and is exposed to different climatic conditions. Another barrier is the company cost of the product. When the products are sold wholesale, it means a sale at very low prices, so it hardly represents income for the company. This is why they have had to plan a new business strategy. This focuses on selling by units and matching the rest of the suppliers in the area. Currently, they compete with suppliers of Galician oysters. They have the ability to sell at competitive prices. However, the oyster produced by The Company is a natural crop and the production is very low, so they must sell at high prices in order to be profitable. Before the Covid-19 crisis, this company sold to local distributors in the area, (restaurants), as well as bulk sales at very low prices. Due to the pandemic, the hospitality sector suffered a great loss and many of the restaurants had to close their doors. Since then, they have started selling to private customers, so they have had to match prices with their main competitors in the area. Now, they sell by units and have seen how it is possible to obtain greater profitability from the product. Now their income has been doubled compared to the pre-pandemic era.
Resources Required	Resources required in facilities: On the one hand, for the part of aquaculture crops, water options, cultivation, tides ... in this aspect, they do not mention any need.

	For the ecotourism business line, they have certain needs, since the former salt mine buildings where they carry out their activities are abandoned, they do not have electricity or running water, so in order to provide a quality service, they have to invest a lot in the system. To cover some costs of sustainable expenses, adaptation of roads, etc., they have requested and have been awarded a grant from the Rural Development Management (GDR). Regarding production needs, they find no need since their production is traditional and specific machinery is not necessary.
Key Partners	Other aquaculture producers, wholesalers, research centres, local communities etc. • Andalusian Aquaculture Technology Centre (CTAQUA). • University of Cádiz (UCA). • Rural Development Management (GDR). • Puerto Real City Council. • ASEMA
Market Information	Target customers (aquaculture sector): Catering. Target customers (tourism): local, national, and international. Food lovers. Nature lovers. Distribution Channels: Direct distribution. Products range from estuaries to restaurants, as well as private distribution. Use of

	online sales and social networks. They also sell to a distributor who is responsible for distributing to other companies, catering, etc.
Revenue Streams	The main income stream is obtained through sales to local and national restaurants.
Cost Structure & Investment Required	• Staff: 5 people at maximum performance € 105,000 / year. • Raw material: € 35,000 / year. • Land rent: € 5,000 / year. (Reviewable) • Transport: € 18,000 (required) • Marketing: € 5,000 / year and up to five years, the rest represent an annual expense of € 3,000 / year. • Insurance and occupational risk prevention: € 2,000 / year. • Loans: € 9,000 / year (4-year maturity) • Funding source: GDR grant € 73,000 (only for tourism). • In relation to State subsidies for aquaculture production, they believe that they are not advantageous, so at the moment, they are focussing on the ecotourism sector, since with aquaculture production they are able to manage it with capital own.
Growth Potential	In the aquaculture sector, they currently have an annual production of 5,000 - 6,000 kilograms of oysters. They foresee a significant growth in production, and they are putting in place a plan with which they would obtain around 40,000 - 50,000 kilograms per year.

Chapter 4: Mussella (Brittany Region)

Business Model Type	**Cooperative**
Region	Britanny
Trading Name	~~Mussella~~
Website	https://mussella.com/

Introduction	The cooperative is an association of shellfish producers located on the French Atlantic coast. They are committed to limiting the waste of their unexploited marine raw materials. They are specialised in Mussels production, transformation, transformation of by-products, packaging, processing… Recently they developed a sustainable new method to transform and value mussels' by-products. *Context: Before arriving on the stalls, the mussels are sorted, and only the biggest are retained. There is therefore a very high proportion of mussel subproducts that can reach 50% of production. Due to lack of alternative, mussel growers reject their subproducts at sea for the majority; with a possible impact on the marine ecosystem: siltation, eutrophication, possible microbial pollution of the marine environment at sea; olfactory nuisance on*

	the ground. That's why Mussela decided to develop a process to re-use mussels' by-products. Mussels' flesh and shell are separated through a business' patented steam process. Products obtained are used for: *nutraceutical, food, petfood, appetizing, aromatic, cosmetic, amendment, matrix, treatment industry.*
How it was established	It's the third generation of a shellfish farm that created the company, the first generation set up the business, the second enabled the mechanisation, and the third is starting to produce sustainably. The cooperative has conducted research on the mussels' by-product issues aiming at setting up a sustainable development method for the reuse of mussel by-products. They developed a process to separate the shell and the flesh of a mussels. Then they could use these ingredients to create other new products (the flesh is used for nutraceutical industry, the shell powder that contain lot of limestone can be used for biomaterials (cosmetic, bioplastics).
Activities	Mussel production, Transformation, R&D, Processing, packaging, quality (certification), marking and commercial. • Bouchot mussel production, "Organic production » agreement. • Process to separate the shells of the by-products. • Shellfish by-product valuation:

	- The flesh (for food or nutraceutical industry). - The shell: creation of shell powder (lot of limestone) that can be used for biomaterials (cosmetic, bioplastic). Context: A high proportion of by-products in shellfish culture that can reach up to 50% of production with a high impact on ecosystem due to discards into the sea
Business Challenges	• There is a high proportion of by-products in the product of buchot Mussels, so there is a need to develop or find a patented method to separate the flesh and the shell of the mussel by-products. • To have enough mussels' by-products (necessity to associate with other shellfish producers). • Find customers for obtained products (mussel flesh only and shell powder)
Resources Required	Shellfish farm concession: access to primary product with a competitive price. Network of producers associated Machin and production line, Patent 2 Team expertise
Key Partners	R&D platform in Seafood and Biotechnology products. Laboratory specialised in analyses and food safety Shellfish producers' network

Market Information	Mussel Flesh (B to B and B to C) national market: Food industry for ready meals Restauration Medium and large supermarkets Cooking juice (B to B) national market): Nutraceutical industries (articulation problems). Food industries for flavour business Shells: Agriculture and farmers (organic) for limestone. Shellfish producers for larva catchment
Revenue Streams	Most of the selling is made through an external distributor Flesh selling 85% of the revenue.15% between cooking juice and shells.
Cost Structure & Investment Required	Staff 15 persons, loans, Machin, mussel production, commercial and communication fees, equipment and production line
Growth Potential	Want to increase the sales related to shells (5% of the total) and cooking juice (18% of the total).

Chapter 5: Meitheal Trá na Rinne Teoranta t/a Waterford Oysters (Irish Region)

Business Model Type	**Limited Company**
Trading Name	Meitheal Trá na Rinne Teoranta t/a Waterford Oysters
Address / Region	Móta, An Rinn, Dún Garbhán, Co. Phort Láirge Indicate the Region
Key Contact	Clíona Mhic Ghiolla Chuda
Website	www.waterfordoysters.com

Introduction	The company Meitheal Trá na Rinne was founded in 1990 in the Irish speaking (Gaeltacht) area of An Rinn, Co. Waterford, Ireland. The company has been farming Pacific Oysters (Crassostrea gigas) by bags and trestle method. The company markets and sells oysters on behalf of the shareholders of the company who independently farm oysters on their own individual aquaculture sites in Dungarvan Bay.
How it was established	The first oyster farm was set in Dungarvan Bay in 1986. It was soon realised that a vehicle was required to market and sell the produce. Several oyster farmers, some incorporated as limited companies and others as sole traders, came together and invested shares in a limited company. This company was set up to market and sell the premium quality oysters produced by growers in Dungarvan Bay.

Value Proposition

The company's value proposition is based on the quality of its produce and the sustainability of their processes. The oysters undergo rigorous testing standards to ensure that only the highest quality, fully traceable, quality controlled oysters leave their premises.

The quality of the oysters and their sustainability credentials are independently certified by the following two schemes:

- **Ecopact Certification** Ecopact is an Environmental Code of Practice for Irish aquaculture companies and traders. The company participates in the EcoPact Programme, ensuring the oysters are produced in an environmentally sustainable manner. As a part of EcoPact, The Company Waterford Oysters have implemented an Environmental Management Programme, which covers waste management, nature conservation and visual impact.

- **Origin Green** Origin Green is Ireland's food and drink sustainability programme. It unites government, the private sector, and food producers through Bord Bia, the Irish food board. The Company Waterford Oysters has committed to six sustainability targets under the Origin Green Charter and have had their sustainability plans independently verified by international auditors, SGS. Their progress is reviewed annually to ensure they are making progress to reach their

	sustainability goals. These include the sustainable farming of oysters – 100% of oysters supplied to be grown by farmers with EcoPact Certification, continued reductions in energy usage, packaging, water use and waste to landfill and further developing their engagement with the local community.
Activities	The oyster farmers produce their oysters in Dungarvan Bay using the bags and trestle method and supply the sales and marketing company, Waterford Oysters. The company grades the oysters in a central production facility and when ready for sale they purify them in a state of the art purification facility before packing them for market
Resources Required	The company receives its product from local oyster farmers produced on a number of individual aquaculture sites in /Dungarvan Bay. It also as a central production facility, tractors, and equipment. The company directly employs three staff to oversee the company's operations.
Market Information	The company sells the bulk of its products to the French market, some to Italy and of late is targeting the Asian market. They supply oysters of all sizes depending on season and availability: No.0 150 gm+ No.1 115-150 gm No.2 90- 115 gm No.3 70-90 gm

	No.4 50-70 gm
Growth Potential	The company wishes to increase its production capacity. This is dependent on oyster farmers obtaining licenses for additional aquaculture sites in Dún Garbhán Bay, improving their husbandry methods and thereby reducing morbidity rates, and producing higher value 'Speciale' oysters,and also by improving efficiencies at its production facility.

Chapter 6: Cooperativa Formosa (Portuguese Region)

Business Model Type	**Cooperative**
Trading Name	Cooperativa de Viveiristas da Ria Formosa CRL
Address **Region**	Olhão, Portugal

Introduction	Cooperativa Formosa is headquartered in Olhão, Portugal and processes clams, oysters and cockles for its members, with the aim of achieving a fair market price for both the producer and the seller. Since opening, the Purification Centre has had a substantial impact on the sale price for new members.
How it was established	The Formosa–Cooperative was formed in 1998 by a group of aquaculturists. A Purification Center was opened in 2014.
Activities	The Coooperative has nurseries where clams are produced. They buy and sell bivalves from aquaculturists and then clean and package the bivalves for sale nationwide. The purification Centre also performs the Purification Service for any customer who wants to bring their own bivalves to facilitate compliance with

	the standards required by law. There are also some retail buyers who buy bivalves from third parties and who are required by law to use this service, which in this case is provided by the Purification Centre
Business Challenges	The biggest challenges are related to stocks and their maintenance. It is necessary to carry out a careful management of the bivalve stocks inside the purification tanks. For this, the demand for products needs to be anticipated in order to have available for sale the right amount of purified bivalves, in healthy condition at the right time. Algae blooms and increased biotoxins cause major disruption to the business. This type of event can happen very suddenly, and can often call into question stocks that are already purified, and in the process of being delivered to customers, and this can create very large constraints in the bivalve sales chain. The lack of proper transport for distribution is also a constraint. We hired a transport company (TPO) to deliver most of our products to our customers. Another setback of our business is the lack of availability of good clam seed. There is a lack of good clam nurseries in Portugal. Only seed captured in the natural bank is available using an authorization granted by D.G.R.M in conjunction with I.P.M.A. This process is time consuming and impractical.
Resources Required	Nurseries and aquaculture members holding nursery licenses, Bivalves Mollusc Purification and Dispatch Center equipped with a purification system and packaging machines.

Key Partners	Our key partners include: • Members of the Formosa cooperative as aquaculturists and bivalve suppliers • Retailers who buy purified and packaged bivalves for the supply of restaurants and supermarkets • Aquaculture members who use the purification services at our Centre
Market Information	Our key markets include Catering Outlets which we reach through distributors, and retailers which are services mainly by Supermarkets. Marketing activity is limited to local gastronomic festivals.
Revenue Streams	Retailers (selling throughout the country, restaurants and supermarkets), direct sales to consumers, provision of purification services to aqua-culturists with their own distribution and sale to restaurants.
Cost Structure & Investment Required	There is an average monthly cost of approximately € 10,000.00 which includes personnel costs, rent, energy and packaging materials. There is an average monthly cost of €20,000 for live stock and to keep the machine running. At busier times the cost can be significantly higher.
Growth Potential	The production / sale of high quality clams is the major part of our income. However, with consecutive episodes of mortality in this species, there has been less availability of good quality clams on the market, leading to an increase in their first sale price. This means that despite the current health crisis, we do not have a very significant annual break. In view of possible improvements in the country's health crisis, the business shows signs of clear growth.

Chapter 7: Green Aqua Vagos (Portuguese Region)

Business Model Type	**Limited Company**
Region	Aveiro Region (Portugal)

Trading Name	Green Aqua Vagos
Key Contact	Rui Pereira
Website	www.greenaqua.pt

Introduction	Located in Vagos (Aveiro region) with the aim of producing Fucus for biorefinery (mainly for extraction of pigments and polysaccharides)
How it was established	It was established based on a partnership of two companies (Green Aqua with A4F, Algae for Future SA), supported by P2020 funds
Activities	Production, Processing and Sales, Research, Innovation. However, project is still in the implementation phase. **Value Preposition** Become the main producer of this specie in the EU and valorise its biomass through the biorefining concept.
Business Challenges	At this stages, main challenge is the development of techniques for Fucus cultivation in large scale.
Resources Required	Aquaculture site / buildings, machinery, transport.
Key Partners	Key partners include: • A4F as technology provider and for project implementation, research entities (mainly for the biorefining aspects)

	• Captágua as landowner,
Revenue Streams	To be determined but likely direct sale to distributor
Cost Structure & Investment Required	Main source of investment are the P2020 funds and own funds,-for a total of ca. 2 000 000 eur

Chapter 8: Atlantik Fish, Pescado de Mar, Lda. (Portuguese Region)

Business Model Type	**Limited Company**
Trading Name	Atlantik Fish, Pescado de Mar, Lda.
Key Contact	André Lima Cabrita
Website	www.atlantikfish.com

Introduction	• Atlantik fish is located on old saltpans in Algarve region, which were adapted to produce fish on low densities (up to 3 Kg/m2 at harvest) and maintain the natural conditions in which the fish live in costal lagoons and estuaries; • The water in the ponds is renovated using only the tides, so that we have high water renovation and simulates the natural habitat for the fish; • The water is very rich in natural food like shrimps, algae, crabs and polychaeta, that enters with the water and grows on the ponds, allowing the fish to feed on natural food, as they do in the wild; • We monitor regularly the biological and chemical indicators in the water; • The packing unit is HACCP certified to guaranty the quality and freshness of our products.

	• The Atlantik Fish sea bream and sea bass are an aquaculture fish of superior quality, with a look and taste similar to wild fish, due to the production system and to the natural food they eat during their growing; • The low density of fish allows them to swim and rest freely in the ponds, like the wild fish, which grants the fish the right meat consistency and correct and even distribution of fat in the body and tissues; • The Atlantik Fish Sea bream has a light silver color, a clear gold strip between the eyes and a red area under the eyes, like the wild sea breams. These distinctive marks appear naturally because of the natural food and the low fish density.
How it was established	We bought this installation in 2008 and it was already a fish farm, that was adapted from a shrimp farm. So, the conditions were not ideal, and the farm was old and not well maintained. We rebuild the entire farm. The seawater is now renovated with the tides, saving energy and water oxygenation, reducing the growing time and improving the fish quality.
Value Proposition	The Atlantik Fish sea bream and sea bass are an aquaculture fish of superior quality, with a look and taste similar to wild fish, due to the production system and to the natural food they eat during their growing period.

Activities	Growing of Sea Bass and Sea Bream
Business Challenges	Reduce the production costs and improve the fish quality. We moved around 1.000.000 m3 of earth to rebuild the ponds, build all new tunnels for the water circulation, new feeding platforms, etc. The results have been successful and the market recognizes and pays for the fish quality.
Resources Required	Land, Machines, Oxygen, Feed, Staff, Energy and Juveniles.
Key Partners	Clients and Employees.
Revenue Streams	Sales to distributors, mainly to traditional markets
Cost Structure & Investment Required	Staff cost: 127.898,80 General Expenses 232.675,55 Cost of goods sold: 1.135.885,72 Depreciation: 203.917,99 Financial Cost: 8.139,98.
Growth Potential	We have 3 pond that we plan to adapt from oysters to fish production and there are some expansion area.

Chapter 9: Developing the Aquaculture Sector

As outlined in previous chapters, there are a multiplicity of business models that are applicable to the aquaculture sector. All have their advantages and constraints, and none are uniquely applicable to the aquaculture sector exclusively. In the previous chapters a number of different business models were profiled, and a roadmap given for the development of business model. This chapter gathers some key learning from the research and analysis carried out by the Access2Sea Project Partners as part of Action Three – Work Package Six

- It is of paramount importance for producers that a competitive, sustainable route to market is available. Access to this route to market or its competitiveness market may change over time. For example, currently the "just-in-time" land bridge-model for shipping fresh seafood produce from Ireland, which has worked well for many years, is now seriously threatened by Brexit. Another example is direct sales (see reference to producer-driven models in Chapter One). This can be described as an inversion of the value pyramid. The producer can sell less quantity for more per unit. As a result, this makes the producer less dependent on high volume low value selling less.

- Public investment is required to ensure an enabling environment for business to commence and thrive. This includes the provision of physical infrastructure e.g., port facilities and transport links

- "Incubator" and "Accelerator programmes for the aquaculture sector would be helpful in supporting the business development capacities of aquaculture entrepreneurs

- Encourage the evolution of aquaculture specific financial instruments that recognises risk and timetables associated with the sector. This may include elements of grant aid and

social finance until the business demonstrates its capacity to engage with the normal finance providers

- Enable the availability and use of technology to enhance production techniques, improve quality, capture market opportunities, assist innovation, and minimise the administrative and regulatory burden

- Maximise the connections with R&D facilities locally, nationally and internationally to ensure access to e.g., cutting-edge technology and emerging consumer trends

- Support the development of culturally sensitive business models that maximise horizontal and vertical integration in the value chain where appropriate The West of Ireland has been shown to be an exhibit of underdevelopment as [O'Boyle 2020]. A fisheries example was employed by O'Boyle, one which is instructive for the aquaculture sector: the infrastructure for fishing in Ireland is centred around Donegal and Cork and landings have decreased in the West in recent decades as a result. Aquaculture is missing a hub in the West. **Reference:** O'Boyle, M. Spatial Planning from a Local Perspective "New Opportunities for Seafood Producers," September 21, 2020 (Mayo Ideas Week 2020)

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