

“Piloting of eco-innovative fishery supply–chains to market added–value Adriatic fish products”

Priority Axis: Blue innovation

1.1 - Enhance the framework conditions for innovation in the relevant sectors of the blue economy within the cooperation area

D5.3.1 – Eco-innovative value chains design recommendations

WP5: BUILDING UP VALUE CHAIN AND MARKETING OF ADRIATIC ECO-INNOVATIVE FISHERY PRODUCTS / A5.3 DESIGNING ECO-INNOVATIVE VALUE CHAINS

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TABLE OF CONTENTS

1	INTRODUCTION	3
2	SCOPE OF THE STUDY	4
3	THEORETICAL FRAMEWORK AND METHODOLOGY	7
3.1	BUSINESS MODELS AND BUSINESS MODEL CANVAS	7
3.2	METHODOLOGY	12
4	BUSINESS MODELS CANVAS DESIGN.....	14
4.1	BUSINESS MODEL CANVAS FOR SARDINE FILLETS.....	14
4.2	BUSINESS MODEL CANVAS FOR CLAMS	36
4.3	BUSINESS MODEL CANVAS FOR FISH-BURGERS.....	51
4.4	BUSINESS MODEL CANVAS FOR E-COMMERCE OF LOCAL SEAFOOD PRODUCTS	68
4.4.1	<i>Business Model Canvas from Pilot Action – P.P. Assam</i>	85
4.4.2	<i>Business Model Canvas from pilot action – P.P. OP Bivalvia</i>	87

1 INTRODUCTION

This deliverable is intended to draw recommendation about the design of eco-innovative value-chains for the fresh fish market. What follows in the next chapters is intended to be implemented by Producers Organizations (or co-operatives) involved in fisheries and processing but could also be used by companies of other legal forms (or supply chain stage) after specific adaptations.

Through an iterative process undergone along the whole Prizefish project, some eco-innovations have been identified as particularly capable of adding more value to the supply chain while respecting the environmental ecosystem, opening in this way the road to new valorization paths for local species and resources. Those eco-innovative value chains have been evaluated and selected basing on the inputs provided by the WP3, the WP4 and on the results of the activities already carried out within the WP5 (Supply chain report, Consumer analysis report).

The selected eco-innovations took the final form of four items: three eco-innovative fishery products and the concept of an e-commerce capable to distribute fresh local fish.

The three eco-innovative products have been already subjected to a qualitative analysis made basing on an online panel and to a quantitative analysis made with a CAWI survey, returning promising results. In addition, a prototypical sample of the products have been subjected to the public of a fisheries related public fair occurred in Poreč, Croatia, during 2019.

2 SCOPE OF THE STUDY

Here follows a short description of the four items considered in the study conducted:

Item 1 (product concept 1): *Sardine fillets*. Presented on trays with transparent film of 200g each (2-3 portions). Protected by an innovative Modified Atmosphere Packaging (MAP) which consists in the reduction of Oxygen level in the packaging and its consequent substitution with Argon or NO₂. By reducing oxidation reactions and microbiological spoilage, it can be conserved 4 days more than the conventional packaging systems (up to 12 days) without any loss on organoleptic characteristics or food safety. The key innovative element of the product is the long-lasting aspect, along with the convenience (no cooking skills needed for the cleaning operations).

Item 2 (product concept 1): *Clams*. Presented on trays with transparent film of 500g each (2-3 portions), this product concept is processed with a High Hydrostatic Pressure (HHP). If correctly conserved within 1° and 4°C, their shelf-life is extended from about 6 days of a conventional product, up to 2-3 weeks (at least +100%), with stable quality characteristics. The key innovative element of this product is the long-lasting aspect while still being a fresh product.

Item 3 (product concept 3): *Fish-burgers*. Presented on trays with transparent film of 500g each (2-3 portions), this product concept is processed with a High Hydrostatic Pressure (HHP). Thanks to the conservation technologies applied which keeps the temperature between 1 and 4 °C, the shelf-life is extended from about 5 days of a conventional product up to 30 days, with stable quality characteristics (i.e., microbiological aspects, color, etc.). The key elements of this product are the product innovation (possible to eat it raw and mixed combinations of ingredients, e.g., mullet-crustaceans burger) and the long-lasting aspect.

Item 4: *E-commerce of local products of the sea* (finfish, mollusks, crustaceans...), directly delivered at home or in click&collect points. The central aim is to shorten the supply chain by admitting local fishermen to directly sell their products on the e-market, avoiding the long chain of intermediaries that is normally involved in this business.

As far as the latter item is concerned, i.e. the fish e-commerce, the Prizefish project made a further step, actively supporting the operations of two project-partners interested in the implementation of very different pilot projects, representing different interests and implementations. Those partners are ASSAM (Agenzia Servizi Settore Agroalimentare Marche) and the PO Bivalvia.

a) ASSAM pilot action

Being Assam a public regional body having the role of connector between the producers' world and the scientific research, the principal aim of the Pilot enhanced by Assam is to analyze the

changing market for seafood delivery, identifying the new opportunities presented by platforms and apps in the reaching for new markets and customers. Special attention has been posed on new markets and customers that recognize the added value proposed by artisanal fisheries, who act within a framework of sustainable fishing and socially fair practices.

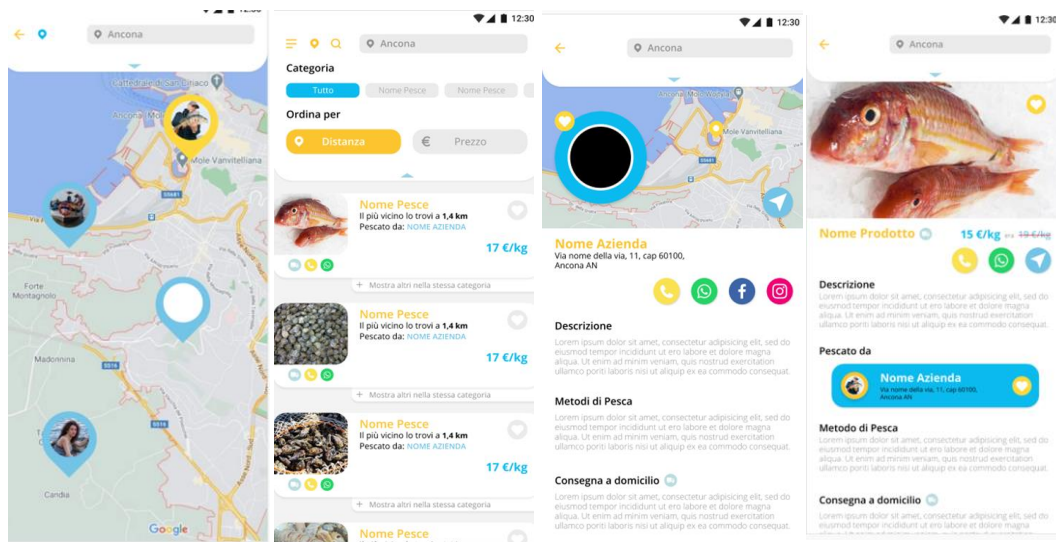
Actively, the Assam pilot includes a customized mobile application that consents direct marketing to end consumers, developed by an external contractor, *Ubisive srl*.

Subjects included in this project are cooperatives/consortium of fishermen, selected by best offers received after the *Expression of interest* called by Assam. The best offers have been sent by *CO.GE.PA. (Consortio di indirizzo, coordinamento e gestione tra imprese della Piccola Pesca artigianale, operating in the Southern Marche)* and by the *Producers Organization of fisheries producers of Fano, Marotta and Senigallia (operating in the north of Marche)*.

Those selected producers' aggregations will receive support in the testing phase. They will also get help with the back-end operations, data collection and the general support on the app distribution and promotion.

The App itself, after selecting the user's location, allows to scroll between all the available fishermen companies (with corresponding information on company description, fishing methods and home delivery characteristics) and their daily available products.

Figure 1 Actual screenshots from the App



b) PO BIVALVIA pilot action

Bivalvia is a Producer Organization. It produces a relevant share of the Italian landings of Clams. Its pilot project is thereby moved by the necessity to find new markets and consumers for their own product's overproduction. This need became particularly urgent during the hard lockdowns and the movement personal restrictions occurred since the pandemic's start. Before the lockdown in fact, the main part of the production sold under the brand "iPescaOri" was destined to the B2B and the Ho.Re.Ca. sectors. The forced closure of the lockdown made the request from this category dramatically collapse.

The social sale's platform has been thereby specifically created for the final consumers, but due to the social's success and the convenience of the delivery method many businesses from the Ho.Re.Ca. sector started to make fishery orders within this commercial channel instead of the one they used.

It is currently appreciated even by restaurants. Starting from an operative range of 50 Km, upon insistent requests by customers it has been pushed to 200 Km.

Consumers can freely access the e-commerce platform through the website <https://delivery.ipescaori.it/>, and can also directly contact the producer for information through social media channel such as the Facebook page or the Instagram account.

During this experience, Bivalvia decided to buy a cooled van in order to implement an own direct delivery system. Home deliveries request a minimum order of 50€ and can be paid through credit card or bank transfer.

3 THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 BUSINESS MODELS AND BUSINESS MODEL CANVAS

The theoretical framework chosen to describe the eco-innovative value-chains is the Business model Canvas. In order to introduce it, a further general explanation of business models is due.

An enterprise's business model is the description of the core logic for creating value or, in other words, the description of the enterprise's mechanism to earn money¹. In this sense, describing a business model is a good proxy to describe the underlying value-chain.

The scientific community proposed several definitions of business model over the years, whose least common ground can be identified in *the fundamentals of creation and value capture by the organization*². One of the most complete and appreciated definitions on the other side is the one from Osterwalder, the creator of the Business Model Canvas:

A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams.³

During the last years, business model research gained a major attention in the entrepreneurial world. A business model can in fact be a very versatile and effective tool to answer at five different categories of functions, namely: understanding & sharing, analyzing, managing, prospects and patenting.⁴

According to Osterwalder, who recalls a similar nomenclature from Linder and Cantrell (2000), business models are distinguishable into three categories: Abstract BMs Concepts (generic models of elements, components and relationships), Operating BMs (already implemented and existing) and Scenario BMs (which encompass virtual business models, not already existing).

1 Changing Business Models: Surveying the Landscape, Jane Linder & Susan Cantrell, 2000

2 Innovation and Business Model: a case study about integration of Innovation Funnel and Business Model Canvas. F.Bonazzi, M.Zilber, Revista brasileira de Gestão de Negócios, vol. 16, núm. 53, 2014

3 The business model ontology: a proposition in a design science approach, Alexander Osterwalder, Phd thesis, Universite de Lausanne, 2004

4 The business model ontology: a proposition in a design science approach, Alexander Osterwalder, Phd thesis, Universite de Lausanne, 2004

The Business Model Canvas is a business design template firstly proposed by Alexander Osterwalder in 2004⁵. It's a very versatile tool as it can be used by enterprises independently from their dimension or core business. As stated by Tjitradi (2015)⁶, the BM Canvas is a *business model that can be used as the evaluation and design of a new business model that is better and more modern for the ongoing effort in the future*. Moreover, Boedianto and Harjati (2015) highlighted that *BMC can be used as an approach for creating business development strategies*.

For those reasons we think that the Canvas framework is the most adapt for the current purpose of describing the business opportunities potentially opened by the deployment of the new eco-innovative fish products.

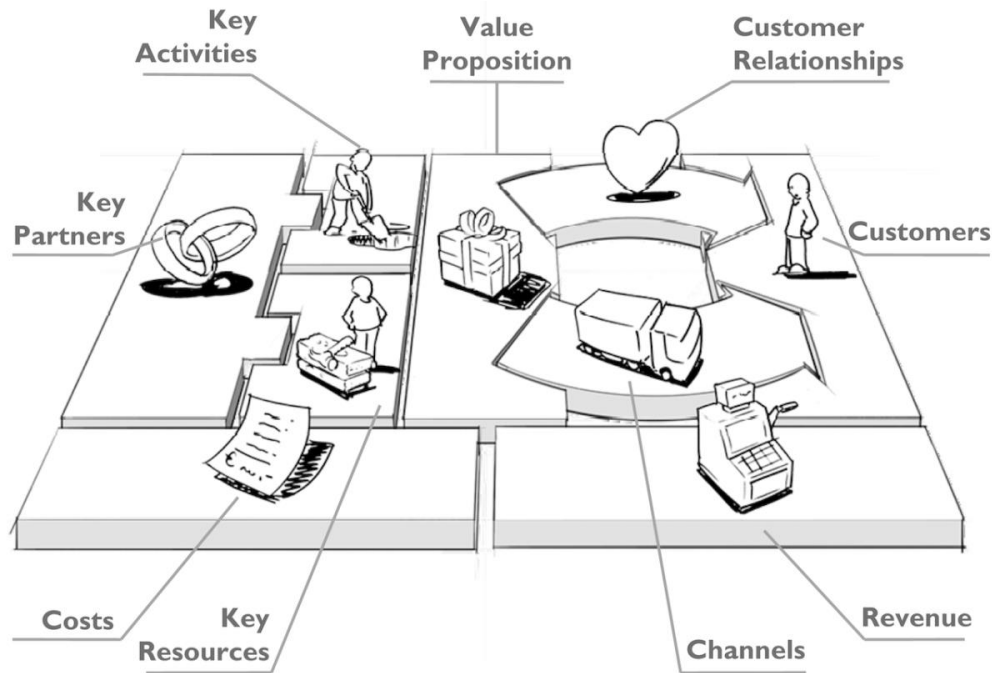
The main point of this design concept is the ability to distinguish, visualize and analyze the relationship that the business owners share and farms with their partners and their customers.

The graphic representation of those relations is rendered through the identification of nine blocks, related to each other by different kind of linkages.

5 The business model ontology: a proposition in a design science approach, Alexander Osterwalder, Phd thesis, Universite de Lausanne, 2004

6 Tjitradi, Elizabeth Cindy. 2015. Evaluation and Design of Business is based on the Business Model Business Model. Journal of the University of Petra. Surabaya

Figure 2 Business Model Canvas representation, extracted from *Business Model Generation*, Osterwalder&Pigneur, Pag.18-19



Those blocks are hereunder described:

- Customer Segments.** Considered the hearth of the business model. It's a description of the customer segments that the enterprise aims to serve. A correct segmentation should delimit all the people or organizations that share common needs, behavior and/or other attributes. Possible market segmentation's analysis outputs include Mass Market (when there are no relevant distinctions between customers), Niche Market (very specific and specialized customer segments), Segmented (one or more slightly different customer segments, each treated following their respective particular needs), Diversified (when the firm serves two or more unrelated customer segments) or Multi-sided Platform (it's the case of enterprises whose business model requires to serve and link the needs of two different customer segments). This block answers the questions: For whom are we creating value? Who are our most important customers?⁷

⁷ Alexander Osterwalder & Yves Pigneur, *Business Model Generation*, John Wiley & Sons publisher, 2010

- **Value Proposition.** This block describes what are the products and services that create value for the consumers. In other words, it tells what's the need or the problem of the customer that the enterprise can solve. The concept of value proposition (and, generically speaking, of value itself) can be intended extensively. Value can in fact be perceived by the customers in a qualitative or in a quantitative way, it can be disruptive and innovative or similar to competitors. Different examples of perceived value include Newness (often technology-related), Performance, Customization, Design, Branding/Status, Price (it satisfies price-sensitive customer segments), Risk Reduction or Convenience/Usability (the fact of making something more convenient and easier to use for the consumer).
This block answers the questions: What value do we deliver to the customer? Which consumer needs are we satisfying?
- **Channels.** Describes the company interface with consumers, the communication techniques implemented in order to reach the customers and deliver the value proposition. The choice of the correct channel (or the mix of channels) should be carried out choosing a medium that helps consumers to evaluate the value proposition, to easily buy product and services from the firm and to be followed with a post-purchase assistance if needed. Channels can be direct (company owned) such as own stores, web sales or sales force or indirect (partner channels) like could be wholesale distribution retail or partner-owned web platforms. Partner channels usually brings lower profit margins but have the positive effect to enlarge the potential market.
This block answers the questions: Through which Channels do our customers want to be reached? How are we reaching them? Are our channels integrated?
- **Customer Relationship.** Clarifies the nature of the relationship established with specific customer segments. The kind of relationship is generally guided by three main motivations: the customer acquisition, the customer retention or boosting the sales (upselling).
The Customer Relationship can range from personal to automated, touching several possible categories such as: Personal assistance (human-interaction based, can be carried out through call center, e-mail, at the point of sale or other methods), Self-service (no direct help involved but the customers are given all the means necessary to help themselves) or Co-creation (the value is co-created by the firm and the customers, i.e. the Amazon feedback-review system).
Questions answered by this block are: What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have been established? How costly are they?

- **Revenue Stream.** This block presents the revenues that are generated by the customer segments. The correct identification and separation of the revenue streams is staple in order to correctly manage each pricing mechanism.

Revenue streams can be generated by different ways, some of them are: Asset sale (usually physical products or services), Usage fees (i.e. telecom operators requiring payments for phone calling), Subscription fees (the sale of a service's access), Lending/Renting/Leasing or Licensing (the transfer of the right to use protected intellectual property).

It answers the questions: for what value are our customers really willing to pay? For what do they currently pay?

- **Key Resources.** Encloses all the assets and the resources the company needs in order to run the business model and create the Value Proposition. Different business models require different key resources. Those have to be intended as physical (facilities, buildings, machines, point-of-sale...), financial (lines of credit, cash, stock option pools...), intellectual (brands, knowledge, patents, copyright, customer database...) or human (highly important in knowledge-intensive and creative industries).

This block answers the question: What key resources do our value propositions, distribution channels, customer relationships and revenue streams require?

- **Key Activities.** Encompasses all the most important activities the company need to do in order to operate successfully and greatly vary depending on the kind of business model the firm is following.

Key activities can be divided into three main areas: Production (the most important in manufacturing firms), Problem solving (the search for new solutions for customer's problems, i.e. consultancies or hospitals) and Platform/network (platform management, service provisioning and platform promotion).

This section answers the question: What key activities do our value proposition, distribution channel, customer relationships and revenue stream require?

- **Key Partnership.** This block describes the suppliers' network and highlights other relevant partners that make the business model work.

The reasons standing behind the need of partnership are three: The search for economy of scale (optimization in resource allocation, cost reduction), the reduction of risk and uncertainty (strategic alliances could mitigate highly competitive markets) or the acquisition of particular resources or activities (such as could be i.e. patents).

Moreover, Osterwalder identifies four potential kinds of partnerships: Strategic alliances between non-competitors, Coopetition (strategic partnership with competitors), Joint-ventures and buyer-supplier relationships (to encourage stable supplies).

This block answers the questions: Who are our key partners? Who are the key suppliers? Which key activity do partners perform?

- **Cost Structure.** Is a description of the most important costs the company sustains while operating the business model. There are two possible business model cost structures: Cost Driven and Value-Driven. The cost driven business models aims at the minimization of costs wherever possible, involving maximum automation and extensive outsourcing. The Value Driven business model is more focused on value creation than on costs implication.

This part answer to the question: What are the most important costs inherent in our business model?

This representation template allows to specifically describe the three main dimensions of the business model definition previously quoted: the creation of value (key partners, key activities, key resources), the delivery of value (channels, customer segment, customer relationship) and the capture of value (cost structure, revenue structure)⁸. Moreover, the business model Canvas admits to explicit the relationships existing between the internal and external components of the organization.

3.2 METHODOLOGY

The main operative point in the BM Canvas construction is to obtain accurate information relative to the business model idea to fill the template's blocks.

In this deliverable, the greatest share of information comes from the deliverables previously published within the Prizefish project, collected, merged when necessary and piled into the correct block, and from further elaborations.

For each Canvas compiled, a full explanation has been written on the following pages in order to furtherly understand the matter.

The following exhaustive list includes all the deliverable from which info have been token:

- D3.1.1: Report of the mapped fisheries in Italy
- D3.1.2: Report of the mapped fisheries in Croatia
- D3.2.1: Report on Consultation Meeting with relevant fishing operators in Italy

⁸ *Innovation and Business Model: a case study about integration of Innovation Funnel and Business Model Canvas.* F.Bonazzi, M.Zilber, Rivista brasileira de Revista Brasileira de Gestão de Negócios, vol. 16, núm. 53, 2014

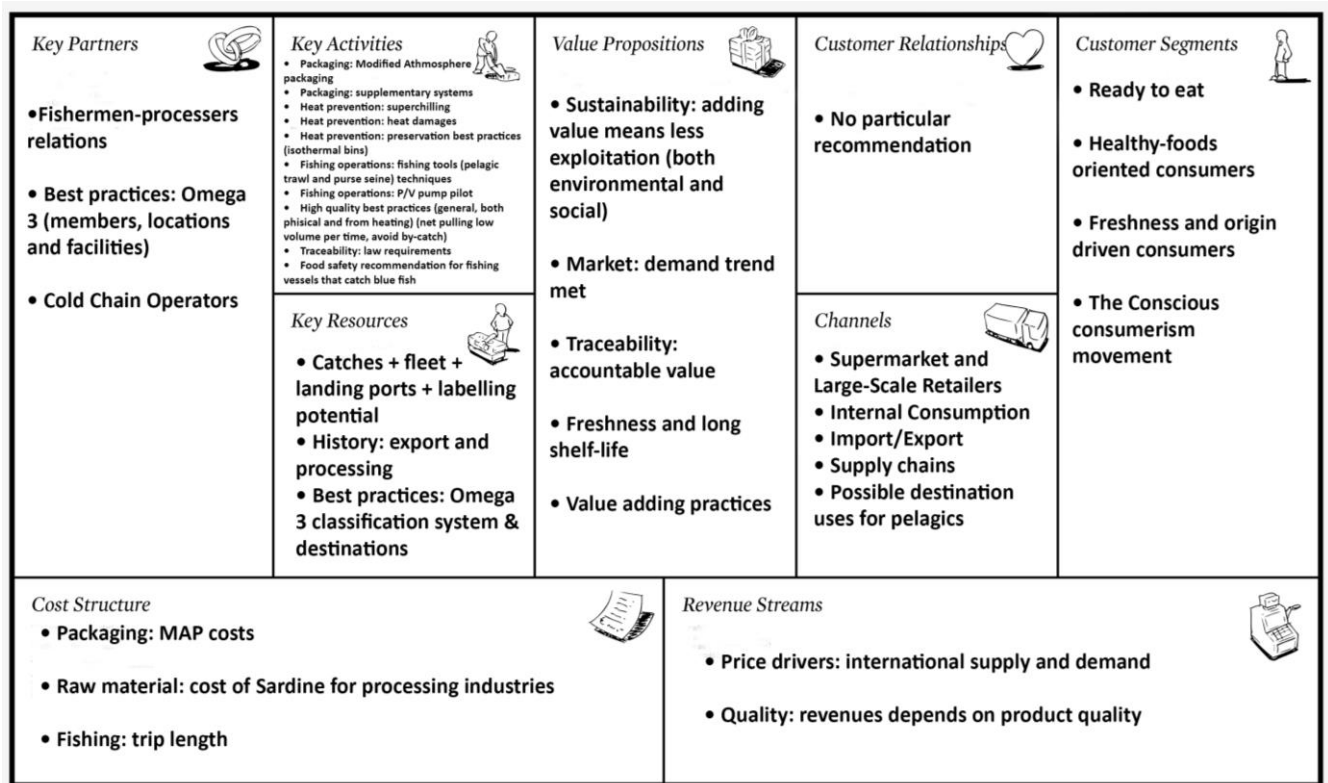
- D3.2.2: Report on Consultation Meeting with relevant fishing operators in Croatia
- D3.2.3: Sustainability guidelines ARFM
- D4.1.1: Report on the present production status of target species and related processing industry
- D4.1.2: Report of the possible innovative harvesting and processing solutions for product value adding and market niche
- D4.2.1: Brochure of product lines
- D4.2.2: Guidelines/Technical papers of solutions for innovative production solutions
- D4.4.2: Certification scheme for new innovative products and process
- D5.1.1: Supply chain report
- D5.1.2: best practice guide
- Mapping of the existing initiative, models of seafood products e-commerce and home delivery and possible evolution. Prizefish WP5 (December Draft).

Regarding the fourth item, the e-commerce of fresh fisheries products, a precise attention has been accorded to the activities of two project partners (ASSAM and OP Bivalvia). Those PPs are already trying to implement this instrument in different ways and have thereby to be elevated as particularly relevant case studies. For this purpose, a dedicated Canvas has been drawn for each pilot action just after the Canvas for the Item 4. The information needed in order to compile their Canvases has been collected through written or online interviews conducted with the project managers of the partners.

4 BUSINESS MODELS CANVAS DESIGN

4.1 BUSINESS MODEL CANVAS FOR SARDINE FILLETS

Figure 3 Business Model Canvas for SARDINE FILLETS



KEY PARTNERS	<ul style="list-style-type: none"> • Fishermen-processers relations • Best practices: Omega 3 (members, locations and facilities) • Cold Chain Operators
KEY ACTIVITIES	<ul style="list-style-type: none"> • Packaging: Modified Atmosphere packaging • Packaging: supplementary systems • Heat prevention: superchilling • Heat prevention: heat damages • Heat prevention: preservation best practices (isothermal bins) • Fishing operations: fishing tools (pelagic trawl and purse seine) techniques • Fishing operations: P/V pump pilot • High quality best practices (general, both physical and from heating) (net pulling low volume per time, avoid by-catch) • Traceability: law requirements • Food safety recommendation for fishing vessels that catch blue fish
KEY RESOURCES	<ul style="list-style-type: none"> • Catches + fleet + landing ports + labelling potential • History: export and processing • Best practices: Omega 3 classification system & destinations
VALUE PROPOSITION	<ul style="list-style-type: none"> • Sustainability: adding value means less exploitation (both environmental and social) • Market: demand trend met • Traceability: accountable value • Freshness and long shelf-life • Value adding practices
CUSTOMER RELATIONSHIP	<ul style="list-style-type: none"> • No particular recommendation
CHANNELS	<ul style="list-style-type: none"> • Supermarket and Large-Scale Retailers • Internal Consumption • Import/Export • Supply chains • Possible destination uses for pelagics

CUSTOMER SEGMENT	<ul style="list-style-type: none"> • Ready to eat • Healthy-foods oriented consumers • Freshness and origin driven consumers • The Conscious consumerism movement
COST STRUCTURE	<ul style="list-style-type: none"> • Packaging: MAP costs • Raw material: cost of Sardine for processing industries • Fishing: trip length
REVENUE STREAMS	<ul style="list-style-type: none"> • Price drivers: international supply and demand • Quality: revenues depends on product quality

KEY PARTNERS:

Fishermen-processors relations

The main subjects inside the small pelagic fish supply chain are fishermen, processors, foreign wholesalers and supermarket chains. Their mutual relationship may vary depending on the specific case.

For what concerns cooperatives, the rapport between management and members-fishermen is regulated by co-operative rules that define fish quality, fishing techniques, inspections, pricing and profits distribution. The rules are accepted as a new member joins the cooperative.

In the case instead of self-employed fishermen, the cooperation with processors is generally weak, without cooperation contracts and based on verbal agreements. Commonly the conditions are discussed once or twice a year, and explicit prices, required quality and ways of delivery. Self-employed fishermen are generally reluctant to sign binding contracts because if sudden opportunities arise, they want to be able to sell the product to the higher paying buyer.

Best practices: Omega 3 (members, location and facilities)

One of the most important partners in the MAP Sardine development is the fish supplying network. This specific case involves the Croatian Omega 3 fishery cooperative.

Omega 3 was founded in 2008 in Kali, on the island of Ugljan in the Zadar county. Its main fishing target is composed by small pelagics, accounting for a relevant share of the national production (namely 10% of volume for sardine and 6% by volume for anchovy). From 2015 it has been

recognized by the Croatian Ministry of Agriculture as the first producers organization in HR under the name “Fishing co-operative Omega 3 – the organization of producers” (skr. O3OP)⁹.

In June 2012 the cooperative built a production plant situated in the industrial zone Šopot, for further product processing. The new facility encompasses a refrigerated warehouse, with a storing capacity of 7.000t, and a freezing plant for fresh fish. This latter machinery is equipped with the new IQF (Individually Quick Frozen) technology, which allows to individually freeze 5 tons of product per hour, reaching a temperature of -18 degrees measured along the fish bone¹⁰.

Up to now, counting all the operative sectors, the cooperative employs 88 workers, 16 of which are members-fishermen, owning a fleet of 21 trawl ships.

Cold Chain operators

Another central point in the Sardine MAP production is the absolute need to rely on an effective cold chain management system, which should be implemented by partners of maximum trust.

One of the most significant progress made by Omega3 in the small pelagic fish supply chain is the establishment of a well-connected SHIP-TO-FACTORY cold chain. The majority of the catching fleet is equipped with technological apparatus (like on-board ice machines) capable of preserving catches quality until the landing site. If some boats are not able to produce ice for themselves, the processor provides it.

From this place to the factory, the transportation is fulfilled with refrigerated trucks. The choice of having an internal logistic service or a third-party one can be made evaluating the costs, the benefits and the indirect effects of a potential low-quality service (i.e. in terms of branding and consumers trust).

KEY ACTIVITIES:

Packaging: Modified Atmosphere Packaging

Packaging is one of the most important activities in the Sardine MAP production. The Modified Atmosphere Packaging is an increasingly popular dynamic canning system that brought major

⁹ Deliverable 5.1.2 pag.42

¹⁰ Deliverable 4.1.1 pag.11

changes in storage, distribution and marketing of raw and processed foods and that can be implemented in small unit packs. The general assumption is to modify the original packaging atmosphere (normal air) in order to reduce the O₂ content (from 21% to 3%) and increase the CO₂ and/or the N₂ content. Some novel gases, as Argon (Ar) or Nitrous oxide (N₂O) have been approved for food use by the European Union but as in the case of the latter have not been already use for fish-packaging. The main aim of this technique is to slow down breathing and biochemical processes having place in the food that reduce the shelf life, such as respiration, transpiration (loss of moisture), ethylene development, oxidative reactions and the growth of microorganisms.

Being MAP a very versatile technique, different foods (and even species!) require different composition, on the base of variables like fat content or initial microbial load. Thereby, its specific gas composition should be evaluated and studied case by case.

In the market up to now there are mainly three kind of MAPs:

- Type I. Relatively oxygen-rich atmosphere: O₂ 16-11% CO₂ 5-10% N₂ 79%
- Type II. Oxygen-poor atmosphere: O₂ 2-3% CO₂ 2-5% N₂ 92%
- Type III. Low-oxygen atmosphere: O₂ 2-5% CO₂ 0-2% N₂ 97%

Previous reports of the Prizefish project already identified and signaled as recommended a mix of 40% carbon dioxide, 30% nitrogen and 30% oxygen (for white fish, shrimps, prawns and caps) and a mix of 60% carbon dioxide and 40% nitrogen for oily fish and smoked products¹¹.

MAPS system can be achieved by active or passive modification:

- in the passive method the atmosphere is generated and maintained by the packaging material's process of respiration
- in the active method the modified atmosphere is achieved by the combined action of the breathing process and the artificial addition of a gas mixture, plus the potential addition of additives that absorb or release O₂, CO₂, water vapor and other respiration products. This method is more expensive as it is carried out in chambers and requires large storage areas.

¹¹ Deliverable 4.1.2 pag.60-61

The main advantage of MAP, if confronted to traditional packaging, is the shelf-life improvement. Özogul et al.¹² experimentally proved that a mix of 60% CO₂ and 40% N₂, at 4°C, could improve the Sardine preservation up to 12 days, whereas ordinary atmosphere duration was only 3 days and vacuum packaging 9 days. His experiment considered several parameters, as histamine content, bacterial counts, total volatile nitrogen and trimethylamine concentration.

Within the Prizefish framework a pilot project already identified the technical requirements for a correct MAP of fisheries products, pointing as a solution the use of a quaternary gas mixer mod.KM100-4 (Witt-100 Gasetechnik, Witten, Germany) combined to a gas-flushing welding machine mod. Multiple 315 (Orved Srl, Venezia, Italy). The pilot project indicates how before the packaging the sardines need to be headed, gutted and filleted, before being put in polypropylene (PP) trays and sealed with a PP film that exclude any gas exchange with the exterior. The pilot also selected as demo company the *Economia del Mare di Casali Roberto* (Cesenatico, FC, Italy).

Packaging: supplementary systems

Recent technological steps introduced in the market a plethora of new packaging techniques that can be implemented along the Modified Atmosphere Packaging, such as:

- *Innovative packaging*: ice, cooling gel or dry ice in bags. Can also present an insulation layer usually made by Styrofoam.
- *Active packaging*: packagings that create special conditions within the box to extend the shelf life of the product. Active packages may have absorption system for undesirable substances such as oxygen, carbon dioxide, ethylene, excess water or other substances. They also can have a system for adding desirable substances such as carbon dioxide, antioxidants and preservatives.
- *Intelligent packaging*: packaging that provide information on the condition of packaged food and its quality during transport and storage. Information is given through mechanical, chemical or enzymatic processes and embrace important indicators of time and temperature, reducing the perceived food-risk for consumers. It is capable to signal, in an irreversible way, if the temperature has been higher than the target one for a selected timeframe (which is usually two hours).

¹² The effects of modified atmosphere packaging and vacuum packaging on chemical, sensory and microbiological changes of sardines (*Sardina pilchardus*), F. Özogul, A. Polat, Y. Özogul, Food Chemistry vol.85, March 2004

- *Packaging with antimicrobial properties*: Packaging equipped with microorganism reducing properties. Those systems could exploit organic acid supplement (benzoates, parabens, sorbates and propionates), enzyme supplement (lysozyme, nisin, glucose oxidase), fungicides and bacteriocins, natural spices (mint, oregano, cumin, clove) or other elements (silver, zeolite, antibiotics).

Heat prevention: Superchilling

An important activity for the fish quality preservation is the technique called *superchilling* or *partial freezing*. It consists in storing of the fisheries products at a temperature 2°C below the freezing temperature. Generally, it means between 0°C and -4°C, more commonly between -2°C and -2.2°C, but it really varies depending on the specific species and its salt and other solutes specific content.

If the temperature of the internal fluids of the fish drops to -2.8°C, the fish completely froze. A frozen fish can be stored up to 35 days, but the longer shelf-life is counterbalanced by larger ice crystals and the destruction of fish tissue after thawing.

The superchilling can instead extend the shelf-life by 15 to 30 days in the case of whitefish species, giving additional time to resellers without the quality cons of freezing. Moreover, it can be very useful for processors as it is easier to be processed (as in the case of filleting) and helps saving in logistics as no ice is needed for transport and storage. Superchilled products are in fact transported inside styrofoam boxes and ice is added only in case of longer transportation.

By technical point of view, there are two ways to achieve superchilling. The easier one is the cooling of the product without any previous treatment. The latter requires to start with the freezing of the fish surface, then the inner temperature is slowly equalized. If the equalization of the temperature is carried out incorrectly, large crystals form in the tissue and the overall fish quality is ruined.

Heat prevention: heat damages

A critical point in the pelagic quality preservation is the fish's temperature achieved after the catch.

The temperature in fact does directly affect the appearance of rigors, the process of muscle contraction which enable enzymatic activity and spoilage. In case of low temperature, the

contractions are milder, while at higher temperatures the muscle tissue could even separate in the fish fillet.

Experiments did prove that the first 60 minutes from the net pulling are characterized by a weak quality loss, after which it accelerates. A good practice should thereby be to load on board and cool the fish within 60 minutes from the net pulling. Long boarding operations should be avoided, if possible, in order to prevent significant quality loss.

After the fish is pulled out on the boat's deck, it is suitable of being "shocked". The shock procedure includes the killing of the fish inside an emulsion of water and ice, fact that interrupts catabolic processes (as i.e. anaerobic digestion processes) and grants a longer duration of the product in the retail.

Even the following phases are critical to the fish temperature. The cold chain has to be maintained onboard until the landing, possibly within a range comprehended between 0°C and -0.6°C. This can be achieved with the traditional system of the fishing cages or with the newer technique which involves thermally insulated containers which will be better explained later.

Heat prevention: preservation best practices (isothermal bins)

There are two possible ways to transport fish: isothermal bins or cassettes.

a) Cassettes

This technique implies the fish, after being caught, is grabbed into cassettes and stacked on the deck. After this, fish cassettes are covered with plastic wrap in order to protect the product from the direct light of the sun and from warm air before the landing. The unloading of the cassettes is carried out manually and almost 1 Kg of ice is added to each cassette before going into refrigerated cargo trucks directed to the processing plant.

Disadvantages in this method are the inability to maintain a constant temperature (despite eventual ice additions) and the requested greater fish manipulation, which leads to physical damage and accelerated spoilage.

b) Isothermal bins

With this method, the fish is directly transferred from the net to isothermal bins with a capacity of 700-800 liters each. Bins are prepared with a mixture of water and ice, mixed, closed and stocked at the unloading point where the next phase of the cold chain will be fulfilled on refrigerated cargo trucks directed to the processing plant.

The usage of isothermal bins presents favorable impacts on quality, if confronted to cassettes, but it's still used by a smaller number of vessels. Reasons have to be searched on the more invasive requirements it need to be implemented. In fact, this methodology do need more manipulative space on the deck and reduce the amount of disposable catches per vessel and requires additional investments for handling and unloading. In Croatia, only the larger vessels can implement this system of transport and maintenance of the cold chain.

Fishing operations: fishing tools (pelagic trawl and purse seine) techniques

The nowadays contemporary small pelagic fishing is carried out with surrounding networks (the *purseine*) and trawl nets (*pelagic trawler*). Regarding the Adriatic Sea, fishermen from the east coast use purseine vessels while since the '80s fishermen from the Italian side switched to pelagic trawler. The natural commercial target for purse seine fished pelagics is the processing market. Pelagic trawler fishermen instead primary look at fresh products market.

Purseine fishing is a complex activity. The fleet usually leaves the port in the afternoon: by summer at 16-17 p.m., while in the winter a little sooner, around 14-15p.m.

During the trip to the fishing area, sonar and echo sounders help finding fish groups and the vessel is anchored when a flock is identified. By night, fish are pushed to stay around the ship by the use of strong artificial lights (up to 16kW). Before the dawn, with the help of an auxiliary boat that maintains the light on, the main boat rapidly (in about 10 minutes), surround the flock with a net. When the net setting is completed, the steel rope passing through the rings at the lower end of the net is pulled onto the boat through the help of a hydraulic winch. After this, the net is slowly and gently pulled on the boat deck.

The small pelagics fishing is an activity subjected to many management measures, which include closed areas, restrictions in the use of fishing gears and minimum landing sizes. The vessel are requested to own a qualifying license explicitly expressing the type of gears that can be used.

The Croatian catches management is carried out using recorded fishery logbooks and vessels' catch reports.

Possibilities for improvement are recognizable in introduction of efficient methods for preservation of sea bed, “friendly” gears, reporting/monitoring system, and energy economizing. In particular, advances on technical measure/gear adjustment could also lead to better profitability reducing operative costs as well as to lower impact on fish by-catches.

Fishing operations: P/V pump pilot

As reported few pages above, the fish removal from the net is a critical operation as it can lead to physical damages. A full net can hold around 100-300+ Kg of pelagics, so that the fish on the bottom can be crushed. Actually the traditional transfer of fish from the net to ships or tanks, common in the Adriatic, is the most heavy bottleneck in small pelagic fish handling.

An innovative solution that admits to avoid this mechanical stress is the use of on-board Pressure/Vacuum pumps (from now on, P/V Pumps). The working principle consists in the creation of a vacuum in accumulation tanks of 500-1500 liters.

P/V Pumps operate sucking fish and water directly from the water through an underwater suction tube into a tank positioned on the boat. When the tank is filled, the fish-water mixture is pumped into another tank. The fish/water ration should be constantly monitored and the water should be separated from the fish as much as possible in order to maintain the cooling tanks' temperature.

Fish integrity is more protected by this method as its continuously transported in the water (with relatively gentleness) and there cannot be a large accumulation of product.

Disadvantages of this method include the oversized rigid components that need to be mounted on the vessel and the relative slowness of the operations due to the need change in pumping direction and pressure. Evidences (technical sketches and experimental units) proves that this latter problem can be avoided with the installation of two P/V tanks working alternately with the same pump.

Currently pump systems are already used worldwide in large industrial fishing, where the huge dimension of the boats also admits installing built-in fish tanks.

Adriatic purseine fleet requires the installation of smaller pumps, portable if possible, easier to install and operate. Synchronously an effective water discharge system is required. The Prizefish project already identified a pilot test for enhancing this method on smaller vessels'

fleet. An aquaculture pump with special adaptation has been proposed since in this industry similar systems have been enforced to select and transfer fish from one pool to another.

Moreover, it has been planned to use pumps without a vacuum tank in order to compact the instruments into smaller dimensions.

Pumps can also be used to speed up the unload operations. If the tanks are installed below the deck, pumps will unload it by pumping, always mixing the product with water.

High quality best practices (general, both physical and from heating) (net pulling low volume per time, avoid by-catch)

One of the main important catch quality facilitators is to work with fewer catches pulled in the nets, as an excessively large amount of fish trapped harden the fishing operations and the following shocking and quality preservation until the landing. Fish deterioration starts from the moment of the death and all the following aspects of fishing handling contributes and need attention.

A more variegated catch (including many species by-catch), will require additional work as the by-catch need to be sorted both for commercial purposes and administrative obligations (vessels are requested to record species by weight at the first sale). Most important by-catches by volume include Atlantic horse mackerel and Chub. In particular the presence of Horse mackerel in the catch damage the sardine and anchovy. Anchovy is particularly sensitive to skin damage caused by scales on the side of the mackerel.

The net pulling act has direct implications on fish quality. Main goal should be getting the fish out of the net as quickly as possible with the least possible damage. This includes evaluation about the catch density and the sack discharge rate. Innovative solutions can bring significant improvements in those phases by reducing the stress, the physical damage and the time required to carry out the operations. It is in fact advisable to avoid the physiological changes inducted by the stress.

In regard with this, the duration of the pull should not be too long, and large amounts should be avoided so that the fish caught do not cause damage, that the stress does not last too long and that the fish do not suffocate in the net.

As a matter of fact, physical stress and damage causes the release of enzymes from the digestive tract into muscle tissue, the release of enzymes from damaged cells into the surrounding tissue and open the way for microorganisms and oxidation processes to accelerate fish spoilage.

Some of the best practices recommended in the catching system to raise quality have been previously identified in the Prizefish reports include to choose a small volume to pull the net and to use a pump when removing fishes from the net.

Traceability: law requirements

As reported in the European Regulation (EC) no. 178/2002, the definition of "traceability" is the possibility of tracing food, feed, food-producing animals or substances intended for incorporation or expected to be incorporated into food or feed, through all stages of production, processing and distribution. Any business operating in this field must have information about the step before and the step after it, that is, about the person who supplied them and the person to whom they delivered their products.

Council Regulation (EC) n. 1224/2009 states that fishery products, with batches as unit, are requested to be traceable at all stages of distribution. This includes the insert of identification marks on cassettes or boxes during the transportation.

The minimum amount of information to be provided consists in identification number of each batch, identification number and name of the fishing vessel, FAO three-letter code for each species, date of the catch, quantity of each species (in kilograms net weight or, if appropriate, in individuals number), name and address of the supplier and all the information requested by the Article 35 of regulation (EC) nn. 1379/2013 (trade name, scientific name, relevant geographical area, method of production and information on whether fishery products have been previously frozen).

For each batch, when a unique identification or a LOT number is applied, it should include L marking and document type designations (LOG - electronic register of commercial fishing at sea, LB - register of commercial fishing at sea, CR - catch report). It is a numerical code consisting of: the last two digits of the year, the last five digits of the CFR number of the vessel; in the case of an electronic register - the last three digits of the serial number, or in the case of a paper register or report - the last four digits of the serial number of the register or report; FAO species codes.

Food safety recommendation for fishing vessels that catch blue fish:

As with regards to food safety and fish quality maintenance, two focal points have to be observed: an effective cooling and icing system to prevent the formation of histamine and a rigorous observation of the cold chain (along with the recording of the temperature present in the tanks).

KEY RESOURCES:

Catches + fleet + landing ports + labelling potential

The EU catches a share around the 21 % of the world's sardine. Within the EU, Croatia currently leads the production with the 22 % of European catches (as from 2014 data). The Netherlands is next behind Croatia, followed by Spain, Italy and Portugal.

Italy

Considering the Italian side of the Adriatic Sea (GSA17), and defining as fishery the combination of species and gears, has to be noticed that European Pilchard (commonly known as Sardine) fished by pelagic pair trawl is the fourth most important fishery by value and the first by volume. Landings in the period 2015-2016 reported in mean more than 20 Million € per year.

Croatia

In the Croatian side of the Adriatic Sea (GSA17), European Pilchard fished by purse seine is the most important fishery both by volume and value, collecting 18.1 Million € during 2017, when Anchovy instead accounted for 10.1 million €. Moreover, from the 110 different fishery products commercialized in Croatia, 6 of them accounts for more than 90% of the total weight.

Records of fish landings linked with the landing sites have been collected since 2016. The most important landing sites for sardine and anchovy here are the port of Zadar Gaženica (with the 16.88% of national pelagic landed), followed by Biograd (10,59%), Tribunj (9,66%), Plomin (6,01%), Kali (5,71%) and Vela Luka (4,23%). The landing is concentrated in the proximity of the biggest national processing plants for small pelagics, namely the fishing cooperative Omega 3, Mirna d.d., Sardina d.o.o. and Mardešića d.o.o.

One of the most important players in the Croatian pelagic fish industry is the Producer Organization Omega3, which also is the partner number 8 (PP8) of the Prizefish project. Omega3 has been established during 2008 (and recognized as PO in 2015), gathering 16 associates for a total of a 21 vessels-fleet.

Born with the aim of being specialized in the small pelagic fishing and processing, nowadays it accounts for around the 20% of the national small pelagic catch and owns a factory plant on the Kali island that can store 7000t of products and process 5t per hour, employing 88 people. Vessels from Omega3 in average spend 150 days per year at sea, visiting places within 20-85 Km from Zadar.

Normally, each vessel from Omega 3 require a crew of 8-12 people and lands 4-5 tonnes of catches, 80% of which is Sardine and 20% is Anchovy.

Sardine landed are sorted by quality as the 4% of the total catch are destined to feed tuna farms and are paid 0.3-0.4€/Kg instead of the normal 0.80€/Kg for processing use.

Dimension

Bigger fish are to be preferred as are easier to process (i.e. filleting) and allow a better valorization on the market. Industrial producers usually look for 10-12 cm anchovies as a good measure.

Labelling potential

European Pilchard and European Anchovy (both fished by purse seines) are considered a potential high-value source of eco-labelled products. In this sense, they could be candidate as “sustainable fisheries” to start an Adriatic Responsible Fishery (ARF) certification process. Those species in fact do reproduce very quickly and are fished with a selective fishing technique.

History: export and processing

In the last decade, many fisheries products influenced the fish consumption increase. Between them has to be named value added products (like surimi or ready meals) and fish fillets/portions, who respond to need for convenience. Sardine could take the opportunity opened for value-added products, but it needs an “image makeover” like the property of being rich in omega 3.

Historical records of sardine and anchovy for Croatian coast indicates that they have been treated as commercial species (not only for local markets, but also for export) for centuries. Basing on

the first fisheries documents of the east Adriatic coast (late XIX° century), this is linked to the possibility of fish preservation from deterioration, largely based on the use of salt. Some older records by the way report the use of vinegar, as the Order of the Providence of Dalmatia by A. Civran in 1630. It is thereby affirmable that small pelagic processing industries have a long history.

Best practices: Omega 3 classification system & destinations

The PO Omega 3 developed a quality assessment system which assigns points to the product samples on a 1-10 scale, basing on external appearance (i.e. presence of blood after freezing) by visual inspection.

Samples within the range 1-2 are considered third category and used to tuna feeding in farms, individuals with belly burst are automatically included in this section. Samples contained in the 3-5 range are considered as second category, usually destined to be processed into canned fish. The last category, with a rating of 6-10, contains the fish of the highest quality, sold at the greater price.

VALUE PROPOSITION:

Sustainability: adding value means less exploitation (both environmental and social)

A central point in the value proposition of this product is to be able to reduce market pressure at the time of its saturation, creating positive spillover effects for the fish and the fishing community.

For this aim, it's strategic to achieve a better price for the fish sale. This should include a greater valorization of the product and the avoiding of inferior use of the catch, as i.e. sardines sold and used for aquaculture fish feeding.

Market: demand trend met

As the evolution of the fish market made emerge the need for new food technology on production and preservation, one of the main opportunities of fishery products in the European market is the creation and adaptation of products according to market trends, consumption, production and trade. Fish processors who are dedicated to adding value and creating ready-made products as well as participating in trends can serve the growing demand. Opportunities

nowadays exist for excellence in quality, boned fish, fillets and frozen ready meals like fish-burgers.

Actually, there is a commercial interest for Croatian Sardines that makes the Omega 3 output count on 4 million €. The Producer organization aims to meet the demand trend by developing a MAP longer lasting product to be potentially sold in fresh markets, branded local products, HORECA and retail segment.

Traceability: accountable value

The establishment of an effective traceability system, along with the law requirement, can serve different purposes and bring more perceived value to the final product.

A tracking system does have the main objective of providing transparent reliable information. This information is directed to a multiplicity of stakeholders, including the very own company, consumers, state inspection bodies and technical auditors.

Regarding consumer protection, it is an effective element able to strengthen the confidence and the safety perception. In this sense, potential defective or unsafe products can be immediately identified and withdrawn from the market. The principle of consumer protection in fact states that consumers have the right of being completely, clearly and unambiguously informed about the food present in the market in order to make an informed choice. Moreover, when safety dangers emerge, it admits to determinate responsibilities and obligations.

The traceability system can also provide internal logistical support, establishing a feedback loop of information able to improve quality and efficiency of the deliveries.

Fresh and long shelf-life

Online discussions rooms organized within the Prizefish project already proved that consumers from the considered countries (Italy, Croatia and Spain) generally evaluate positively the idea of having a fresh and good quality product with an increased shelf-life.

Value adding practices

Enhancing some best practices has the possibility to add value to the product.

The choice of the MA packaging delivers a value composed by higher quality and extended durability, along with the low use of preservatives. Other value spillovers perceived from the consumers derive from the attractive appearance of the box and from the easy handling.

The use of pumps for harvesting accelerate the transfer process, as previously reported, also helps to maintain the maximum quality and the nutritional values of the meat.

CUSTOMER RELATIONSHIPS:

No particular recommendation

To the extent of the proposed eco-innovative product, no particular customer relationship is suggested as preferable. The market presence of this product can in fact be accompanied and enhanced by a wide spectrum of different relationships, all valid in specific contexts. Considerations on the right kind of interconnection should be made keeping in count their costs and their effectiveness in customers' acquisition/retention and upselling.

CHANNELS:

Supermarket and Large-Scale Retailers

Nowadays, retail chains and supermarket are the most common place to buy groceries in Europe, generally speaking. This tendency can be explained to a certain degree with the little spare time people have, so that they tend to concentrate in one place what one time was bought in a large number of stores.

Fish partially represent an exception, in the meaning that even if the majority of European countries' customers mostly buy fish in the supermarkets, there still are countries (such as Greece, Malta and Italy) where customers predominantly buy in the specialized fish markets or fishmongers. This distinction is not only linked to the fact of being traditionally maritime countries, as Croatia the 69% of the fish is bought in the supermarkets.

Internal Consumption

The internal consumption (domestic market) is a major fact in the small pelagic market. Sardines are much more consumed from Croatians than from Italians.

Import/Export

As previously explained, small pelagics have been processed and exported for centuries.

With regards to fresh sardines, it has to be noticed that the quality of the fish along the distribution chain is crucial in both local and export markets due to the perishable nature of the good. This is one of the reasons why the European Union imports very little fresh sardines (78t in 2015) and almost the whole European fresh sardine consumption is supplied by member countries. Fresh pelagics export is usually only related to neighbor countries, i.e. from Croatia to Italy or from Spain to Portugal.

Taking the example of Croatia, pelagics here fished have as main destination market the Spanish one, with an average flow of 8.806tons/10 million euros per year on 2015-2019 base. The second most relevant commercial partner is Italy, where on the same time base 6.393t/year are expected, followed by Serbia, France and Bosnia and Herzegovina. From the Eurostat CN8 database it's possible to discover that during 2017-2018 the most important sardine-related production by value for Croatian export has been *Sardines, prepared or preserved, whole or in pieces (excl. minced sardines and sardines in olive oil)*.

As in the case of the Omega 3 producer organization, export is a significant and relevant channel. Omega 3 works with 28 foreign and 1 domestic wholesaler, 13 foreign and 2 domestic fish processing plants. Between the most significant buyers, Spanish wholesaler and fish processing plant have a major role (i.e. HERMANOS BELTRAN ADELL, Gil Comes).

Supply chains

The European market does have a complex retail channels system. Main actors of this system are supermarkets, hypermarkets, fish retailers, fish markets and grocery stores, but also other relevant agents like importers, representatives and processing companies. After the catch, the fresh products may in fact undertake very different paths.

A process of consolidation, led by increased competition and improvements in logistics, is currently ongoing for fisheries products, especially concerning frozen or processed products but also impacting fresh or chilled products. The shortest supply chain (fishermen – fishmonger - consumer) includes only one intermediary at retail level. The Fishmongers buy fresh products directly at the landing site or, more often, are directly provided with products by the fishermen.

The most significant supply chain by economic value is the one that includes as leading agents the wholesalers, who then resell fresh products to fishmongers, supermarket chains and restaurants.

An emerging trend at European level is large retail chains directly buying from producers. This is particularly relevant regarding aquaculture products and involves safety, good service, efficiency and traceability as requirement for a strong cooperation. This supply configuration leads to a shorter and more direct supply chain.

Multiple retail chains instead became lately very popular, due to the demand for adequate food and the trend of buying groceries in one place, at the expenses of fish markets and fishmongers. If the traditional retail chains used to primarily sell frozen and canned fishery products, they have now begun to enlarge their fresh or repackaged product's offer (such as could be fish fillets or prawns). Multiple retail chains are already often actively implementing MAP systems for their fresh offer.

Possible use destinations for pelagics

The small pelagic catches Adriatic market is quite diversified. It consists of:

- Traditional canning processing market mainly including sardines
- Renewed salting processing market, which mostly includes anchovies but in a smaller part looks for sardines
- Newer market for anchovy processing by marinating
- Freezing processing market
- Fresh product market
- Fresh product market for animal nutrition (tuna farming)

CUSTOMER SEGMENTS:

Ready to eat

As already partially said, modern lifestyles usually include extended working hours and the consequent lack of time to prepare elaborated dishes. A new class of consumers thereby emerged, who is eligible at being very interested in quick preparation products that require low-

to-none time or energy effort. Ready-to-serve dishes (or products that require a short heat treatment) are very suitable for this consumer segment.

Healty-foods oriented consumers

Given the healthy image enjoyed by fish, fishery products are suitable to be fully inserted into the healthy food consumption modern trend. Healthier diets require to be low in calories and high in nutritional values, and fish fits quite well in this description as it has a lower content of fat and a high content of proteins, vitamins and minerals. Moreover, fish are characterized by the presence of other beneficial effects, given by particular nutrients as the omega 3 fatty acids that helps preventing heart diseases and the circulatory system.

Health-focused people (or people with pre-existing health problem) are thereby a potential customer segment.

Freshness and origin driven consumers

A survey, carried out by Eurobarometer in 2018 including 27.000 European citizens, proved that he 77% of respondents use to buy fishery products in shops and supermarkets. The 59% of them further explained that their buying choice is mainly moved by the appearance of the product, defining appearance as freshness and presentation. After this motivation, choice has been signaled as price-driven and the third most important factor chosen was the geographical origin of the product.

From this survey emerges that there is commercial room for fresh and locally caught fishery products and suggests that the design of the package should include and highlights this kind of information in order to be more attractive and distinguishable.

The Conscious consumerism movement

A relatively new trend in the markets is the *responsible retail*, mainly directed to the “conscious consumerism”, the milder version of the anti-consumerism movement emerged in the last 20 years.

The archetype of the consumers who identify themselves in this large movement is a person focused on environmental protection, social responsibility and sustainability. At the same time, the market offer for sustainable food products is only about the 15% but presented a high growth during the last 5 years.

This latter change of shopping habits is led by the so-called Generation Z and Millennials who represent a growing market sector.

COST STRUCTURE:

Packaging: MAP Costs

Strictly speaking about costs, the Modified Atmosphere Packaging does require valuable equipment and materials that make this system noticeably more expensive than traditional.

Raw material: cost of Sardine for processing industries

First price of fresh sardine from Croatia range from 2-10 kn/Kg, being 2 kn/Kg the cost of sardine for tuna feeding and 10 kn/Kg the maximum price for premium sardine at the fresh market.

Within this price framework, sardine used in processing industry are usually paid 2.75-4 kn/Kg, with some cooperatives paying even 4.7 kn/Kg for premium quality products. Successful cooperatives can pay their fishermen a price 10-15% higher than the market's.

Fishing: trip length

The cost of the fishing trip is proportional to the distance of the fishing area from the landing port and to the length of the fishing operations.

REVENUE STREAMS:

Price drivers: International supply and demand price drivers

Price for small pelagics is not really affected by local production. More correctly, price is strongly bounded to demand and supply both at national and international level.

This is empirically provable as in the warm season, when Croatian purse seiners begin to fish, prices for Italian pelagics fished with pelagic trawlers can decrease up to two thirds. Specularly, when there is full moon and the Croatian fleet cannot fish, price is higher.

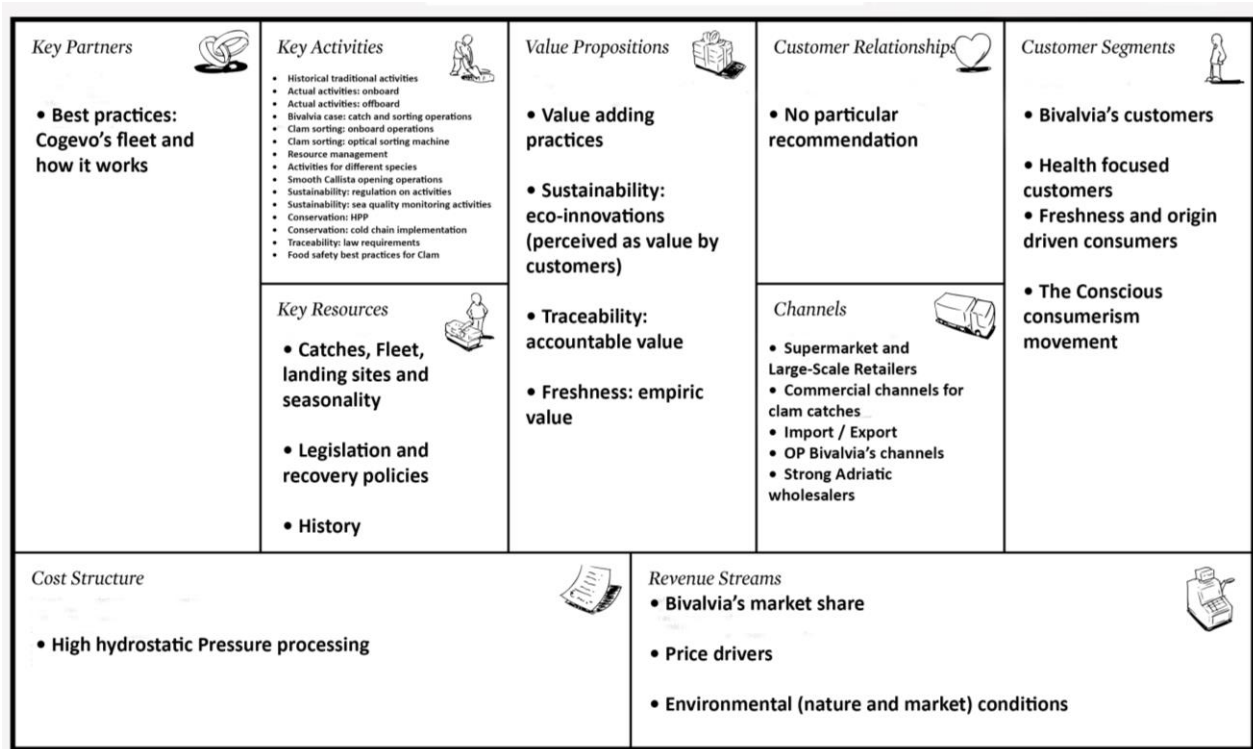
Quality: revenues depends on product quality

The ex-vessel price paid for small pelagics greatly depends on the quality of the catch and its structure (species, average size).

The premium sardine must have natural colour throughout and no traces of blood. This fish is intended for the most demanding consumer niche on the Spanish market.

4.2 BUSINESS MODEL CANVAS FOR CLAMS

Figure 4 Business Model Canvas for CLAMS



KEY PARTNERS	<ul style="list-style-type: none"> • Best practices: Cogevo's fleet and how it works
KEY ACTIVITIES	<ul style="list-style-type: none"> • Historical traditional activities • Actual activities: onboard • Actual activities: offboard • Bivalvia case: catch and sorting operations • Clam sorting: onboard operations • Clam sorting: optical sorting machine • Resource management • Activities for different species • Smooth Callista opening operations • Sustainability: regulation on activities • Sustainability: sea quality monitoring activities • Conservation: HPP • Conservation: cold chain implementation • Traceability: law requirements • Food safety best practices for Clam
KEY RESOURCES	<ul style="list-style-type: none"> • Catches + Fleet + landing sites + seasonality • Legislation and recovery policies • History
VALUE PROPOSITION	<ul style="list-style-type: none"> • Value adding practices • Sustainability: eco-innovations (perceived as value by customers) • Traceability: accountable value • Freshness: empiric value
CUSTOMER RELATIONSHIP	<ul style="list-style-type: none"> • No particular recommendation
CHANNELS	<ul style="list-style-type: none"> • Supermarket and Large-Scale Retailers • Commercial channels for clam catches • Import / Export • OP Bivalvia's channels • Strong Adriatic wholesalers
CUSTOMER SEGMENT	<ul style="list-style-type: none"> • Bivalvia's customers • Health focused customers • Freshness and origin driven consumers • The Conscious consumerism movement

COST STRUCTURE	<ul style="list-style-type: none"> • HPP Processing
REVENUE STREAMS	<ul style="list-style-type: none"> • Bivalvia’s market share • Price drivers • Environmental (nature and market) conditions

KEY PARTNERS:

Best practices: Cogevo’s fleet and how it works

The fishing fleet consists of around 160 vessels associated within the PO Bivalvia and the Co.Ge.Vo consortium, all using the hydraulic dredge (HMD) as fishing gear.

PO Bivalvia Veneto is a “Società cooperativa” with headquarter in Caorle (VE). Bivalvia collaborates closely with the two Co.Ge.Vo. (Consortium for the Management and Protection of Fishing of Bivalve Molluscs) of Venice and Chioggia located throughout the Veneto Region. The two consortia together gather a total of 163 companies representing the totality of the Venetian vessels dedicated to fishery of bivalve molluscs. 43 of these vessels catch the smooth clam (*Callista chione*) and are associated to the PO Fasolari, while the remaining 120 vessels catch venus clam (around 100 of which are associated to PO Bivalvia).

Most of the vessels have a length comprehended between 14 and 18 meters an engine power around 200 horse power, the whole fleet is equipped with the automatic identification systems (AIS).

KEY ACTIVITIES:

Hystorical traditional activities

The traditional clam industry has been based for a very long time on hand grabs and manual dredges. Far away from being an effective method, along with the growing economic importance of this specie, the fishing gears evolved. In fact, starting from the 1930’s, hydraulic dredges already became the most common method, proving to be the most efficient for catching *Stripped venus*.

Present activities: onboard

Fishing activities for those species are conducted on daily bases. The procedure starts with the choice of the most appropriate hydraulic dredge and the most appropriate grill size for the target species, then the dredge is towed backwards, and the catch is lifted on-board. After this, the catch passes a selection process composed by a rotating sieve and a vibrating grill mesh.

The next step to be done onboard is the weighting and the labelling. A non-removable tag is in fact appointed on the product indicating the name of the vessel, species, the method and date of capture, the fishing area, the unique lot number, the weight, the FAO code (SVE for venus clam *C. gallina*, KMK for the smooth clam *C. chione*) and other useful information.

After this, the remaining by-catch are thrown back into the sea and all the undersized clams are released into designated area in order to further grow. No other operations are carried out on-board.

Present activities: offboard

Taking the case of PO Bivalvia, clams are unloaded from the fishing vessels into the processing facilities located in Caorle (VE) or Chioggia (VE).

There the processing moves by unloading the bags into a hopper where clams are measured (by machines) and selected (by a human operator). After this, clams are placed into large containers with a flowing salty water for purification and de-gritting.

Lastly, the cleaned and purified clams are seared and frozen, ready to be packed into PVC boxes and sent to distribution. Another strategy is to froze and store the product to rationally use the resource.

Bivalvia case: catch and sorting operations

In the case of OP Bivalvia, the Striped venus represents the most important target specie.

The fishing vessels are equipped with a hydraulic dredge gears, constituted by a large water pump and a metallic dredging cage with water jet nozzles for catching the specimens.

The metallic cage has an edge followed by an inclined sieve structure made of evenly spaced metallic bars. Additional sorting equipment is placed on-board, following the collection bin, used for separating the Striped venus specimens above the minimum conservation reference size (MCRS) defined in the Common Fishery Policy (CFP) from undersized specimens, other by-catch species and debris.

At first, an upward rotating sorting screw with longitudinally equally spaced rods separates most of the debris and smaller by-catch species, discarded directly into the sea. The separated material is transported to the vibrating screen for the final selection. The separation unit has several vibrating selection screens placed at different levels for separating different size classes of clams. The selection screen primarily uses two patterns, either equally spaced longitudinal bars or perforated plates with round holes.

Clam sorting: onboard operations

The sorting operation is central for a good quality management. It is in fact true that every sorting process does add some stress on those organisms, as vibration or thumbling can even damage the shell. Possible damage level does moreover increase proportionally with the clam size: small sized end up to be less damaged than medium sized.

The on-board sorting machine used in the stripped venus fishery is a horizontally slightly inclined vibrating multi-level sieve. Vibrations move the clams on the sieve and help selecting and the passing of smaller specimens from a higher sieve to a lower one, where the lowest has the smallest holes. The sieving screens are easily interchangeable and can thereby be changed by the fishermen appropriately with his needs. The whole machine has different possible setting, being the vibrating intensity modified by rotation speed, inclination of the sieve screens and the quantity of clams brought together.

This machine is definitely very efficient as it allows to sort a huge quantity of product in short time, being cost-effective and easy to use and set. It has the possibility to be installed both on-board and in land facilities since it can be powered by electricity or by hydraulic system.

Clam sorting: optical sorting machine

A recent innovation in the clam sorting operations has been brought by the introduction of optical sorting machines, the most advanced available technique. This kind of machine allows to inspect the quality of the products and to immediately detect defects. It is not able to sort individuals by size but can assure the product quality.

Optical sorting machines use computer assisted visual inspection that scans the products put on the transporting tape and identifies non-conforming products with the aim of artificial intelligence. Individuals identified as not adequate are removed by a short burst of air.

The brittle nature of the machine, which presents delicate electronic components, makes it optimal for in-land use at production facilities.

Resource management

The life cycle of clams requires that in order to be sustainable the resource have to be managed in an oculate way.

The management of the resource was given to appositely created consortium, the Co.Ge.Vo. (Consorti di gestione vongole) whose mission is to plan the fishing activities basing on the available resources and to define sustainable quotas, fishing effort (in terms of number of days per week and daily fishing hours, besides temporary interruption).

Activities for different species

As Venus clam and Smooth clam present slightly different habitat, being *C. chione* located more further off the coast, activities do quite differ.

In particular, in the case of venus clam, the cage is pulled backwards using the propeller thrust while in the case of smooth clam is pulled back using the anchor and retrieving the anchor line. A secondary gears difference lies in the digging deepness. If *C. gallina* requires a dredge that digs around 10 cm and has a screen with narrow grills, *C. Chione* requires deeper excavation (around 15 cm) and a wider grill.

Smooth Callista opening operations

In the case of processing that requires Smooth Callista to be opened, operators manually open shells into half-shell products as there aren't automated shucking machines and suitable instruments for this species still have to be developed. The difficulty lies in the right calibration able to separate tissues and shells without damaging the shell and creating debris.

The actual procedure is both slow and very expensive due to manual labor cost.

Sustainability: regulation on activities

Fishing activities are regulated by D.M. 22/12/2000, defining the specifications of the dredge (maximum width of 3 meters, maximum pressure at nozzles 1.8 bars and maximum weight of 600 kg).

The most common configuration uses parallel metallic rods at the lower sieving panel, and the distance between rods is restricted to minimum of 12 mm. Alternatively, the lower screening can have a squared mash (of minimum 17 mm per side), a rectangular mesh (of minimum sides 12 and 25 mm) or a perforated mesh (with round holes of minimum 21 mm diameter and a perforated surface of at least 2/3 of the total). The on-board sorting sieve needs to follow the same restrictions.

The minimum conservation reference size of Venus spp. in Italian territorial waters is set to a total length of 22 mm from the current regulation (UE, 2020/3).

Sustainability: sea quality monitoring activities

To monitor the quality of the sea and shells in the area of production, fishing and relaying, a plan is mandatory in terms of production and/or harvesting and collection of shellfish. Its purpose is to constantly monitor the microbiological quality of live bivalve molluscs and to check for the presence of toxic plankton or other live shells contaminants.

Conservation: HPP

The High-Pressure Processing (HPP), also known as cold pasteurization, is a technological technique for the sterilization and preservation of food. Products, already sealed into final packages, are introduced into a hyperbaric chamber filled with water and subjected to high hydrostatic pressure by order of 300-600 MPa at a temperature of +4-10°C.

The result of the process is the deactivation of many microorganisms (such as Listeria, E.Coli, Salmonella and Vibrio) and enzymes in food while preserving sensory and nutritional properties of the food, as no heat treatment is enhanced. However, the process does not deactivate all the enzymes and the food has an extended life that need to be accompanied by cold temperatures.

HPP has been mainly used for acidic foods like yogurt and fruits as spores of high-pressure resistant microorganisms typically does not live in low PH conditions.

High Pressure Processing presents several advantages if confronted with traditional treatments:

- Better food quality, product characteristics remain intact, taste and nutrients unchanged
- Destruction of pathogens (Listeria, Salmonella, Vibrio, Norovirus) and food safety
- Extended shelf life
- Reduction of microbial spoilage - better quality over the shelf life
- No need for preservatives and food additives (new clean label possible)
- Responsible for products that cannot be heat treated - innovative technology
- If fresh bivalve molluscs are treated in this way, they leave open shells from the chamber, making cleaning easier. It also makes it easy to clean crabs.
- The device is environment-friendly, consuming only recyclable water and electricity

For the application of this technology to a new kind of food or species, many experimental tests have to be conducted in order to encounter the correct balance between pressure level and time exposition that does not modify organoleptic or structural characteristics.

Conservation: cold chain implementation

An effective cold chain implementation is of staple importance for the seafood industry as goods are very exposed to deterioration and spoilage and maintenance of cold (along with a careful handling) can minimize those processes. Moreover, the quality of produced clams is a central selling point as shellfish need to be alive when sold and consumed.

The real cold chain for Clam production starts only after the landing, as caught clams are firstly transported on-board in bags stored in the aft, in a temperature not controlled space. Right after the landing, clams are led to the production facility where the cold chain starts. Clams are stored in a chilled room, transformed (if needed) and packed. The optimal temperature for clam and shellfish preservation is comprehended between 6°C and 8°C and shouldn't reach 4°C. Being exposed to temperature higher than 10°C for longer than 4 hours is considered critical for health

and quality. Also, large temperature changes have to be avoided as they lead to stress for the animal. For this reason, direct contact with ice should be avoided and during the first transportation (from the caching point to the landing point) a temperature similar to the one present in the sea should be maintained.

Traceability: law requirements

As reported in the European Regulation (EC) no. 178/2002, the definition of "traceability" is the possibility of tracing food, feed, food-producing animals or substances intended for incorporation or expected to be incorporated into food or feed, through all stages of production, processing and distribution. Any business operating in this field must have information about the step before and the step after it, that is, about the person who supplied them and the person to whom they delivered their products.

Council Regulation (EC) n. 1224/2009 states that fishery products, with batches as unit, are requested to be traceable at all stages of distribution. This includes the insert of identification marks on cassettes or boxes during the transportation.

The minimum amount of information to be provided consists in identification number of each batch, identification number and name of the fishing vessel, FAO three-letter code for each species, date of the catch, quantity of each species (in kilograms net weight or, if appropriate, in individuals number), name and address of the supplier and all the information requested by the Article 35 of regulation (EC) n.1379/2013 (trade name, scientific name, relevant geographical area, method of production and information on whether fishery products have been previously frozen).

For each batch, when a unique identification or a LOT number is applied, it should include L marking and document type designations (LOG - electronic register of commercial fishing at sea, LB - register of commercial fishing at sea, CR - catch report). It is a numerical code consisting of: the last two digits of the year, the last five digits of the CFR number of the vessel; in the case of an electronic register - the last three digits of the serial number, or in the case of a paper register or report - the last four digits of the serial number of the register or report; FAO species codes.

Food safety best practices for Clam:

As Clams caught in the majority of Italian waters require a period of depuration after the landing, an adequately operative purification system have to be enhanced in order for the food to be safely eaten.

During the whole process many toxicological tests have to be carried out and the records of those tests should be kept safe.

KEY RESOURCES:

Catches + Fleet + landing sites + seasonality:

Clams are one of the most important resource of the Italian side of the Adriatic Sea (GSA17), in fact Striped Venus fished by hydraulic dredge represents there the most important fishery (as combination of species and gears) in terms of value and the third by volume.

The main target for clams is *Chamelea gallina* (striped Venus clam), but also other bivalve molluscs are relevant, such as *Callista chione* (smooth clams).

Marche is nowadays the most important region for clam landing in Italy. There operate 200 boats (on a national fleet of 700 boats) and 460 persons are employed on dredgers fishing boats. Marche also produces around the 50% of the overall national production of Clam.

The Veneto region is one of the most productive regions for clam. There operates the producer organizations OP Bivalvia, that collect around the 75% of the clam regional production through the consortia of Venezia and Chioggia. Those fishing operators have been appointed by the MSC certification for their products. OP Bivalvia is also the partner number 10 (PP10) of the Prizefish project.

The Italian yearly mean landings of venus clams between 2014 and 2018 have been around 4000t. The highest market orders are generally expected during the summer and in December due to the touristic season and other holidays.

Legislation and recovery policies

There is a very strict legislation about Clams since they are very susceptible to environmental changes and the hydraulic dredge hard impact on stock, benthic fauna community and sediment structure is well known.

The EU Common Fishery Policy (CFP) Mediterranean regulation (EU Reg. 1967/2006) established a minimum conservation reference size (MCRS) for Venus clam at 25mm, although a successive three-years derogation (EU Reg. 2016/2376) set the MCRS for Italy at 22mm.

Although the present resources allow a stable and constant fishing activity, there is a need to preserve the stock in good health. Following this need, the Reg. (EU) 1380/2013 sanctions the obligation to land the discards to limit the by-catches of species regulated by quotas or minimum conservation reference size. On this purpose, reducing the ratio of undersized specimen in the total catch is a priority.

The area of Venice and Chioggia, one of the most important in Italy for Clam production, did present a significant Venus clam biomass decrease from 2009 to 2011, before returning to normal levels. To avoid those situations in 2006 has been promulgated the National Management Plan for hydraulic dredgers (Reg. CE n.1967/2006) which imposed the minimum biomass density to 5 g/m². The management plan for the period 2019-2021 aims to increase the biomass density to 10 g/m² by implementing a more efficient fishing management strategy.

The PO Bivalvia did set additional internal rules on clam stock conservation, that encompass measures on undersized clams (which have to be released in designated or closed areas, called nursery, in order to reach the MCRS). Moreover, adopted several initiatives to keep the sustainable exploitation like seeding in nursery areas, restocking, rotation of exploited areas and temporary closure of specific areas.

The fishing activity is supported, in order to reach a long-term sustainable exploitation, by many bodies as local research institutes, health authorities and veterinary services. Their role is to monitor the status of the clam population, its biomass and grow-rate, eventual diseases and the general status of the local environment.

History

Shellfish has been a relevant part of human diet since ancient times, it is therefore a product that is considered traditional in a great part of the Italian coastal area.

VALUE PROPOSITION:

Value adding practices:

- As the Common Organization of the Markets in fisheries and aquaculture products of the EU asserted, the actual state of the sea resources requires to create innovative added-value seafood products to successfully penetrate EU and non-EU markets.
- Basing on the fact that commercial landings of Venus clam are based on daily market orders rather than on the seasonality, a possibility to rationally use and preserve this resource emerges from the praxis of freezing and storing part of the catch for further uses. Another viable road is to extend the shelf-life, as in this specific case of the HPP processed clams. This second method could also be perceived as more value adding by final customers as it conserves in a more solid way the organoleptic characteristics.
- A value-adding practice, already fulfilled by OP Bivalvia, is the acquisition of MSC (or other) certifications for Striped Venus. This label does in fact guarantee the correct

exploitation of the natural environment and habitat and empirically allows to ask for higher retail prices.

Sustainability: eco-innovations (perceived as value by customers)

The sustainability of the fishing industry is perceived as a clear value by the customers.

On this purpose, one of the most impacting issue is the by-catch of undersized specimens. Possible innovations could be implemented by developing more advanced equipment for the catching and sorting operations. From one side, an innovative dredge could reduce the stress for the sea bottom and the infauna, also admitting undersized specimens to continue living in the same environment. On the other side, a more evolved sorting machine is required as small variations in the sieve holes diameter lead to significant changes in selectivity.

Traceability: accountable value

The establishment of an effective traceability system, along and over the law requirement, can serve different purposes and bring more perceived value to the final product.

A tracking system does have the main objective of providing transparent reliable information. This information is directed to a multiplicity of stakeholders, including the very own company, consumers, state inspection bodies and technical auditors.

Regarding consumer protection, it is an effective element able to strengthen the confidence and the safety perception. In this sense, potential defective or unsafe products can be immediately identified and withdrawn from the market. The principle of consumer protection in fact states that consumers have the right of being completely, clearly and unambiguously informed about the food present in the market in order to make an informed choice. Moreover, when safety dangers emerge, it admits to determinate responsibilities and obligations.

The traceability system can also provide internal logistical support, establishing a feedback loop of information able to improve quality and efficiency of the deliveries.

Freshness: empiric value

Online discussion rooms conducted within the Prizefish framework in the considered countries (Italy, Croatia and Spain), demonstrated that consumers generally appreciate and positively evaluate the idea of having a fresh, good quality, product with an increased shelf-life.

CUSTOMER RELATIONSHIPS:

No particular recommendation

To the extent of the proposed eco-innovative product, no particular customer relationship is suggested as preferable. The market presence of this product can in fact be accompanied and enhanced by a wide spectrum of different relationships, all valid in specific contexts. Considerations on the right kind of interconnection should be made keeping in count their costs and their effectiveness in customers' acquisition/retention and upselling.

CHANNELS:

Supermarket and Large Scale Retailers

Nowadays, retail chains and supermarket are the most common place to buy groceries in Europe, generally speaking. This tendency can be explained to a certain degree with the little spare time people have, so that they tend to concentrate in one place what one time was bought in a large number of stores.

Fish partially represent an exception, in the meaning that even if the majority of European countries' customers mostly buy fish in the supermarkets, there still are countries (such as Greece, Malta and Italy) where customers predominantly buy in the specialized fish markets or fishmongers. This distinction is not only linked to the fact of being traditionally maritime countries, as Croatia the 69% of the fish is bought in the supermarkets.

Commercial channels for clam catches

In the European market, a very relevant role is held by importers, agents (representatives) and processing companies. The retail framework is composed by supermarket, hypermarket, fish retailers, fish markets and grocery stores. While in northern Europe large retailers dominate the market, in southern countries such as Italy or Spain strong wholesalers continue to prevail. In both cases by the way there is an active process of consolidation ongoing, especially regarding frozen or processed products.

Another emerging trend is large retail chains buying fish directly from one or more producers, particularly for aquaculture products, still with strong safety and efficiency requirements. This trend enforces the shortening of the supply chain and supports more direct relations between suppliers and retailers.

The specific Italian supply chain for Clam is quite complex, as fishermen or POs can sell products to large wholesalers, local small wholesalers or directly to large retailers, fishmonger or HO.RE.CA. sector subjects.

Large and small wholesalers operate on very different ways.

Small wholesalers usually do buy small quantities of clams and keep the name and the origin of the producer as an added-value.

Large wholesalers do instead usually buy bulk quantities from different areas and sell it after eventual selection and mixing operations (losing in this case the local origin of the product). They can have different suppliers and customers at the same time.

With the exception of large retailers having direct contact with large wholesalers, wholesale markets of Milan and Rome are the most important point of contact between wholesalers and retailers/customers.

A noticeable share of wholesaler sales is done with other countries (mainly Spain, but also Portugal and France), with contracts that can be signed between Italian and Spanish wholesalers or directly between Italian wholesalers and Spanish large retailers (e.g. Mercadona).

Import / Export

Import and export of fresh fish is never an easy operation due to the perishable nature of those goods. Preserving the quality of fishery products is thereby crucial for both local and abroad markets. Despite this, the Italian clam industry is clearly supported by the intra-EU exports (being the extra-eu clam exports over 100t/year only since 2018).

Intra-EU flows became very relevant since 2012, when this kind of export passed from 2142t to 9289t. The increase of European competition created some conflicts between Spanish and Italian producers, as the increase of Adriatic production made prices diminish.

OP Bivalvia's channels

The PO Bivalvia has a very differentiated set of customers.

Regarding frozen products, Bivalvia sells certified (MSC or organic label) frozen clams to two different brands, who can sell the clams under proprietary label or, as in the case of Naturasi, under the specific label "La Venexiana".

The whole set of customers includes 10 large wholesalers (who normally buy from different provenience and mix the products), 15 small wholesalers (who maintain the Bivalvia logo on the nets), 10 fishmongers, 30 HORECA operators, an Italian large retailer and a foreign large retailer. The 85% of the production is by the way sold to large and small wholesalers but HORECAs and fishmonger are considered best customers since they pay more.

Strong Adriatic wholesalers

As we saw that large wholesalers are very important for clam producers, it is to be noted that on the Adriatic coast operate many of them, being the two most relevant (New Copromo and COPEMO) located in the Marche region.

CUSTOMER SEGMENTS:

Bivalvia's customers

Bivalvia sells both frozen and fresh clams.

The frozen ones are mainly directed to Ho.Re.Ca. and retailers and sold into packages between 450g and 1000g.

Fresh products are instead mainly sold to local wholesalers, in nets of 2, 5 or 10 Kilograms.

Health focused customers

Given the healthy image enjoyed by fish, fishery products are suitable to be fully inserted into the healthy food consumption modern trend. Healthier diets require to be low in calories and high in nutritional values, and fish fits quite well in this description as it has a lower content of fat and a high content of proteins, vitamins and minerals. Moreover, fish are characterized by the presence of other beneficial effects, given by particular nutrients as the omega 3 fatty acids that helps preventing heart diseases and the circulatory system.

Health-focused people (or people with pre-existing health problem) are thereby a potential customer segment.

Freshness and origin driven consumers

A survey, carried out by Eurobarometer in 2018 including 27.000 European citizens, proved that he 77% of respondents use to buy fishery products in shops and supermarkets. The 59% of them further explained that their buying choice is mainly moved by the appearance of the product, defining appearance as freshness and presentation. After this motivation, choice has been signaled as price-driven and the third most important factor chosen was the geographical origin of the product.

From this survey emerges that there is commercial room for fresh and locally caught fishery products and suggests that the design of the package should include and highlights this kind of information in order to be more attractive and distinguishable.

The Conscious consumerism movement

A relatively new trend in the markets is the *responsible retail*, mainly directed to the “conscious consumerism”, the milder version of the anti-consumerism movement emerged in the last 20 years.

The archetype of the consumers who identify themselves in this large movement is a person focused on environmental protection, social responsibility and sustainability. At the same time, the market offer for sustainable food products is only about the 15% but presented a high growth during the last 5 years.

This latter change of shopping habits is led by the so-called Generation Z and Millennials who represent a growing market sector.

COST STRUCTURE:

HPP Processing

One of the most relevant costs in the processing of this product concept is represented by the High Pressure Processing. Following the growing adoption of this technology, improvements are supposed to lower the initial costs of the machines in the near future.

Along with the fixed cost of the HPP machine come indirect costs. Some of them are: additional staff to follow the operations, training course for the new staff, overhead and utility costs, maintenance and major failure risks.

REVENUE STREAMS:

Bivalvia's market share

The PO Bivalvia has a strong position in the Italian fresh clam market, as its share is around the 25% of the total. Despite this, there is a constant need to adapt to competitors and the demand-supply of the market as the price constantly changes (usually in a range between 2.8€/Kg and 5.9 €/Kg).

Price drivers

The price does change according to demand and supply, particularly for the fresh product.

In the frozen clam market, there is less competitions as the competitors are few. This leads to a more stable price range (usually between 6€/Kg and 8€/Kg).

Frozen clam costs more than fresh due to costs relative on processing and packaging.

On both case (frozen and fresh clam) price is firstly related with size. Other relevant drivers are cleanness, closure, area of provenience and (for some customers) colour.

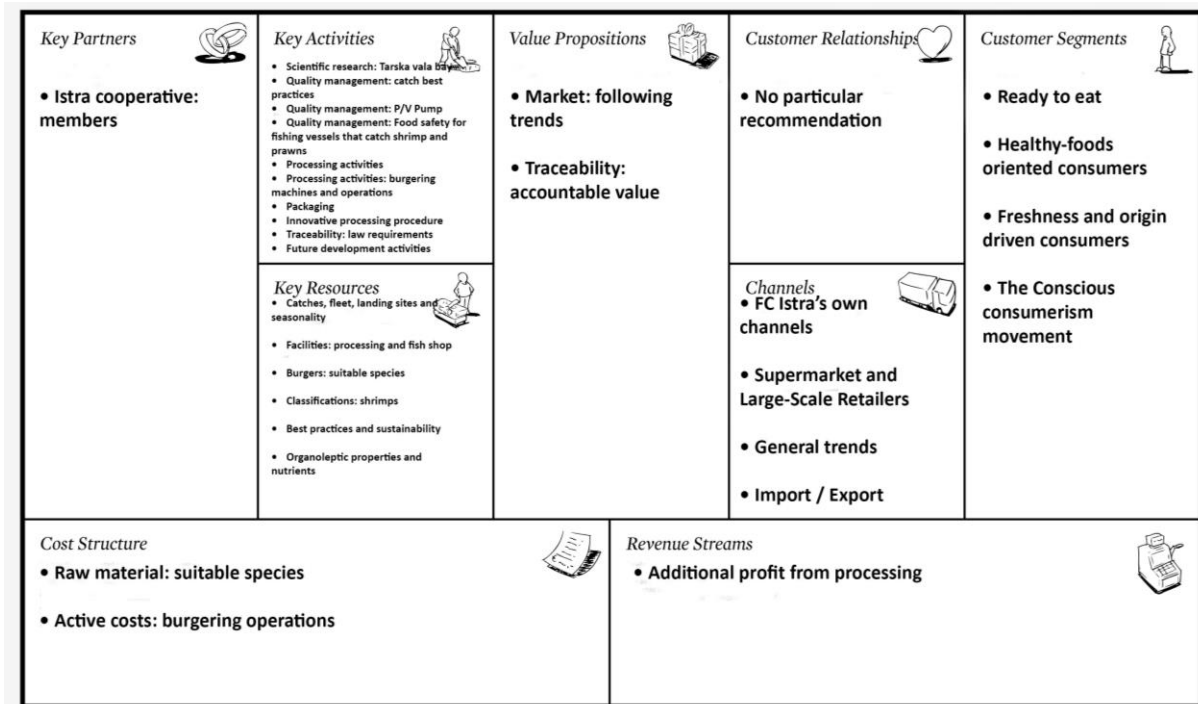
Environmental (nature and market) conditions

The price of Venus clam is strictly correlated to climatic conditions. This rule is both valid for fresh and frozen market. Apart from the climate, the volume of received orders and the competitors' price have also to be accounted.

Being the frozen market less crowded than the fresh one, the PO Bivalvia has a better control on its market quota. In this sense, the volume become the main factor determining the final price and the revenues.

4.3 BUSINESS MODEL CANVAS FOR FISH-BURGERS

Figure 5 Business Model Canvas for FISH BURGERS



KEY PARTNERS	<ul style="list-style-type: none"> • Istra cooperative: members
KEY ACTIVITIES	<ul style="list-style-type: none"> • Scientific research: Tarska vala bay • Quality management: catch best practices • Quality management: P/V Pump • Quality management: Food safety for fishing vessels that catch shrimp and prawns • Processing activities • Processing activities: burgering machines and operations • Packaging • Innovative processing procedure • Traceability: law requirements • Future development activities
KEY RESOURCES	<ul style="list-style-type: none"> • Catches + fleet + landing sites + seasonality • Facilities: processing and fish shop • Burgers: suitable species • Classifications: shrimps • Best practices and sustainability • Organoleptic properties and nutrients
VALUE PROPOSITION	<ul style="list-style-type: none"> • Market: following trends • Traceability: accountable value
CUSTOMER RELATIONSHIP	<ul style="list-style-type: none"> • No particular recommendation
CHANNELS	<ul style="list-style-type: none"> • FC Istra's own channels • Supermarket and Large-Scale Retailers • General trends • Import / Export
CUSTOMER SEGMENT	<ul style="list-style-type: none"> • Ready to eat • Healthy-foods oriented consumers • Freshness and origin driven consumers • The Conscious consumerism movement

COST STRUCTURE	<ul style="list-style-type: none"> • Raw material: suitable species • Active costs: burgering operations
REVENUE STREAMS	<ul style="list-style-type: none"> • Additional profit from processing

KEY PARTNERS:

Istra cooperative: members

The fishery cooperative “Istra”, established in 2004, is today the leading fishermen cooperative of the Istria region. The cooperative counts 50 active members and few more subcontractors, for a fleet composed by 56 boats.

Their smaller vessels operate during all and are multi species catchers. Most important landings in winter months are Musky octopus and Sole. Other relevant catches are Mulletts, Red mullet and Rose Shrimp.

KEY ACTIVITIES:

Scientific research: Tarska vala bay

FC Istra continues some traditional fishing operations deeply rooted in local culture:

For many years the cooperative had a concession for fishing in “Tarska vala”, an aquatic habitat near the river Mirna delta where for more than 1000 years traditional fishing has been performed. This tradition consists in closing a local bay with a large beach seine net for catching mullet in winter months. Being this kind of fishing forbidden under EU regulation, those activities are actually focused on getting scientific data to fulfill a derogation request.

Quality management – catch best practices

In order to obtain top-class quality fishburgers, it is important to manage the catch in a correct way and to cool it down as soon as possible to raise the quality.

In the catching and handling operations there are some recommended best practices, here will follow some.

It is a wise practice to choose a volume as small as possible to pull the net and to reduce, if possible, the duration of the pull-hover.

It is suggested to draw fish out of the net with less sack filling to prevent kneading due to heavy weight, a maximum of 400Kg of fish should be raised in one operation in order to avoid crushing the catch.

Quality management: P/V Pump

A possible innovation to raise the product quality since the catching operations is to remove fish from the net with the help of a P/V pump (pressure/vacuum).

The working principle of those kind of pumps is to place a reservoir of 500 to 1500 liters alternately under vacuum and under pressure. The fish, along with the water, is thereby sucked into the tank through a tube and a valve. When the tank is filled, the mixture of fish and water is pumped into another tube and into a strainer. The pumps for lifting fish from the net to the ship have an underwater suction, the ratio of water to fish during pumping must be monitored and the water should be separated from the fish as much as possible in order to maintain the temperature in the cooling tanks.

Peculiarity of the P/V pump is being very gentle with the catches, a characteristic that makes it perfect for raising the catch final quality.

Disadvantages of this technique are the low capacity and the need to frequently interrupt the operations (avoidable by connecting two tanks per pump). A possible obstacle are the oversized rigid components that could be problematic on smaller vessels.

Quality management: food safety for fishing vessels that catch shrimp and prawns

Shrimps are a specie subjected to melanosis if not correctly treated on-board. Melanosis, also known as blackspot, is a harmless discoloration (or darkening) of the Shrimps that occurs after the catch, caused by enzymes.

To avoid this antiesthetic phenomenon, catches are treated with some products. It is desirable to use product without sulphites, although it's a common practice.

As previous Prizefish reports report, melanosis prevention products shall be used exactly in the prescribed concentrations and duration. For this purpose, the on-board crew should be well-trained on accurate concentration achieving and use all the requested safety protective equipment while handling solutions.

On the product, an indication on whether the product has been treated and by what should be placed.

Processing activities

The cooperative has a wholesale fish market facility in leasing in Poreč and since 2017 it owns a processing plant in Kaštelir – Labinci. The leased facility is where Istra has a cold facility and a bivalve's purification centre. The catch is there brought by vans or refrigerator vans and is then sorted and repackaged following the current market needs.

Species like Queen scallop, Mulletts and Bluefish are brought to the Kaštelir – Labinci processing plant, where are transformed (and then offered on the market or exported) into products such as Frozen queen scallop meat, frozen shrimp meat, fish fillets or other kind of specific preparation for the Ho.Re.Ca. segment.

Processing activities: burgering machines & operations

Due to the high price of raw materials, the production of shrimp burgers requires the addition of white fish meat. Possible candidates include Hake fillet and mullet meat, since they are sold at a lower cost.

The industrial preparation of fish burgers requires innovative automated equipment capable to separate meat from bone or scallop from meat (in crabs and shrimps), each specie requires peculiar operations or machines.

Deep water rose shrimp's meat can be separated using a de-shelling machine. Being burgers a product where the texture of the ingredients is not relevant, it's possible to increase the usability percentage of the machine separation process.

For the species that need to be de-boned, a pilot test has been carried out within the Prizefish project with a machine from a German process equipment manufacturer, the highly efficient Bader 601 de-boning machine.

Moreover, a burger shaping machine is required for the final product. The Prizefish project already identified as a good candidate the VER automatic burger shaping machine. This machine presents some advantages: its molds are replaceable quickly and easily, it's easy to clean and it can produce burger with different shapes (such as circles, animals, ovals and sticks). From the productivity point of view, it can make burgers up to 130mm in diameter, with a thickness comprehended between 5 and 18 mm and it can process 200-600 Kg of raw material per hour.

The operation chain for fish Burgering is composed as it follows:

If products are not purchased already cleaned, thawing, washing and cleaning of the raw material is the first step. If raw materials are used in the plant and there isn't a sufficient turnover, the resources should be stored in order to collect a sufficient amount to start the burgers production. It is indeed needed to plan the production flow to achieve the best utilization of the plant and the labor, optimizing the costs.

Ingredients are then weighted and individually chopped.

Following steps are to mix the ingredients (and if necessary, to ground them to the desired texture) and press them into the mold of the Burgering machine.

The production line is thereby composed by immersion in the mixture, breeding, squeezing, packaging and, eventually (depending on the target market), freezing.

Packaging

Packaging is a very relevant phase for marketing and there are many innovations in this field that deserve to be considered.

Innovative packaging: The classic packaging for the transport of fishery products requires many layers to protect the product and keep the cold chain. Innovative alternatives include ice or cooling gel in bags, a Styrofoam insulation layer, an additional waterproofing exterior layer.

Active packaging: Innovative active packaging creates special conditions within the packaging to extend the shelf life of the product. They may have an absorption system for substances like oxygen, carbon dioxide, ethylene, excess water or dyes. They also may have systems to release substances like carbon dioxide, antioxidants and preservatives.

Intelligent packaging: Intelligent packaging can provide information on the condition of packaged food and its quality during transport and storage basing on the principle of mechanical, chemical or enzymatic processes and can collect and provide various information.

Cold chain indicators give signals on time and temperature. The TTI (Time Temperature Integrator) remembers and records the total time when the temperature was higher than a certain number of degrees (3°C or 5°C stickers can be purchased).

If the product has been correctly stored at a lower temperature all the time, there is no colored indicator. If the specified temperature has been higher for a period of 2 hours, the first color will appear and after 4 hours the next. The indicator is precise and irreversible and allows the customer to assess the risk of the product.

Packaging with antimicrobial properties: Innovative packaging include some that present systems for reducing the number of microorganisms in the package. They can present organic acid supplement, enzyme supplement, fungicides, bacteriocins, natural spices or other supplement as silver, zeolite and antibiotics.

Innovative processing procedure

Due to the recent trends of decline in fish catches and fall of prices, the cooperative is following the principle of products diversification to consolidate the company's business.

This is declined into new processing procedures inside the existing facilities and dispose in this way the excess fish, entering the production from ship to table. A steady base for this project could be Mulletts and Shrimp due to this resource stability.

Traceability: law requirements

As reported in the European Regulation (EC) no. 178/2002, the definition of "traceability" is the possibility of tracing food, feed, food-producing animals or substances intended for incorporation or expected to be incorporated into food or feed, through all stages of production, processing and distribution. Any business operating in this field must have information about the step before and the step after it, that is, about the person who supplied them and the person to whom they delivered their products.

Council Regulation (EC) n. 1224/2009 states that fishery products, with batches as unit, are requested to be traceable at all stages of distribution. This includes the insert of identification marks on cassettes or boxes during the transportation.

The minimum amount of information to be provided consists in identification number of each batch, identification number and name of the fishing vessel, FAO three-letter code for each species, date of the catch, quantity of each species (in kilograms net weight or, if appropriate, in individuals number), name and address of the supplier and all the information requested by the Article 35 of regulation (EC) nn. 1379/2013 (trade name, scientific name, relevant geographical area, method of production and information on whether fishery products have been previously frozen).

For each batch, when a unique identification or a LOT number is applied, it should include L marking and document type designations (LOG - electronic register of commercial fishing at sea, LB - register of commercial fishing at sea, CR - catch report). It is a numerical code consisting of: the last two digits of the year, the last five digits of the CFR number of the vessel; in the case of an electronic register - the last three digits of the serial number, or in the case of a paper register or report - the last four digits of the serial number of the register or report; FAO species codes.

Future development activities

The future development of FC Istria includes activities such as starting innovative processing channels, managing market surpluses in unfavorable market price periods and confectioning products that represent a higher degree of added value in fish processing (partial preparation, semi-finished and ready-to-cook meals).

KEY RESOURCES:

Catches + fleet + landing sites + seasonality

One of the key resources for a company that wants to launch a fish-burger production line is preselected fish species.

- Mullet

Mulletts belong to the family Mugilidae, which numbers about a hundred different species, of which 8 inhabit the Mediterranean and only 6 live in the Adriatic. They belong to the coastal white fish and mostly live in smaller or larger flocks.

Of the 6 mullets species living in the Adriatic Sea, the most common which is possible to find on the western coast of Istria are *Liza aurata* (golden mullet), *Liza ramada*, *Liza saliens*, *Mugil cephalus* and *Chelon labrosus*. Between those, *Liza aurata* is the most valued and *Liza saliens* and *Chelon labrosus* are less valued mainly due to the fact that they mostly live in ports. The most significant Croatian landing sites for mullet are Karigador (11.9% of total catch), Umag (9.52%), Poreč (8,92%) and Vrsar (8,62%).

All the mullets are fished continuously with standing nets and often with small coastal boats, but the most relevant part of the catches is made during the spring and autumn, when boats can catch several tons of mullet at night.

On the Italian side, have to be considered the *Liza saliens*, *Liza aurata*, *Liza ramada*, *Chelon labrosus* and *Mugil cephalus*. Mulletts are here fished along the whole year and the biggest catch occurs is in the period of September-October.

Target species	Caught in 2018 by FC Istra (kg)	Total value (EUR)	Average price (EUR/kg)
mullet	6,730	5.765,99	0,86

- Deep-water rose shrimp

In the Croatian side of the Adriatic Sea (GSA17), Deep water rose shrimp fished by bottom otter trawl is among the most important fisheries (fifth for value, seventh for volume)

- Spottail mantis squillid

The fishing of this species is carried out with small pots, a technique that present a non-selective impact. By-catch includes many non-target species, including the Gobies.

A pilot project from Prizefish is trying to solve this issue by providing a small amount of modified set gillnets that should be effective in raising the catches selectivity.

All the considered species present very different characteristics and nutritional values (Table 1). Here follow an explanatory table for Shrimp, Octopus and Mullet.

Table 1 Nutritional values of the considered species for Hamburgers¹³

in 100g	shrimp	octopus	mullet
Calories	106	82	117
Proteins /g	20,3	14,9	19,4
Fats /g	1,7	1	3,8
Carbs /g	0,9	2,2	0
Water /g	75,9	80,3	77
Ash /g	1,2	1,6	1,2
Cholesterol /mg	152	48	49
vitamin A/IU	180	150	123
vitamin C/mg	2	5	1,2
Vitamin E/mg	1,1	1,2	1
Vitamin K/mcg	0	0,1	0,1
Tiamin/mg	0	0	0,1
Riboflavin/mg	0	0	0,1
Niacin/mg	2,6	2,1	5,2
Vitamin B6/mg	0,1	0,4	0,4
Folat/mcg	3	16	9
Vitamin B12/mcg	1,2	20	0,2

Facilities: processing plant and fish shop

Considering the strategic facilities of ISTRA Cooperative, have to be considered as key resources the leased facility in Poreč, the processing plant in Kaštelir – Labinci and the mobile fish shop near a shopping centre in Poreč operative since 2018.

Burgers: suitable species

¹³ Deliverable 4.2.2. pag. 81-82

For the purpose of this business model, can be considered suitable species all that present high seasonal concentration of catches and distribution of the product in larger quantities, implying low prices. The high volumes along with low prices make those species particularly adapt to the value-adding process through the creation of burgers. Development and innovation should thereby be there focused.

With regard to the catch availability of FC Istra, in 2018 over 130 tons of the already identified as suitable species has been landed (mullet, Queen scallop and Bluefish). All those can be considered as low value species because their price is comprehended between 1 and 4 €/Kg.

- Deepwater rose shrimp fished with trawl:
Commercial interest (current value): 300-500kg per year of tails at €12-13/kg, whole €3/kg
Potential value (opportunity to grow): From Peter Pan vessels landing in Zadar and Split. More could be purchased.
Market potential: Value added product. 'Shrimp burgers' using de-shelling machine (creates 'pulp' not whole tail): a 40/60 mix with frozen hake (import). Fisheries agreed with ISTRA to be studied.

Classifications: shrimps

Even within the same species, the individual classification system can lead to very different prices and qualities.

The shrimp market is segmented into many categories, basing on the size, presentation, preservation and the eventual presence of certification. The size classification is composed by two classes: Shrimp I is mainly commercialized as a fresh whole product and is the top-quality, Shrimp II is usually destined to processing operations.

Best practices & sustainability

In the fish-burgers making activities there are best practices that can enhance both quality and sustainability of the production.

An effective continuous cold chain has to be implemented for all species, but with a particular attention to shrimps, as they are very sensitive to temperature and the head and body turn black, which reduces its quality.

Measures that can assure preservation of the fish stock and the establishment of sustainable fishing are staple. Those can include the ban of trawl fishing within 3 miles from the shore and the increase of the eye on the net weight.

As regards with hygiene, raw materials should be clean and fresh, and the deboning machine should be washed every two hours. After the mincing, the meat should be frozen or processed into a product that will be frozen or stabilized by some other method. Minced meat can be used for the creation of burgers but also to other form of value-adding products, such as fish sticks, pate or sausages.

In the specific case of bluefish, the addition of antioxidants and texture-enhancing additives is needed.

Organoleptic properties and nutrients.

Shrimp is a food extremely rich in nutrients. Their calories content is very low (106cal per 100g) and it comes for the 90% from proteins, while the rest is provided by fat.

Shrimps are rich in calcium and iodine, and despite being rich in cholesterol (3 times average fish content) are still considered good for the circulatory system because of the absence of saturated fat. Moreover, they contain about twenty different vitamins and minerals, including selenium, which helps reduce inflammatory processes and has a beneficial effect on health. Shrimp are a good source of omega 6 and omega 3 fatty acids.

VALUE PROPOSITION:

Market: following trends

The fish-burgers have the possibility to respond to needs and trends recently emerged in the fish market. As the Common Organization of the Markets in fisheries and aquaculture products of the EU stated, the creation of innovative added-value seafood products is a correct way to penetrate EU and non-EU markets. Market potential is in fact currently particularly high for added-value products that meet market trends. Recent trends to be highlighted are the search for excellence in quality, boned fish, fish fillets and ready meals.

A noticeable fact is that recent studies showed how older consumers have a greater intention to consume fresh fish at home than youngsters. From this point emerges the need to attract this consumer segment by serving ready-to-eat products as fish burgers could.

Traceability: accountable value

The establishment of an effective traceability system, along with the law requirement, can serve different purposes and bring more perceived value to the final product.

A tracking system does have the main objective of providing transparent reliable information. This information is directed to a multiplicity of stakeholders, including the very own company, consumers, state inspection bodies and technical auditors.

Regarding consumer protection, it is an effective element able to strengthen the confidence and the safety perception. In this sense, potential defective or unsafe products can be immediately identified and withdrawn from the market. The principle of consumer protection in fact states that consumers have the right of being completely, clearly and unambiguously informed about the food present in the market in order to make an informed choice. Moreover, when safety dangers emerge, it admits to determinate responsibilities and obligations.

The traceability system can also provide internal logistical support, establishing a feedback loop of information able to improve quality and efficiency of the deliveries.

CUSTOMER RELATIONSHIPS:

No particular recommendation

To the extent of the proposed eco-innovative product, no particular customer relationship is suggested as preferable. The market presence of this product can in fact be accompanied and enhanced by a wide spectrum of different relationships, all valid in specific contexts. Considerations on the right kind of interconnection should be made keeping in count their costs and their effectiveness in customers' acquisition/retention and upselling.

CHANNELS:

FC Istra's own channels

The biggest share of Istra catches is exported to Italy, but also relevant share is destined to the Ho.Re.Ca. segment (restaurants and hotel) and a smaller portion is directly sold to consumers in Croatia through a small fish shop situated in Poreč.

Supermarket and Large-Scale Retailers

Nowadays, retail chains and supermarket are the most common place to buy groceries in Europe, generally speaking. This tendency can be explained to a certain degree with the little spare time people have, so that they tend to concentrate in one place what one time was bought in a large number of stores.

Fish partially represent an exception, in the meaning that even if the majority of European countries' customers mostly buy fish in the supermarkets, there still are countries (such as Greece, Malta and Italy) where customers predominantly buy in the specialized fish markets or fishmongers. This distinction is not only linked to the fact of being traditionally maritime countries, as Croatia the 69% of the fish is bought in the supermarkets.

General trends

The actual state of the fresh fish supply chain sees retail channels mainly composed by supermarkets and hypermarkets, fish retailers, fish markets and grocery stores, with large retailers taking the lead over fishmongers particularly in Northern Europe.

Increased competition and improvements in logistics opened the road for the consolidation of the distribution channels particularly for frozen or processed products but are still affecting the fresh fish market.

Large retail chains buying fish directly from producers is also another emerging trend especially valid as concerns aquaculture products. The requirements for this supply primarily relate to safety, good service and efficiency. These trends lead to the shortening of the supply chain and more and more direct relationships between the supplier and the retailer, where delivery must be traceable at all times.

Import / Export

For what concerns mullet, Dalmatia represent a significant market, followed by Italy who usually absorbs market surpluses. This need of external absorption is given by the fact that mullet is exclusively sold as fresh fish, and when the market is saturated wholesalers stop buying it.

CUSTOMER SEGMENTS:

Ready to eat

As already partially said, modern lifestyles usually include extended working hours and the consequent lack of time to prepare elaborated dishes. A new class of consumers thereby emerged, who is eligible at being very interested in quick preparation products that require low-to-none time or energy effort. Ready-to-serve dishes (or products that require a short heat treatment) are very suitable for this consumer segment.

Healty-foods oriented consumers

Given the healthy image enjoyed by fish, fishery products are suitable to be fully inserted into the healthy food consumption modern trend. Healthier diets require to be low in calories and high in nutritional values, and fish fits quite well in this description as it has a lower content of fat and a high content of proteins, vitamins and minerals. Moreover, fish are characterized by the presence of other beneficial effects, given by particular nutrients as the omega 3 fatty acids that helps preventing heart diseases and the circulatory system.

Health-focused people (or people with pre-existing health problem) are thereby a potential customer segment.

Freshness and origin driven consumers

A survey, carried out by Eurobarometer in 2018 including 27.000 European citizens, proved that he 77% of respondents use to buy fishery products in shops and supermarkets. The 59% of them further explained that their buying choice is mainly moved by the appearance of the product, defining appearance as freshness and presentation. After this motivation, choice has been signaled as price-driven and the third most important factor chosen was the geographical origin of the product.

From this survey emerges that there is commercial room for fresh and locally caught fishery products and suggests that the design of the package should include and highlights this kind of information in order to be more attractive and distinguishable.

The Conscious consumerism movement

A relatively new trend in the markets is the *responsible retail*, mainly directed to the “conscious consumerism”, the milder version of the anti-consumerism movement emerged in the last 20 years.

The archetype of the consumers who identify themselves in this large movement is a person focused on environmental protection, social responsibility and sustainability. At the same time, the market offer for sustainable food products is only about the 15% but presented a high growth during the last 5 years.

This latter change of shopping habits is led by the so-called Generation Z and Millennials who represent a growing market sector.

COST STRUCTURE:

Raw material: suitable species

Price is strongly related with the second fish species present in the burger along with shrimps. The use of already identified suitable mixes can in fact radically lower the per burger cost of raw material.










Active costs: burgering operations

Industrial preparation of burgers comes with its related costs and some investments have to be done at the beginning. Different kind of innovative automated equipment are in fact needed in the process. Those include de-shelling machine, meat separator, burger shaping machine and a packaging machine.

A variable cost has to be considered as additional personnel is requested to dedicatedly follow the whole operation, from the cleaning of the raw material to the stocking of the finished product.

4.4 BUSINESS MODEL CANVAS FOR E-COMMERCE OF LOCAL SEAFOOD PRODUCTS

Figure 6 Business Model Canvas for E-COMMERCE of LOCAL SEAFOOD PRODUCTS

<p>Key Partners </p> <ul style="list-style-type: none"> • Payment systems (banking) • Feedback system • Some important partners of real cases e-commerce • Source of sold goods, fishermen/co-operatives/suppliers 	<p>Key Activities </p> <ul style="list-style-type: none"> • Cold chain maintenance • Law traceability requirements • Best practices on logistics or activities from case studies <p>Key Resources </p> <ul style="list-style-type: none"> • Storage depot • Fish: Following the specific business model (fresh fish in general, a fish niche, fish complementary goods or others) 	<p>Value Propositions </p> <ul style="list-style-type: none"> • Disintermediation - Fishermen empowering • Added values: Freshness perception; Seasonality and sustainability; Comfort • Accountable traceability value • Convenience • Fish origin • Added value focus from case studies 	<p>Customer Relationships </p> <p>Partner's case study</p> <p>Channels </p> <ul style="list-style-type: none"> • General trends • Mobile phone as a gateway • Channels best practices from case study 	<p>Customer Segments </p> <ul style="list-style-type: none"> • Ready to serve dishes • Healthy-foods oriented consumers • Freshness and origin driven consumers • The Conscious consumerism movement • B2B oriented ecommerce • Customer segments from case studies
<p>Cost Structure </p> <ul style="list-style-type: none"> • Shadow warehouse • Cost of raw material • Cost of IT infrastructure (app, website, dedicated staff) • Cost of logistic service (in-house or third-person logistic) 		<p>Revenue Streams </p> <ul style="list-style-type: none"> • Larger menu = higher average purchase • Pandemic opportunities 		

KEY PARTNERS	<ul style="list-style-type: none"> • Payment systems (banking) • Feedback system • Some important partners of real cases e-commerce • Source of sold goods, fishermen/co-operatives/suppliers
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CUSTOMER RELATIONSHIP	Partner's case study
CHANNELS	<ul style="list-style-type: none"> • General trends • Mobile phone as a gateway • Channels best practices from case study
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REVENUE STREAMS	<ul style="list-style-type: none"> • Larger menu = higher average purchase • Pandemic opportunities
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KEY PARTNERS:

Banking systems

One of the most delicate elements of an e-commerce is the presence of a reliable online banking and payment system.

Most of the e-shops admit payments through different payment circuits in order to facilitate customers during the order. In the case of OraPesce.it it's possible to pay the orders through PagOnline Unicredit and Paypal.

PagOnline, powered by the Italian bank Unicredit, allows to receive money from Visa, Visa Electron, Mastercard, Maestro, American Express and Postepay.

Paypal instead directly admits the very same credit/debit cards and indirectly accepts bank transfers to fill the Paypal wallet.

Easiness, liability and reliability are key and indispensable qualities in the choice of the correct banking partner.

Feedback system

Online shops (especially if freshly inaugurated) are sometimes seen with a sort of suspect from some customer segments. This is particularly true about the older customers (who also are the ones with greater economic availability) that are still restrained to use their credit card online due to digital risks. Adhering to a feedback system can be a risk-reducing move that helps customers to trust the vendor.

In example, Orapesce adhered to the online feedback system "Feedaty". This system guarantees real comments and vote to the e-shop, encouraging uncertain consumers to submit orders. In this specific case potential customers can check, even without having bought anything, that the 98% of the real customers evaluated their experience positively with an average rate of 4,9/5. Feedbackers are asked to evaluate different aspects such as shipping timing and products quality.

Source of sold goods, fishermen/co-operatives/suppliers

As the fish consumers are generally quite requesting, for every kind of fresh fish e-commerce, a very important relationship (possibly based on quality and reliability) has to be built with the producers or the source of the saleable goods.

Some important partners of real cases

E-commerce	Important partners
Itticosostenibile.com	Being the sustainability a core value of the business model, one of the most important partners' class for this e-commerce is represented by the <i>fair-trade purchasing groups</i> (GAS, gruppi di acquisto solidale). Itticosostenibile does supply 15 GASs within the provinces of Venice, Treviso, Brescia and Sondrio.
Freshfishalert.it	The supply of fresh products is of staple importance for Freshfishalert. It does operate with more than 100 fishing units working in the coastal waters of the Gulf of Catania.
Pescato.net	It is a project born from the Mare Nostrum cooperative. Mare Nostrum does bring together fishermen from the Viareggio area of Tuscany.
Mangialocale.ml	MangiaLocale's central vision is to set up a network among the agri-food sector enterprises in order to enable them to sell their products directly. The implementation of a wide network of enterprises, and the maintenance of the relationship with them, is thereby of central importance for an effective realization of the project.

KEY ACTIVITIES:

Cold chain maintenance

As this kind of business is carried out with a very perishable food, the implementation of an effective cold chain along all the phases of the supply chain and distribution is essential.

The cold chain is to be considered broken every time the seafood's temperature rises above 1°C, as it leads to quality loss that cannot be reversed by any means. Thereby, in order to maintain as high as possible the quality of the fishery products and maximize its shelf-life, temperature fluctuations have to be avoided.

As a best practice, many fresh fish e-commerces do operate the deliveries following all the prescription suggested by the *Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP)*. The ATP is an international standard, signed by 50 countries within the U.N. framework. In a practical case, as in Orapesce.it experience, enhancing the ATP means fulfilling deliveries made guaranteeing a cold-chain

between 0 and 4 degrees, dispatching the products within isothermal packages posed into an ice-filled box.

Traceability, law requirements

As reported in the European Regulation (EC) no. 178/2002, the definition of "traceability" is the possibility of tracing food, feed, food-producing animals or substances intended for incorporation or expected to be incorporated into food or feed, through all stages of production, processing and distribution. Any business operating in this field must have information about the step before and the step after it, that is, about the person who supplied them and the person to whom they delivered their products.

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The minimum amount of information to be provided consists in identification number of each batch, identification number and name of the fishing vessel, FAO three-letter code for each species, date of the catch, quantity of each species (in kilograms net weight or, if appropriate, in individuals number), name and address of the supplier and all the information requested by the Article 35 of regulation (EC) nn. 1379/2013 (trade name, scientific name, relevant geographical area, method of production and information on whether fishery products have been previously frozen).

For each batch, when a unique identification or a LOT number is applied, it should include L marking and document type designations (LOG - electronic register of commercial fishing at sea, LB - register of commercial fishing at sea, CR - catch report). It is a numerical code consisting of: the last two digits of the year, the last five digits of the CFR number of the vessel; in the case of an electronic register - the last three digits of the serial number, or in the case of a paper register or report - the last four digits of the serial number of the register or report; FAO species codes.

Fish: Following the specific business model (fresh fish in general, a fish niche, fish complementary goods or others)

The main resource for an e-commerce of this kind is the raw (or processed) fish provided by the producer(s). Depending on the kind of e-shop (i.e. crustacean-based, mollusks based, geographical provenience based or fish in general) it can be focused on a particular species or family. Moreover, many e-commerce already operating in the Italian market do sell many complementary products with the aim of raising the average shopping cart. This has the effect to capture a higher share of revenues and at the same time to lower the effective delivery cost for the company and makes this kind of resources potentially relevant.

Best practices on logistics or activities from case studies

As logistics is a central aspect of the fresh fish e-shop, here will follow some best practices recognized within Italian businesses already operating in the sector.

	Logistics / activities
Pescenostro.it	<p>Fresh fish is directly home-delivered twice a week in some of the biggest cities of those region: Marche, Emilia-Romagna, Lombardy, Veneto, Lazio and Umbria. The delivery is free of charge but a minimum order of 40€ is requested so as to achieve economical sustainability.</p> <p>Shipments are organized and forwarded by means of the company refrigerated van fleet or by partners couriers.</p>
Ilpescatoreonline.it	<p>This e-commerce stocks up directly at the Milan fish market, and is able to forward deliveries directly at home within 24 hours in all Italian territory and within few hours in Milan.</p> <p>Ilpescatoreonline’s business model doesn’t include an internal delivery fleet. In fact, all the expeditions are carried out through third party logistics. The regular national delivery are contracted to SDA (Poste Italiane), while the Express deliveries in Milan are provided by a private courier.</p> <p>Great attention is given to hygiene:</p> <ul style="list-style-type: none"> • An ad-hoc trained operator follows all the stage of production, storage, processing, preparation and administration in order to ensure a full implementation of the mandatory HACCP protocol rules. • The laboratory has been certified by the EC Stamp according and in line with the directives of the “Hygiene Package” (European Regulation EC 853/2004 et al.) <p>Each order is individually packaged into isothermic containers that can maintain he temperature between 0°C and 2°C for at least 72 hours by virtue of the frozen gel inserted into the fish box. This performance level is a sufficient guarantee of quality for all the national deliveries.</p>
Pescolo.com	<p>Pescolo.com is focused on the delivery of fresh fish cleaned and ready-to-cook.</p>

	<p>Customers can receive the goods in a 2-hours window on a fixed weekly day.</p> <p>The service used to be active on the whole Italy but due to the recent troubles in logistics it now temporary restricted the operating area.</p> <p>Deliveries do have a fixed cost of 5€ for the customer.</p>
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KEY RESOURCES:

Best practices from case studies

Itticostenibile.com	valorizing the local production and the less invasive fishing methods with particular attention to fish species defined as “poor” for their low commercial value.
ToscoPesce.online	<p>Fresh fish: caught at several seas around the world.</p> <p>Frozen fish: Fish is frozen on board and packaged with attractive packaging;</p> <p>Other food products (flour, vegetables, meat, oil).</p>
Pescheriatarabico.it	Several sections are displayed for shopping within the APP: fish (including fresh fish, molluscs, ready to cook products, seafood sauce), dairy products, butchery, gastronomy, artisanal preserves, wines.
Ilpescatoreonline.it	<p>The platform offers a wide range of products: crustaceans, crudités, oysters, blue fish, molluscs both caught in the open sea and coming from certified and controlled farms, smoked and portioned fish (a selection of fish already cut into carpaccio, tartare, fillet or sliced dosed and portioned).</p> <p>Each product has its own data sheet rich in information, from the production site to the processing method in any, the type of product, scientific name, conservation, tools used for fishing, allergen, data sheet, nutritional values, conservation and cleaning.</p>

<p>Pescolo.com</p>	<p>The enterprise purchases fish directly within the main Adriatic fish markets (Chioggia, Cesenatico, Rimini, Fano, Ancona and San Benedetto del Tronto) and by fishermen and breeders from the North Sea, Spain and France. [...] Seasonality and daily availability also due to weather conditions are values of a paramount importance for the enterprises.</p> <p>[...]Pescolo offers fish boxes ng from a catalogue of 20 kind of boxes. The fish boxes can have 3 different sizes according to the meal needs of a family of two, three or four people with fixed price (20 €, 30 € and 40 €). Some of the ingredients can change, also taking into account principles of availability and sustainability, nine out of 20 boxes offer the products variability each week. The boxes are carefully selected taking into account seasonality and nutritional aspect of the different species.</p>
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Storage depot

In order for this business to work properly with the shipping system, an efficient fresh fish storage base is necessary. The depot needs to be on a strategic place, close both to the connection with the harbors where fish is landed and to the shipping hubs.

VALUE PROPOSITION:

Disintermediation - Fishermen empowering

As almost the 90% of the fish stock in the Mediterranean Sea is presumedly overexploited, methods and intensity of the fishing efforts need to be more compatible with the potential of biological renewability of the species. Moreover, weak market engagement and poor involvement of the fishing sector in decision-making processes worsen the situation.

One of the value propositions of this business model is the possibility to enhance a supply chain disintermediation along with the fishermen empowering, able to shorten the supply chain. The fishermen empowering is also recommended by the Common Fisheries Policy of the European Union. The modification happened in the fish market during at least the last 20 years in fact increased the relative strength and the control of large distributors. The giants of the retail distributors (such as Tesco, Costco, Sainsbury) successfully put deflationary pressure on seafood,

squeezing the margins for fishermen and forcing them to look for alternative markets for their products.

Speaking about quality, a short market chain can also allow to reduce costs while raising quality products.

Added values:

Freshness perception:

A direct distribution channel such as an e-commerce can be perceived by customers as more able to guarantee the freshness of the products, if confronted to traditional channels.

Seasonality and sustainability:

The e-shops that base their catalogue on seasonality put more attention on products organoleptic qualities and environmental sustainability. This is of great value for all the customer segments that evaluate positively the seas health status.

Comfort:

Some sociological research (i.e. Caldarovic et al. 2017) highlights that an aggravating factor in fish shopping is the difficulty to park a car near the fish market. In this sense, a home delivery can help this kind of customer to easily be supplied.

Accountable traceability value

The establishment of an effective traceability system, along with the law requirement, can serve different purposes and bring more perceived value to the final product.

A tracking system does have the main objective of providing transparent reliable information. This information is directed to a multiplicity of stakeholders, including the very own company, consumers, state inspection bodies and technical auditors.

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The traceability system can also provide internal logistical support, establishing a feedback loop of information able to improve quality and efficiency of the deliveries.

Convenience:

Some customers evaluate very positively the role of e-commerce in increasing convenience confronting to traditional retail channels. They do measure convenience advantages in terms of saving time, saving energies, ease of ordering and the direct contact with producers.

Fish origin:

Many researches on consumer behavior proved that, particularly for fresh fish, the origin of the fish is an important choice factor.

Generally speaking, fish from Europe is preferred since it's perceived as safer thanks to European health and food safety regulations. Moreover, in the case that fish from Europe have the same price, products from the same region or country are chosen with a higher frequency.

Added value focus from case studies

Website	Added value ¹⁴
Pescenostro.it	The central value delivery mission is oriented to provide customers with fishery products of guaranteed, local, catch origin
Itticosostenibile.com	This e-commerce gives particular attention to the sustainability value, and delivers additional services as informative and training activities
Toscopesce.online	The presence of a wide basket of available goods furnishes a great convenience to the customers that doesn't want (or have the time to) split the grocery shopping into many different sources
Fishfishalert.it	As this project involves a huge number of fishermen and sector associations, it validates the empowering process of producers. This is of great interest to customers who evaluate positively the sea sustainable exploitation

¹⁴ Source of the whole table is Mapping of the existing initiative, models of seafood products e-commerce and home delivery and possible evolution. Prizefish WP5 (December Draft)

Ilpescatoreonline.it	<p>A staple point of the value delivery operated by ilpescatoreonline is the convenience and the customer-orientation.</p> <p>Those elements are carried out through an easy-to-use and well-structured website that incorporates a dedicated Customer Service and the possibility to buy giftcards.</p> <p>Additionally, the fish orders include a free cleaning service for those who doesn't like (or doesn't have the knowledge to) personally clean it</p>
Pescato.net	<p>Having a direct contact with the cooperative, customers can have an higher perception of the products quality, which trust is strengthened by a live chat assistance</p>
Pescolo.com	<p>A fish box weekly subscription system does simplify the fish supply for the customers who regularly eat fish. For this segment, value is given by the easiness of the supply (no need to spend time and energy on it) along with its quality</p>

CUSTOMER RELATIONSHIPS:

Partner's customer relationships (as from interview)

PARTNER CASE STUDIES	
ASSAM	<ul style="list-style-type: none"> • Promo codes and offers for the customers • Personal assistance and contact with fishermen selling their own products
BIVALVIA	

CHANNELS:

General trends

The actual state of the fresh fish supply chain sees retail channels mainly composed by supermarkets and hypermarkets, fish retailers, fish markets and grocery stores, with large retailers taking the lead over fishmongers particularly in Northern Europe.

Increased competition and improvements in logistics opened the road for the consolidation of the distribution channels particularly for frozen or processed products, but are still affecting the fresh fish market.

Large retail chains buying fish directly from producers is also another emerging trend especially valid as concerns aquaculture products. The requirements for this supply primarily relate to safety, good service and efficiency. These trends lead to the shortening of the supply chain and more and more direct relationships between the supplier and the retailer, where delivery must be traceable at all times. This latter trend, in a similar way, can be implemented directly by the producers through the use of e-commerce.

Mobile phone is a relevant gateway

An effective fish e-shop has to keep in consideration that the contact medium with electronic commerce in the last years partially moved from desktop to mobiles, and thus should include the mobile platform as a priority gateway.

Even in the last year of intermittent lockdowns, smartphones have been the preferred tool for online researches and purchases. Up to now they account for the 56% of the total online transaction

Channels best practices from case study

Website	App/social networks/informative channels/sales ¹⁵
Pescenostro.it	Orders from Pescenostro can be done both online (by pc/laptop or mobile) and offline (at one of the authorized “Pesce Points”) Furthermore, a Facebook profile shows the products and act as a customer magnet
Itticostenibile.com	This project implemented a great variety of channel mediums. <ul style="list-style-type: none"> • A website under construction will shortly permit to directly make orders. • A Facebook profile, a WhatsApp number and a newsletter are used to divulge the offers of the day and, when available, videos of the daily catch operations

¹⁵ Mapping of the existing initiative, models of seafood products e-commerce and home delivery and possible evolution. Prizefish WP5 (December Draft).

	<ul style="list-style-type: none"> • The participation to the Too Good To Go project/app offers the possibility to sell (at a third of the original price) products close to the expirations date that would otherwise remain unsold • The cooperation with GASs (ethical purchasing group, citizens interested in fairtrade organized on local bases) is enhanced through the creation of a reserved product list.
Tscopesce.online	<p>It utilizes social network as Facebook and Instagram to communicate.</p> <p>A mobile application is on construction and will abilitate customers to directly make orders.</p>
Pescheriatarabico.it	<p>This project uses a Facebook page to attract customers and communicate news.</p> <p>A free proprietary application for android and iOs, available on the most common app stores, makes possible to carry out orders. Through the app, customers can visualize all the available species, see the exact prices, choose the wanted products and add to the cart. Registered users can also receive promotions and order the home delivery, after a short registration process.</p>
Fishfishalert.it	<p>This project does have an app on construction, which up to now is still not operative.</p> <p>A Facebook page (progettodiverso) gives general information about this project, funded by the EMFF 2014-2020</p>
Ilpescatoreonline.it	<p>Communications are enhanced through a Facebook page, a website and a WhatsApp number (also directly accessible from the website)</p>
Pescato.net	<p>The Pescato.net website platform is accessible from pc and smartphone. After the account registration, customers can log in and check the daily offers availability in terms of species, quantity and prices. Photos of the fish are also shared online.</p>

	During the purchase process, customers can be supported by a live chat assistance
Pescolo.com	This e-commerce is linked to a Facebook page and developed a Newsletter to be constantly updated with the news
Mangialocale.ml	<p>This project has developed a website and an Android//iOs application that shows the products of all the directly selling farms who adhere at the project. From this platform is possible to browse the production and check if the selected producer does home delivery or requests to go at the farm.</p> <p>The home delivery service has been added during the second half of the 2020 due to the increasing demand caused by Covid-19 restrictions.</p> <p>A strong attention has been posed on social media presence as they administrate a Facebook page, an Instagram account and a Youtube channel.</p> <p>The orders are managed in different ways basing on the specific producers: some requests to contact and reach the farm, others offer multiple choices (in-house home delivery for certain close municipalities or express courier delivery for farrer locations).</p>

CUSTOMER SEGMENTS:

Ready to serve dishes

As already partially said, modern lifestyles usually include extended working hours and the consequent lack of time to prepare elaborated dishes. A new class of consumers thereby emerged, who is eligible at being very interested in quick preparation products that require low-to-none time or energy effort. Ready-to-serve dishes (or products that require a short heat treatment) are very suitable for this consumer segment and can thereby be inserted in the catalogue to attract this class of consumers.

Healty-foods oriented consumers

Given the healthy image enjoyed by fish, fishery products are suitable to be fully inserted into the healthy food consumption modern trend. Healthier diets require to be low in calories and high in nutritional values, and fish fits quite well in this description as it has a lower content of fat and a high content of proteins, vitamins and minerals. Moreover, fish are characterized by the presence of other beneficial effects, given by particular nutrients as the omega 3 fatty acids that helps preventing heart diseases and the circulatory system.

Health-focused people (or people with pre-existing health problem) are thereby a potential customer segment.

Freshness and origin driven consumers

A survey, carried out by Eurobarometer in 2018 including 27.000 European citizens, proved that he 77% of respondents use to buy fishery products in shops and supermarkets. The 59% of them further explained that their buying choice is mainly moved by the appearance of the product, defining appearance as freshness and presentation. After this motivation, choice has been signaled as price-driven and the third most important factor chosen was the geographical origin of the product.

From this survey emerges that there is commercial room for fresh and locally caught fishery products and suggests that the design of the website should include and highlights this kind of information in order to be more attractive and distinguishable. In addition, an e-commerce focused on local valorization could capitalize on this products' properties.

The Conscious consumerism movement

A relatively new trend in the markets is the *responsible retail*, mainly directed to the "conscious consumerism", the milder version of the anti-consumerism movement emerged in the last 20 years.

The archetype of the consumers who identify themselves in this large movement is a person focused on environmental protection, social responsibility and sustainability. At the same time, the market offer for sustainable food products is only about the 15% but presented an high growth during the last 5 years. For reasons already written, an e-commerce of local fresh fish is a useful tool in order to being supplied with sustainable fished fishery products.

This latter change of shopping habits is led by the so-called Generation Z and Millennials who represent a growing market sector and are moreover the most predisposed to natively use online services for their daily needs.

B2B oriented ecommerce

The online purchase of fresh fish and seafood products is a concrete necessity for some small restaurants owners and for enterprises offering cooking classes or “chef at home” services, in particular if operating on some internal area where the retail chains and traditional channels are not focused on this kind of high-quality products.

Customer segments from case studies:

	Customer segment
Toscopesce.online	<p>This project is focused on the B2B sector.</p> <p>The main target is the Ho.Re.Ca. (namely hotels and restaurants) and It makes a strong point on the ability to supply fresh products in a very short time respecting the current quality standards and regulations in force</p>

COST STRUCTURE:

Shadow warehouse

Some e-commerce business model stocks the products available on the platform in dedicated warehouses. This admits to noticeably speed-up the shippings and lowers the average costs at the same time. Of course, the organization of a dedicated infrastructure does have a fixed cost and need to be carefully evaluated.

In the particular case of Easy-coop, the whole shipping process is fully tracked from the depot and consumers receive a text message shortly before to delivery to be ready and at home.

Cost of raw material

The raw (or the already processed) fish supply is a relevant cost for an e-commerce in the case it’s not run by producers. Drivers of this cost are the distance from the landing site, the species, the quality and the market conditions.

Cost of IT infrastructure (app, website, dedicated staff)

Depending on the internal organization, the implementation of online platforms does reflect on the operative work needed. A dedicated staff should be thereby hired in order to dedicatedly follow all the e-commerce operations.

The platform uses itself does come with some additional costs, such could be the website building, the mobile phones application or social network engagement analysis reporting.

Cost of logistic service (in-house or third-person logistic)

A relevant share of the costs for the general e-commerces is the delivery, in particular regarding the last mile. This is particularly true concerning e-groceries. Even if third party logistic could seem cheaper, the quality of the service, its reliability and recognizability from the customer have also to be accounted.

REVENUE STREAMS:

Larger menu = higher average purchase

A variously assorted catalogue (including complementary products or completely different kinds of goods) usually provides higher average purchases. Having a fixed trouble in waiting the delivery van at home when expected, makes the customers feel as buying other products present a null marginal fatigue.

Pandemic opportunities

The Covid-19 crisis is accelerating the expansion of e-commerce towards new customers and types of products, likely involving a long-term shift of e-commerce transactions from luxury goods and services to everyday necessities as can be food and groceries. The pandemic social effects included the greater use of information technologies and the restrictions of movements, preparing the field for a massive habit change.

A report from the eCommerce B2c Observatory (Milano Politecnico) highlighted that in Italy e-commerce ranks among the most developing sectors in past years. During 2020 there has been a significant increase of +26% by value confronted the previous year.

4.4.1 BUSINESS MODEL CANVAS FROM PILOT ACTION – P.P. ASSAM

KEY PARTNERS	<ul style="list-style-type: none"> • Fishermen • Producers association and consortium of fishermen coordinating and supporting fishermen activities for innovative marketing and distribution model • Consumers association and ethical purchasing groups • Public Authorities e.g. FLAG helping to connect fishermen and consumers • Food bloggers that can support the innovative marketing and delivery model
KEY ACTIVITIES	<ul style="list-style-type: none"> • Searching for the nearest fishermen • Searching and filtering the available products • Reaching the nearest direct selling point for fresh fish from the Adriatic Sea • Get in contact with the fishermen for the order and the delivery of the products • Platform management • Supporting the growth of the network of consumers and fishermen selling fresh fish from the Adriatic Sea
CUSTOMER SEGMENTS	<ul style="list-style-type: none"> • Consumers sensitive to Issues of sustainability, 0Km/0mile and fresh products, local economy support; • Ethical purchasing groups (GAS) • Middle/high class influenced by new cooking habits as consequence of Covid19 pandemic • Fishermen interested in increase direct selling and promote their own products • Restaurants preparing and selling fresh fish from the Adriatic Sea
VALUE PROPOSITION	<ul style="list-style-type: none"> • Providing consumers information about the origin and the quality of the products • Exact price of the species • Providing consumers with access to fresh, locally landed fish at attractive prices • Possibility to have direct contact with the fishermen and know details about the enterprise • Sustainability of the products (no transport for the products, no intermediaries)

	<ul style="list-style-type: none"> • Information on nutrition properties, seasonality and other features of the available species of the Adriatic Sea • Empower consumers to choose quality and local products • Valorisation of the “poor fish” in direction of social, economic and environmental sustainability • It generates more orders of fresh fish during the year, an additional income possibility for the fishermen promoting their catches directly to potential customers
CHANNELS	<ul style="list-style-type: none"> • Mobile App for iOS and for Android • GPS navigation mode to reach the easiest way the selling point of the fresh food • Mobile number and WhatsApp chat of the fishermen available for customers downloading the App • Social media helping fishermen to develop the on-line presence
CUSTOMER RELATIONSHIP	<ul style="list-style-type: none"> • Promo codes and offers for the customers • Personal assistance and contact with fishermen selling their own products
REVENUE STREAM	<ul style="list-style-type: none"> • Standard Fee from fishermen/enterprises partners joining the APP after the testing phase • Marketing and Advertising fee from fishermen/enterprises partners
COST STRUCTURE	<ul style="list-style-type: none"> • Technology (Software maintaining cost, technical assistance and customer support) • Availability on the Android and iOS store, App • Promotion/marketing cost, • Discount for customers
KEY RESOURCES	<ul style="list-style-type: none"> • Customers demanding and ordering fresh and local fish from the Adriatic • Selling point for fresh fish (small fish market in the coastal city) • vehicles and proper equipment for fish delivery

4.4.2 BUSINESS MODEL CANVAS FROM PILOT ACTION – P.P. OP BIVALVIA

KEY PARTNERS	<ul style="list-style-type: none"> • Marketing agency • Social network influencer (famous chefs, others...)
KEY ACTIVITIES	<ul style="list-style-type: none"> • Recalibration of the packaging machines to serve domestic customers • Marketing and social networks activities • Delivery activity (started within 50 Km, progressively extended to 200 Km on customers request) • Processing activities to cover a greater product spectrum, along with a strong attention to the consumers feedbacks to understand which products are requested by the market
CUSTOMER SEGMENTS	<ul style="list-style-type: none"> • As it started during the Covid-19 pandemic, domestic consumers were the most important segment. • On a marginal share, ready-to-cook or processed products sold with multi-language packages intended to be appreciated by tourists during the summer season. • In a second time, the Ho.re.ca. sector came back as an important destination.
VALUE PROPOSITION	<ul style="list-style-type: none"> • Local, certified, high-quality clams and other fishery products. • Processed and Ready-to-cook high quality products
CHANNELS	<ul style="list-style-type: none"> • Bivalvia communicates with the customers through a dedicated website (where is possible to submit the orders) • Social networks as Facebook and Instagram are great source of viral advertising or medium through which explain the product's origin and the daily catch or just to share recipes and curiosities to stimulate the public attention
CUSTOMER RELATIONSHIP	<ul style="list-style-type: none"> • Individual assistance: contacts take place on Facebook, where they can ask for recipe suggestions or be informed about food provenience
REVENUE STREAM	<ul style="list-style-type: none"> • Directly depending from quantity and magnitude of the orders
COST STRUCTURE	<ul style="list-style-type: none"> • Certification costs (around 100.000€ to start the program + a variable cost depending on the yearly quantity of certified product) • Marketing consultancies costs • Delivery activity costs: 1) a dedicated van appositely bought and adapted to maintain the cold-chain 2) Assigned van operator

KEY RESOURCES	<ul style="list-style-type: none">• Both financial resources (investments) and informal resources (network of customers, influencers, local support)• Processing plants
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