Interreg
Italy - Croatia
PRIZEFISH
European Regional Development Fund

EUROPEAN UNION

PRIZEFISH PROJECT

PILOTING OF ECO-INNOVATIVE FISHERY SUPPLY-CHAINS TO MARKET ADDED-VALUE ADRIATIC FISH PRODUCTS

Consumer attitude towards eco-innovative seafood products, designing eco-innovative value chains and the PRIZEFISH APP for the valorization of the Adriatic fish products

Cross-Border Training Module (Activity 5.4)


4SB 401

Index

The PRIZEFISH project

The European project of territorial cooperation **"PRIZEFISH - Eco-innovation of fishing chains in the Adriatic for the marketing of fish products with high added value"**, co-financed by the INTERREG VA Italy - Croatia 2014-2020 Program, has set itself the ambitious goal of contribute to the renewal of the entire Adriatic fish chain, developing sustainable fishery products from both an environmental, economic and social point of view.

The project was funded under the **"Blue Innovation" priority axis** of the Italy-Croatia 2014-2020 Program, which aims to improve the conditions for innovation in the relevant sectors of the Blue Economy for the Adriatic Regions involved, which also include fishing and aquaculture activities.

This project assessed the main recent consumers' trends by exploring appreciation and concerns of customers regarding relevant attributes of seafood, such as Quality, Sustainability and Local Production. More specifically, the following aspects have been assessed:

1. Understanding the **general consumer attitudes** towards seafood (main drivers and barriers to seafood consumption)

2. Understanding the **reaction of consumers** on specific new proposed eco-innovative products, in terms also of willingness to buy and willingness to pay

3. Understanding the **perceived importance of ecologic/ sustainable choices** inside fishery supply chain by consumers (e.g., certifications).

This has been done through first a qualitative analysis and then a quantitative analysis on a panel of seafood consumers in Croatia, Italy and Spain. The analysis provided useful feedback for the development of **3 new eco-innovative products** and **a new certification scheme** which have been built through a collaborative evaluation process within PRIZEFISH partners, including universities and producers.

The PRIZEFISH project therefore intends to offer sector operators the opportunity to promote and enhance the selected products through eco-innovation processes and certification tools.

This module will help summarize main results of the project. Specifically, the **first section** will focus on presenting main consumers' attitudes and perceptions on eco-innovation concepts and sustainable certifications in the fishery sector. Then, in the **second section,** eco-innovative value chains design recommendations have been elaborated using the framework of the Business Model Canvas. Finally, the **third section** presents the PRIZEFISH App developed for the valorization of the Adriatic fish products.

These results will be translated into knowledge to be transferred to main supply chain operators, thus, empowering key actors who potentially can take the lead in converting research into innovations.

CONSUMER ATTITUDE TOWARDS ECO-INNOVATIVE SEAFOOD PRODUCTS

1.1 Recent demand trends

1.1.1 Main market trends and target markets

The European Union is one of the most relevant world's markets for fishery and aquaculture products, in terms of consumption and economic relevance.
Despite being a globally relevant producer, the European demand is such significant that can be fulfilled and sustained only through imports from outside the Union. As a matter of fact, the EU fish-balance position is being a net importer whose specific commercial deficit for FAP's amounted at around 21 billion Euros during 2019 (Eumofa, 2020)[1].

However, a drop on supply for European citizens has been registered for the past year, supposedly because of a mix of reasons comprehending the lower volume of available catches, the reduced production of farmed fish and the increased export of wild-caught products. Despite this average decrease, some countries moved against the general trend or in the same direction but with a different and thereby noticeable magnitude. In fact, from 2017 to 2018, **Italian apparent consumption increased** in volume by 1% (up to 31.02 Kg/capita/year) and **Croatian increased** by a strong 6% (to 19,19 Kg/capita/year). **Spain** instead presented a **reduction** of 1% (to 46,01 Kg/capita/year).

However, European markets do not share the same characteristics on fish catches and consumption and should be considered, for a deeper understanding, as separated

1. Eumofa (2020). The EU fish market, Publications Office of the European Union

but highly interrelated markets. According to CBI Ministry of Foreign Affairs (2020)[2], the European Union can be divided into three homogeneous blocks:

1. **Southern Europe** (Portugal, Spain, France, Italy and Greece): contains the main producers and consumers of FAPs. Those are also the major processing nations of the continent.

2. **Northwestern Europe** (Netherland, Belgium, Germany and the United Kingdom until Brexit): contains countries with relevant consumption and a strong commercial trade vocation.

3. **Eastern Europe** (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia): contains eleven countries with a lower consumption but greater growth possibility, especially now after the pandemic by shifting supply chains post-COVID 19, benefitting from the willingness of being less dependent from other markets.

After an overview of recent seafood market trends, **three main target countries** have been chosen for this project research: **Croatia, Italy and Spain**. This can be explained by the choice to keep a Mediterranean focus in the project and the recent trends of promising fishery markets for these countries. Italy and Spain have recently experienced a demand increase while Croatia on the other hand seems to be an interesting case to take into consideration to boost fishery supply and cope with increasing European consumption trends.

2 CBI Ministry of Foreign Affairs (2020). What is the demand for fish and seafood on the European market?, available at https://www.cbi.eu/market-information/fish-seafood/what-demand

1.1.2 Consumers' appreciation of eco-innovative seafood

The project addresses the **current consumption trends of seafood products in the EU**, with a particular focus on **Italy, Spain and Croatia.**

During 2019, all the EU household spent more than the previous year on fishery and aquaculture products. The per capita nominal **household expenditure** in 2019 **increased by 1% for Spain, by 2% for Italy** (who historically is the member state with highest total expenditure) and **by 5% for Croatia** (Eumofa, 2020).

Some recent trends have been probably boosting fishing consumption in the last years:

TABLE 1 - Main Trends Boosting Seafood Consumption

MAIN TRENDS BOOSTING SEAFOOD CONSUMPTION	
1. Convenience and practicality	In modern lifestyle, families averagely have less time to spend on grocery shopping and preparing the food, becoming more sensible to convenience and to the possibility to buy ready-to-eat or ready-to-cook dishes. A longer shelf-life guaranteed to the product can also be seen as convenience, as the product can be bought without an already organized occasion to consume it.
2. Health and well-being	The growing interest on well-being good practices, in particular referring to food habits and correct diets, boosts the demand.
3. Sustainability and responsible consumption	The fishery sector presents endemic problems of sustainability. There is the need to find an equilibrium between business profitability and safeguard of the wild fish stock. New generations and consumers in general appear to be more focused on the environmental impact of their actions.

A staple challenge for nowadays producers is thereby how to combine those attributes with a product that is often seen as traditional. From the producers' perspective, this emergency in the wild fish industry reflected into the need to intercept this new kind of demand and sustainability attention with a faster adoption and a more scientific use of eco-innovations.

European Commission defines **eco-innovation** as *"any innovation that makes progress towards the goal of sustainable development by reducing impacts on the environment, increasing resilience to environmental pressures or using natural resources more efficiently and responsibly".*

The fact of sustainability being a credence attribute makes very difficult even for ethic consumers to really understand what's in their dish and the real effects of their food choices on the environment. Eco-innovations can be in this sense a way for producers to signal to the customers (and to the whole market) their attention to the issue.

In this context, the project evaluates **customers' perceptions and appreciation towards fishery products,** including main social and psychological drivers and barriers to seafood consumption. Collecting reactions and feedbacks from consumers on these aspects will be fundamental for the future development of eco-innovative products.

1.2 The three eco-innovative products and certification schemes developed in PRIZEFISH

PRIZEFISH project has taken up the challenge of low propensity for innovation of this very traditional sector by developing **3 eco-innovative products** and **a new certification scheme.**

1.2.1 Eco-innovative products

Three eco-innovative product concepts have been built through a collaborative evaluation process within PRIZEFISH partners, including universities and producers.

The product concepts have been conceived with the aim to add value to the benefit of economic actors and to ensure sustainability along the fishery supply chain. In fact, they have three main features:

1. they exploit species that have been declared or are considered suitable for sustainable exploiting,

2. they allow for an extended shelf-life and

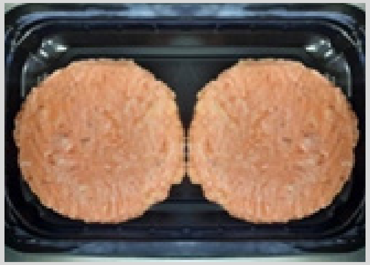
3. they provide ready-to-cook or ready-to-eat solutions to meet the needs of modern consumers.

After a first testing period on different ingredients composition, the three final product concepts have been defined as follows (Table 2):

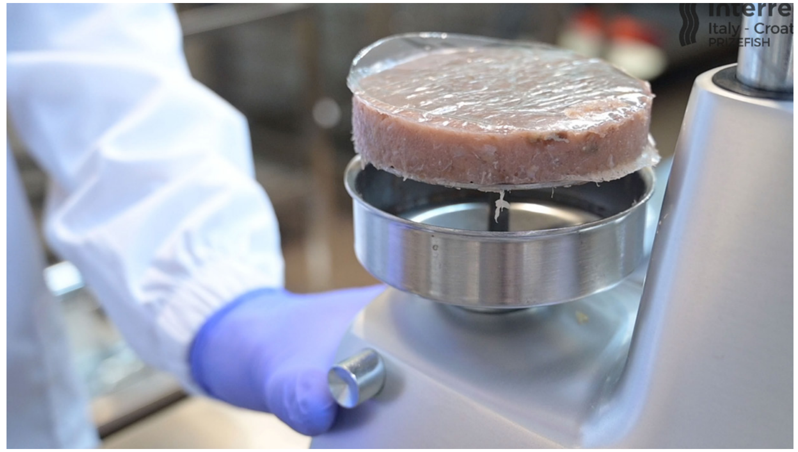
TABLE 2 - The eco-innovative product concepts

Product Concept	
Product concept 1 **Sardine Fillets**	
Main specifications	**Key innovative aspect**
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 Oxigen level in the packaging and its consequent substitution with Argon or NO2. By reducing oxidation reactions and microbiological spoilage and if correctly stored between 1° and 4°C, 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).
Product Concept	
Product concept 2 **Clams**	

Main specifications	Key innovative aspect
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 element of this product is the long-lasting aspect while still being a fresh product.

Product Concept	
Product concept 3 **Fish burger**	

Main specifications	Key innovative aspect
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.



1.2.2 Certification schemes

Two existing certification schemes have been used per each type of analysis:

- the **MSC** certification, the main reference seafood certification scheme for sustainable fishing at international level in the current fishery production system.
- the **RFM** certification, a third-party certification program for wild-capture fisheries documenting responsible seafood sourcing practices and proof of origin.

The PRIZEFISH project has also proposed a new RFM certification to be adapted to specific fishery areas of the Adriatic Sea, being referred to as **ARFM** (Adriatic Responsible Fisheries Management) certification.

The main features of the certification schemes are summarised in the following table:

TABLE 3 - The certification schemes

Type of certification	Description
Marine Stewardship Council (MSC)	Marine Stewardship Council is a non-profit organization that works to spread sustainable fishing. The MSC standard for fishing companies is widely used in products marketed by modern distribution. The MSC fishing standard is based on three key principles: • fishing must have a management system that leaves enough resources in the sea to ensure that the stock can reproduce, and the fishing activity can thus continue over time; • fishing must be carried out with gear and in areas that minimize its impact, allowing habitats and marine animals to thrive; • fishing must be managed by administrations and companies responsibly and in compliance with applicable laws.
Responsible Fisheries Management (RFM)	A RFM standard is developed on the basis of responsible fishing guidelines developed by FAO. This type of approach is already active in Alaska and Iceland. The RFM fishing standard is based on three key principles: • an efficient and adaptive management system, with clear sustainability objectives and which guarantees monitoring, control and surveillance of fishing activity; • availability of assessments of the status of the target resource and the ecosystem that hosts it, considering the specific impact of the fishing activity concerned; • the fishing activity must be characterized by compliance with social and safety at work policies and with economic indicators that highlight profitable activities.
Adriatic Responsible Fisheries Management (ARFM)	The ARFM certification process is developed as part of the PRIZEFISH project. The certification of fishing companies according to the ARFM standard will be voluntary and may be coupled with the MSC certification. This standard is open to all companies involved in fishing in the Adriatic (Geographical Sub Areas 17 and 18) and will include many fish species exploited with different types of tools. When a fishing activity is certified according to the ARFM Standard, its certified catch can be sold with a special mark that will document not only that the product was caught in the Adriatic, but also that the fishing practice is carried out in a responsible way.

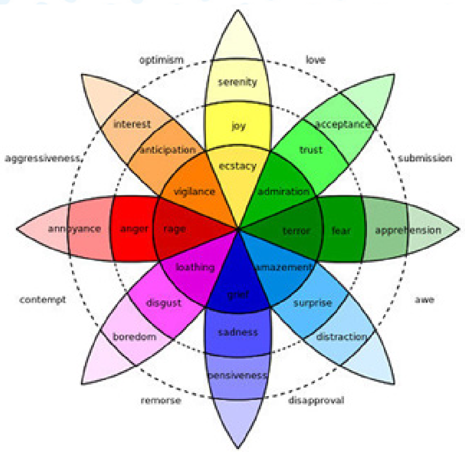
1.3 Consumers' perceptions on products and certifications

Consumers' attitudes on products and certifications have been evaluated through both qualitative and quantitative analysis.

First, in the **qualitative analysis**, attitudes towards seafood of around 190 consumers engaged in online discussion rooms have been evaluated in Croatia, Italy and Spain.

The qualitative analysis also collected information on consumers' **purchasing habits and preferences concerning seafood**. Respondents had to evaluate a list of product attributes indicating how much they agree with a series of statements on a score from 1 (disagree) to 9 (completely agree) for all three eco-innovative products.

FIGURE 1 - Plutchik's wheel of emotions



Furthermore, consumers' attitudes towards seafood have been evaluated using two techniques:

a) **sentiment analysis:** it has been used to study people's sentiments, opinions and attitudes towards services and products. Sentences given by the interviewees are classified in positive, negative, or neutral, according to a score range from -1 to +1.

b) **emotion analysis:** it has been used to study a series of emotions associated with the eco-innovative products developed. This analysis is based on **Plutchik's model**, which contains 8 types of emotions: 2 **positive** emotions (joy and trust), 2 **ambivalent** (surprise and anticipation), and 4 **negative** (sadness, fear, disgust and anger).

The **quantitative analysis** instead was carried out through structured direct interviews on a panel of 3760 purchasers of seafood in Croatia, Italy and Spain. Furthermore, a choice experiment was conducted to assess consumers' Willingness to buy (WTB) and Willingness to pay (WTP) for the three eco-innovative products proposed.

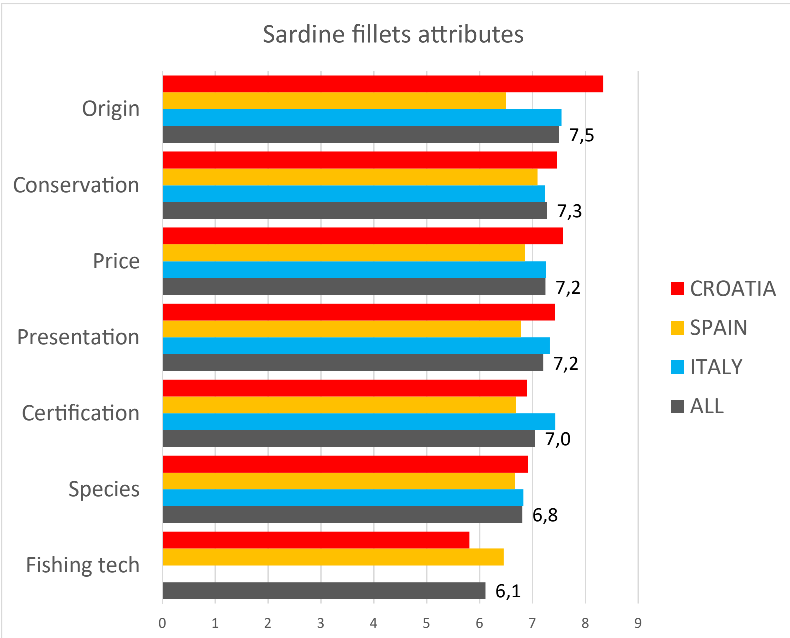
1.3.1 Sardine fillets

Attributes evaluation: Based on the interviews, it has been observed that consumers assign higher scores for attributes related to the **origin, conservation and price** when it comes to choose sardine fillets.

In particular, Croatian and Italian respondents seem to mostly pay attention on the origin of the product while Spanish respondents tend to focus more on conservation. Price seems, instead, an attribute particularly relevant only for Croatian and Italian respondents.

FIGURE 2 - Attributes' evaluation sardine fillets

Adriatic	6,79
Croatia	5,90
Italy	5,57
EU	5,51
Spain	4,93
Non -EU	3,73
MAP	7,04
Frozen	5,75
Fillets	6,90
Whole/headed/ gutted	6,06
MSC	6,88
ARFM	6,90
Sardines	6,43
Anchovies	6,05
Seine Fishing	6,00
Pelagic Trawling	5,40



Sentiment and emotion analysis: **positive** connotations are associated with almost all three proposed eco-innovative products in all the three countries. This has been confirmed also by the emotion analysis where the three most registered emotions were trust, anticipation and joy among all countries. Specifically, sardines have been the **most positively accepted product** among the three eco-innovative options, in all three countries.

Willingness to buy (WTB)

- **Shelf-life attributes:** while only **Croatian consumers** tend to prefer the **frozen product compared to the conventional** refrigerated product under protective atmosphere, the majority of consumers tend to prefer the conventional product over both the frozen and innovative options. Once considering also the no buy option, it seems that **consumers are open to new options in all the three countries.**

- **Price:** all consumers do not like to pay additional prices for sardines.

- **Origin:** they prefer to **buy sardines only from their country of origin** and not from abroad.

Attributes like city location, city size and income have also been considered.

- **City location:** Croatian consumers from inland have preferences for sardines regarding price similar to people from the coast.

TABLE 4 - Willingness to buy sardine fillets

Willingness to buy (WTB)			
Attribute	**Croatia**	**Italy**	**Spain**
Frozen	Consumers tend to prefer it compared to the chilled conventional one	Not significant	Consumers tend not to prefer it compared to the chilled conventional one
Innovative	Consumers tend not to prefer it compared to the chilled conventional one	Consumers tend not to prefer it compared to the chilled conventional one	Not significant
No buy option	Consumers are open to new options in the three countries		
Price	Consumers do not like to pay additional prices for sardines		
Origin (local level)	Consumers prefer to buy sardines from their country of origin		
Origin (foreign level)			

■ **City size and income:** Spanish people instead living in bigger cities associate higher prices of sardines with better quality while in Italy the same behavior is found in consumers with higher income.

Willingness to pay (WTP)

■ **Origin:** only **Italian and Spanish** consumers are willing to pay a **higher premium price** for sardines originating from their countries (respectively max + 6.22€ in Italy and max +5.81 € in Spain), compared to the ones from Croatia.

■ **Certifications: Italian** consumers are also willing to pay a premium price for certified sardines with **RFM** while **Spanish** consumers for sardines certified with **MSC**.

TABLE 5 - Willingness to pay sardine fillets

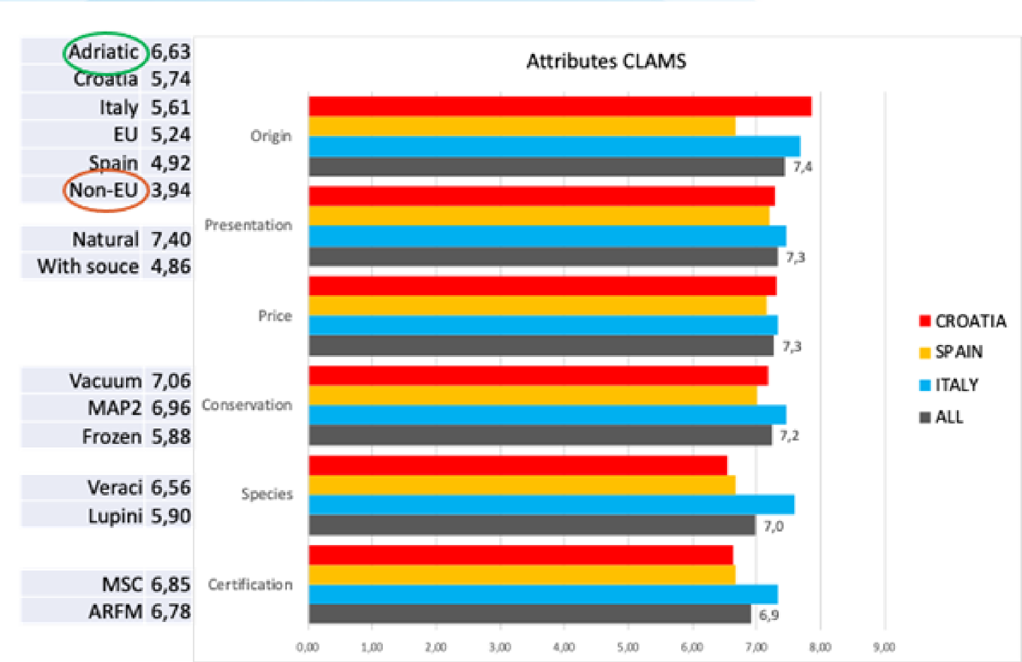
Willingness to pay (WTP)			
Attribute	**Croatia (€)**	**Italy (€)**	**Spain (€)**
Origin: Italy	-4,2	**6.22**	0.63
Origin: Spain	-3.9	0.32	**5.81**
Certification RFM	-0.13	1.41	NS
Certification MSC	NS	NS	1.03

1.3.2 Clams

Attributes evaluation: Consumers assign higher scores for attributes related to the **origin, presentation and price** when it comes to choose clams. Similar to sardines, Croatian and Italian respondents still mostly pay attention on the origin of the product. Unlike for sardines, when it comes to clams, Spanish respondents tend to focus equally on both presentation and price of the product.

Sentiment and emotion analysis: Clams have mostly received a **positive** connotation among all three countries, especially by Italian respondents. This has been confirmed by the emotion classification where the three most registered emotions were again trust, anticipation and joy among all countries.

FIGURE 3 - Attributes' evaluation clams



Willingness to buy (WTB)

- **Shelf-life attributes:** once again **Croatian consumers** tend to prefer the **frozen product compared to the conventional** refrigerated product, however the majority of consumers tend to prefer the conventional product over both the frozen and innovative options. Once considering the no buy option, it is confirmed again that **consumers are open to new options in all the three countries.**

- **Price:** all consumers do not like to pay additional prices for clams (higher values for Italy).

- **Origin:** they prefer to **buy clams only from their country of origin** and not from abroad.

The attributes of city location, city size and income have been considered for this product too.

- **City location:** Croatian consumers from inland have preferences for clams regarding price similar to people from the coast, and the same behavior is to be found among Italian inland and coast consumers.

- **City size:** the size of the city does not seem to affect consumers' preferences on clams.

- **Income:** preferences related to income are instead similar among countries, indeed, people with higher incomes associate better quality to clams with higher prices.

TABLE 6 - Willingness to buy clams

Willingness to buy (WTB)			
Attribute	**Croatia**	**Italy**	**Spain**
Frozen	Consumers tend to prefer it compared to the chilled conventional one	Consumers tend not to prefer it compared to the chilled conventional one	Not significant
Innovative	Consumers tend not to prefer it compared to the chilled conventional one		
No buy option	Consumers are open to new options in the three countries		
Price	Consumers do not like to pay additional prices for clams		
Origin (local level)	Consumers prefer to buy clams from their country of origin		
Origin (foreign level)			

Willingness to pay (WTP)

- **Origin:** Similar to sardines, **Italian and Spanish** consumers are willing to pay a **higher premium price for clams originating from their countries** (respectively max +10.5€ in Italy and max +32 € in Spain) compared to the ones from Croatia.
Unlike before, consumers from Italy and Spain are willing to pay a premium price for clams originating from Spain and Italy respectively, meaning that there is generally a **low preference for Croatian clams.**

- **Certifications:** **Italians** appreciate both **RFM** and **MSC** certifications, but they are willing to pay a higher premium price for RFM.
Spanish consumers prefer **both certificates** too but are willing to pay a **much higher** premium price for the **MSC**.

TABLE 7 - Willingness to pay clams

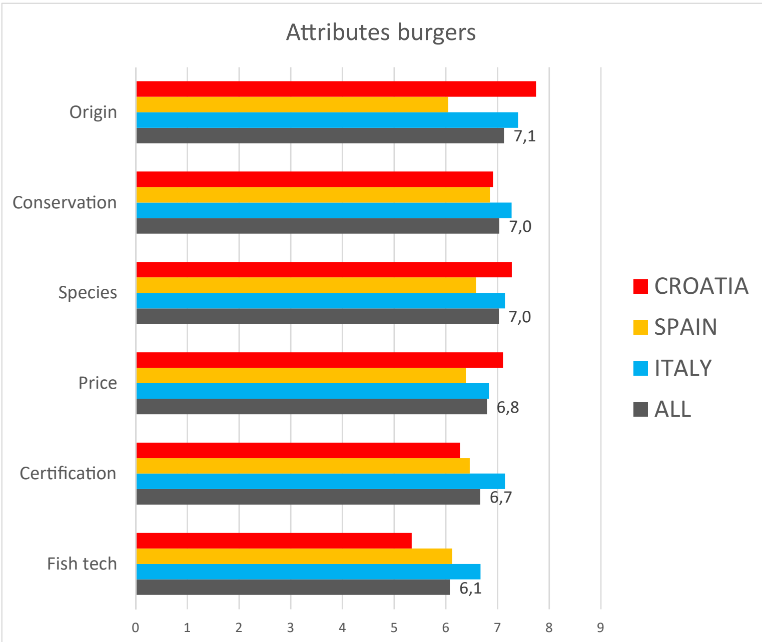
Willingness to pay (WTP)			
Attribute	**Croatia (€)**	**Italy (€)**	**Spain (€)**
Origin: Italy	-8.3	**10.5**	4
Origin: Spain	-9.3	0.5	**32**
Certification RFM	NS	1.92	3.5
Certification MSC	NS	1.75	8.5

1.3.3 Burgers

Attributes evaluation: Consumers assign higher scores for attributes related to the **origin, conservation and species** when it comes to choose burgers. Origin is still the highest scored attribute for both Croatian and Italian consumers while Spanish respondents do not seem to pay too much attention on this attribute, but mostly on conservation. Croatian and Italian consumers seem also to pay much attention on the attribute of species as component ingredients of the product.

FIGURE 4 - Attributes' evaluation burgers

Adriatic	6,59
Croatia	5,81
EU	5,45
Italy	5,40
Spain	4,94
Non EU	3,67
HPP 30 days	6,60
HPP 10 days raw	6,27
Frozen	5,70
Shrimp & mullets	6,41
Mantis shrimp & white fish	6,02
ARFM	6,65
MSC	6,59
Trap-nets	5,88
Trawlers	5,08



Sentiment and emotion analysis: Burgers have been mostly received a **positive** connotation among all three countries, especially by Italian respondents. This has been confirmed by the emotion classification where the three most registered emotions were again trust, anticipation and joy among all countries.

Willingness to buy (WTB)

- **Shelf-life attributes:** unlike sardines and clams, **in all three countries consumers are not interested in buying neither the frozen option nor the innovative burger** product compared the conventional one. However, once consumers are put in front of more than a choice, consumers seem to be open to new options.

- **Price:** all consumers do not like to pay additional prices for burgers.

- **Origin:** they prefer to **buy burgers only from their country of origin** and not from abroad.

Once considering additional attributes:

- **City location:** unlike before, Croatian inland consumers associate a better quality to burgers with high prices compared to people living in the coast.

- **City size:** In Croatia, the city size does not affect consumers' preferences while in Spain and Italy people living in bigger cities tend to consider higher prices of burgers with better quality.

- **Income:** if in Italy income does not affect preferences, in Croatia and Spain instead people with higher incomes

TABLE 8 - Willingness to buy burgers

Willingness to buy (WTB)			
Attribute	**Croatia**	**Italy**	**Spain**
Frozen	Not significant (Consumers are not interested in buying the frozen option of burgers in the three countries)		
Innovative	Consumers tend not to prefer it compared to the chilled conventional one		Not significant
No buy option	Consumers are open to new options in the three countries		
Price	Consumers do not like to pay additional prices for burgers		
Origin (local level)	Consumers prefer to buy clams from their country of origin		
Origin (foreign level)			

assign to higher prices a better quality for burgers. In addition, Spanish consumers with higher incomes prefer burgers originating from Spain and with the RFM certificate.

Willingness to pay (WTP)

- **Origin:** once again only **Italian and Spanish** consumers are willing to **pay a higher premium price for the burgers** originating from their countries (respectively max +9 € in Italy and max +10.2 € in Spain) compared to the ones from Croatia.

- **Certifications:** unlike for sardines and clams, **Italian** consumers are **not willing to pay** a premium price **for certified** burgers while **Spanish** consumers are willing to pay a premium price for burgers with **MSC** certification.

TABLE 9 - Willingness to pay burgers

Willingness to pay (WTP)			
Attribute	**Croatia (€)**	**Italy (€)**	**Spain (€)**
Origin: Italy	-6.04	**9**	3.04
Origin: Spain	-6.3	0.70	**10.2**
Certification RFM	NS	0	NS
Certification MSC	NS	NS	1.24

1.3.4 Certifications

Sentiment and emotion analysis on consumers' perceptions towards certifications have been conducted too.

Sentiment and emotion analysis: **positive** connotations are associated with almost **all three certification** concepts (certifications in general, certification ARFM and certification MSC) in all the three countries. This has been confirmed also by the emotion analysis where the three most registered emotions were trust, anticipation and joy.

Specifically, **MSC** certification has been associated with a **more positive** sentiment in **all countries compared to the ARFM** certification, with the exception of Croatia where respondents on the inland had a higher level of trust for certification ARFM.

Once we consider certifications, some additional considerations related to each eco-innovative product can be made:

- **Sardines:** **Croatian** consumers do not particularly rely on certifications while purchasing sardines, still, they have a very low preference for RFM certificate. Similarly, **Italian** consumers prefer RFM certificate compared to no certificate or MSC. On the other hand, **Spanish** consumers prefer MSC certificate compared to no certificate, and they do not particularly prefer RFM.

- **Clams:** **Croatian** consumers do not seem to particularly rely on certifications while purchasing this product. Contrary to Croatia, in Italy and Spain consumers prefer clams with certificate to no certification at all. **Italian** consumers prefer both types of certificates, however, they seem to have a slightly higher preference for RFM certificate compared to the MSC. On the other hand, **Spanish** consumers prefer MSC certificate compared to no certificate and they do not particularly prefer RFM.

- **Burgers:** **Croatian** consumers do not particularly rely on certifications in their purchasing habits. However, **Italian and Spanish** consumers do not particularly appreciate burgers that do not have any certificate. Still in Italy they prefer mostly the new RFM certificate and in Spain the MSC.

We can, hence, sum up main consumers' preferences on certifications, as follows:

TABLE 10 - Main consumers' preferences on certifications

Sardines/Clams/Burgers	
Croatia	No certification
Italy	Certification RFM
Spain	Certification MSC

1.4 Conclusions

In conclusion, the most important attributes which seem to be consistently common among seafood consumers are the following ones:

- **Origin:** in all the three countries, consumers seem to particularly care about the origin of the product they purchase. Consumers would prefer to buy products from their country of origin. However not all of them would be willing to pay a premium price for this attribute (only Spanish and Italian except for Croatian).

- **Shelf-life attributes:** even though consumers showed positive sentiments towards these eco-innovative products, they do not seem to particularly prefer innovative products over conventional ones. However, they seem to be open to new options.

- **Certifications:** in each country consumers showed to have preferences towards specific certifications. Italian consumers seem to prefer the RFM certification and are willing to pay a premium price for it. Spanish consumers tend to prefer the MSC certification and are also willing to pay a premium for these certified products. Croatian consumers, instead, do not seem to have specific preferences towards certifications and they would not be willing to pay any premium for it.

ECO-INNOVATIVE VALUE CHAINS DESIGN RECOMMENDATIONS

One of the objectives of Prizefish project is to draw recommendation about the design of eco-innovative value-chains for the seafood market of the Adriatic area. Prizefish mainly develops this activity with a focus on Producers Organizations (or cooperatives) involved in fisheries and processing, but it could be used also (after specific adaptations) by companies with other legal forms or being active in other stages of the supply chain.

Through an iterative process undergone along the whole Prizefish project, some eco-innovations have been identified as particularly capable of adding 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. These eco-innovative value chains have been evaluated and selected building on the inputs provided by the partners of the project that have carried out studies on the sustainable management of resources, on the procedures necessary to obtain an ecolabel, on the development of specific processed products, on the analysis of current supply chains and on the preferences of the consumer.

The same **3 processed eco-innovative** products presented in the previous section (**sardine fillets, clams and fish burgers**) have been used as key stones for the proposal of recommendations.

Even if these three products implicate specific characteristics for the business models of the enterprises producing them, in this booklet we will focus on the common aspects that can be used as a reference for other firms (in particular Producers' Organizations) that want to develop processes for adding value to fresh fish.

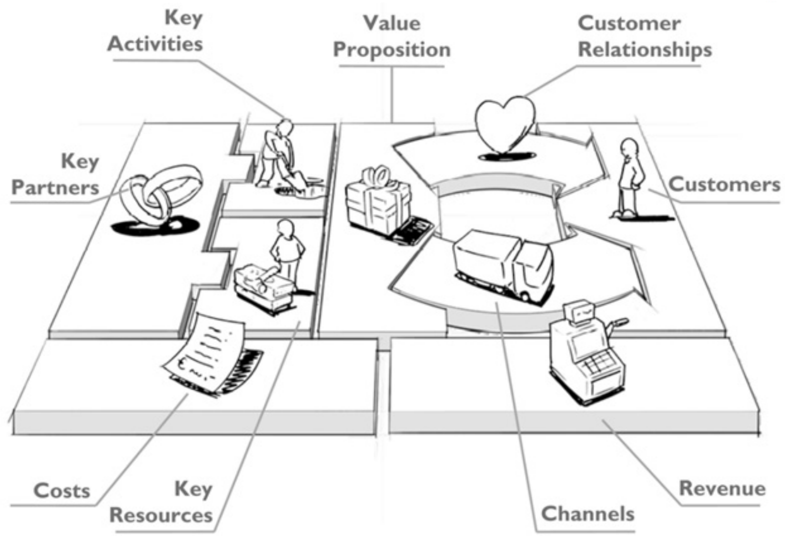
2.1 Business models and business model canvas

The framework chosen to describe the eco-innovative value-chains is the **Business model Canvas**. An enterprise's business model is the description of the core logic to create and deliver value to customers. The business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities. In this sense, describing a business model is a good proxy to describe the underlying value-chain.

The Business Model Canvas is a business design template firstly proposed by Alexander Osterwalder. It can be used for the evaluation and design of a new business model that is better and more modern, and for creating business development strategies. The graphic representation of this concept is rendered through the identification of nine blocks, related to each other by different kind of linkages.

In the following sections the basic ideas for the development of an eco-innovative value chain if seafood products will be considered, using the nine blocks of the Business Model Canvas.

FIGURE 1 - 1 business model canvas representation, extracted from business model generation (osterwalder & pigneur, pag.18-19)



2.1.1 Customer Segments

It is 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 that share common needs, behavior and other attributes. This block answers the questions: For whom are we creating value? Who are our most important customers?

Analysis on consumption trends indicate that the preferred place for buying seafood products is supermarkets. This is much truer in the case of processed or semi-processed products. Consumer segmentation indicates that there are specific clusters of consumers that are particularly interesting for the development of eco-innovative seafood products. These are:

- Ready to eat driven consumers
- Healthy-foods oriented consumers
- Freshness and origin driven consumers
- Conscious consumerism movement

"Ready to eat" or "ready to cook" driven consumers are modern citizens that have not the skill, the time or the will to wash, clean and prepare complicated seafood dishes. Thus, they need products that are easy and quick to cook. Shelf life is also important, since these people normally make large purchases at supermarket once per week, and need products that can be preserved for a long number of days.

Healthy-foods oriented consumers are a natural target since fish and seafood have been recognized as a health-promoting food for human consumption since a very long time, and nowadays doctors and nutritionists strongly recommend their presence in the human diet.

Freshness and origin driven consumers look for local products or, in other cases, products characterized by a strong geographical personality. Freshness is also associated to local production, since it is not necessary to recur to heavy processing or preservation techniques to manage local supply chains. For this very reason, for this segment, fresh products are normally preferred to preserved products, but high value processed products can find niche opportunities if geographic attributes are well communicated.

Finally, conscious consumers are those (in particular new generations) who are becoming more and more careful to environmental aspects and are focused on the impact of their actions. Many are aware that the fishery sector presents endemic problems of sustainability. For these consumers, labelling schemes such as MSC or "Friend of the sea" are the main tools that may guarantee the quality of the products. It is to be noticed that, at the moment, it is very difficult for the Italian and Croatian markets to provide local eco-certified wild fish, while this is relatively easier in the case of aquaculture products and processed imported products.

2.1.2 Value Proposition

Here it is explained 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. This block answers the questions: What value do we deliver to the customer? Which consumer needs are we satisfying?

Taking in mind the characteristics of the consumers previously considered, the main characteristics that an eco-innovative seafood product should have to meet consumers' needs are:

- The geographical attribute
- The sustainability or fishery responsibility attribute
- The convenience (ready to cook or to eat)
- An extended shelf life

The geographical attribute is important since surveys clearly indicate that people prefer national origin. However, there are cases where a geographical attribute can be appreciated abroad if sufficiently communicated and promoted. For example, in Italy, fillets of anchovies from the Cantabrian Sea are very appreciated; similarly, processed products whit the label “Seafood from Norway” (going with a Norwegian flag) represent a clearly identified product meeting consumers’ expectations.

Sustainability or fishery responsibility are attributes that will become more and more important in the future. In Northern Europe and North America, labels like MSC and “Friend of the sea” are largely adopted and recognized by consumers. These products are still missing and not well known in Italy and Croatia, but the trend is clear and Adriatic fishers must be ready to face the competition of imported products (mainly processed) that have this certification. The Adriatic Responsible Fishery Management (ARFM) label can be a tool to satisfy, with only one certification, the requirement for both geographical typicality and sustainability.

Finally, processed or semi-processed products are necessary to satisfy the needs of ready to cook foods and the increased necessity of shelf-life duration.

It has to be noted that all these aspects, required by the consumers, allow to increase the value of the raw fresh fish, and permit to increase the revenue of fishers.

2.1.3 Key Activities

Key activities encompass the most important activities that a firm needs to do in order to operate successfully and to provide the value attributes previously discussed. This section answers the question: What key activities do our value proposition, distribution channel, customer relationships and revenue stream require?

In our seafood case, the key activities that Producers’ Organizations mainly deal with are:

- Responsible catches
- Certification
- Processing

Certification procedure is an inevitable process to obtain whatever label, and in order to obtain an eco-label it could require several changes (depending on specific fisheries) in fishing techniques, gears, and restrictions. This would affect the flow of costs and revenue. Differently from similar eco-schemes adopted in agriculture, this change is something that cannot be realized by a single isolated fisher, since the sustainability of fish stocks (that are a common resource) is something related to the behaviour of all the fleets using the resource. For this reason, operating as a large Producer Organization is essential to guarantee sustainability and to obtain eco-certifications.
On the other hand, processing is something that Producers Organizations could efficiently realize for the benefit of all their members as normally happens in many agri-food sectors and as a few examples of Adriatic fishery POs are currently realizing.

2.1.4 Key Resources

Key resources enclose all the assets and the resources the firm 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 (social capital, expertise). This block answers the question: What key resources do our value propositions, distribution channels, customer relationships and revenue streams require?

For the production of eco-innovative seafood products, many assets are necessary, but we would focus on:

- Sustainable stocks
- Responsible fishing techniques (and gears)
- Management capacity
- Processing plants
- Processing know how

The first three point are the key assets that are necessary in order to fish in a sustainable or responsible way. Stocks must be maintained in good health. In order to do it, POs must have the management capacity to co-manage them and to use the appropriate fishing techniques.
Processing plants and know how are, on the other hand, the basic assets needed for creating high value added, ready to cook, long shelf-life seafood products. In many cases, such resources are impossible to be acquired and managed by single fishers, but they can by POs.

2.1.5 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 (patents). This block answers the questions: Who are our key partners? Who are the key suppliers? Which key activity do partners perform?

For the development of eco-innovative seafood products by Producers' Organizations, several key partners can be considered, and in particular:

- Management or co-management authorities
- Cooperative members
- Technology providers
- Research centers
- Certification authorities

A strong relationship with national management authorities or co-management authorities is key to prepare fishery management plans that can satisfy the requisites for sustainability certification. The case of co-management in the clam sector (i.e. COGEVO/COGEMO, consortia for clam management) represents a best practice in the Adriatic Sea, since in several Italian regions we can find a strong relationship between COGEMOs and Producers' Organizations in order to decide daily catches on the base of customers' daily needs.

Cooperative members are naturally the main providers of each PO, and a strong agreement among them and the organization is necessary in order to define the quality and quantity of the product to be caught.

Technology providers are required to satisfy key needs both for the fishery stage and for the processing stage of production. Research centers are necessary to define biological indicators and catch limits, as well as to provide information and suggestion about available technological innovations. Finally, certification authorities are necessary to obtain eco-labels.

2.1.6 Customer Relationship

Here it is necessary to define 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). 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?

In our situation we want to stress the importance of the Producer Organization as the institution that permits to have a more powerful relationship as an intermediary between the fishers and the buyers (e.g. wholesalers, large retailers, Horeca). The role of a large (and well managed) organization is key to increase the market power and the contractual power of isolated fishers. It permits to receive orders from customers and fixing catches on the base (or below) of these needs, so to maintain the price high and not landing unnecessary fish.

It permits to better define quality standards necessary for the market. It also permits to enter in new markets where minimum and constant quantities must be guaranteed (i.e. supermarkets).

2.1.7 Channels

Channels describe 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. This block answers the questions: Through which channels do our customers want to be reached? How are we reaching them? Are our channels integrated?

The main channel to reach consumers with eco-innovative seafood products is supermarkets, thus Producers' Organizations need to establish strategies to open these markets (isolated fishers would not be able to establish relations with supermarkets).

However, eco-innovative products have the right characteristics to use alternative channels to reach different segments of consumers, including Horeca and exporters.

2.1.8 Costs and revenue

These are two separate blocks that present the costs and revenues that are generated by the activity. There are two possible business model 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. These blocks answer to the questions: which prices and revenues can be obtained? What are the most important costs in our business model?

Eco-innovative seafood products entail a value-driven business model. There are several reasons why these products should guarantee higher revenues for fishers:

- Processed products of high quality (ready to cook, long shelf life) permit to generate added value that Producers' Organizations distribute to their members.
- Consumer willingness to pay is higher for products with recognized eco-labels and renowned geographical indications.
- Common commercialization through Producers' Organizations guarantees higher contractual and marketing power.

On the other hand, it is clear that POs (and consequently their members) have to face increased costs linked to:

- Costs for certification schemes
- Investments for new fishing gears

- Investments and yearly costs for processing activities
- Transaction costs for horizontal (i.e. PO management) and vertical coordination.

Finally, sustainability practices entail decreased revenue in the short term (since catches must decrease to reach Maximum Sustainable Yield), but higher revenue (and lower fishing costs) in the long term when MSY is reached.

All these aspects have to be considered before establishing changes in the PO business model.

THE PRIZEFISH APP FOR THE VALORIZATION OF THE ADRIATIC FISH PRODUCTS

3.1 Introduction

During the initial project implementation phase, good practices related to the production, processing and supply of Adriatic fish products have been identified and analysed by means of ad -hoc interviews submitted to the companies involved. Later, the preferences and the purchase habits of Italian, Croatian and Spanish consumers have been analysed in relation to both traditional and eco-innovative seafood products realized within the project (ready-to-cook sardine fillets, ready-to-cook clams, ready-to-cook fish-burgers).

Based on the results of the above-mentioned activities, involved project partners have designed an eco-innovative value chain to support new valorisation paths both for the eco-innovative products realized and for the e-commerce of Adriatic fresh products.

The information collected and the good practices analysed provided for valuable inputs to develop and test (through the methodology of the Business Model Canvas) **an innovative model of distribution and valorisation of the Adriatic fresh fish products.**

ASSAM, the Agency for Agrofood Sector Services of Marche Region, partner of the project, designed and tested within the project a local and reliable seafood market model for the fresh product, also with the aim to offer a further support to the fishery's sector to cope with the pandemic emergency and emergency consequences.

The pilot activity was developed according to the following steps:

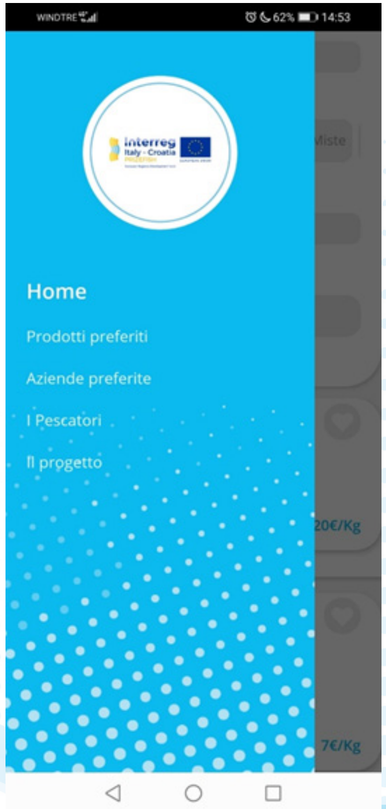
1) STATE OF THE ART analysis
Mapping of the existing initiatives, models of seafood products e-commerce and home delivery and possible evolution. This review focused on practices, already existing platform and mobile app supporting e-commerce and innovative delivery models of seafood products.

2) SETTING UP OF THE MODEL to support the Adriatic seafood delivery market
The Business Model Canvas methodology have been applied to investigate how to create value, how to identify the resources needed and the consumer's expectations and how entrepreneurs (fishers) can exploit external opportunities.

3) TESTING of the Adriatic seafood delivery market model
The pilot testing of the innovative delivery and market services has been supported by a customized mobile app exploring the possibilities for direct marketing to end consumers and supporting the whole supply chain of the Adriatic responsible fishery.

The activity has been designed with the cooperation of local fishermen cooperatives and producers' organizations and ASSAM provided them with the necessary knowledge and tools to enhance the delivery and the local market systems and increase the value of the local products along the whole seafood value chain.

3.2 The PRIZEFISH App aim and structure



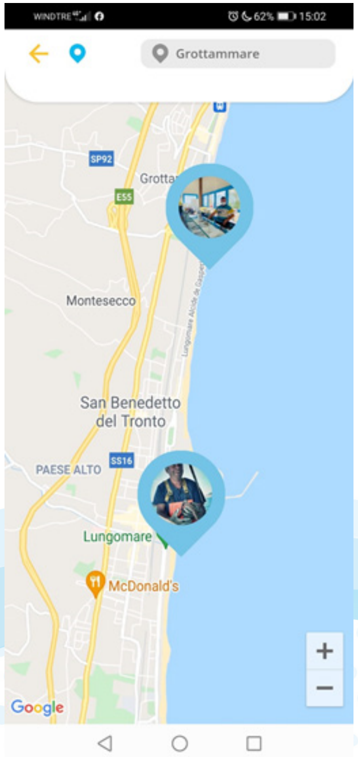
The App developed has been conceived as an opportunity to create a direct contact with consumers which recognize and add value to Adriatic seafood products obtained by more sustainable fishing practices and tools.

The App has served a dual purpose:

1) Informative function, to inform consumers on daily available fish products thus adding value to the whole chain;

2) Operative function, to facilitate the direct contact with the consumers, the products selling and delivery.

The App allows the consumer to know the "zero mile" fish available around him and start a direct contact with the fishermen.



3.2.1 The Adriatic Fishery products at the heart of the model

The Adriatic Fishery products represent the core part of the model, the object that capture consumers' attention. By means of georeferenced information it will be possible to know:

- the fishery's products availability and the distance from the consumer's localization;
- information on the species and seasonality;
- information on the fishermen that caught the product, techniques and tools used;
- when and where to go to buy the product;
- if the product can be home delivered.

3.2.2 Opportunities for the consumers

Conscious and origin driven consumers looking for local and high-quality products have the possibility to:

- Exactly know the distance from the fishermen selling point and reach them by means of the App GPS indication;
- Gain all the fishermen contacts to directly know them and talk to them;
- Understand how the fish was caught;
- Collect information about the characteristics and properties of the different species of the Adriatic Sea;
- Support local economy and the fishery's operators sensitive to sustainability issues.

3.2.3 How to join the PRIZEFISH APP pilot testing

For the consumers:
The App is available for download on the IoS and Android store looking for "PRIZEFISH"

For the fishermen:
Adriatic fishermen can join the activity and be included in the APP requesting for registration on the following website: https://www.prizefish.eu/

3.2.4 PRIZEFISH App Monitoring

Google analytics allow to monitor the trend/performance of the App. It is possible to obtain the following data:

- Number of users in a certain time period
- Number of sessions (how many times the app is opened)
- Number of displayed screens
- Number of displayed screens for session
- Average session length
- Geographical location of the user
- "Behaviour Flow" that shows the user flow the within the App

Further, the following «events» can be monitored:

- The most viewed fishermen
- How many times the user has clicked on «Go to» function to reach the fishermen
- How many times the user called the selected fishermen
- How many times the user visited the social pages of the fishermen
- The most visualized product
- The product more frequently "added to favorites"

THE PROJECT PRIZEFISH IN A NUTSHELL

Title

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

Motto

Fishing better! Gaining more! Respecting the Adriatic Sea!

Description

The project PRIZEFISH aims to increase the competitiveness on the European and international market of Small and Medium-sized Enterprises (SMEs) and Italian and Croatian Producers' Organizations (POs), operating in the fishery sector

Objectives

- Increase the Adriatic fishery competitiveness through the development of innovative technologies, paying attention to environmental and economic sustainability.
- Increase the efficiency of Italian and Croatian Adriatic SMEs and OPs in the production and selling of eco-certified and high value-added fishery products.
- Improve the competitiveness of SMEs and OPs within the fish markets both at European and International level.

Partnership

Prizefish, coordinated by the Centre for Research in Environmental Sciences – CIRSA of the University of Bologna, involves six Croatian and seven Italian Partners including among others Research Bodies, Regional Administrations and Producers' Organizations. The project is funded by European Union within the Priority Axis 1 Blue Innovation of the Interreg Italy-Croatia 2014-2020 CBC Programme.

Further to the University of Bologna, Lead partner of the project, partnership is composed by:

- Zadar County (HR)
- National Research Council, Institute for Marine Biological Resources and Biotechnology (IT)
- Agency for Agro-food Sector Services of Marche Region - ASSAM (IT)
- CESTHA, Experimental Centre for Habitat Conservation (IT)
- Secondary High School 'Remo Brindisi' - Pole of Sea Crafts (IT)
- Institute of Oceanography and Fisheries of Split, IOF (HR)
- National Institute of Oceanography and Applied Geophysics, OGS (IT)
- Fisherman's Cooperative OMEGA3 (HR)
- Fishing Cooperative ISTRA (HR)
- O.P. BIVALVIA VENETO S.C., Producers Organization of Bivalve Mollusc of the Veneto (IT)
- Ministry of Agriculture (HR)
- RERA SD, Public Institution RERA S.D for coordination and development of Split- Dalmatia County (HR)
- Emilia Romagna Region (IT)

Information in English language available on the web site **https://www.italy-croatia.eu/web/prizefish**

Social media

https://www.facebook.com/prizefish

https://www.instagram.com/_prizefish_/

https://www.linkedin.com/company/prizefish

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