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The low commercial value fish. How can we increase its consumption?

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Abstract

The primary aim of this research was to understand the target species of interest for a sustainable promotion and development strategy for fish products. We focus on the fish termed "low commercial value fish" (LCVF), which fetch lower prices when compared to well-known fish species. This work was laid out in several different steps: a description of the type of species chosen, an analysis of fish consumer demand and the added value that comes from local identity and from the culture of production and consumption. After a preliminary analysis of Lazio's fish exports the region did not exhibit a competitive advantage in this sector but Lazio shows some productive characteristics that might be extended to several other cases. In particular, it has a productive tradition of fishing. The empirical analysis conducted on local consumers showed a local fish culture in consumption terms that, together with fishing methods, local fish consumption and production characteristics, suggests a promotion and development strategy based on the factors surrounding territorial identity.

Key words: "low commercial value fish" species, sustainable consumption, local values, sustainable fish, promotion and development.

JEL Code: Q22; Q13; O13.

1. Introduction

At a global level 12,000 species of fish are at risk, partly because of the monotony of the menu required by "global" society. There are 266 species of edible aquatic animal living in the Mediterranean but in the face of so much diversity, little more than 10% (amounting to about thirty species) are found with some regularity on fishmongers' slabs in towns and cities. The consequence of the concentration of demand on just a few species (ISMEA, 2007) has resulted in the over-exploitation of many fish stocks. For other species, however, the problem is not that of conservation, but rather that of the fishing or rearing techniques, impacting negatively on planet welfare and human health (Myers & Worm 2003). On both counts the role of consumers and their purchases is decisive and consumer awareness can have a positive effect on reducing

1 Mariarosaria Simeone is a researcher at the University of Sannio, Debora Scarpato is Associate Professor at the University of Naples Parthenope. Though the entire work is the joint product of the two authors, sections 1, 5, 6.1, 6.2 and 7.2 are attributable to Debora Scarpato while sections 2, 3, 4, 6.3 and 7.1 are the work of Mariarosaria Simeone. Section 8 is attributable to both the authors. The first results of this research were presented to the XVIII Conference of SIEA that was held in Venice, 3/5 June 2010.

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overfishing (Finco *et al.*, 2005). This lack of diversification in the supply is also damaging to local fish-based gastronomic traditions that are ever more neglected by younger generations. The promotion of fish products from local fisheries in such a complex market requires that the consumer must first associate these particular products with qualitative aspects such as purity and cleanliness, fine taste and great healthiness when comparing the quality of the environment of origin of the product itself, and, no less importantly, its ties with local traditions. A promotion and development strategy for fish products must satisfy three priorities: meeting consumer demand, resolving difficulties in the selling of certain species and raising the profitability of players in the sector, especially in small-scale fisheries. Fish consumption in Italy is concentrated on just a few species and this has serious consequences for the environmental impact of fishing. To understand the possible strategies to be adopted as part of the promotion and development of fishery products, target species, i.e. species considered of special interest, have been identified. This choice was made by identifying those species with a low commercial value, caught on a large scale during the year and with the potential for possible use and promotion, both as fresh and part-prepared products, given that many species, “forgotten” by the markets, are of significant nutritional quality. In addition, during the identification of the target species, historical aspects related to traditional fishing techniques and/or local methods of storage and processing were taken into account. Specifically, our attention was focused on the large proportion of marine life that meets the definition of “low commercial value fish” (LCVF), that is to say unexploited resources that accidentally end up in fishing nets, especially trawls, and when caught during operations out to catch “valuable species”, end up in large measure being thrown back into the sea. In the following sections, after carrying out a survey on patterns of consumption and production and on territorial identity, we define a possible strategy for the enhancement of LCVF. In particular, a case study of the Lazio region will be presented, since, on preliminary analysis of the data at the national level, the region has productive and environmental characteristics that can be extended to similar settings. In particular, Lazio has a tradition of production and a fishing industry that is marginal both in terms of its fleet and its catches. These features suggest that a process of development of LCVF based on local identity can be put forward.

2. Low Commercial Value Fish (LCVF). Characteristics of the product potentially subject to promotion and development.

Several studies show that the nutritional characteristics of the fish that fall into poorly profitable categories in fishing terms are very close to those of the more valuable species consumed. In particular, a study conducted by the University of Palermo on the chemical composition of the main species present in trawling discards, including Argentine *Argentina sphyraena*, Boarfish *Capros aper*, Shortnose greeneye *Chlorophthalmus agassizi*, Silvery pout *Gadiculus argenteus*, Blackbelly rosefish *Helicolenus dactylopterus*, Silver scabbardfish *Lepidopus caudatus* and Atlantic horse mackerel *Trachurus trachurus* scientifically demonstrates how the protein content of these minor species is similar to that of the more valuable ones and with the same nutritional value (Ferro, 2009). The same is true for oily fish as several species fall into this category of low-value fish despite their considerable nutritional benefits due to the content of omega-3 polyunsaturated fatty acids and a high content of phosphorus, vitamins, minerals and iron. In addition, the discarded species are small, with low risk of accumulation of mercury that is found in oily fish species with higher commercial value. Despite the high nutritional value of

these types of oily fish and even though they represent a large part of our national fish catch, they are barely to be found in fish markets or on sale elsewhere. LCVF represents that part of the fish catch often little valued by the consumer and representing a large proportion of the haul but with a low commercial value. The consumer does not know about it and does not ask for it and therefore does not have access to supplies from commercial distribution. This fish, however, still represents a staple in the diet of the fisherman and his family but, in many cases, as a result of its qualities, it has also enriched the history and traditions of coastal towns and cities. Worldwide, there are about 490 species of fish that go to make up 70% of the catch, but which are difficult to market and are priced low due to lack of demand. Of 550 species of fish only 60 are regularly marketed and are the result of “bycatch”, fish caught unintentionally in a fishery while intending to catch other fish. Among these less important species there is a category of fish of moderate value, but which shares the fate of the previous species because, in a fishing industry that is becoming ever more industrial, their marketing is scarcely profitable from an economic perspective. Therefore, a considerable amount of fish is discarded. In particular, the following categories of fish can be distinguished:

- The catch discarded as a result of morphological characteristics, such as a low body growth or the fragility of the edible part, and therefore not attractive in appearance;
- The accidental catch of some species that, despite having suitable physical characteristics (size, texture of the meat, etc.) for commercialization, are devalued by ancient popular beliefs based on a presumed poor nutritional value of the meat;
- A group of fish of moderate value, but whose sale is economically unprofitable.

Currently, the fish consumed globally amounts to 48 million tones, of which 45% comes from aquaculture. The amount of wild fish caught increased 5-fold in the second half of the last century, leading to the depletion of fish stocks. In 2003 52% of stocks were being exploited to the maximum extent and only 3% of marine stocks are under-exploited, while just over 20% are moderately exploited and could support a modest increase in the level of catches. As far as the environmental aspect is concerned, one can say that encouraging the fishing of little known and rarely-marketed species will help to ensure the sustainability and, above all, the future of fishing activities. To render fish consumption sustainable it is necessary to focus on less-exploited species so as to avoid further depletion of those at risk. If we examine seven of the top 10 marine species that together represent approximately 30% of the entire fish catch, they are fully exploited to, or in excess of, their capacity and an increase in their catch would cause serious biological damage to the species in question and consequent economic damage to fishing activities.

3. Perceived quality and Consumer demand in the fisheries sector

Quality is the requirement to meet the needs and expectations of the consumer (Pagliuca and Scarpato, 2011; Cosmina, Prestamburgo, 2004). Analysing the properties and dimensions of the quality of the products (Hooker and Caswell, 1996) the following factors come to the fore: food security, the attributes of value, the attributes of an informative nature (labelling), processing and nutritional values being the properties that contribute to defining the quality of food and that are of significant interest to the fishing industry. Of particular interest are the trade-offs between the properties of food and other sensory attributes together with their interaction (Caniglia, 2008). Indeed, quality dimensions are interrelated and vary from product to product (Cavicchi, *et al.*, 2009). Consumer choices depend on the preferences that are formed starting from intrinsic

sic and extrinsic ones. Consumers use the individual attributes of quality for each dimension to infer the total quality of the product. What is meant by food quality in the fish market? For some consumers the quality of fish is associated with freshness (Peary *et al.*, 1994, Nielsen *et al.*, 1997; Ólafsdóttir *et al.*, 1997) and therefore the fish is considered high quality if prepared and eaten freshly-caught.

Several studies on consumers concerning the understanding of their perception with regard to fresh fish and reasons for buying it have shown that among the motivations inducing the consumption of fresh fish are considerations related to aspects of health and physical well-being together with those of personal pleasure (Nielsen, *et al.*, 1997; Valette-Florence *et al.*, 2000). The fact that the product is fresh and unprocessed and therefore natural, means it is regarded as a rich source of minerals and vitamins as well as being a pure product, the consumption of which is associated with health and well-being. A general framework used to explore the perception of quality by the consumer is the total food quality model, introduced in 1996 by Grunert and his colleagues and is one of the most popular models, studied and applied in both the academic and professional fields. This model integrates the multi-attribute and hierarchical approaches to the perception of quality. The total food quality model distinguishes between the assessment both before and after purchase. Many characteristics of the product cannot be ascertained before purchase, and food products, in particular, fresh products, can be evaluated in terms of quality only after consumption. The distinction between quality before and after consumption represents the basis of the total food quality model. The model shows that before consumption, it is qualities such as the product's extrinsic characteristics that determine expectations, including the label and the information shown on it, which can generate expectations with regard to quality or confer elements of value and pleasure on the product. After purchase, the consumer will have experienced the quality which is often different from that expected at purchase, especially if based on aspects of the product with a low predictive level. The quality experienced is influenced by many factors. The product and its sensory characteristics are one of the determinants, but there are others that emerge including the modes of preparation, previous consumer experiences and expectations of the product before consumption (Russo, Simeone; 2004) that will impact on evaluation of the quality experienced post-consumption. According to the fish quality model (Bech *et al.*, 2001) variations in quality depend on the factors specified in the model. The freshness and other intrinsic characteristics such as odour, appearance and the anticipated quality all act on quality expectations. Quality experienced and the expected quality before consumption determine the overall quality of the product and a judgment of the consumption experience and the realization of expectations.

The presence of initiatives to promote locally-caught fish can affect consumer quality expectations. The local product, linked to the territory, generates high expectations, often linked to the freshness and origin of the fish being caught. The appreciation of the flavour is also linked to some extrinsic aspects of the product such as hedonic elements that affect purchasing decisions. From the consumer's point of view, quality is a subjective concept. The appreciation of a product may also depend on the fact that the consumer may associate the presence of nutritional or ethical attributes associated with the environment or social aspects (Simeone, Marotta, 2010). From an objective point of view some of the beliefs have no foundation but exist only in the mind of the consumer. Quality therefore is ever more frequently about intangible dimensions of food that are difficult to verify except through recourse to indicators and quality certification. In addition, supernaturalness, the spectacle, status, history, syncretism, the sensoriality, health and flavour represent dimensions that are acquiring increasing importance in the definition of qual-

ity from a multidimensional perspective (Fabris, 2003).

Recently, the literature has been gradually moving towards the study of the intangible attributes and value of fish linked to a geographical area, such as its origin and tradition together with the other aspects which provide it with added value by acting on the different dimensions of quality (Marchini et al., 2014).

4. Territorial identity and the promotion of “low-value fish”

The promotion of quality and the exceptional nutritional properties of fish products should be considered the two main factors on which to focus in guiding the development of a local fishing industry, while, at the same time, creating the tool able to activate cohesion between stakeholders in the supply chain. In this context, today, the local fish catch, attracting resources (both human and financial), can become added value and the driving force for the development of new economic and social activities aimed both at the local market and at the regional level (Scarpato et al., 2011; Scarpato and Simeone, 2013). This reason is not only to be found in the specificity of the geographical origin of the fish, but also in the “quality” that is associated with it and recognized in it; a quality not only represented by the distinctive features of the product from the area of origin in question when compared to other areas, but also by its freshness, flavour, taste and gastronomy linked to “fresh local fish”. Promotional strategies such as these should be integrated with the spread of knowledge about the market with regard to the specific characteristics of the species in question. One of the pre-conditions for the activation of strategies for the promotion of local products lies in the sensitivity displayed by consumers in respect of such products and their associated values. In this study, only after identifying the characteristics of a traditional character in the regional fishing industry’s catch will it be possible to emphasize, using an appropriate marketing plan, the important attributes which have emerged from the analysis. The drawing up of a strategic development plan entails a series of actions related to the different policy areas in which it is necessary to adopt measures relating to the suitability of the product, its marketing and communication. The definition of a strategic development plan therefore requires the choice of an action plan to enhance the product. In conclusion, in the case of local fish products, and, specifically, the lesser-known species, a proper promotional strategy should focus directly on the conditions needed to boost local development. This approach allows value to be added to the product with the rediscovery of native fish varieties, by increasing consumer awareness of the value of the areas in which a heritage of priceless culture, traditions and gastronomic quality is rooted. From this it appears that a fundamental point on which to aim for the promotion of low value fish is represented by territorial identity. Globalization raises the challenge on the positioning and definition of the role of areas facing new forms of competition. This obliges local systems to enhance their distinctive qualities compared to those are found elsewhere. In order to put a successful local development strategy in place the local actors must organise themselves with projects that put the specific resources of the local *milieu*³ at its centre, creating competitive advantages and values (economic, social and cultural) that can circulate in global networks (Dematteis, 1997). The identity of a local or regional area becomes the crucial variable in the processes of development of indigenous production through the enhancement of

³ According to Dematteis the *milieu* can be understood as “a particular set of local environmental conditions in which a local network operates”, which refers to “potential fixed assets” characterising a local area, that is, the set of physical and social-cultural conditions embedded in that area as a result of long-lasting processes.

the local *milieu*. The search for place identity takes on the characteristic of a search for the authentic and the memory of the place and serves to promote that identity. The advantage of identity allows the promotion and maintenance of all the resources of the area that go to make up its “territorial capital”. These local systems can be understood as its “Brand” and thus compete for the conquest and consolidation of the most important segments of a growing market. From this perspective, the “identity” of an area is based on a set of identifiable values including its history, culture, in the aspects of its hospitality, in the welcome it provides as well as local production together with its natural, landscape and cultural aspects, in its ability to “communicate” and in its “memorability” (Annunziata and Scarpato, 2014, Mohamad R.S.,2013). A group of traditional residents, the guardians of local memory, is particularly important in defining the identity of a place, its symbols and its heritage. As far as fisheries are concerned, it should be noted that the identity heritage that is transmitted with fishing is often unknown and, with the process of the globalization of the world economy, our dietary habits have undergone changes so as to often render species typical of our own coastlines unknown at the expense of products coming from the other side of the world. This reference scenario requires actions aimed at the promotion of traditional dishes on a regular basis to help rediscover and commercialize those fish species that are little-known by consumers and therefore not valued, even by restaurateurs. The same awareness of restaurateurs, aimed at reviving simple and traditional fishermen’s recipes, made using local fish and the simple ingredients of the Mediterranean diet, may provide a valuable tool for promoting knowledge of these “forgotten” species and their consumption, including at home. In this sense, local identity can represent a lever for the development of “neglected fish” to ensure that less well-known species are not subject to comparison with more renowned products, but, on the contrary, allow for the “exploitation” of freshness for a “zero food miles” type of consumption, i.e. close to the point of landing (Verbeke and Brunso, 2007). A very important aspect that emerges from the study of territorial identity is the circular relationship that exists between it and the promotion of low commercial value fish. In essence, this territorial identity represents a lever on which to base efforts for an effective and sustainable strategy for exploiting such “neglected” fish but at the same time, the economic, social and environmental impact of this type of fishing may represent a valuable tool for the protection of the local identity on which these products base their existence.

5. Qualitative and quantitative surveys: Analysis of the production supply in the case of Lazio

5.1 The structural characteristics of the Lazio fleet

Fishing takes place all along the coast in the region of Lazio and still plays a significant economic role in terms of income and employment. Equally important, however, are the cultural aspects as a witness to traditions that have been passed down over time. The maritime regional fishing fleet consists of 561 vessels and is stationed in the three Maritime Compartments of Civitavecchia, Rome and Gaeta. It is possible to split the fleet into the following main subdivisions:

- *Artisan*: made up of vessels engaged in so-called “small-scale fishing” mainly with static gear (trammel nets, gill nets and tangle nets);
- *Trawlers*: the fleet engaged exclusively in trawling activities;
- *Hydraulic dredging*: boats which mainly engage in the capture of live bivalve molluscs (clams and razor shells) using a hydraulic dredge;

- *Rake vessels*: boats that catch clams using a rake mounted on the vessel;
- *Purse netters*: boats engaged mainly in catching “oily fish” (largely mackerel, sardines and anchovies) by “purse seining”;
- *Versatile*: those units that, depending on the season and the weather, practice different types of fishing throughout the year.

In the region there is a prevalence of small-scale fishing vessels, i.e. those vessels of less than 10 tonnes gross tonnage and less than 12 metres in overall length, engaged in small-scale fisheries using selective gear and operating within 12 miles of the coast.

Table 1: Production subdivided by fishing system

SYSTEM	Tonnes	%	€ (millions)	%
<i>Artisan</i>	1231.4	17.74	13.74	21.77
<i>Purse-seining</i>	1165.8	16.80	3.73	5.91
<i>Dredging</i>	134.9	1.94	1.29	2.05
<i>Rake vessels</i>	81.4	1.17	0.82	1.30
<i>Trawlers</i>	4194.6	60.44	42.64	67.58
<i>Versatile</i>	131.9	1.90	0.87	1.39
Total	6940.0	100.00	63.09	100.00

Source: ARSIAL Lazio (2009).

Table 1 shows that in Lazio the system that carries out the largest portion of the catch is trawling with 60.44% of the regional total. The catch mix of this system consists of red mullet, hake, common pandora, sole, common and musky octopus, flying squid, cuttlefish, squid, scampi and shrimps. The artisan boats account for 17.74% of the total regional catch and the product is characterized by high selectivity, which only allows the capture of adults of particular commercial value and consists largely of hake, various sea-brems, sole and scorpaenids. The seine fleet contributes to the catch with 16.80% of total fish landed, mostly oily fish (anchovies, sardines and mackerel). Hydraulic dredges essentially fish for clams and, to a lesser extent razorshells, contributing 1.90% to the total regional catch, the rake boats, a local tradition adding a further 1.2%. The versatile boats add another 1.90%, catching mainly hake, silver scabbardfish, Scorpionfish *Scorpaena sp.* and Swordfish *Xiphias gladius* (Table 2).

Table 2: Regional production subdivided according to species

FISH					
Species	Quantity		Sales		Price
	tonnes	%	€000	%	€/kg
European anchovy <i>Engraulis encrasicolus</i>	707	13.80	1117.06	2.92	1.58
Flathead mullet <i>Mugil cephalus</i>	166	3.24	864.86	2.26	5.21
European hake <i>Merluccius merluccius</i>	1251	24.41	12409.92	32.46	9.92
Common pandora <i>Pagellus erythrinus</i>	336	6.56	2056.32	5.38	6.12
Atlantic bonito <i>Sarda sarda</i>	131	2.56	466.36	1.22	3.56
European pilchard <i>Sardina pilchardus</i>	481	9.39	620.49	1.62	1.29
Atlantic mackerel <i>Scomber scombrus</i>	253	4.94	888.03	2.32	3.51
Dover sole <i>Solea solea</i>	160	3.12	3692.8	9.66	23.08
Red mullet <i>Mullus barbatus</i>	532	10.38	4367.72	11.42	8.21
SHELLFISH					
Species	Quantity		Sales		Price
	tonnes	%	€000	%	€/kg
Musky octopus <i>Eledone moschata</i>	130	13.90	1060.8	10.55	8.16
Common Octopus <i>Octopus vulgaris</i>	106	11.34	1228.54	12.22	11.59
Common cuttlefish <i>Sepia officinalis</i>	227	24.28	2294.97	22.83	10.11
Tellins <i>Tellina sp.</i>	79	8.45	771.04	7.67	9.76
Flying squid <i>Todarodes sagittatus</i>	141	15.08	1228.11	12.22	8.71
Clams Veneridae	131	14.01	1210.44	12.04	9.24
CRUSTACEANS					
Species	Quantity		Sales		Price
	tonnes	%	€000	%	€/kg
Rose Shrimp <i>Parapenaeus longirostris</i>	258	29.32	4357.62	29.39	16.89
Red Shrimp <i>Aristaeomorpha foliacea</i>	73	8.30	1889.24	12.74	25.88
Mantis Shrimp <i>Squilla mantis</i>	412	46.82	3341.32	22.54	8.11
Scampi <i>Nephrops norvegicus</i>	83	9.43	3827.96	25.82	46.12

Source: ARSIAL Lazio (2009).

Results from this study conducted in Lazio region, for the characteristics of its fish sector, could be expanded to similar case in Italy. The feature that has led us to concentrate study in the Lazio region was: the presence of a uncompetitive fishing for the qualitative aspects of the catch, the characteristics of the small fleet, mainly focused on low quality fishing and the marginality of fish sector compared to other productions but that is part of productive tradition of the coastal areas.

5.2 The typical species found in Lazio and their seasonality

An analysis of the typical fishery species in Lazio according to the seasonality of the catches, shows the presence of several little-known and often also under-utilized species, which however, at the regional level, exhibit good commercial potential both in terms of their presence in markets and the high quality of the meat. In Lazio there are 34 species and 21 of these are avail-

able fresh year-round or unavailable for not more than two months a year and are very convenient both in terms of their purchase price and their excellent nutritional value. Below are the LCVF species found in Lazio together with their period of availability along the coasts of the region (Table 3).

Table 3: Fish availability by season in Lazio

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Mantis shrimp
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Red mullet
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Surmullet
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Common pandora
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Common Octopus
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	European Anchovy
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Horse Mackerel
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	European Hake
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Blue Whiting
												Abundant	
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Rare	Flathead Mullet
												Abundant	

Source: our analysis of data from Consorzio Mediterraneo (2008)

Analysis of the results of the Lazio case study, taking into account the characteristics of the production structure, the relative abundance of the LCVF species present and their availability in the course of the year, shows that the promotion and development of fish stocks is a requirement for regional economic, social and environmental reasons. With regard to the economic and social aspects, in terms of income and employment, the region has a fleet of 600 vessels, of which slightly more than 130 are trawlers, while about 400 carry out small-scale fishing with craft, for a catch estimated at around 6,000 tonnes per year. As reported in the previous section, fishing in this region is dominated by small-scale vessels, i.e. those vessels of less than 10 ton-

nes gross tonnage and an overall length of less than 12 metres engaged in small-scale fisheries using selective gear and operating within 12 miles of the coast. In relation to the environmental aspects it may be stated that encouraging the fishing of little-known and marketed species will help to ensure the sustainability and, above all, the future of fishing activities. In order to pursue a strategy for promoting and developing the economic, social and environmental aspects of LCVF a fundamental part is to be played by the rediscovery and marketing of these fish species, little known by consumers, on a regular basis. To this end, this requires the rediscovery of native varieties of fish as alternatives to those consumed in large quantities. This, however, requires a rediscovery of the cultural dimension to recover and to adequately develop and promote the strong cultural identity and food heritage of a geographical area in which seafaring traditions are strongly-rooted, given that the stretches of coastline along which this type of fishing is carried out also put themselves forward as custodians of traditions handed down over time.

5.3 The fisheries sector in Lazio: a comparison with other Italian regions

5.3.1 The Revealed competitive advantage

In this contribution we carried out an empirical study of international competitiveness of one of the Italian regions with an important fishery tradition. The first problem we encountered was related to the scarcity of empirical data available. To cope with this problem we chose, within the existing indicators, the revealed comparative advantage (RCA) indicator. The RCA of a country for any particular good is the share of the international market of that good divided by its share of the international market for all goods. Several studies have analysed trade and RCA measures for trade flows, conducted primarily by Balassa (1965). Polymeros et al. (2005) sought to evaluate the competitiveness of the fisheries and aquaculture industries of some Mediterranean countries. The RCA index of Italian, French, Greek, Portuguese and Spanish fish products were estimated in order to gain new insights regarding the competitiveness of such products in EU markets. In our work we used the RCA index to gain insights into the competitiveness of Lazio fish products towards European countries and to compare it with that of other Italian regions towards the same market, for the same fish products.

5.3.2 The Fisheries sector in Lazio

Fishing in the current environmental and productive setting is ever more linked to improvements in capture technologies and the optimization of the different forms of aquaculture but, above all, by product promotion and the adoption of additional activities that make it possible to contain the pressure on the natural resources in question. Using preliminary meetings with opinion leaders and industry associations and through the preliminary analysis of the data at the national level the catch characteristics of the Lazio region have been outlined which could represent the situation with regard to the productive characteristics and environmental features in similar settings elsewhere. Although the case of Lazio, with its marginal fishing both in terms of the fleet and the catch, suggests that the overall crisis in the sector and the ageing of the fleet has worsened as far as small-scale fishing is concerned, it also shows that there is a tradition of production that may represent a harbinger for a strategy to promote the catch. The first step in the case study was to evaluate the competitiveness of Lazio compared to other Italian regions in the EU market of 27 countries.

A country j reveals its comparative advantage for a product i when the share of its exports is higher than the corresponding share of exports of the same product on total world trade. Starting

from the revealed competitive advantage (1), the indicator (2) was defined. The indicator (2) allows, with respect to a given market (M), to compare the weight of the export of each Lazio food product to the weight of the same food products on Italian exports.

With this in mind, starting from the RCA (Revealed Comparative Advantage) indicator (1) transformed into (2), with reference to a given market (M), it was possible to compare the weight of each of the food products (*i*) on the exports of the Lazio region compared to the weight of these products on domestic exports (Italy as a whole) and where:

- *i* are products of agriculture and horticulture; live animals and products derived from animals; forestry products; fish and other fishery products; meat and meat products; processed and preserved fish; prepared or preserved fruits and vegetables; vegetable and animal oils and fats; dairy products and ice cream; milled products; starches; animal feeds; other food products; beverages.
- *M*: are the countries that currently make up the EU-27 (2).

This indicator was calculated for the years 2000 and 2008 in order to obtain an idea of any changes in competitiveness in the two years considered, to give evidence to what emerged from the deep interviews with opinion leaders (Tables 4).

$$(1) \quad RCA = \frac{X_{ij}}{\sum_i X_{ij}} \cdot \frac{\sum_j X_{ij}}{X_{ij}}$$

$$(2) \quad RCA = \frac{X_i^{Lazio, M}}{\sum_i X_i^{Lazio, M}} \cdot \frac{\sum_i X_i^{Italia, M}}{X_i^{Italia, M}}$$

Table 4: Calculation of the Fish Products' RCA for Lazio compared to Italy as a whole, years 2008 - 2000. Target market: (M) EU-27

2008 –Target market: (M) UE 27					
Products	Lazio Export value in .000 Euro	Italy Export value in .000 Euro	$\left(\frac{X_i^{Lazio, M}}{\sum_i X_i^{Lazio, M}} \right)$	$\left(\frac{\sum_i X_i^{Italia, M}}{\sum_i X_i^{Italia, M}} \right)$	RCA Lazio
Fish and other fish products	715,00	156.895,00	0,002	0,009	0,204
Perceived and trasformed fish and fish based products	525,00	238.410,00	0,001	0,014	0,099
2000 –Target market: (M) UE 27					
Products	Lazio Export value in .000 Euro	Italy Export value in .000 di Euro	$\left(\frac{X_i^{Lazio, M}}{\sum_i X_i^{Lazio, M}} \right)$	$\left(\frac{\sum_i X_i^{Italia, M}}{\sum_i X_i^{Italia, M}} \right)$	RCA Lazio
Fish and other fish products	1.116,00	162.975,00	0,004	0,014	0,312
Perceived and trasformed fish and fish based products	1.347,00	188.016,00	0,005	0,016	0,326

Source: Our analysis of INEA data 2009.

In the indicator (2) the incidence of Lazio exports of a given product with respect to all regional food exports is compared with the national exports of the same product in relation to the total national exports of food products. If the indicator yields a value higher than one, it means that Lazio assumes a leading role in the export of that product to the EU countries.

What emerges from Table 4, is that Lazio has no competitive advantages for fishery products compared to other Italian regions. Moreover, the same indicator calculated for the year 2000, showed that in 2008 the “competitiveness” of Lazio’s trade in fishery products declined when compared to other Italian regions in the European market (EU-27). In particular, in relation to the items “fish and other fishery products” and “processed and preserved fish”, the value of the index for the year 2000 was, respectively, 0.311 and 0.326, better values than were recorded for 2008. This initial analysis shows a lack of competitiveness for the fisheries sector in a region that has a strong productive tradition, with a mainly small-scale fishing fleet as shown above.

6. The culture of fish consumption in the Lazio region using an analysis of the local consumer

6.1 *The productive tradition and territorial identity of fishing in Lazio*

Fishing in Lazio is carried out right along the coast, and in some municipalities still plays a fundamentally important economic and cultural role in terms of income and employment. Fish was a staple food in the diet of the ancient Romans, and if, in the beginning, it was eaten only in times of famine, it was soon considered an essential and sought-after food. Among the best known species were gilthead bream *Sparus auratus*, pike *Esox lucius*, sole *Solea sp.* and red mullet *Mullus sp.* Fish kept in fishponds constructed in connection with the sea were also very popular including moray eels *Muraena helena*, cuttlefish (Sepiidae), octopus (Octopoda), lobster *Homarus gammarus*, spiny lobster *Palinurus elephas* and various shellfish (Mollusca)⁴. There are several testimonies to the ancient traditions of fishing in Lazio. Of particular interest are the fishmongers’ *tabernae* in the archaeological area of ancient Ostia, where, excavated on either side of the central *Macellum* (food market) dating back to the 3rd century AD, these were laid out with marble counters and trays for live fish. Lazio also has a range of typical fish dishes in popular culture.

6.2 *An analysis of the local consumer*

The aim of this exploratory investigation was to verify the presence of a “maritime culture” in the area in terms of fish consumption by local consumers. To this end, 135 questionnaires were administered according to non-probability sampling by reasoned choice. The aim of this work is to conduct a case study on a local seaside town with a huge tradition in fishing and where fish was for long time considered a staple food in the diet of local people. For that reason we cannot do inference of results but we can represent a typical consumer in an area with a long fishing tradition.

The consumers interviewed live in the administrative sector of the compartment of Gaeta,

⁴ Several examples of fishponds can still be found in Formia that had conditions suitable for fish-rearing. In these the *acquatio*, a mixture of salt water and fresh water, could be created as a result of the abundance of spring-fed streams along the coast at Formia, creating a favourable mix for the fish. Other examples of fishponds on the coast of Lazio can be seen in Torre Astura and at the Villa of Tiberius at Sperlonga.

one of the three Maritime compartments of Lazio, together with Rome and Civitavecchia. The characters of the sample are described in table 5. This sample includes a wide variety of socio demographic background. The respondents interviewed were responsible for food purchase of their households and this emerges from the gender distribution that is 63% female and 37% male.

Table 5: *Descriptive characteristics of the sample*

		Sample
	Female	63%
	Male	37%
Average Age		50%
Education	Primary	21%
	Middle	18%
	High School	31%
	Degree	25%
	Postgraduate	4%
Profession	Housewife	19%
	Trader	1%
	Disoccupato	2%
	Employee	23%
	Entrepreneur	6%
	Free Lancer	10%
	Worker	5%
	Retired	18%
	Student	3%
	Dependent On Pubbl Adm.	13%

The questionnaire was composed in sections. The interviews were conducted *face-to-face* during the months of April and May by interviewing the purchaser after shopping in a major retail shop. In order to have different groups of consumers within the sample, the questionnaires were administered at three different times: in the morning from 08.00 to 12.30, in the late afternoon from 16:30 to 18:00 and in the evening from 19:00 to 20:30. The questionnaire is based on the theory identified by the economic literature in similar studies and consists of 16 questions divided into four parts.

In the first section we ask about demographic information of the family like the presence of children, old people, fish consumption and kind of diet regime.

In the second section we ask about farmed fish consumption and the perceived differences between farmed fish and fish catch. In this part we tried to exploit the difference the consumers notice between the two different kind of fish and the channels where consumer is more likely to buy fish (direct from fisherman, from shops, from local market, from supermarket etc) and if he/she buy fish regardless of the weather.

The third section aimed at understanding the trust in the seller and/or the importance of certification through specific indication and the importance of controls for the fresh fish. In this part

there are questions also about the willingness to pay for freshness and for local fish and questions to exploit the fish culture of people interviewed.

Finally, the last section was to deepen the fish culture through the ability to gutting fish and the knowledge of fish traditional recipes when there is a guest for dinner. Followed questions about demographic aspects of the person interviewed and about his/her family.

6.2.1 Results from cluster analysis

The people buying fish were interviewed and the results were analyzed using hierarchical clustering techniques (Zanni, 2000). The results of the cluster seem to bear out the presence in the area of four groups of consumers who may be identified as follows:

Traditionalists; Amateur experts, Uncompromising; Pragmatics.

1. *Traditionalists*: This group represents 38.1% of the sample and is the most numerous of the four groups considered. They prepare a fish menu if they have guests at home, consume only sea-fish, but the source of fresh fish for this type of consumer is an important element in their choice. They prefer caught to farmed fish, but the locally-farmed fish are preferred to foreign-caught fish. They buy, even if the weather is bad and seem able to evaluate the freshness of the fish and plan their fish purchases from home. The typical person buying in this group is a woman from 40-60 years old with a high school diploma.

2. *Amateur experts*: This group represents 15.3% of the sample considered. This type of consumer is able to distinguish between farmed fish and caught fish even before consumption and considers that there are also perceptible differences between the two categories of fish. They buy fish only when the weather conditions allow fishing and consider it important to have information on the date of the catch. Freshness is an important attribute for this consumer, buying only if they are sure that the fish is freshly-caught fish and preferring less esteemed caught fish to expensive farmed species. The typical buyer is a man around 50 years old with a high school diploma who claims to eat fish because he particularly likes it (a high weekly consumption).

3. *Uncompromising*: This group makes up 14.4% of the sample and is characterized by a strong preference for the consumption of fish caught locally to the extent that they will not tolerate farmed fish. When locally-caught fish are unavailable they prefer to consume fish from abroad provided it isn't farmed. This type of consumer also likes less expensive fish to farmed fish. The consumer behaviour and demographics of the group suggest a pensioner living alone who rarely consumes meals outside the home but who associates a fish lunch as a favourite, recognizing its important nutritional value.

4. *Pragmatics*: this group is made up of young people representing 34% of the sample. The typical buyer is a woman with good education (a university degree) belonging to a family composed of one or two people and with a balanced diet. Though knowing how to cook, this consumer buys gutted fish and does not seem to attach importance to a relationship of trust with the vendor, although preferring locally-caught fish, attaching great importance to expensive species, preferring farmed fish of value to locally-caught but less-esteemed species. They do not recognize the difference, either in appearance or taste, between wild-caught or farmed fish even if they state that they prefer wild fish when available. This cluster does seem to indicate a reduction in the maritime culture, probably due to generational change. For this type of consumer the direct channel of trust with the seller seems less important, and they seem to accord greater importance to the date of the catch and the certification of origin. This first exploratory survey

brought out two important aspects on which it would seem worth spending some time:

- These groups, while presenting differences within them, have a common feature: they prefer locally-sourced fish and have a good knowledge of the preparation of fish dishes.
- The pragmatist group, who represent the young end of the sample, reveals the pattern of current consumption. This consumer, while having a knowledge and culture in the preparation of fish, brings out, in several of its behavioural aspects, a reduction in the maritime culture in the new generations.

7. Conclusions

Whereas the nutritional value of these under-utilized species is no less than that of other more sought-after fish, their regional availability, the structural features of regional fishing, the productive tradition of fishing and the presence of a strong culture of fresh fish consumption mean that it is considered appropriate to provide regionally-linked promotion.

The characterization of LCVF through its association with the coastal source area could represent a way of promoting these products by giving them a specific identity through the preparation of recipes that belong to the local tradition and are defined as having a “low environmental impact” precisely because they exploit species not subject to fishing effort and that have high reproductive rates.

In the light of the many complex issues that must be considered, as well as the circular relationship that exists between regional identity and the promotion of LCVF, in the case of Lazio, an effective promotional strategy should take into account the following aspects:

- *Identifying LCVF available in Lazio.* Under this programme initiatives must be developed to define the specific elements of the quality of LCVF and initiatives designed to differentiate them in commercial channels from similar products;
- Promoting the *distinctive characteristics* of Tyrrhenian fish products according to their area of origin, their taste and the typical gastronomy related to “fresh local fish”;
- Identifying all the *functional activities* involved in marketing LCVF for the placement of the product on the market by establishing a communication plan at retail outlets, consumer education and the organization of events related to the area in question;
- To inform consumers about the nutritional value of these “forgotten fish”, relying mainly on the young generation and raising awareness among food service operators and consumers, both with regard to the production process and to the catch’s seasonality through a local communication campaign.

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