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### Coastal fishing : resource's enhancement and preservation

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## Coastal fishing: resource's enhancement and preservation

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### Abstract

The recession in the French fishing industry in the early 1990s led to disastrous human and economic situations. In response to this crisis some groups of commercial fishermen committed themselves to finding a way to enhance their profitability and adapt their production to meet the demand. Their efforts led to the implementation of a quality scheme (Bretagne Qualité Mer, Ligneurs de la Pointe de Bretagne, etc.) to ensure the freshness and quality of their products.

The relationship between the enhancement project fishermen's incomes and the consequences for resource usage are analysed in the Valpêche research programme (Rapport final du programme Valpêche, 2002, 340 [1]). The fishermen's attitude towards the enhancement programme was analysed with surveys of 185 and 60 skippers working along the Channel, from Brest to Boulogne. The surveys were designed to investigate the success of the enhancement programme and its knock on effects. At first, we focus on the question of the relative adaptability of official certification standards for aquatic products, then, we analyse the level of uptake from the industry. We also use a preliminary cost–profit and cost–efficiency approach to interpret the impact that such programmes have on fishermen's incomes. Finally, we focus on the impact of such a programme on the level of effort expressed by the fleet, in other words the incentive to fish more or less. The paper ends by considering how a product enhancement programme could be combined with increasing incomes and better management of the resource? In this respect, we rely on the results of the survey that was done among fishermen adhering to the marketing programme “Ligneurs de la Pointe de Bretagne”.

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## **1. Introduction**

The recession in the French fishing industry during the early 1990s, led to a disastrous situation in both human and economic terms. Many lessons were learnt during this period and some groups of commercial fishermen committed themselves to finding a way to add value to their output and reduce their vulnerability to external shocks. They also tried to adapt their production characteristics in order to be more responsive to demand signals. A quality standards programme (Bretagne Qualité Mer, Ligneurs de la Pointe de Bretagne, etc.) was implemented as a guarantee of the freshness and quality of their products, and as a first step towards achieving their aims.

The research programme “Valpêche” is analysing the relationships between catch volumes, income to fishermen and consequences of fishing practices and effort [1]. Several case studies have been carried out to investigate this relationship. A survey of 185 skippers, working along the Channel, from Brest to Boulogne, was carried out in order to analyse fishermen’s attitudes towards enhancement programmes. A second series of surveys was also undertaken from 60 skippers supporting the enhancement programme to determine the programmes effectiveness. At present, however, results from only 25 of the fishermen are available.

At first, we focus on the question of the relative adaptability of official certification standards for aquatic products. Then, the survey results are used to investigate the general consensus on the effectiveness and popularity of the enhancement programme. A preliminary cost–profit and cost–efficiency approach is then used to analyse the impact that such programmes has on fisheries’ incomes. Finally, we focus on the effects that such programmes may have on the activity of participating fleets, i.e. the incentives they gain to fish more or less.

The paper concludes by considering the question: how could product enhancement be combined with increasing incomes and better management of the resource? In order to address this, we rely on survey data from fishermen involved in the marketing programme “Ligneurs de la Pointe de Bretagne”.

## **2. Production enhancement in the fishing domain; motivation vs. stagnation**

While the fishing crisis of 1993–1994 plunged a large proportion of the industry into (further) debt and caused much distress, it also acted as a stimulus by forcing the industry to accept a number of unpleasant truths. There had been a:

- significant decrease in exploitable stocks,
- increasing exploitation costs,
- and a decrease in the price received for some species,

Tackling these issues would be a significant challenge for any sector, and especially so in the case of traditional fisheries, which are not used to co-operative arrangements. Yet the economic situation led to growing calls for improved

organisation and a better understanding of the fish marketing chain in order to remain profitable in the future. In effect the industry had to become more efficient, and responsive to supply and demand signals.

Several groups of producers then started to think about how production could be enhanced [2]. They looked to the agriculture industry with its well-established certifications [3,4] and quality standards, and decided to adopt this approach for their aquatic products. The system would enable fishermen to add value to their product and increase their profitability. However, adopting such a standards scheme is not simple as existing systems are not easy to reform [5] and the new approach had to be adapted from a different industry (agriculture) [6].

The most widely recognised example of the quality assurance scheme is the Label Rouge,<sup>1</sup> which has become especially popular in aviculture because of the clear difference in quality of labelled chickens and industrially bred chickens. The AOC (label of origin) is also used to specify the good's region of origin, this label is more important for wines<sup>2</sup> and cheese products. Geographical labels indicate a bond, real or imagined, between the place of production and the quality of the product.

Unfortunately these marketing techniques are not easy to implement for aquatic products. The Label Rouge's potential to improve the market price for wild caught fish depends on its ability to guarantee quality, i.e. dictate standards of processing. As only organoleptical (taste, smell and appearance) characteristics are relevant, the label must ensure that these characteristics are noticeably improved. However, since this may be impossible to achieve for wild caught aquatic products, it would seem that the Label Rouge is not suitable for fisheries industries.<sup>3</sup>

Implementation of the AOC scheme, which is supposed to guarantee quality with a link to the products origin of production and its location, faces different problems. For example, the migratory nature of fish stocks and the fact that most boats operate in many different areas, makes the concept of *maritime soil* difficult to implement. The only aquatic products that can make a solid case for an AOC scheme are the fixed resources like scallop beds,<sup>4</sup> which remain closely connected to specific marine environments, and products caught from space-limited stocks,<sup>5</sup> in bays or along some coastlines.

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<sup>1</sup> Among consumers, the Label Rouge is the most popular; for 82% of them it corresponds to a high standard of quality. In the domain of aviculture, which is undoubtedly the predilection sector for the Label, the difference between industrial chicken and labelled chicken is perceptible to the basic consumer. This difference of quality is also perceptible in terms of price: a labelled chicken can be 4 or 5 times more expensive than an industrial chicken.

<sup>2</sup> Wine industry is undoubtedly the sector of AOC (90,000 exploitations, 51% of the French vineyard surface proposes an AOC labelled production). Besides, the AOC is particularly famous: more than 50% of the consumers would be able to identify its logo.

<sup>3</sup> On the contrary, it could be used to certify and guarantee the quality of farmed fish and shells.

<sup>4</sup> A procedure is being implemented for the scallops of the department Côtes d'Armor, in the Bay of Saint Brieuc, northern Brittany.

<sup>5</sup> For instance the Sole, in the Seine River Bay.

The Geographical Registered Indication<sup>6</sup> (IGP) is not a sign of quality, but offers the protection of a label of origin. It ensures the promotion and enhancement of local production. In one sense it seems well suited to this industry and the needs of the consumer, but there is a problem of selecting the geographical area to determine the IGP. This could be the fishing area i.e. a bay or underwater bed, landing harbour, home port, a type of geographical fishing area such as the coastal or open sea.

The most unsuitable system is the Product Conformity Certification, which is a guarantee of specific product characteristics, such as the fishing technique used. However, since no official quality standard has yet been obtained for unprocessed aquatic products, it would have very high start-up costs.

In addition to the problems outlined above, commercial fishermen also had to evaluate the economic feasibility of any enhancement scheme. The implementation of label schemes is expensive because research was required to determine the most important aspects of quality in aquatic products. The fish industry organisations did not want, or could not afford, to support these preliminary expenses, and even when the scheme is running it will be costly to maintain. For example, official labels and certification must be dealt with on a species-specific basis which will be difficult for a commercial fisherman who catches many different species to undertake.

In spite of these problems the crisis in the early 1990s led some fishermen to undertake such a scheme in order to find a way to cope in the new market conditions. One of these new conditions was a growing demand for product trace-ability from consumers and supermarkets (GMS). The fishermen, therefore, aimed at promoting *guaranteed* qualities and characteristics in their products. The establishment of a third certifying institution (Véritas, for example), these collective trademarks to guarantee that production meets certain standards of quality. The guarantees are based upon the *processing methods* used and the freshness of the fish. In addition, labels may specify the location (Bretagne Qualité Mer, Normandie Fraîcheur Mer, Fraîcheur de Litoral de Haute Normandie), fishing method (Ligneurs de la pointe de Bretagne), and region in which the species was caught (Homards de Côtes de France).

However, the bulk of the profession has still not changed this approach to fishing and fish marketing. It seems that there is a general lack of motivation to adapt to the new market conditions. An economic survey of the Channel fleets may therefore provide useful information on the fishing *habits*, the exploitation *strategy* and the marketing processes that fishermen use. The way they perceive the industry, their interest in new possibilities to improve profitability and the new methods they think of must be examined. The possible repercussions on their incomes, as well as the impact on fishing practices can then be assessed. The enhancement procedures, relevance, efficiency, and the economic profitability programmes are discussed in the third part of this article.

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<sup>6</sup>Such a programme IGP does not oblige to guarantee a quality. Yet, it enhances the product underlining its location. In the consumer's imagination, this is the expression of a certain mode of production, savoir-faire, and a history to which he becomes sensible.

### 3. Enhancement of small-scale traditional fishing today

In the context of the research programme “Valpêche”, we have limited our study to the small-scale traditional fishing fleet [7] and to the Channel geographical area (zone VIIe and VIId of the CIEM).

#### 3.1. Sampling and method

The French coast along the channel is divided into 12 maritime districts from Brest in the west to Boulogne in the east. The survey focused on the fleet of small, less than 25 m, traditional fishing boats registered in channel ports from one of the 11 maritime districts.<sup>7</sup>

The nature of their activities can be described in terms of different métiers, i.e. “the implementation of a fishing gear to catch a given species, in a determined area, during a given season, and for which any capture resulting from a fishing effort can be characterised by the same diagram of exploitation”.<sup>8</sup>

#### 3.2. Exploitation, marketing, and enhancement strategies

In order to properly interpret the survey results we must take account of the basic characteristics, which determine the activity of each boat. For example, while the fleet is quite homogenous in terms of technology, the analysis of a target species according to boat size underlines the existence of an inter-fleet heterogeneity and there is a strong relationship between boat size and range. The correlation between size and range means that boat length has significant consequences for the distribution of fishing activities in the Channel. It also determines the location of fishing activities and thus on the total level of fishing effort.<sup>9</sup>

The most important factors controlling the level of fishing effort exerted by the fleet are *fishing time* and *fishing power*.<sup>10</sup> The time spent at sea by each fleet is clearly a key feature describing the amount of fishing done. However, the fishing time is not a direct measure of effort since a large and variable proportion of this time is spent travelling to and from fishing grounds. Another inconsistency between fishing time

<sup>7</sup>We did not consider the fleet of the westernmost district of the zone VIIe of the CIEM (that of Douarnenez-Camaret), simply because most of the boats registered there do not fish in the Channel.

<sup>8</sup>In Catalogue International of the Channel Fleet activities [13].

<sup>9</sup>The fishing effort tends to quantify the importance of the exploitation of a stock within a given period of time. There also exists a difference between the way the fishing effort is made by the fishermen and the way it would be “felt” by the fish. Because of this, a distinction is usually made between the nominal fishing effort, and the effective fishing effort. The first corresponds to the total input volume generated by the production programme, which can be quantified in physical and monetary terms. The second is defined by the biologists and concerns the rate of mortality of a stock (resulting from fishing activity). Catches made by unities of effort can thus be used in order to assess the abundance of the stock. The notion of nominal fishing effort remains closer to the “conceptual” frame of our discussion.

<sup>10</sup>The “fishing power” is closely dependent upon the engine power of the boat, but does not amount to it. The nature of the fishing gear used must be taken into consideration too. Due to a close correlation with the engine power, the size of the boat can also be considered to define the fishing effort.

and effort is the difference between the dragged and the laid gear, since the latter can “keep on fishing” while the boats are back in port. Fifty percent of the skippers admitted that they had significantly increased their operations at sea (in number and duration) during the last five years, whereas only 7% of them had reduced it.

Enhancement is not perceived by all fishermen to be the best way to improve their financial situation, indeed the survey found it to be the fourth most important condition (10%). After price increases or a fixed minimum price (33%), an increase in fishing effort (16%) and better management and regulation of the access to the resource (11%). The overhauling of the fishing industry, and better internal communication, are considered to be of lesser importance.<sup>11</sup>

While at the start of the product enhancement scheme a quarter of the fleets boats were committed, today, only 11% are still involved.<sup>12</sup> For 58% of respondents the programme was overly simple, without a real structure, or any particular requirement. For example, the consumers only guarantee was the boats homeport. For instance, in the districts of Northern Brittany, the programme promoted fish from Brittany in Breton, or it could be the marking of anglerfish tails that indicated the location. As a whole, though almost  $\frac{3}{4}$  of the skippers recognise that enhancement is relatively, or even very important, those who are effectively committed to such a programme are more convinced of its importance.

For skippers, whatever their speciality or the type, the meaning of the word “quality” is immediately associated with freshness (84%), time since capture. Only 6% of them consider the storage procedures, preservation, or processing method as priorities. Yet, for these criteria, the type and the size of the boat is an important factor in attitude determination. Skippers who dragged the fishing gear stress the criteria “preservation and storage” (52%), while those who fish with fixed gear, or have mixed activities, place more importance on the type of fishing before the visual characteristics of the product and preservation method.

For the other aspects of quality, apart from freshness, skippers views depend on boat size. Skippers of small boats consider the type of fishing (33%) more important than preservation method (27%), and product characteristics (size and appearance). For boats between 12 and 16 m in length the priorities are preservation (38%), fishing type (17%), and then the fish characteristics (12%). For larger boats, between 16 and 25 m, storage and preservation is the top priority (60%), and fishing areas are second. There is a strong relationship between fishing method and the quality of fish landed, with smaller boats landing fresher fish since it has been caught on the same day (Fig. 1).

Skippers of larger boats meanwhile, have to try and ensure the quality (freshness) of their catch by improving the storage facilities. More than  $\frac{3}{4}$  of skippers were

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<sup>11</sup>The majority of the profession shares the feeling that in spite of efforts made, people remain reticent to eat fish because they do not feel comfortable with the product. This concerns its nutritional qualities and cooking requirements. In the context of mad cows, dioxin chicken, much could have been done to underline its natural and healthy qualities, thus leading the consumers to pay more attention to this product.

<sup>12</sup>Enhancement is considered as any programme that helps the consumer recognise and identify the product. It can be a single advertisement, or quality programmes resulting in the grant of a Label.

prepared to commit to a product enhancement programme if it would improve the freshness of their goods. On the whole, bigger boats displayed a greater level of support<sup>13</sup> for such a scheme. Small boat skippers seemed less interested in this type of product enhancement, as they generally have their own marketing areas, where the quality of their production is already established and included in the final price. For example, they do not always sell their fish through the auction room as they may have direct links with consumers, restaurants, fishmongers and wholesale merchants.

These links are a big feature of the groups who are not interested in such a programme. For example, skippers who sell most of their landings directly to the consumer tended to reject the idea of a quality programme (55%), while those who sell their production in the auction room were more positive (60%). Skippers of boats under 12 m in length claim that such a programme would not increase their sales, while skippers of larger boats (16–25 m) said that enhancement was not a priority (43%) as there is no demand for such a programme from their customers, the programme would have no effect; also it would require too much extra labour (14%). However, the most frequent argument, regardless of boat size, is the cost-effectiveness of the scheme in terms of the effect it will have on price and market share. The most significant stumbling block for the programme is therefore its potential price effect.

Also, there is a perceived threat from free-riders on the project who would undermine the effectiveness of the project, reduce its profitability, and maybe even reduce participants market share.<sup>14</sup>

### 3.3. *Expectations and consent to fish less*

The large majority (82%) of skippers expected that the product enhancement programme would have an impact on the selling price. They also hoped to be able to differentiate their product from the build of the market (26%), while others expect to find new sales outlets (26%). A price increase of 15%, on average, was required to guarantee commitment to the enhancement programme.<sup>15</sup>

The scheme can also be considered in terms of its effect on fishing technique, and its effect on the level of resource utilisation. A reduction in fishing effort, resulting from the enhancement programme, would be a positive outcome; while an incentive to fish more would be a negative effect. The central question here concerns the

<sup>13</sup> Yet, for boats above 16 m equipped with fixed fishing gear, the repartition between skipper in favour of such a programme or not, is symmetrical: 50–50%. An analysis by speciality reveals that pot-boats are favourable to this idea (75%), and trawlers are hostile (66%).

<sup>14</sup> When such a programme is initiated important means must be guaranteed to ensure control of the quality and selling prices. For some skippers, this would be the reason that explains their scepticism regarding enhancement programmes.

<sup>15</sup> This notion is relatively similar to a “reservation price”; in other words, the price from which they would accept to support quality or enhancement programmes. This hoped for gain of price is not so unrealistic, notably regarding the results obtained by certain programmes. For instance, on certain species (small pelagic fish), the BQM programme obtained up to 62% of gain of the mean price throughout the year. This might be exceptional but it proves that hoping for a 15% increase is not totally utopian.



responsiveness of fishing effort to changes in the price received, and whether this would be a positive or negative relationship. Would the scheme persuade fishermen to behave differently?

Half of the skippers (51%) said that they would be prepared to change their fishing methods, more or less, in order to enhance production. The chart below gives a breakdown of the responses:

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How would you react if your production were enhanced

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1. Fishing like before increasing your income if a real enhancement of the production is initiated.	49%
2. Fishing less (reduction of the fishing effort) thanks to an improved enhancement of the production: income remains stable.	41%
3. Fishing more, with a significant increase in your income by combining greater fishing effort and enhanced production.	10%

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Of the 51% who would be prepared to change their fishing habits, the great majority would, given a stable income, reduce fishing effort. A small number of them would increase fishing effort to enhance their income. However, in the 16–25 m group, 46% of fishermen would reduce their effort while only 4% of them would increase it. This observation is highly significant in the context of resource preservation because it is this group, the larger boats, which have by far the greatest capacity. A re-orientation of their fishing habits would have proportionally greater consequences for resource stability.

A successful enhancement programme may therefore help achieve a new balance of work/spare time, i.e. a growth in nominal income and a reduction in the number of days at sea [8].

Economic theory demonstrates that income level is an important determinant in the supply of labour.<sup>16</sup>

Slutsky's equation:

$$\Delta R/\Delta w = \underset{(-)}{\text{substitution effect}} + \underset{(+)}{(\bar{R} - R)} \underset{(+)}{\Delta R/\Delta m}$$

where  $R$  indicates labour,  $w$  gives wage rate and  $m$  is the nominal income. If we assume that spare time is a normal good then the substitution effect indicated above is always negative and  $\Delta R/\Delta m$  is positive. However,  $(\bar{R} - R)$  is also positive, and consequently the sign of the whole expression is undetermined. Unlike the standard consumer demand scenario, the demand curve for spare time presents an undetermined sign, even if it is a normal good. Therefore, as income increases fishermen may be persuaded to work more or less. This indecision results from the

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<sup>16</sup>This is the result of Slutsky's equation; the demand curve of a normal good must feature a negative slope. If spare time is a normal good, the work supply curve should present a positive slope.

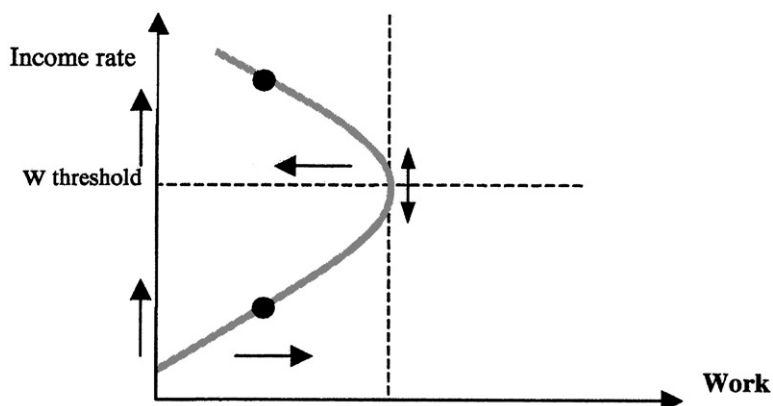


Fig. 1. Fishermen's supply curve after the enhancement approach.

substitution effect that leads to more work, instead of enjoying spare time due to the rate of income growth. On the other hand as the endowment grows the additional income (due to the enhancement programme) could also persuade fishermen to take more leisure time as they can earn the same income from fewer days at sea. An empirical approach, taking into account the initial distribution of time between work and leisure, is the most appropriate way to find out which of the substitution or income effects are dominant. Slutsky's equation reveals that this case is more likely when the value of  $(\bar{R} - R)$  is significant, in other words when labour supply is already high. The results of the survey show this is a real and established trend. During the last five years, we have noticed a significant increase in the time spent at sea and, according to skippers, a maximum threshold has almost been reached.

When the income rate leads to a fall in labour supply, we have a backward bending supply curve, corresponding to the standard labour economy.

With low salaries, the substitution effect dominates the income effect and pay increases reduce the demand for leisure, i.e. more time spent at work. However, with a higher salary, the substitution effect can be negated by the income effect if an increase in salary leads to a reduced supply of labour (Fig. 1).

For the majority of skippers who would agree to fish less, and there would be a consequent reduction in total fishing effort, if there was a successful production enhancement scheme (56%).

The largest boats (16–25 m) would be more likely to reduce their fishing effort for all species (65%), given a successful enhancement programme. For big trawlers (20–25 m) this can partly be explained by the fact that they cannot really select their catches, unless they select their fishing areas. In most cases, these skippers answered that they would tend to reduce the number of days spent at sea, or the duration of the time spent at sea. Yet, 30% of the skippers from the 16–25 m boat group, would reduce their fishing effort by “targeting” their effort towards the most enhanced species, and therefore reduce the catch of species for which there was less demand.

This type of response would undermine the capacity of an enhancement programme to be used to manage the resource on a species level. Among skippers of smaller boats, 12–16 m and under 12 m, the response is a bit different. Around a third of them would tend to reduce their fishing effort with a product enhancement programme since a lesser quantity would bring in a similar income.

It seems therefore that an enhancement programme would not lead many fishermen (~10%) to increase their fishing effort. However, it is still quite difficult to draw conclusions for each boat group because of the small sample size. Yet, we can propose a number of hypotheses. Paradoxically, in terms of size, the different boat size groups display quite similar behaviour. Half of them would increase their fishing effort and would focus on the most enhanced species while maintaining their activity for the rest of the production. The second typical behaviour, the most frequent and consists in a global increase in the fishing effort.<sup>17</sup> As far as the 12–16 m long boats are concerned, they would focus on the most profitable species (63%).

A second survey was then administered in order to get a better understanding of the decisions that determine fisherman's income, its components, the strategy of exploitation and fishing response to a production enhancement programme. In order to do this we paid particular attention to skippers who have been involved in an enhancement programme for a number of years, the "Ligneurs de la Pointe de Bretagne".

#### **4. Analysis of an enhancement programme: "Ligneurs" of western Brittany**

This survey has several objectives:

- To assess the additional costs incurred from the quality programme (boat alterations, equipment, preservation, storage and processing equipment, change in work habits, additional work time).
- To determine the income and additional profit made from price increases.
- To assess the effect of the programme on investment and fishing techniques.
- To understand how the enhancement programme can be used to persuade fishermen to fish less or in a more responsible way.

##### *4.1. The enhancement programme: impacts on the market and competition*

The commercial sea bass fishermen who wanted to emphasise the quality of their products created the association "Ligneurs de la Pointe de Bretagne". In particular, they wanted to help consumers distinguish farmed-bass from wild caught lined sea bass. Every year the aquaculture industry produces some 2300 tons of sea bass,

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<sup>17</sup>There again, we can underline the trend observable among larger boats, and more particularly those operating dragged fishing gear. Indeed, it seems that they would not make any distinction between the enhanced species and the others. (This non-selectivity due to the nature of the activity- was already in use in the case of an incentive to reduce the fishing effort.)

which is sold in the same market. This competition has driven prices down for both sets of producers, for example, before 1992, the average price for wild sea bass was about 100 Francs per kg, which has since fallen to around 55–60 Francs while farmed-sea bass was sold around 45 Francs per kg.

The wild sea bass producers chose the collective label “Bar de ligne de la pointe de Bretagne” to differentiate their production from farmed fish by promoting the fish’s wild and regional (location) qualities through labelling. There are weaknesses in this approach though, since this programme is not consistent with the “statutory and usual method” of quality certification and is therefore open to potential labelling frauds. However, In spite of initial scepticism from the majority of the profession, the labelling programme “lined sea bass” was a success. Today, the association includes between 100 and 120 members, i.e. ~80% of the lined sea bass industry and it produces about 450–500 tons a year, compared to the 2300 tons of sea bass from fish farms.

The survey focused on this programme and included between 100 and 120 boats or 25% of the fleet. Wherever possible it was carried out with fleet representatives or skippers with a minimum of 4–5 yr experience.

This enhancement programme, “Ligneurs de la Pointe de Bretagne”, is interesting for several reasons:

- *Location*: It was totally initiated by the basic actors, skippers reacting to the market signals, and the appearance of new competitors.
- *Nature*: It is not an official standard, but focuses on the enhancement of a “speciality” and a particular fishing method (lines and long lines) for one species.
- *Functioning*: Members are grouped into associations, which enhance production by “labelling” fish according to pre-established requirements.
- *Results*: It has had an impact on prices, and consequently, on fishing habits.

This “communication” strategy seems to be quite efficient at all levels, and the collective mark has achieved a specific quotation at the Rungis market, the largest fish market in France. Their success is also confirmed by the response from producers in Poitou-Charente who, after losing market share as a result of the Breton campaigns, now want to implement a similar scheme. Indeed, they have multiple objectives in joining the collective label:

- The creation of the label generated a significant price increase, ending the decline that had set in around 1993–1994.
- It helped line-fishermen to differentiate their products from farmed, trawled or netted sea bass.

Line-fished sea bass are fished all year, and, along with pollock and conger are the most important fish for the small coastal fishing boats (6–10 m), which operate all year along the coast of Brittany. On an average, sea bass represents 80–85% of their annual turnover, and since this technique requires only one person onboard the enhancement programme can have a significant, and direct, impact on fisherman’s

income. The fleet is relatively homogeneous since all boats are between 6 and 10 m in length and most are of a similar age, around 15 years old. In 85% of the cases the fisherman is the only person onboard. However, because fishing takes place in strong tidal currents the engines are relatively powerful with respect to the size of the boat, the official mean power is 133 hp, but in reality it is probably greater. The majority (80%) of these boats never sail beyond 12 nautical miles. The official average annual harvest per boat is 6 tons a year, but this may be an overestimate since several boats fish more intensively than the rest of the fleet and catches of around 4.5 tons per boat year are probably more accurate. The number of days spent at sea varies from 150 to 280 a year. But for most (88%) of the skippers interviewed the number of days they spend at sea is relatively stable, and would have even been decreasing for the last few years.<sup>18</sup> In financial terms, gross turnover was found to be stable for 65% of the skippers and rising for 35%, over the last few years. Today, the mean turnover is 553,000 Francs.<sup>19</sup>

#### *4.2. Effects of the lined sea bass enhancement programme in Brittany on marketing, turnover and incomes*

Sixty-five percent of line-fishermen sell the bulk of their sea bass at auction where prices are usually higher. Yet, the rest, ~35%, prefer to sell directly to wholesale merchants because of established relationships, and the logistic flexibility this gives them. This flexibility is important because—sales to the auction room must be made at fixed opening hours. However, 50% of those who sell to wholesale merchants admit that they also supply the auction houses where they receive a higher price and for small quantities, some can even deal directly with restaurants. As a whole, producers stressed that at the beginning the enhancement programme was not particularly popular among the wholesale merchants. Now, however, the distinction that proves the authenticity of lined sea bass is a very important aspect of the goods and leads to higher prices for most buyers.<sup>20</sup>

Four levels of differentiation are distinguished:

Prices are basically comparable for labelled and unlabelled fish except for certain periods of the year in a few harbours. Indeed, 50% of the skippers say that there is only a gap of 2–5 Francs between labelled, and unlabelled fish.

<sup>18</sup> In the meantime, comparatively, for all boats under 12 m, whatever the skipper's speciality, this rate is divided by 2. Only 44% of them state that they reduced or stabilised their fishing activity. 56% admit that they increased the number or duration of their trips to sea. In this first conclusion, it seems that we have matter for interrogation and reflection about this tangible difference for boats of similar size, but "practising" different specialities: could this be a first effect of the enhancement programme?

<sup>19</sup> It is worth comparing this turnover with all the boats under 10 m in length that we studied in the first survey (around 390,000 Francs for the boats operating dragged fishing gear (trawls, etc.), and about 520,000 Francs for those operating fixed fishing gear (fixed nets, pots, etc.). On most boats, the crew is comprises two persons only.

<sup>20</sup> Yet, in some harbours or "regions", line fishermen wish wholesale merchants would play the game of enhancement between the labelled and non-labelled line sea bass: they ask for a label but refuse to pay for it.

For the others, there is no price difference. It seems that the whole profession has taken advantage of the enhancement programme. In this context, “non-members” behave like free-riders, taking advantage of the system without being involved.

- For netted sea bass, the price differentiation is more evident than in the above example. The average difference is about 10 Francs per kg. This price difference is particularly noticeable in harbours where “netted sea bass” are marketed differently.
- There was a greater price differentiation between lined sea bass by labelling. Indeed, the trawled product is usually 20–25 Francs cheaper.

Finally, the enhancement programme initiated by line-fishermen turned out to be particularly helpful in competition with the ever-increasing output of farmed-sea bass. Before the enhancement programme was initiated the gap between prices had been disappearing, and had fallen to only 15 Francs. By labelling their lined sea bass, the fishermen reversed this trend and pushed their prices back up again. Today, the gap is around 45 Francs per kg. There is, however, an exception for the smallest sea bass, between 500 and 850 g, which are in competition with the farmed “portion sea bass” because this product does not declare its origin, i.e. farmed or wild caught.

Annual mean expense due to the programme	Annual mean income resulting from the programme
<i>Investment</i>	<i>According to differentiation degrees</i>
Gun 584 F	1. Unlabelled lined sea bass: 4500 kg × 2 F = 9000 F
Labels 1861 F	2. Netted sea bass: 4500 kg × 10 F = 45,000 F
<i>Cost/additional time</i>	3. Trawled sea bass: 4500 kg × 25 F = 112,500 F
“Processing” of the fish: 2950 F	4. Aquaculture sea bass: 4500 kg × 35 F = 157,500F
<i>Diverse expenses</i>	
Subscription 250 F	
“Administration” 216 F	
Total cost per year: 5861 F	
<i>Profits according to the scheme retained</i>	<i>% of the mean turnover</i>
1. 3139 F	0.05%
2. 39,139 F	7.10%
3. 106,639 F	19.20%
4. 151,639 F	27.42%

This price increase has had a significant effect on the turnover and income of line-fishermen, but it is difficult to assess the impact of price increases solely from the enhancement programme since several trends are present.

- Two-thirds of line-fishermen claimed that their turnover has remained stable, while a third said that it has increased (by more than 10%) over the last five years.
- Thirty-five percent of the skippers suggest that the price increase has compensated for increased resource scarcity and allowed them to maintain their turnover. Fifteen percent of them said that higher prices have had a positive impact on their turnover. Finally, 50% of line-fishermen estimated increase in their turnover to be around 15% as a result of the enhancement programme.

In order to analyse the effects of such a programme on fishermen's income, it is necessary to consider all annual expenses.

It appears that whichever scheme is implemented, the enhancement programme is profitable. Yet the scheme chosen has a highly significant impact on the financial outcome. Financial stability, however, is just one of the programmes aims. The ability to differentiate between high and low quality goods is also important in order to maintain the viability of the much smaller sea bream processing sector (600 vs. 2300 tons). This aim emphasises the importance of differentiation for the enhanced product. Being questioned about the financial profit they make from supporting the enhancement programme, 88% of them assess their profit gain from labelling to be in the region of 17%<sup>21</sup> while, the 12% said that the gain was hard to quantify.

#### *4.3. Effects of the lined Sea bass enhancement programme on investments and the fishing effort*

Sixty-one percent of line-fishermen admit that they do not have an alternative investment plan for the additional revenue generated from the enhancement programme. Thirty-one percent of them said that the greater financial flexibility allowed them renew their fishing gear more rapidly. In some cases fishermen even bought new boats. Interest in re-investment comes from the capital requirements of the activity which needs highly efficient boats and reliable engines in order to be effective.

The product development carried out in this programme has led to an evolution in skippers fishing habits, 94% of them said that they had changed their fishing behaviour. Thus, the price increase brought about by product differentiation, did not lead to a change in fishing strategy for only a very small fraction of the fleet. Among those who have changed their fishing strategy, 6% increased fishing effort (in order to maximise profit by taking advantage of higher prices), while 94% stuck with the same financial turnover. For these fishermen price rises led to a reduction in fishing

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<sup>21</sup> At first sight, this figure seems to be different from that which corresponds to the turnover. It reveals another reality that will be discussed later. An increase in the prices helps fishermen reach their monetary objective more rapidly during a year. Thus they will be able to reduce the number of goings at sea. They will reduce their expenses and they will profit from a better profitability of the exploitation.

effort as they reached their financial target more rapidly. The additional “gain” is not considered in terms of strict financial profits but rather in terms of additional spare time.

A reduction in fishing effort was caused by one of two reasons:

- Thirty-six percent of those who reduced their effort admit that the enhancement programme was not the sole reason and was mainly due to a declining resource base. Yet, effort would have increased sharply if the programme had not been successful. They estimated that on an average 19% of the reduction in fishing effort was due to the enhancement programme.
- Sixty-four percent admit they have already reduced their fishing efforts, while preserving their incomes, thanks to the enhancement programme. They estimate the mean reduction of their fishing efforts to be around 15%, which led to a fall in the number of voyages for 80% of them. This enables skippers to limit the risks, i.e. they can stay ashore when the weather conditions are bad and get additional days off. Twenty percent of them have reduced their fishing capacity or have even adopted less physically demanding techniques.

## **5. Conclusion**

In order to promote responsible fishing and sustainable resource management, a quality enhancement programme, aimed at inducing improved product marketing, may encourage fishermen to reduce effort [9] under certain conditions. However, two separate factors are extremely important in determining the outcome:

- Fishermen may be persuaded to fish less if a new balance is created between work and spare time, with a dominating income effect. According to the survey, this outcome could occur with almost 50% of skippers of small-scale traditional fishing boats. An important point though is that the largest boats, which have a greater fishing capacity, could also be induced to reduce effort not simply because of the additional profit from programmes, but because many have increased their effort during the last few years, which has put the resource and their boats at risk. It seems likely that a significant enhancement in the production would give an incentive to fish less.
- Fisherman’s output may also be improved with the imposition of technical constraints such as a restriction on the time between capture and landing of the fish. There could also be constraints aimed at reducing the effective fishing time, i.e. onboard processing, specific preparation and packaging methods.

It seems that product differentiation, using labels to specify “lined sea bass” products, has resulted in price increases at first sale (in favour of fisherman). This price change has an impact on the fisherman’s income and on resource utilisation. The resource effect results from the new equilibrium that is created between work and spare time. A price increase will persuade line-fishermen to increase their spare time at the expense of fishing time, i.e. effort. The price of sea bass can, therefore,



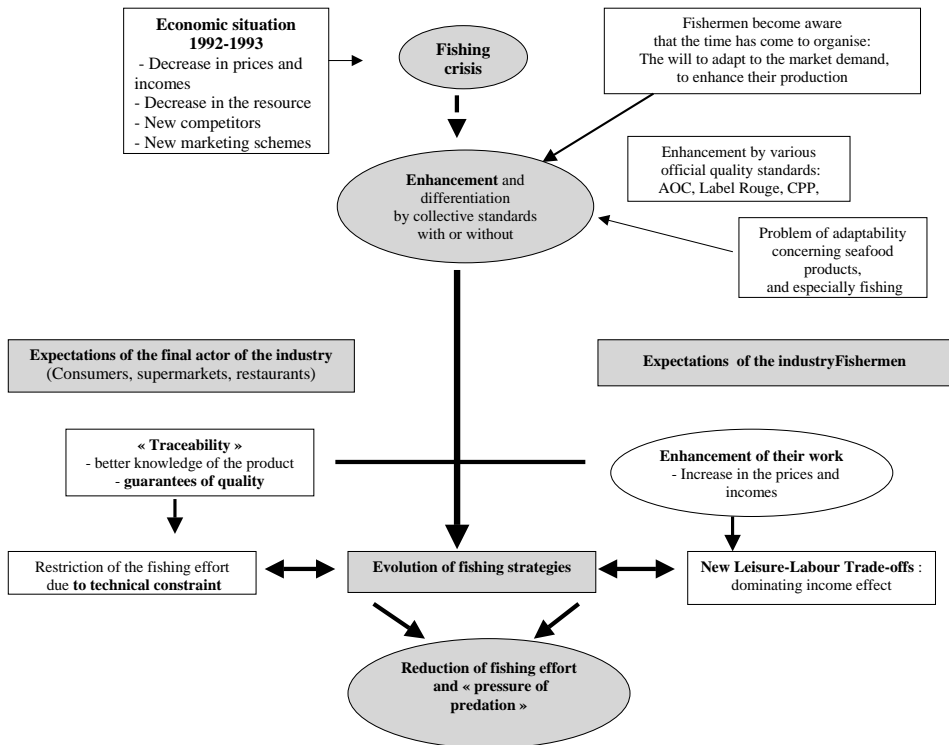


Fig. 2. Improving the quality of fisheries products and fishermen incomes: economic incentives and fishing strategies.

have a significant impact on the level of resource utilisation and its preservation (Fig. 2).

However, such a programme cannot be, in itself, a solution to the problem of over fishing. It is more likely that for certain species an improvement of fishermen's income could be used to improve the sustainability of a fishery. It may also be considered as a measure to facilitate the control of the production (quotas, TACs, etc.) or the factors of production (licenses, etc.) [10,11], and only in certain cases (ecological [12], C or economic niches) it should be used in isolation as a management tool.

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