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# **EMPIRICAL ANALYSIS OF SUSTAINABLE FISHERIES AND THE RELATION TO ECONOMIC PERFORMANCE ENHANCEMENT: THE CASE OF THE SPANISH FISHING INDUSTRY.**

## **ABSTRACT**

Sustainability and fishery must be a linked concept when considering the future of the natural resources. The environmental impacts of global seafood production and the effects of the intensive exploitation of our seas and oceans are indeed an issue under study and regulation. To minimize the negative effects of the fishing activity over the environment a growing number of companies are joining the Marine Stewardship Council (MSC) certification. The MSC is a leading wild-capture fisheries certification program that involves the fishing chain of custody. The increase in the number of certifications confirms that the seafood processing industry suggest their consideration of the environmental orientation as a key element of their strategies. In this paper the MSC certification and its implications for companies' value creation process are analyzed. To do so, data from 561 Spanish firms is retrieved and a multivariate quantitative analysis is deployed. Results show that that there is a difference in the economic performance of businesses that were MSC-certified over those that were not and the moderating role of size.

*Keywords: eco-labels; economic performance; environmental certifications; fishery industry; MSC Certification; sustainability.*

***EMPIRICAL ANALYSIS OF SUSTAINABLE FISHERIES AND THE RELATION TO ECONOMIC PERFORMANCE ENHANCEMENT: THE CASE OF THE SPANISH FISHING INDUSTRY.***

**1. Introduction**

There is growing concern about the sustainability of the existing fishing model. In fact, the environmental impacts of global seafood production are well known [1]. Issues such as the overexploitation of many species [2], the effects of fishing on entire ecosystems [3], or the reduction of marine biodiversity [4] are just some of the main environmental problems related to the intensive exploitation of our seas and oceans.

This concern for the sustainability of the seas not only affects fishing but is spread across all industries related to fish processing as well as distribution. In fact, environmental concerns have moved from being considered to be a matter of goodwill to becoming a key issue for competitiveness in many sectors [5], especially those related to food [6].

The need to be proactive on environmental issues has encouraged the use of eco-labeling and certification schemes, which are increasingly used in the global trade and marketing of fish and fish products [7]. In fact, several market studies carried out in the European Union show that consumers are concerned about the health of the oceans and would be willing to buy seafood preferably labeled as environmentally responsible [8.9].

Large-scale retailers and food services now drive demand for certified fishery products in relation to food safety and quality, sustainability and social criteria [10]. Hence, eco-labels and certification schemes could improve access to certain markets and provide a price premium for fish products.

In recent years, different standards for sustainably managed fisheries have appeared, some of which have been developed by governments or Regional Fisheries Management Organizations, such as excellent examples in New Zealand and the United States [11], along with other certificates created by environmental non-governmental organizations such as the Marine Stewardship Council (MSC), the Friends of the Sea or the KRAV certificate [12].

Seafood certification has two main goals. The first aim is to identify producers that meet defined ecological standards that allow retailers and consumers to trust products; the second and main target of seafood certification is to enhance sustainability and incentivize environmental improvement within a production sector [13].

Among the various seafood certifications, we should outline two: Dolphin-safe Labels and MSC certification. In this paper, we focus on the latter. The MSC is a leading wild-capture fisheries certification program. A total of 10% of global fish catches have or are in the process of being certified. This certificate has the peculiarity that all companies in the supply chain – from boat to plate – must obtain the MSC chain of custody certificate. Indeed, there had been an annual increase of 100% in MSC chain of custody-certified products for sale in the world by the end of 2010 to nearly 10,000 products [14].

Focusing on the Spanish market, unlike other European countries, the introduction of MSC certification is very recent. However, in Spain the increase in MSC-certified products is about 200% annually [14]. These figures lead us to hypothesize that *MSC certification contributes to creating value in the seafood processing industry by improving economic performance (Hypothesis 1)*. Moreover, it is interesting to study if firm size affects the influence of MSC certification on economic performance, which allows us to validate whether *MSC certification has an unequal influence on the economic performance of firms according to their size (Hypothesis 2)*.

The originality of this is the fact that we study the economic impact of adopting the MSC chain of custody certification on businesses. Although this type of analysis has been carried out with other

environmental certificates and eco-labels, the analyses of the benefits of the MSC have thus far focused on fisheries [15,16]. The objective of this analysis is to go further and see how it affects the next step of the chain, the seafood processing industry.

## **2. Theory.**

### **2.1 Environmental Sustainability and Management.**

Companies are putting sustainability at the heart of their business strategies. Taking care of the environment allows the firm to reach new markets and to differentiate them from competitors [17]. Companies aim to incorporate their environmental orientations through different environmental tools such as environmental management systems or eco-labels. Although these facts are generalizable to most sectors, they seem to be particularly important at the food industry [18]. Repeated food scares have placed matters related to quality, safety and the environment as key aspects of food industry management [19].

At the food industry, it is particularly important to distinguish between eco-labeling and environmental certification [20]. On one hand, the industry design and apply systems are aimed at incorporating environmentally sustainable management tools such as ISO 14001 and the EMAS certification [21]. On the other hand, the numerous existing eco-labels inform customers about the specific environmental attributes in the product, general attributes as in the case of the European Eco-label or specific product labels such as organic food or sustainable fishing.

In both cases, there is an extensive literature linking higher corporate profits with a proactive environmental attitude [22]. In the case of eco-labeling, which is the focus of this study, studies relate organic labeling to better prices and profits in industries as diverse as coffee [23], baby food [24] and cotton garments [25].

In the specific case of fishing, there is growing demand for fish products that ensure a minimum guarantee of sustainability; thus, many companies related to the sector are putting sustainability at the core of their business strategies.

Environmental concern is not new; one of the oldest and most popular labels is given within the fisheries sector: the dolphin-safe label. The reasons for its rapid and successful implementation have been extensively studied [26, 27], and its positive effects on the performances of companies have been verified [28]. The problem with the dolphin-safe label is that it focuses on a specific environmental problem, for which it is necessary to obtain a more general fishing certificate. The MSC has become the reference fishing certificate in recent years. Its characteristics are explained fully in the next section, but it is significant that it follows the model of the Forest Stewardship Council (FSC). This certificate along with other sectorial initiatives such as the Sustainable Forestry Initiative prompted substantial changes in forest practices by managers who believed that the benefits of forest certification were greater than the disadvantages [29].

Although there are several studies analyzing the environmental impact of adopting environmental certificates and labels [30], the effects of certification and eco-labeling in marine conservation still generate many questions and debates [31]. This paper does not analyze the effects of MSC certification on the environment but focuses on analyzing the economic effects for companies that adopt it. Previous works have focused on the food industry and these relate a proactive environmental attitude to productivity improvements and competitiveness [32]. Several studies have also analyzed the economic effects of eco-labels, environmental management certificates such as ISO 14001 or similar certificates such as the FSC. However, the difference is that in MSC-certified fisheries it is difficult to quantify its impact on companies. Nevertheless, as presented in the next section, the certification of seafood does not end with the fishery but rather all companies – from boat to plate – must obtain the MSC chain of custody certificate. This means that many

companies in the supply chain have to be certified and, therefore, we can assume that their economic figures are conditioned by the adoption or not of the MSC certificate.

In these studies, a factor to consider is the size of the companies, which influence organizational behavior because of the higher level of specialization, standardization and formalization [33]. Indeed, several studies indicate firm size as one of the key factors in adopting any type of environmental innovation [34].

## **2.2 MSC Chain of Custody Certification.**

The World Wildlife Fund in partnership with the multinational Unilever founded the MSC in 1997, although in 1999, the MSC became a fully independent non-profit organization that was seen by environmental organizations and the fishing industry alike as an essential step to gaining credibility as a neutral body in a multi-stakeholder industry [35]. The initiation of the MSC was inspired by the success of the FSC, and the similarity of their names and logos was no coincidence [36].

MSC certification has generated debate about whether to focus on environmental issues or extend it to social and development issues [37] and whether to certify aquaculture initiatives [38]. However, the MSC focuses primarily on fishing operations and environmental issues in wild-capture fisheries.

On both the supply side and the demand side, MSC certification has become crucial in recent years. In early 2011, 250 fisheries were in some stage of the evaluation process, an increase of 34% over the previous year. Likewise, on the demand side, there has been an exponential increase in the use of the MSC eco-label in the market, with more than 1600 companies in 80 countries accredited with the MSC chain of custody. In addition, annual sales of MSC-certified products have exceeded \$2.5 billion in retail value, covering almost 10,000 product lines. The most important countries in terms of the number of products sold are Germany (about 3000 products),

the Netherlands, the UK and the US. In Spain and Portugal, the MSC certificate was introduced recently, but in one year it has experienced increases of 200%.

Despite its commercial success, the MSC certificate has also been criticized and analyzed from different perspectives [39,40]. The main criticism about the certification is its doubtful capacity to solve MSC-related environmental problems in the fisheries industry [41,42]. Other significant criticisms stem from its excessive flexibility and inconsistent assessments [43, 44], the potential financial conflict of interest and its high cost and bureaucratic complexity [45], which may restrict the market access of non-labeled products from developing countries [46]. Meanwhile, other reports claim that MSC-certified products play an important role in marine conservation [47], although there is consensus that alone it is unable to resolve the serious environmental problems caused by fisheries [48].

These important social and environmental issues have been addressed in different works, but there is still no consideration whether MSC certification contributes to creating value in the seafood processing industry by improving economic performance (H1). This key issue has been discussed for eco-labels and other certificates, identifying the importance of analyzing firm size, because certificates may have an unequal influence on the economic performances of firms according to their size (H2). In the next section, we present the methodology and results of the analysis of these two important issues.

### **3. Methods**

To validate these hypotheses, the analysis is focused on sector 10.20 of the NACE classification: “Processing and preserving of fish, crustaceans and mollusks” and use a quantitative analysis to compare different economic and financial ratios among companies. Economic information on the 561 Spanish firms identified as belonging to the 10.20 industry were obtained from the Iberian Balance Sheet Analysis System (SABI) database for 2010. Further, data referring to the 33



Spanish firms with a MSC chain of custody certificate according to the MSC database were extracted.

The 10.20 sector of the NACE rev.2 classification is “Processing and preserving of fish, crustaceans and mollusks”. For Eurostat [49], this includes the preparation and preservation of fish, crustaceans and mollusks: freezing, deep-freezing, drying, cooking, smoking, salting, immersing in brine, canning etc, production of fish, crustacean and mollusk products: fish fillets, roes, caviar, and caviar substitutes.

First, an ANOVA test was applied to compare certified fisheries with noncertified firms to detect mean differences across business functions. Then, specific performance indicators extracted from the SABI database were used; such as trading income (TI); size by number of employees (Size); profit margin (PM); profit per employee (PPE); earnings on sales before interest, taxes, depreciation, and amortization (EBITDA); return on assets (ROA); return on capital (ROC); and return on equity (ROE).

The ANOVA technique indicates whether the null hypothesis, that reflects the equal mean values for each  $\alpha$  level of significance, is rejected. Thus, one can confirm whether the mean of the variable performance is significantly different for firms according to the certification.

Afterwards a multivariate qualitative analysis which included the use of dummy variables and different regression analysis was run to confirm the results.

#### **4. Results and discussion**

The ANOVA test highlighted significant differences between firms with MSC certification and those without for TI, ROE, Size, EBIT and EBITDA. Moreover, the mean values of TI and Size of MSC-certified firms are more than three times bigger than non-certified establishments. Considering the mean size gives some indication of the relationship between size, process organization and economic performance. This indication is supported by the EBIT and EBITDA

values.

*[Insert Table 1 about here]*

Even though we can see from the mean comparison analysis that MSC-certified firms have, in general terms, higher economic returns (EBITDA), TI and Size, whether that result is caused directly by having received a sustainable seafood certification from the MSC cannot be determined. Thus, a regression analysis was conducted on the entire sample and the former variables studied for this purpose. Dummy variables were created to analyze the effects of size on the economic and financial variables. Finally, another regression analysis to assess the effects when certification and size are crossed was run.

Company size is measured by number of employees. Following the European Commission [50], firms with fewer than 50 employees are considered to be small companies, those between 50 and 249 to be medium sized and those with more than 250 to be large companies. Two dummy variables representing size ( $S_1$ ,  $S_2$ ) were created to examine whether size (large, medium or small) and MSC certification are related, namely if they have influence the economic performances of these firms. Thus, the performance variables were taken as the dependent variables. Dummy variables were modeled to sort data into mutually exclusive categories and assess their influence, taking a value of 0 or 1, depending on whether they are present or absent.

The regression models for economic and financial performance were built considering that the performance variables are dependent on MSC certification and on firm size as follows:

$$\text{Indicator} = C + \beta_1 \text{MSC} + \beta_2 S_1 + \beta_3 S_2 + E \quad (1)$$

$\beta_1$  helps us determine whether there is a difference in the performance indicators between certified and uncertified fisheries.  $\beta_2$  and  $\beta_3$  help us evaluate if firm size has a significant influence on the performance indicators. A positive  $\beta_1$  coefficient indicates a higher performance for MSC-certified

firms for the same value as the other factors influencing the performance indicators. Small firms without certification were considered as the base group or omitted category to which all comparisons were made in the models. The results for the economic and financial indicators are shown in Table 2.

*[Insert Table 2 about here]*

The  $R^2$  change method was used to test the significance of the dummy variables, ignoring the individual  $t$ -tests for each dummy  $\beta$  coefficient. The parameter  $R^2$ , called the coefficient of multiple determinations, indicates the percentage change in the dependent variable that can be explained by the independent variables in the model. Note that the relative predictive power of each variable is measured by the beta weights. The  $\beta$  coefficient shows how much more the dependent variable increases (or decreases if  $\beta$  is negative) when each independent variable increases by one unit in comparison to the omitted reference category.

The results indicate that when  $S_1$  (large size) acts in an isolated way, it influences TI ( $\beta=0.706$ ,  $p<0.001$ ), which confirms the logical assumption that larger fisheries generate higher sales and, therefore, higher incomes. Moreover, size affects EBIT ( $\beta=0.365$ ,  $p<0.001$ ) and EBITDA ( $\beta=0.540$ ,  $p<0.001$ ), which are realistic economic performance indicators. However, the most interesting conclusion is that MSC certification only shows incremental incomes, but has no significant impact on any other performance indicator. We obtained similar results for  $S_2$  (medium size): TI ( $\beta=0.239$ ,  $p<0.001$ ), EBIT ( $\beta=0.268$ ,  $p<0.001$ ) and EBITDA ( $\beta=0.321$ ,  $p<0.001$ ); however, the impact of this variable was, as expected, smaller than that for  $S_1$ .

MSC certification significantly influences only TI ( $\beta=0.087$ ,  $p<0.01$ ) and ROE ( $\beta=0.113$ ,  $p<0.05$ ); no other variable was significantly affected by this variable. Further, the TI  $\beta$  coefficient in this case was relatively low, showing the relatively small impact of this variable compared with the

others.

Interaction terms were added to the model to incorporate the joint effect of the certification and size variables on a dependent variable over and above their separate effects (see Table 3). The new estimation model is as follows:

$$Indicator = C + \beta_1 MSC + \beta_2 S_1 + \beta_3 S_2 + \beta_4 S_1 MSC + \beta_5 S_2 MSC + E \quad (2)$$

*[Insert Table 3 about here]*

The  $F$ -test of the significance of the interaction variables shows the significance of the change in  $R^2$  of the equation with the interaction terms and the equation without the set of terms associated with the ordinal variable (size). Salojärvi [51] considered values up to 0.099 to be sufficient to denote a significant relationship. Note that the restriction in the variance of the size variable by classifying the number of employees into three categories and building the corresponding dummy variable attenuates the correlation and lowers  $R^2$ .

Only the TI and ROE new models were considered to be significantly ( $\text{sig}(F) < 0.05$ ) better than would be expected by chance and, therefore, one could reject the null hypothesis of no linear relationship for each of these variables to the independent variables. The cross-effects analysis indicated that in large fisheries that have MSC certification ( $\beta = 0.110$ ,  $p < 0.01$ ) only TI data improve. However, the results also show that TI, ROE, EBIT and EBITDA are affected by at least one of the indicators taken into account. In this case, TI, EBIT and EBITDA are affected by size.

MSC certification is less statistically significant and has much lower influence than size in TI, meaning that it can be concluded that certification does not make a large difference in increasing income. Finally, it is interesting to highlight that this discussion has been about economic performance, and it should be remarked that none of the financial performance indicators seems to be affected by size or MSC certification.

## 5. Conclusions

The aim of this study was to analyze firms' economic performances when adopting the MSC chain of custody certification. A difference in the economic performance of businesses that were MSC-certified over those that were not was found. In the analysis of the sample, data show that size is a differentiating factor. Firms that have MSC certification are generally larger than those that do not. The mean of the entire sample was 44 employees, but firms with the MSC averaged 149 workers. It is not surprising that the ANOVA test showed significant differences between the two sets of firms, which are highly affected by size, such as TI, EBIT and EBITDA.

Although the interaction between size and MSC certification was proved, validating H1, a complementary analysis to isolate the effects of the factors in the first analysis using dummy variables was ran. MSC certification and firm size measured by the number of employees were used. The results showed different performances and, therefore, data did not support the assumption that better economic revenues were caused directly by MSC certification.

Then, the individual effects of size and certification on the performance variables were investigated. It was found that the factor that had an important effect on total income is size, which improved the economic results (EBIT and EBITDA). Therefore, H1 could not be validated, as MSC certification positively affected TI, but it was not significantly different for the rest of performance variables. The only variable that affects economic performance is size.

The cross study of the relationship between size and MSC certification resulted in an improved regression model only for TI and ROE. It showed better incomes for large firms that had MSC certification and lower ROE for medium-sized firms with MSC certification. These results reject H2. Differences between certified and not certified firms were also evident. On one hand, the most important difference is size. As expected from the theory [52], small firms need support systems to help managers in their development needs, while larger firms can afford a team of specialists.

The size role has been disentangled. Results show that being a larger firm implies higher TI, EBIT and EBITDA regardless of MSC certification. To sum up, the analysis shows that there are no significant differences between firms certified by the MSC and those without certification, but there is still a research gap in understanding why performance is not better.

The limitations of this research include the available sample and data. Future research should focus on the use of different methodologies with more complex (a larger variety of organizational factors) and larger databases as well as longitudinal studies. An in-depth qualitative case study will be necessary to obtain further information on why MSC certification makes no difference on the main economic performance indicators.

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