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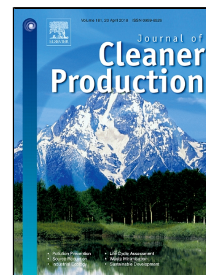
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The influence of Motivations and Barriers in the Benefits. An empirical study of EMAS certified business in Spain

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Highlights

- The paper shows a study of the relationship between motivations, barriers with the benefits.

- In order to test the working hypotheses, multiple regression analysis was used.

- The empirical study was carried out in a sample of 114 of the 255 companies certified in EMAS of the Autonomous Community of Galicia (Spain).

- It is noted how the motivations and barriers jointly affect the possible benefits that are obtained from the implementation of EMAS.

Abstract

The main objective of this research is to analyze through a structured questionnaire, the influence of the motivations that lead companies to implement Eco-Management and Audit Scheme (EMAS) and the barriers found in the benefits perceived by companies, as well as, the degree of difficulty perceived for the implementation of the different requirements to be fulfilled, which are established in the regulation. An extensive review of the academic literature published on motivations, barriers, difficulties and benefits in environmental standards has been carried out in order to establish the working hypotheses which refer to the relationship between motivations, barriers with the benefits and degree of difficulty in implementing the requirements. The empirical investigation was carried out in a sample of 114 of the 255 companies of the Autonomous Community of Galicia (Spain) that have EMAS certification. The methodology used was the use of the application of a regression analysis to test the hypotheses; previously the measurement scales were validated and an exploratory factorial analysis was applied in order to determine the structure of the different variables considered in the study. The results show that the motivations affect the benefits positively and on the contrary, affect the barriers negatively (reduce them) and it was observed that the greater the barriers, the lower the benefits obtained from the implementation of EMAS (negative influence). The proposed regression models show the joint influence of the motivations and barriers on the benefits considered.

Keywords: Environmental Management System; Eco-Management and Audit Scheme**;** EMAS, motivations; barriers; benefits

1. INTRODUCTION

At present, both governments and society have become aware of the negative effects of economic development on the environment, so they put pressure on companies as a significant source of environmental degradation to take measures to minimize the negative impact of their activity on their environment (Claver and Molina, 2000). In this regard, the companies in their process of adaptation to environmental legislation, as well as, to current demands and concerns in the environmental field of consumers and the society in general have adopted as an integral part of their Management System an Environmental Management System (EMS) (Conde et al., 2003:45). This system allows them to

understand and evaluate the environmental impact of their activities and to establish environmental objectives and targets (Cascio et al., 1996; Del Brio et al., 2001; Testa et al., 2014).

Thus, companies mainly use the international standard ISO 14001 (standard created by the International Organization for Standardization-ISO) or the EMAS Regulation (Eco-Management and Audit Scheme) as voluntary frameworks for the implementation of an EMS (Testa et al., 2014). These standards allow companies through a systematic and structured framework to develop an environmental policy, include environmental aspects (Boiral and Sala, 1998) and carry out environmental management. This management, according to Casadesús et al. (2005:231) is understood as the set of measures taken at a strategic and operational level in the company, which allow to comply with the environmental legislation and to reduce the impact of its activities on the environment.

The implementation of these EMS allows companies to gain a competitive advantage with regard to their competitors, both in domestic and international markets (Nunes and Bennet, 2010). This advantage is derived on the one hand, by good corporate image, that is formed and passed on to stakeholders when managing the company by following guidelines and environmental standards and, on the other hand, by improving environmental performance, that allows to improve the internal efficiency of the organization and business performance (Kollman and Prakash, 2002; Potoski and Prakash, 2005; Link and Naveh, 2006; Pan, 2003) and to obtain better results in employees, customers and in financial results (Hillary, 2004; Zutshi and Sohal, 2004; Heras et al., 2011). However, to achieve these positive results it must not be forgotten that managers should focus on the internalization of EMS's approach to benefit from the potential advantages derived of the implementation of the EMS (Testa et al., 2017).

There are numerous investigations in the field of EMS in reference to identify the motivations that lead companies to implement these systems (Gavronski et al, 2008; Mariotti et al, 2014), the barriers to overcome in the process (Christman and Taylor, 2006; Boiral, 2011), the difficulties to meet the requirements of the standard and the perceived benefits from implementation (Poksinska et al, 2003; Gavronski et al., 2008), performed mostly in companies certified with the ISO 14001 standard (Stevens et al., 2012), and more recently numerous investigations have also been published in EMAS certified companies (Biondi et al., 2000; Morrow and Rondinelli, 2002; Iraldo et al., 2010; Iraldo et al., 2013; Ratiu and Morgan, 2014). The novelty of this study lies in analyzing the influence of two variables (the motivations that lead companies to implement EMAS and the barriers encountered) in the different benefits perceived by companies, as a result of the implementation process. Also, the same analysis is performed to observe the influence on the degree of difficulty perceived for the implementation of the different requirements to be followed, established in the regulations. This analysis becomes the main objective of this research.

To meet this objective and to corroborate the work hypotheses derived from it, the data were collected through a questionnaire based on previous research, which was completed by 114 companies, certified EMAS in Galicia (Spain). Once the data were collected, the measurement scales were validated and an exploratory factor analysis was applied in order to determine the structure of the variables considered (motivations, barriers, benefits, degree of difficulty) and finally, a regression analysis was performed in order to test the hypotheses. Scientific research in this area is relevant and necessary to deepen its knowledge and obtain empirical evidence of interest to business managers and stakeholders involved in improving the environmental impact of their business activities.

This article is structured in the following sections. After this introduction, the theoretical framework and the hypotheses, that are intended to contrast in order to fulfill the proposed objective, are presented in Section 2. The third section presents the methodology used (sample, questionnaire and data analysis) and the results are shown and discussed in Section 4. Finally, the results obtained are discussed and the main conclusions are drawn.

2. LITERATURE REVIEW AND HYPOTHESES

2.1. EMAS Regulation vs ISO 14001

The Environmental Management System (EMS) known as EcoManagement and Audit Scheme (EMAS) was created on the initiative of the preventive policy set out in the EU's Fifth Environmental Action Program (CEC, 1996). The current version of EMAS III (2nd review which came into force in January 2010) is governed by Regulation (EC) No. 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation of organizations in a community environmental management and audit scheme.

Specifically, EMAS is proposed by the European Union as a management tool to help organizations evaluate, know and improve the company's environmental activity. The regulation itself defines EMSs as "*part of the general management system including the organizational structure, planning of activities, responsibilities, procedures, processes and resources for developing, implementing, carrying out, reviewing and maintaining the organization's environmental policy*" (EMAS III, 2009: L342/4, Article 2).

On the other hand, Article 3, point 3 sets out the general requirements that an organization must fulfil in order to join and register in the EU EMAS REGISTER, a database that includes the companies that have EMAS. These requirements are: (1) to carry out an environmental analysis of its activities and to implement an EMS, (2) to carry out environmental audits, (3) to prepare an environmental statement, (4) to examine the environmental analysis, the EMS, the audit procedure and the environmental statement, and to validate the environmental statement by involving an accredited environmental verifier, (5) to submit the validated environmental statement to the competent body and make it available to the public.

As already mentioned, the two most popular and used EMSs are ISO 14001 (current version of 2015) and EMAS (Heras et al., 2008). An important aspect to take into account is that the previous version of the EMAS II Regulation integrated the requirements of the ISO 14001:1996 standard, allowing companies certified in ISO 14001 to be able to benefit from the EMAS regulation easily. In this regard, the Council of the European Union takes into account this standard as a valid reference for implementing an EMS and considers that ISO 14001 certified companies can adhere to the EMAS regulation complying with the requirements of drafting, making public and validating an Environmental Statement (it must include the requirements of Annex III of the Regulation) by an accredited Verifier. Like so, verifying EMS certification by an accredited verifier, proving that it respects the applicable legislation (aspect reinforced in the new version) and that the behavior of the company is based on the reduction of environmental impact for which goals and targets of continuous improvement are established (already included in the new version of the standard ISO 14001), maintaining an open dialogue with the interested parties, facilitating the workers to participate in the

process of continuous improvement of environmental performance (aspect also reinforced in the new version) and lastly, registration in the EMAS register through the competent body.

The recent version of the 14001:2015 incorporates changes that allow to approach its European equivalent, EMAS Regulation. The new ISO 14001 implementing a "High Level Structure" (HLS) that to facilitate the integration of requirements derived from various Management System Standards into an integrated Management System. However, the requirements of the EMAS regulation go beyond those of the ISO 14001 standard; EMAS incorporates many of the requirements that are new under the current ISO 14001:2015 standard. Overall, EMAS registered organizations will need to make only a few adaptations to satisfy the new requirements of the ISO 14001:2015 standard and the revised Annexes I-III of the EMAS regulation (European Commission, 2017). The annexes were published in August 2017, to integrate the new ISO requirements in the annexes of the EMAS regulation.

The adaptation of the Emas to the new ISO 14001 implies that the organizations implement EMAS also have to determine the organizational context of their EMS, identify interested parties and their relevant needs and expectations, consider a life-cycle perspective when assessing the significance of their environmental aspects and, determine the risks and opportunities related to their EMS. Despite this adaptation, EMAS still encompasses the following unique features: demonstrated legal compliance signed off by Competent Bodies; a direct commitment to continuously improve environmental performance; transparency, thanks to compulsory communication through environmental statements; employee participation and commitment to continuous improvement (European Commission, 2017).

The Regulatory Committee of the European Commission published a "Bridge Document", in which we can find all the differences between both Systems (EMAS, 2009; European Commission, 2017; Testa et al., 2014; ISO 14001:2015):
 (1) ISO 14001 is international, it is a private standard developed by a private organization (International Organization for Standardization-ISO) and its implementation ends with certification by an accredited certification body, while the EMAS Regulation is European and released by a public body, has a norm that is defined as Regulation and the implementation concludes with the verification carried out by a competent Body,
(2) EMAS requires an initial environmental assessment with the aim of determining and evaluating the environmental aspects, in the event of not having an environmental guarantee system prior to the certificate and in the case of 14001 it is not compulsory, but is advisable,
(3) another important aspect is that in EMAS organizations shall produce key environmental indicators that are not required in ISO,
(4) the periodicity of internal audits in the EMAS Regulation depends on the type of activity carried out and the scope of the EMS Regulation and should also include the environmental policy, the program and compliance with the applicable legislation and in the 14001 it is not established (the scope will only be of the EMS),
(5) in the ISO 14001 Standard, a Public Environmental Statement is not mandatory, but it is advisable, while in the EMAS Regulation it is mandatory and it must be public and validated by an external verifier, which implies a higher level of commitment,
(6) organizations that properly implement and maintain the EMAS Regulation will be registered by an authorized environmental verifier in the EU EMAS REGISTER database, which will entitle them to use the EMAS logo to highlight their compliance to their stakeholders, as opposed to the case of ISO 14001, where companies will be certified and will use the seal of certification of the accredited certification body to prove it if they want to and certification registration is unnecessary.

Regarding the adoption of both systems in Europe, the figures show a greater tendency for companies to certify using the ISO 14001 standard; in the studies conducted by Freimann and Walther (2002) and Neugebauer (2012) it is observed that ISO 14001 seems to be more attractive because of its lower implementation costs, however, EMAS can contribute to an improvement in relationships between organizations and authorities. In Europe, taking into account the ISO Survey (2015) report, there are 119,754 certificates, of which 13,310 correspond to Spanish companies, ranking 5 in the Top 10 of the ISO 14001 standard behind China, Italy, Japan and the United Kingdom. Spain is the third European country in number of organizations with EMAS verification with 888 organizations of the total of 3,706, which represents 23.96% of the total number, behind Germany with 1,161 and Italy with 940.

According to Heras et al. (2008:41) the key factors for ISO 14001 to have clearly prevailed over EMAS at a quantitative level are mainly three: the scope of recognition of ISO 14001 is much broader internationally, participation in EMAS is considered to be more expensive than ISO 14001 certification, the pressure regarding legal compliance is lower in the ISO 14001 case. For its part,, Daddi et al. (2017) investigates why the number of certified organizations EMAS has been decreasing and and notes that the main reasons are the lack of financial and human resources, the lack of market and stakeholder recognition, and the unclear added value of standard. However, Merli and Preziosi (2018:4532) investigated in Italy which aspects and characteristics determine organizations' willingness to renew or drop out of EMAS and the findings allow to affirm that despite the negative growth trend, the high levels of willingness to renew the system, they confirm the tool as a valuable resource and a solid baseline toward the implementation of more sustainable business models.

2.2. Contextualization of concepts (motivations, barriers, benefits)

An extensive review of the academic literature published on ISO 14001 and EMAS about motivations that lead organizations to adopt EMS, the barriers encountered and that must be overcome in this process, the perceived benefits of adopting standards and difficulties found in the implementation of the requirements established has been carried out in order to contextualize the scope of study and to establish the working hypotheses.

2.2.1. Motivations

In this sense, it is verified that there is a great deal of research that approaches these concepts, both from the conceptual and empirical point of view. With regard to motivations, research can be grouped taking into account two perspectives or theoretical approaches (De Durana, 2014:180); the neo-institutionalist one, that suggests that the adoption of EMS is due to external pressures (market, society, legal or technical requirements) and the resource-based perspective that focuses on the internal factors of the organization, whose improvement leads to achieving improvements in productivity, performance and profitability, either in cost leadership or relative differentiation from competitors (Porter, 1991).

The literature review shows an extensive list of reasons that according to Takahashi and Nakamura (2010) are not mutually exclusive and reinforce each other. In Heras et al. (2011:195), Heras and Boiral (2013) and Heras et al. (2014:6) you can see the summary of the empirical literature on the motivations for adopting the ISO 14001 standard and EMAS; pressure from customers and other stakeholders, compliance with legislation, environmental performance improvement, corporate image improvement, reduction of costs, etc. (Biondi et al., 2000; Emilson and Hielm, 2002; Kollman and Prakash, 2002; Morrow and Rondinelli, 2002; Pan, 2003; Perkins and Neumayer, 2004; Chrisriansen and Kardel, 2005; Zeng et al., 2005; Abeliotis, 2006; Watson, 2006; Pedersen, 2007; Bracke et al., 2008; Gavronski

et al., 2008; Salome, 2008; Vernon et al., 2010; Testa et al., 2016). The research has proven that there are several motivations (internal and external) and not only one, which motivate organizations to start an EMS implementation process (Bansal and Roth, 2000; Tourais and Videira, 2016).

In this context, there are several investigations that try to group the motivations in the last years. One of the first studies is the one by Bansal and Roth (2000:718-719) that identify four groups: legislation (compliance with it to avoid sanctions), stakeholder pressure (aspect related to the consequences of negative impact on corporate image), economic opportunities derived from process efficiency, cost reduction, etc., and ethical values, considered as a source of competitive advantage. A subsequent study by Darnal et al. (2002) classifies them in terms of their antecedents (market driven, regulatory driven, societal driven) and Gavronski et al. (2008) grouped them into reactive, internal, legal and proactive motivations.

According to Daddi et al. (2016:1) "*There are essentially two main approaches to explain the drivers: internal and external motivations. Internal motivations are, for example the need to improve management in three areas: environmental compliance, environmental performance and resource efficiency, and organizational and managerial capabilities and awareness (Morrow and Rondinelli, 2002; Heras-Saizarbitoria et al., 2011). External motivations include the need to obtain a third-party certification in order to boost the reputation in the eye of external stakeholders such as clients, public institutions, local communities, trade associations and NGOs (González et al., 2008; Daddi et al., 2011; Tourais and Videira, 2016)*".

Finally, there are many studies that analyze the most influential motivations (Pan, 2003; Poksinska et al., 2003). In this sense, De Durana (2014) states that it seems to be observed that in the majority of cases, external factors are priority over internal ones for most companies but there is no consensus on this.

2.2.2. Barriers and Difficulties

In every EMS implementation process (ISO 14001 standard and EMAS), companies have to face and overcome barriers, not a single one but a set of them. As with motivations, studies have been conducted that have attempted to identify, classify and analyze how they relate to environmental behavior (Post and Altman, 1994; Biondi et al., 2000; Emilsson and Hielm, 2002; Poksinska et al., 2003; Hillary, 2004; Zilahy, 2004; Zutshi and Sohal, 2004; Iraldo et al., 2005; Potoski and Prakash, 2005; Abeliotis, 2006; Pedersen et al., 2007; Chan, 2008; Shi et al., 2008; Murmura et al., 2018). For its part, Quazi (1999) identified the following in their study: the complexity of the standard, legal ramifications, lack of incentives, management commitment and employee involvement, unclear implementation costs and responsibility. In a later work, Del Brío et al. (2001) mentioned ignorance of environmental requirements, lack of commitment of top management, lack of resources in the company, high implementation or maintenance cost, negative impact on benefits, among others. In the same way, Hillary (2004) found that costs in terms of economic resources, time and skills required for implementing EMAS were identified as the main barriers and for Freimann and Schwedes (2000) diffusion is the insufficient promotion of the Scheme by EU institutions.

Regarding studies that have tried to classify them, the one by Post and Altman (1994) was the first one. These authors classified them into industrial barriers (capital costs, competitive pressures, industrial regulations, technical information and undoubtedly labor potential results) and organizational barriers (employee attitude, inadequate top management leadership, poor communications and past practices).

Subsequently, Hillary (2004), Shi et al. (2008), Chang (2008) and Mariotti et al. (2014) who considered 8, 4, 8 and 21 barriers respectively in their study, classified these into external barriers (barriers that cannot be controlled directly by the company) and internal barriers (barriers that can be controlled by the company's assigned resources) (Murillo-Luna et al., 2011:1418). In the study by Murillo-Luna et al. (2011:1419), an interesting classification of external barriers can be seen (high cost of environmental technologies/services, priority of other external matters or requirements, inadequate industry regulation and insufficient supply of equipment and information for environmental adaptation) and internal barriers (lack of organizational capabilities, lack of strategic capabilities and lack of financial capabilities) together with associated problems and authors who have considered them in their research.

Another of the approaches followed in this area of study is research that aims to identify which barriers imply a greater degree of difficulty to be overcome by companies. In this regard, Potoski and Prakash (2005:237) state, taking into account the current literature, that so far high investment in terms of implementation costs (according to Heras et al., 2008:51, labour, documentation, materials and equipment and training and labour consulting expenses are included) and of verification is the main barrier to implement an EMS. Murillo-Luna et al. (2007) and Dahlmann et al. (2008) find that lack of resources and capabilities in the company is the most relevant barrier and for Massoud et al. (2010) it is the lack of government support and incentives, the lack of clear benefits and the lack of legally request as the main barriers to certification. In this same line, there are several authors who obtain empirical evidence that the barriers that most affect and have a greater degree of difficulty are the external ones (Post and Altman, 1994; Hillary, 2004; Murillo-Luna et al., 2007; Dahlmann et al., 2008).

In this study, the differentiation between barriers and difficulties will be made, although all of them can be considered barriers. Thus, with the term barriers are grouped the obstacles that the company identifies prior to the start of the EMS implementation process and that influence the decision making of implementing or not the system. These may be present during the implementation process. On the other hand, the term difficulties is used in this research to refer to critical issues and difficulties, encountered during the realization and implementation of the EMS (Merli et al., 2016), related to meeting the requirements; difficulties at operational level, regulatory compliance, understanding of the standard. According to Martín Peña et al (2014:222) "*can be understood as either negative outcomes of these systems or benefits that fail to materialize, eleven the implementation and certification process has begun*".

2.2.3. Benefits

The academic literature on the benefits of EMS implementation is very broad (see the study by Tarí et al., 2012:305 and De Durana, 2014:298). The benefits have been identified among others by Zutshi and Sohal (2004), Tan (2005), Gravronski et al. (2008), Molina-Azorín et al. (2009), Heras et al. (2011), Tarí et al. (2012), Martín-Peña et al. (2014), Murmura et al. (2018). The results show the positive effects of EMS certification on different areas: organizational and managerial efficiency (Biondi et al., 2000; Morrow and Rondinelly, 2002), operational processes (Hillary, 2004), cost reductions and improvement in productivity (Pan 2003, Pedersen, 2007; Gravronski et al., 2008; Vernon et al., 2009), improvement in product/service quality (Melnyk, 2003), improving environmental performance (Tan, 2005, Link and Naveh, 2006; Pedersen, 2007; Iraldo et al., 2009; Merli et al., 2014), improvement in relations with stakeholders (Zutshi and Sohal, 2004), financial performance improvement and firms' performance (Montabon et al., 2007; Iraldo et al., 2009) and improving the competitive performance (Iraldo et al., 2009). See the summary made by Casadesús et al. (2005:246-247) and Tan (2005:398).

In this sense, Sambasivan and Fei (2008:1428) supported by several studies including Pun and Hui (2001) and Tan (2005), consider that the benefits obtained are: (1) improved company reputation and image (Merli et al., 2011, 2014), (2) increased staff morale and motivation, (3) profit, performance, and opportunity, and (4) customer loyalty and trust". According to Heras et al. (2014), like what for the case for the drivers, this literature has also essentially focused on the ISO 14001 system and the impacts of EMAS certification remains largely underexplored.

It is clear from the list of benefits of EMS implementation, whether they are economic, social, environmental or of competitiveness, that it is very extensive, therefore the the interest of some researchers to group them, so Pakosinska et al. (2003) group them into internal performance benefits, external marketing benefits and relations benefits. Hillary (2004) establishes two groups, internal and external benefits, which in turn are subdivided into different groups, in the case of internal benefits into organizational benefits, financial benefits and people benefits and the external benefits into commercial benefits, environmental benefits and communication benefits. But these are not the only proposals, in a more recent study Gravonski et al. (2008) propose four groups, productivity benefits, financial benefits, market benefits and societal benefits.

Finally, the study by Tarí et al. (2012:297) is highlighted, that reviews the literature using an electronic search in the ScienceDirect, ABI/Inform, Emerald databases to identify papers focusing on the adoption of the 14001 standards and the benefits derived from implementing them. The study shows that the three benefits most considered by the studies identified are environmental performance, efficiency and profitability.

2.3. Working hypothesis

2.3.1. The relationship between motivations, barriers with the benefits and degree of difficulty in implementing the requirements

Regarding the relationship between motivations and benefits in the context of the ISO 14001 certification and EMAS, it is corroborated by the studies. In the specific case of EMAS System, Heras et al. (2014) claim that nevertheless, most of the literature has remained focused on the ISO 14001 and there is no consensus in the literature on the main drivers and benefits of these EMSs. In this sense, the conclusions obtained can be grouped into:

(1) Several studies of a qualitative nature corroborate that greater motivation, whether it is internal or external, influences the achievement of greater benefits (Gavronski et al., 2008; Kitazawa and Sarkis, 2000; Pan, 2003; Poksinska et al., 2003; Zeng et al., 2005; Zutshi and Sohal, 2004).
(2) Gavronski et al. (2008) performed the analysis of the relationship between the two types of motivations (internal and external) and the achievement of benefits separately, corroborating that internal motivations have a strong relationship with internal benefits and external motivations with external benefits.
(3) On the basis of the results, Kitazawa and Sarkis (2000) and Rondinelli and Vastag (2000) state that companies that implement and certify their EMS mainly due to internal reasons obtain better results than those which do so for external reasons (pressures from their stakeholders).
(4) Subsequently, in an empirical analysis, Heras et al. (2011:192) corroborates the positive relationship between the level of motivations and the benefits that managers perceive they obtain by implementing an EMS and "*the internal drivers to implement and certify the ISO 14001 standard*

have a degree of influence on the benefits that are significantly higher than the external ones, irrespective of the size of the company and the sector of activity".

Taking into account the above, the following working hypothesis is proposed:

H1: Motivations have a positive influence on the benefits derived from the implementation of the EMAS standard.

There are no studies that analyze the relationship between the barriers encountered in the EMS implementation process with the benefits obtained, as well as the degree of difficulty perceived by managers to implement the requirements required by the standard. However, it seems logical to think that the greater the barriers that managers have to overcome, these will negatively influence the perceived benefits derived from the implementation of an EMS and the greater the perception of the degree of difficulty to implement the requirements of the standard will be. In this sense, there are exploratory studies that provide empirical evidence of the impact of certain barriers on the environmental performance of the company (Murray-Luna et al., 2007; Dahlmann et al., 2008; Massoud et al., 2010) and therefore, they can influence the implementation level of the EMS and consequently, the perception of the benefits obtained from it. However, Ratiu and Morgan (2014) claim that reviewing the literature, the results show that despite the numerous barriers SMEs have gained various benefits from certified. Therefore, the following working hypothesis are proposed:

H2: Motivations have a negative influence on the barriers encountered in the implementation of the EMAS standard.
H3: The barriers encountered have a negative influence on the benefits derived from the implementation of the EMAS standard.
H4: Companies with higher levels of motivation find it less difficult to comply with the requirements of the EMAS standard.
H5: Companies that face higher barriers in implementation find it more difficult to comply with the requirements of the EMAS standard.

3. METHODOLOGY

3.1. Universe study, questionnaire and measurement

The target population is the 255 EMAS certified companies in the Autonomous Community of Galicia (Spain), belonging to the industrial (68 companies) and service (189 companies) sector. The database was obtained from the EU EMAS REGISTER (http://ec.europa.eu/environment/emas/register/), a European database which lists all the European companies that have EMAS implemented and which is updated every week, and it allows to filter by country and in the case of Spain by Autonomous Community.

The questionnaire was distributed by mail, and the sample object of study was eventually composed of 114 companies (69 belong to the service sector, 38 to the secondary sector and 7 to the primary sector) that completed the questionnaire, which represents a response rate of 44.70 %, which is an acceptable percentage according to the literature (Nawrocka and Parker, 2009). The sampling error is 6.84% for a confidence level of 95% and the least favorable situation of p = q = 0.5. The following formula is used to calculate the sampling size: $n=N/(1+e^2*(N-1)/Z^2*p*q)$; where n=sample size, N=population size, Z=

statistic associated with the confidence level, q=acceptable amount of sampling error, p=proportion of population expected to choose one of the two response categories (Dillman, 2011).

The data were obtained by administrating a structured-questionnaire survey that was designed based on the motives, barriers, benefits and degree of difficulty, adapted from the empirical literature on ISO 14001 standard (Del Brío et al., 2001; Fryxell et al., 2004; Hillary, 2004; Zutshi and Sohal, 2004; Gónzalez and Gónzalez, 2005; Gavronski et al., 2008; Salomone, 2008). To measure the motivations, barriers and benefits 13, 14 and 23 items were used respectively and the respondents were required to choose a value from a 5-point Likert scale (1= not at all important, 5=very important) and to know the degree of difficulty, they were asked using 16 items that refer to the difficulty of implementing certain requirements demanded by the standard (1 = very easy, 5 = very difficult) on a 5-point Likert scale. The questionnaire also contains questions that allow us to develop the profile of the companies, as well as a question that allows us to measure the degree of satisfaction with the implementation of the EMAS standard (1, Very satisfied to 5, very dissatisfied).

Before sending the definitive questionnaire, 20 subjects were selected (managers of the Company the simple and experts in the field of environmental management) and a preliminary pretest was conducted to confirm its validity and clarity of the question. The instrument was revised on the basis of their suggestions.

3.2. Data Analysis

The data analysis is done with the statistical program SPSS 19.0 (Statistical Package for the Social Sciences). In the first place, a descriptive analysis (mean and standard deviation) of the analyzed concepts (motivations, barriers, benefits and degree of difficulty) was carried out and the measurement scales (reliability and validity) were validated. For the internal consistency analysis, the calculation of the item-total Pearson correlation coefficients (the correlation between the items should exceed 0.3 according to Nunnally (1979) and Cronbach's alpha (1951), where alpha must be greater 0.7 for confirmatory studies (Nunnally, 1979), which allowed us to observe the extent to which a measure is free of random errors and therefore, provides consistent results if repetitive measurements are made (Sánchez and Sarabia, 2000:367).

Secondly, an exploratory factor analysis (EFA) with varimax rotation was carried out to identify the dimensionality of the scales (Bagozi and Baumgartner, 1994; Osbourne and Costello, 2009). This process allowed to group the items of each of the concepts and to know their structure. The choice of the method of estimation depended on two magnitudes, the sample size and the infringement of assuming a normal distribution of the observable variables. Taking into account the number of cases and following the recommendations of Hair et al. (2010) and Lévy (2006), the Maximum Likelihood (ML) method was used as the estimation technique that is significantly sensitive to sample size, applying the bootstrap technique (200 samples) to solve the problems derived from the absence of normality. As a previous step to avoid the problems derived from the absence of normality, the two solutions proposed by Hair et al. (2010) were followed; eliminating the anomalous observations and the logarithmic transformation of the observable variables, not correcting the absence of normality.

Finally, in order to test the working hypotheses, multiple regression analysis was used. This multivariate analysis allows to analyze the relationship between a dependent variable and its independent or predictive variables and the regression coefficients were estimated that determine the effect that the variations of the independent variables have on the behavior of the dependent variable

(Cohen et al., 2013). The factors previously extracted in the EFA are used in this analysis; for motivations, 3 factors and barriers, 2 factors (independent variables) and for benefits 4 factors (dependent variables). In order to do so, the measure of the goodness of fit of the model was first estimated; coefficient of correlation, and the coefficient of determination, which is the square of the previous one and expresses the proportion of the variance of the dependent variable explained by the regression model (Hair et al., 2010).

Second, the partial correlation coefficient of each explanatory variable was estimated indicating the specific relationship of this variable with the dependent variable assuming that the other independent variables remain constant. The sign of the correlation coefficient β allows to know the direction of the relationship and the F statistic, the goodness of fit of the regression and the p-value (>or< than 1) indicates the degree of significance with the dependent variable. Prior to the regression analysis, the underlying assumptions which this type of analysis is based on (linearity, independence, homoscedasticity, normality and non-collinearity) were verified (Hair et al., 2010; Tabachnick and Fidell, 2014).

For the assumption of independence of residuals, the Durbin-Watson statistic was obtained, which in the three regression models constructed takes values between 1.4 and 2.5 (Table 6). In all cases it takes values lower than 2 which indicates positive autocorrelation. In the case of collinearity, the analysis provided a tolerance between .244 and .880, indicating no collinearity and therefore, none of the independent variables have correlations greater than .9 (Hair et al., 2010). On the other hand, you can assume the normality of residuals, since this tendency could be verified in the histogram analysis and it was also verified by calculating the Kolmogorov-Smirnov test (Pallant, 2013). Finally, for the homoscedasticity assumption, in the dispersion graph, for each value of the independent variables, the residuals are similarly distributed (no relationship between the predicted values and the residuals).

4. RESULTS

4.1. Motivations for implementing EMAS

The descriptive analysis of the motivations that lead companies to voluntarily adopt the EMAS standard shows that the most valued are: it has been a strategic decision, to maintain an acceptable behavior, to improve the image of the company and to integrate the environment into the corporative strategy. The pressures or requirements of stakeholders (customers, competitors and competition) for their implementation play a minor role as well as cost reduction (Table 1).

The comparison of the results with other studies is complex since it depends on the motives that have been considered in the study, being these very disparate in the literature. However, in general, it is observed that these are corroborated by the study conducted by Fryxell et al. (2002), which determines the following as the main motivations: ensuring regulatory compliance, enhancing the firm's reputation and improving environmental performance. In the study by Mariotti et al. (2014) the strongest motivations were improvement of corporate image and fulfilling regulation requirements and in the one carried out by Santos et al. (2015) the main reasons considered are for improvement and compliance with regulation. All these studies corroborate the low influence of stakeholder pressures and cost reduction, contrary to the study by Chan (2008), which states that companies implement ISO 14001 in response to pressure from their stakeholders. This result is supported by the study by Neugebauer (2012) which states that motivation on the implementation of the EMS are very different referring to

EMAS or ISO 14001. While ISO 14001 is often a response to external pressure, EMAS is significantly coupled with internal drivers. Like Mariotti et al. (2014), it is thought that this disparity is due to the low environmental awareness of the interest groups in the geographical area analyzed.

The exploratory factor analysis shows the factors in which the motivations are grouped (Table 1). The three factors identified are "compliance with stakeholder demands", "competitive orientation" and "environmental orientation". These factors accounted for 60.78% of the total variance (it exceeds the required minimum of 50%). Cronbach's alpha that measures the reliability of each factor (.709, .735, .773 respectively) is higher than the recommended 0.7 minimum (Nunnally, 1979). It was also observed that competitive orientation with an average of 3.90 (s.d.= .73) is the most important factor, followed very closely by factor 3, environmental orientation (mean 3.86; s.d.= .81). The least important factor with an average of 2.30 (s.d.= .95) is compliance with stakeholder demands.

Table 1. Motivations for adopting EMAS. Descriptive Statistics and Exploratory factor analysis

Exploratory factor analysis[1]: Cronbach´s ∝=0,835; χ^2(sig.): 567.337 (.000); KMO:.789; Measure of simple adequacy (MSA): (.752-.789) % Variance: 60.78	Item-total Correlation	Mean*	S.D.[2]	Loadings
Factor 1: Compliance with stakeholder demands (Eingenvalue= 2.550; %Variance= 19.61)				
By requirement of customers	.433	2.43	1.23	.801
By requirement of suppliers	.470	2.00	.98	.833
The competition has an Environmental Management System	.427	2.48	1.35	.654
Factor 2: Competitive orientation (Eingenvalue= 2.537; % Variance= 19.51)				
Improve the competitive advantage of the company	.619	3.60	1.21	.559
Improve relations with Public Administrations (efficient relations with public administrations is directly related to the competitive capacity of companies)	.312	3.84	1.06	.665
It has been a strategic decision	.405	4.28	.90	.651
Improve image and marketing	.506	4.17	.81	.642
Anticipate competitors	.608	3.59	1.23	.687
Factor 3: Environmental orientation (Eingenvalue= 2.814; % Variance=21.64)				
Integration of the Environment into the Corporate Strategy	.504	4.03	1.07	.844
Maintaining socially acceptable behavior	.485	4.33	.87	.872
Maintaining leadership in the sector within the Environmental Management scope	.628	3.85	1.26	.565
Compliance with legislation	.464	3.85	1.14	.598
Reduction of environmental costs	.448	3.22	1.20	.495

*N= 114; Likert scale= 1= least important /5= most important

[1] Tests that show that the data obtained through the questionnaire are adequate to perform the factor analysis (requirements: Bartlett's Sphericity Test χ2 (sig.> 05), KMO> .7 median, MSA = unacceptable for values below .5)

[2] S.D.: Standard deviation

Source: Authors' own data

4.2. Barriers for adopting EMAS

Table 2 shows the main barriers that companies perceive they must overcome in order to successfully implement the process: excessive documentary burden of the process and excessive bureaucracy, insufficient recognition and dissemination of the EMAS Regulation and environmental management, system implementation and verification costs. These results are corroborated by Biondi et al. (2000), Hillary (2004), Iraldo et al. (2005, 2013), Merli et al. (2016) and Vernon et al. (2009). The least important are the lack of management commitment and lack of concern about environmental issues. These results are corroborated by Mariotti et al. (2014), who observed that excessive documentation

constitutes the most important barrier along with a poor legislative framework and little support/guidance to assist firms in implementing ISO 14001 (Curkovic et al., 2005) and for Iraldo et al., (2010) the lack of competitive rewards and the lack of recognition / rewards by public institutions.

In this case, the exploratory factor analysis resulted in two factors: internal barriers and implementation cost (Cronbach´s α .842 and .692) explaining 57.75% of the total variance. The analysis of the most important factor allows us to observe that it is implementation costs (mean 3.51), almost at the same level as the factor 1, that shows an average of 3.49.

Table 2. Barriers for adopting EMAS. Descriptive Statistics and Exploratory factor analysis

Exploratory factor analysis[1]: Cronbach´s ∝ =0,888; χ^2(sig.): 673.982 (.000); KMO:.801; Measure of simple adequacy: (.788-.798); % Variance: 57.75	Item-total Correlation	Mean[*]	SD[2]	Loadings
Factor 1: Internal Barriers (Eingenvalue=4.178; %Variance= 34.73)				
Lack of human and material resources	.639	2.78	1.10	.554
Lack of staff involvement, difficulties in involving and motivating internal staff	.561	2.94	1.26	.801
Lack of support from the Administration	.589	2.84	1.19	.563
Uncertainty about the benefit of the implementation of the System	.738	2.84	1.25	.762
Lack of commitment of top management	.521	2.09	1.19	.810
Little concern of the company for subjects related to Environmental Management	.699	2.19	1.26	.842
Excessive documentary burden of the process and excessive bureaucracy	.490	3.58	1.02	.479
Not achieving the expected benefits	.666	2.64	1.24	.631
Insufficient recognition and dissemination of the EMAS Regulation	.585	3.43	1.24	.521
Factor 2: Implementation costs (Eingenvalue= 2.763; % Variance= 23.02)				
The cost of implementing the system, including consultancy costs	.495	3.38	1.21	.771
Certification and verification costs	.459	3.48	1.22	.836
Environmental management costs (waste management, purification of atmospheric emissions and waste, etc.)	.513	3.07	1.21	.772

*N= 114 ; Likert scale= 1= least important /5= most important
[1] Tests that show that the data obtained through the questionnaire are adequate to perform the factor analysis (requirements: Bartlett's Sphericity Test χ2 (sig.> 05), KMO> .7 median, MSA = unacceptable for values below .5)
[2] S.D.: Standard deviation

Source: Authors' own data

4.3. Benefits of adopting EMAS

The main benefits that companies perceive from the implementation of the standard are the use of tools to measure and monitor environmental impacts, improve the company's image towards customers, shareholders, management and society in general, it encourages them to offer the public and other stakeholders information on compliance with legal requirements, it reduces the consumption of resources: water, fuel, energy, etc., and improves staff training and motivation. The benefits that have been perceived to a lesser extent are: increased customer portfolio, improved relationships with suppliers, new business opportunities and improved profitability.

The exploratory factor analysis resulted in four groups, which were named "operational benefits", "external benefits", "improvements in legal compliance" and "improvements at human resource level" that account for 62.33% of total variance and Cronbach's α of .607, .824, .778, .897 respectively. In the case of the factor, external benefits, the item "improvement of internal communication and participation of employees and workers of the organization", it can not be considered an external

benefit, however, statistically the factor load weighs on this factor, so it was decided to keep on this item included in this factor.

With regard to the analysis of what is the most important factor, the means analysis results in factor 4 improvements at human resource level (mean 3.81) followed by improvements in legal compliance (3.78), operational benefits (3.43) and external benefits with an average of 3.31.

Table 3. Benefits of adopting EMAS. Descriptive Statistics and Exploratory factor analysis

Exploratory factor analysis[1] ; Cronbach´s $\propto$ =0,873; χ^2(sig.): 1657.202 (.000); KMO:.804; Measure of simple adequacy: (.756-.764); % Variance: 62.33	Item-total Correlation	Mean*	SD[2]	Loadings
Factor 1: Operational Benefits (Eingenvalue=4.067; %Variance= 17.68)				
Reduces waste generation	.472	3.74	.97	.719
Reduces the consumption of resources: water, fuel, energy, etc.	.534	3.94	.84	.677
Cost saving in the medium/long term	.492	3.43	1.11	.805
Improved productivity	.655	3.11	1.19	.731
Improved corporate profitability	.686	3.09	1.18	.742
Helps improve the internal management of the organization	.592	3.64	1.16	.566
Improved relations with suppliers	.659	3.03	1.09	.541
Factor 2: External Benefits (Eingenvalue= 3.445; % Variance= 14.98)				
Improves the image of the company towards customers, shareholders, administration and society in general	.487	4.00	.94	.505
Improvement of internal communication and participation of employees and workers of the organization	.646	3.48	1.21	.586
Increases client portfolio	.479	2.61	1.28	.663
Improves relations with public administrations	.606	3.54	1.17	.550
Allows to obtain subsidies, awards, tax advantages ...	.464	3.33	1.18	.674
New business opportunities	.581	3.02	1.16	.761
Advantages in public procurement	.471	3.12	1.49	.755
Factor 3: Improvement in legal compliance (Eingenvalue= 3.693; % Variance= 16.05)				
Provides tools for measuring and monitoring environmental impact	.554	4.10	.89	.467
Provides the public and other interested parties with information on compliance with legal requirements	.486	3.96	1.03	.785
Reduces the risk of legal non-compliance	.488	3.75	1.13	.779
The environmental regulations simplifies administrative obligations or procedures	.675	3.30	1.00	.650
Factor 4: Improvements at human resource level (Eingenvalue= 3.130; % Variance= 13.61)				
Improves internal communication and participation of employees of the organization	.502	3.63	.94	.802
Improvement in staff training of the organization in a professional and permanent way, that implies the active involvement in the improvement in environmental behavior	.432	3.91	.91	.856
Employee motivation: raising awareness and greater training and information for workers	.474	3.91	.88	.868

*N= 114; Likert Scale: 1= least important /5= most important

[1] Tests that show that the data obtained from the questionnaire are adequate to perform the factor analysis (requirements: Bartlett's Sphericity Test χ2 (sig.> 05), KMO> .7 median, MSA = unacceptable for values below .5)

[2] S.D.: Standard deviation

Source: Authors' own data

4.4. Degree of difficulty to comply with EMAS requirements

As for the degree of difficulty that companies face in order to fulfil the objectives required by the EMAS standard, in Table 4 it can be observed that those with a lower degree are: developing the environmental policy, emergency plans, communication and review of the system by the Management. On the contrary, those that are perceived as more difficult to fulfil are the development of the

Environmental Statement, the identification and evaluation of indirect environmental aspects and the identification of legal requirements.

The application of the exploratory factor analysis resulted in three factors (64.75% of explained variance): difficulties at operational level (α = .889), compliance with regulations (α = .815) and understanding of the standard (α = .873). Factor 1, difficulties at operational level with an average of 2.47 is the factor that the company considers the easiest to comply with, followed by factor 2, regulatory compliance with an average of 2.90 and finally factor 3, understanding of the standard (2.97).

Table 4. Degree of difficulty. Descriptive Statistics and Exploratory factor analysis

Exploratory factor analysis: Cronbach´s α^1 =0,928; χ^2(sig.): 1136.586 (.000); KMO:.877; Measure of simple adequacy: (.932-.941); % Variance: 64.75	Item-total Correlation	Mean[*]	SD[2]	Loadings
Factor 1: Difficulties at operational level (Eingenvalue=4.606; %Variance= 28.78)				
Environmental policy	.591	2.01	1.07	.465
Training and awareness	.725	2.77	1.08	.653
Communication	.703	2.38	1.02	.797
Control of documents and records	.646	2.49	1.12	.842
Operational control	.675	2.67	1.03	.756
Emergency Plans	.708	2.38	1.00	.746
Initial diagnosis	.599	2.62	0.90	.542
Factor 2: Regulatory compliance (Eingenvalue= 3.515; % Variance= 21.96)				
Identification and evaluation of direct environmental aspects	.620	2.68	1.13	.797
Identification and evaluation of indirect environmental aspects	.599	3.26	1.15	.759
Objectives and goals	.660	2.78	1.07	.669
Review of the system by the Management	.587	2.44	0.97	.444
Environmental Statement	.569	3.31	1.07	.658
Factor 3: Understanding of the standard (Eingenvalue= 2.239; % Variance= 13.99)				
Identification of legal requirements	.531	3.00	1.14	.898
Assessment of legal compliance	.613	2.94	1.10	.830

[*]*N*= 114; Likert scale: 1 = not difficult / 5 = very difficult

[1] Tests that show that the data obtained from the questionnaire are adequate to perform the factor analysis (requirements: Bartlett's Sphericity Test χ2 (sig.> 05), KMO> .7 median, MSA = unacceptable for values below .5)

[2] S.D.: Standard deviation

Source: Authors' own data

4.5. Hypothesis testing

Multiple regression analyzes were performed to evaluate the effects of five independent/predictive variables (3 motivational factors and 2 types of barriers) on each of the benefit groups that were considered (dependent variable). The regression models were estimated to obtain the coefficients pertaining to the hypothesized relationships, which allowed to observe the relationship between the motivations and the barriers with the benefits and the degree of difficulty to implement the EMAS requirements. Two variables of control were included in the model following authors such as Fryxell et al. (2004: 245) and Murillo-Luna et al. (2011): (1) the size of the facility that was measured on a 4-point ordinal scale in terms of the total number of employees (of 0-9 microenterprise, 10-49 small, 50-249 medium company and and large companies with more than 250 employees), a survey conducted by Lee (1998) on ISO 9000 reported that motivations for seeking certification varied by the size of

facility, (2) distribution according to the sector; primary, secondary and tertiary (was measured categorically by constructing three dummy variables).

First, the results obtained in the correlation matrix between the variables were analyzed (Table 5). Regarding the control variables, although there are no significant differences and the correlation coefficients are weak, it is observed that the dimension positively affects the achievement of external benefits and improvements at human resource level and negatively affects the achievement of operational benefits and legal compliance improvements. The correlation coefficients allow to state that the motivations have a positive relationship with the benefits (H1) (strong and significant correlation coefficients at the level $p < .001$ except for compliance with stakeholder demands with improvements at human resource level, which does show a positive relationship, but very weak and not significant. With respect to the relationship between motivations and barriers (H2), it exists (strong and significant correlation coefficients) and it is negative (the greater the motivation, the lower the perception of barriers) except for compliance with stakeholder demands with internal barriers.

It is also observed that there is a negative relationship between barriers and benefits (H3) (strong and significant correlation coefficients) except for the relationship between barriers and improvements in legal compliance. In the latter case, the correlation coefficients are strong and significant, but the greater the barriers, the greater the improvements in legal compliance. Hypothesis H1, H2 and H3 are partially corroborated.

Table 5. Correlations for motivations for seeking an EMAS, barriers and benefits of implementation EMAS

	1	2	3	4	5	6	7	8	9	10	11
1. Firm size	1.00										
2. Sector	.013	1.00									
3. Compliance with stakeholder demands	.060	.013	1.00								
4. Competitive orientation	.025	-.132	.422**	1.00							
5.Environmental orientation	.073	-.316	.342**	.523**	1.00						
6. Internal barriers	.043	-.290**	.402**	-.453**	-.763**	1.00					
7. Implementation cost	.038	-.039**	-.425**	-.340**	-.627**	.769**	1.00				
8. Operational Benefits	-.072	-.011	.375**	.318**	.630**	-.849**	-.882**	1.00			
9. External Benefits	.087	-.006	.534**	.539**	.511**	-.719**	-.634**	.543**	1.00		
10. Improvements in legal compliance	-0.34	-.180*	.327**	.488**	.655**	.603**	.511**	.552**	.484**	1.00	
11. Improvements at human resource level	.140	-.002	.062	.244*	619**	-.680**	-.394**	.397**	.229*	.408**	1.00

Note: *$p < .05$; **$p < .001$. Bilateral test

In the regression analysis, it is observed that the models presented have a good fit, in this sense the explanatory variables contained in the model explain 85.8% of the operational benefits, 62.5% of the external benefits, 45.4% of improvements in legal compliance and 58.2% of improvements in human resources. In addition, The F statistic that allows to decide whether there is a significant relationship between the dependent variable and the set of independent variables taken together offers a good fit to the point cloud (sig. .000, indicates that there is a significant linear relationship).

Table 6. Results of regression analysis for motivations, barriers and benefits of implementation EMAS

	Dependent Variables			
	Operational Benefits	External Benefits	Improvements in legal compliance	Improvements at human resource level
Control variables				
Firm size	-.107	.052	-.078	.105

Sector	- .038	.073	.000	.085
Independent variables				
Motivations				
Compliance with stakeholder demands	-.011	**.211****	.029	**-.192****
Competitive orientation	-.068	**.278****	**.176***	-.078
Environmental orientation	-.061	-.193	**.393****	**.355****
Barriers				
Internal barriers	**-.484****	**-.552****	.162	**-.805****
Implementation cost	**-.570****	-.133	.068	**-.361****
Model Information				
R^2	.858	.648	.488	.608
R^2 corrected	.849	.625	454	.582
F for Regression	91.595**	27.914**	14.433**	23.518**
Durbin-Watson Test	1.444	1.713	1.720	1.485

Note: Cell entries are standardized coefficients; *p< .05; **p< .001. Bilateral test

The results obtained in the regression together with the correlations allow to observe that in the case of "operational benefits" motivations do not contribute significantly to explain the benefits (sig.> .05). However, the barriers do contribute with high and significant β levels at the p <.001 level. In this sense, the greater the barriers, the lower the perceived benefits. With regard to "external benefits", internal barriers and motivations (compliance with stakeholder demands and competitive orientation) help to explain them. Motivations affect positively and barriers negatively in operational and external benefits. These meetings are corroborated by the study carried out by Álvarez-García and Del Río-Rama (2016), who proposed a structural model in which they analyzed the joint influence of motivations and barriers on benefits. The results show that barriers negatively influence benefits and motivations positively.

In the benefits related to "legal compliance improvements", the barriers do not contribute significantly to explain these benefits (β=.162 and .068, sig.>.05), although the motivations do positively in competitive orientation (β=.176, sig.<.05), and environmental orientation (β=.393, sig.<.001), in the case of compliance with stakeholders demands the statistic β (.029) is not significant, and therefore, this type of motivation does not influence the benefits. Finally, the benefits related to improvements at human resource level are significantly explained by barriers and motivations (compliance with stakeholder demands and environmental orientation). In the case of compliance with stakeholder demands, these have a negative influence (β = -.192, sig. <.001), which means that if the company implements EMAS due to pressures from stakeholders, this does not lead to an improvement in human resources. This result with the data obtained in this study cannot be explained, which opens a research gap to be followed in future studies. In summary, the results of the regression analysis suggest that the hypothesis H1, H2 and H3 are partially corroborated.

In order to corroborate Hypotheses H4 and H5 three models of multiple regression are proposed; Independent variables, motivations and barriers and dependent variables factors obtained from the degree of difficulty in complying with EMAS requirements; difficulties of operational level, regulatory compliance and understanding of the standard. The hypotheses are not corroborated as they are not present in the matrix of correlation coefficients of significant correlation and the regression models do not show an adequate goodness of fit; model 1 (dependent variable=factor 1, difficulties of operational level) the R^2=.037 and the F statistic .057, sig.>.05 indicates that there is no significant linear relationship; model 2 (dependent variable=factor 2, regulatory compliance) the R^2=.078 and the F statistic 1.273, sig.>.05 and model 3 (dependent variable=factor 3, understanding of the standard) the R^2=.096 and the F statistic 1.606, sig.>.05.

5. DISCUSSION

It is started by making reference to the factors in which the items were grouped in each of the concepts considered in the EFA. As for motivations, in this study they were classified into three groups; compliance with stakeholder demands, competitive orientation, environmental orientation. This grouping is very similar to that obtained by other studies. Fryxell et al. (2004) grouped them into internal, external motivations and cost motivations and Heras- Saizarbitoria et al. (2011) into internal motivations and external motivations and Mariotti et al. (2014) into environmental outcomes and perception, competitive orientation and compliance with stakeholder demands. An important aspect to consider is to know which of the motivations are the most important to start the implementation process of the standard. In this study, it was observed that the most important factor was competitive orientation together with environmental orientation, and although in the empirical literature that has dealt with this issue there is no consensus, this result is corroborated by the studies that are in majority, which highlight that it is the external motivations that have the most influence (Morrow and Rondinelli, 2002; Poksinska et al., 2003).

In the case of barriers, these have been classified into two groups, internal barriers and implementation cost (in other studies it forms part of the internal barriers). This grouping shows important similarities with other studies such as those by Post and Altman (1994) that divided them into industry barriers and Organizational barriers or other authors that divided them into external barriers and internal barriers (Hillary, 2004; Shi et al., 2008; Chan, 2008; Murillo-Luna et al., 2011; Mariotti et al., 2014). Not all barriers, however, involve the same degree of difficulty. There are several authors such as Post and Altman (1994), Hillary (2004), Murillo-Luna et al. (2007) and Dahlmann et al. (2008) who have tried to compare their relative importance. There is a certain degree of consensus that internal barriers are more problematic than external barriers. However, in this study there is practically no difference between the two groups, showing the implementation cost greater importance.

With regard to the benefits derived from the implementation of EMSs, in general, according to Heras-Saizarbitoria et al (2008), empirical studies corroborate that these standards enable to improve competitiveness (Kollman and Prakash, 2002) and business efficiency (Rondinelli and Vastag, 2000). In this study they have been classified into four groups: operational benefits, external benefits, improvements in legal compliance and improvements at human resource level, a grouping that has similarities with that done by Poksinska et al. (2003), that grouped them into internal performance benefits, external marketing benefits, and relations benefits, Zeng et al. (2005) into internal operations, corporate management, marketing effects and supplier relations and Gavronski et al. (2008) into productivity benefits, financial benefits, market benefits and societal benefits.

It is interesting to note that the most important benefits obtained are at the human resource level, although the differences between the four groups are very small, so it can be said that the implementation of EMSs influences the four groups of benefits considered. This is corroborated by Tarí et al. (2012:306), who observed that "*in general terms the studies show that the ISO 14001 standard has a significant impact on a high number of benefits… Consequently, the implementation of the ISO 14001 standard has clear benefits on operational results … and the effects on financial results are inconclusive.*"

Once the structure of the concepts considered has been approached, the results obtained on the set of hypotheses in this research are discussed. According to the results, Hypotheses H1, H2 and H3 are partially corroborated. In the case of the positive relationship between motivations and benefits (H1), the relationship is contrasted (in all cases, standardized coefficients of correlation are significant at the $p < .001$ level). These results are corroborated by empirical studies by Kitazawa and Sarkis (2000), Pan

(2003), Poksinska et al. (2003), Zutshi and Sohal (2004), Zeng et al. (2005), Gavronski et al. (2008), Álvarez-García and Del Río-Rama (2016) which state that a higher degree of either internal or external motivation leads to a greater perception of benefits. In these studies, except for Gavronski et al. (2008) and Álvarez-García and Del Río-Rama (2016) the relationship is analyzed separately.

Hypothesis H2 is also corroborated, that relates the motivations with the barriers in the sense that greater motivation by the company reduces the perception level of the barriers faced by the implementation process, corroborated by Álvarez- García and Del Río-Rama (2016). On the other hand, the relationship between compliance with stakeholder demands and internal barriers is positive, which implies that the perception of internal barriers increases. It is thought that this is because the companies that decide to implement an EMS on demand of the stakeholder do not focus their efforts on designing a system to fulfil internal needs, lack of environmental awareness and lack of commitment of the management, as well as allowing an adequate process of staff training and motivation, etc., and therefore, do not promote the internalization of the standard on a day-to-day basis (Boiral, 2011), which means that the barriers are not reduced. This is also seen by Heras-Saizarbitoria et al. (2011) that state that external pressures may lead to a superficial adoption of EMSs, mostly intended to improve the organization's image rather than its environmental performance.

Hypothesis H3 which presupposes a negative relationship between barriers and benefits is confirmed by three of the benefits. Results supported by other studies carried out with the ISO 9001 standard (there are no studies in the 14001) in which they also found that some barriers hinder the implementation and therefore the perception of the benefits that are obtained (Jang and Lin, 2008) and by the study of Álvarez- García and Del Río-Rama (2016). The exception refers to the relationship with improvements in legal compliance, in which case the correlation coefficients are not significant.

Finally, in order to reinforce the verification of the hypotheses and to study the relationship structure, different regression models were proposed, including motivations and barriers as independent variables and benefits as a dependent variable, with the purpose of evaluating the effects of the dependent variables on the benefits. These models allow to observe that hypotheses H1, H2 and H3 are partially corroborated. It is observed that the environmental orientation motivation does not influence operational and external benefits significantly (β = -.061 and -.193), but does show a positive and significant relationship with improvements in legal compliance and human resources (β = .393 and .355; p <.001). With regard to the competitive orientation motivation, it does not influence operational benefits and improvements at human resource level (β = -.011 and -.029), but does significantly influence external benefits and improvements at the level of legal compliance (β = .278 and .176; p <.001 and p <.05).

The motivation compliance with stakeholder demands does not influence operational benefits or improvements in legal compliance (β = -0.61 and -.193), but does influence external benefits (β = .211; p <.001) and improvements at human resource level, in the latter case negatively (β = -.192; p <.001). This clearly shows that internal motivations are more closely related to the perception of benefits obtained by companies that implement and certify their systems according to EMAS. Quantitative studies corroborate the results (Kitazawa and Sarkis, 2000; Rondinelli and Vastag, 2000), as well as quantitative studies (Fryxell et al., 2004; Heras-Saizarbitoria et al., 2011).

With respect to barriers, the implementation cost does not influence operational benefits and improvements at the level of legal compliance significantly, but does influence significantly and negatively operational benefits and improvements at human resource level (β = -.570 and -.361; P

<.001). Internal barriers do not significantly influence improvements in legal compliance, but do influence operational benefits (β = -.484; p <.001), external benefits (β = -.552; p <.001) and improvements at human resource level (β = -.805, p <.001). The results show that the most important barriers are internal barriers. There are no studies on this subject that obtain similar results.

Hypotheses H4 and H5 are not corroborated as they are not present in the matrix of correlation coefficients of significant correlation and the regression models do not show an adequate goodness of fit.

6. CONCLUSIONS

As already mentioned this research is new since it aims to fill a gap in research carried out in companies with standard EMAS. In this sense, this research will allow to analyze and reinforce some of the conclusions already obtained in other studies carried out in ISO 14001 and EMAS certified companies; the motivations and barriers have been studied, among others by Morrow and Rondinelli (2002), Iraldo et al. (2013), Mariotti et al. (2014), Ratiu and Mortan (2014), Testa et al. (2016) and Murmura et al. (2018), as well as the benefits obtained from the implementation of environmental standards by Zutshi and Sohal (2004), Pedersen (2007), Vernon et al. (2009), Martín-Peña et al. (2014), Merli et al. (2014) and Murmura et al. (2018), or disagree with them. The novelty of this study is that four regression models are proposed to study how two independent variables (motivations and barriers) influence a dependent variable (the different benefits considered). In this sense, Fryxell et al. (2004) and Heras- Saizarbitoria et al. (2011) did analyze the relationship between motivations and benefits in companies certified ISO 14001, but they did not consider the barriers. In the study conducted by Álvarez-García and Del Río-Rama (2016) using the Structural Equation Model technique, they analyzed the joint influence of both variables on the benefits, considering a single construct for the benefit.

Firstly, it was found that it is a set of motivations that influence the decision of the management to implement EMAS and not only one, being the external motivations the most influential. Finally, the benefits perceived as the most important are those relative to those obtained at human resource level. These results have been compared with previous studies and their discussion is done in the previous section. The regression analyses proposed allowed to analyze the proposed hypotheses. ~~They also allow to analyze how the motivations and barriers (predictive variables) influence the dependent variable, the benefits.~~ These results show that operational benefits are strongly influenced by barriers (in the negative sense) and not by motivations and the external benefits are strongly influenced by internal barriers (-) and weakly influenced by motivations (compliance with stakeholder demands and competitive orientation).

In the case "Improvements in legal compliance", this benefits are strongly influenced by the motivation "environmental orientation" and weakly by "competitive orientation", not being influenced by the barriers. In this sense, if the company shows great interest and concern for the environment, it seems logical to think that it will comply with greater emphasis with the environmental legislation and implement tools for measuring and monitoring environmental impact. Improvements at human resource level (improves internal communication and participation of employees of the organization, improvement in staff training and employee motivation) are strongly influenced by the barriers (-) and by the motivations grouped into environmental orientation (+) and weakly by compliance with stakeholder demands (-). According to this result, it is observed that the companies that integrate environmental management in their corporate strategy, as well as, want to maintain a socially

acceptable behavior put a greater emphasis on achieving the internalization of EMS requirements for what they need the involvement of employees, which has repercussions in obtaining better benefits in the area of human resources.

Finally, it should be mentioned that these results have important academic implications and are of great interest to companies, public administrations and certifying bodies, as they allow to observe how the motivations and barriers affect the possible benefits that are obtained from the implementation of the environmental standard EMAS. This allows interested parties to know what motivation should be emphasized or what barrier to reduce to increase the desired benefit. In the case of barriers, these influence the perception of the benefits obtained, reducing these. Therefore, companies must take them into account if they intend to obtain the maximum benefit from the implementation of environmental requirements and go beyond mere compliance with legal requirements. In this sense, they must take action before and during the implementation process aimed at reducing barriers. It must be the first step before implementing this type of systems. With regard to the motivations, companies must take into account that these do not influence the operational benefits. However, if companies wish to increase the benefits obtained from implementing an EMS with respect to improvement in legal compliance and improvements at human resource level, it is very important that the motivations that drive this implementation process have an environmental component. If the attainment of external benefits is emphasized, the motivations that should drive this process are those that have a clear competitive orientation and those related to the compliance with stakeholder demands.

Regarding the limitations of this study, the first one refers to data bias as they are provided by the quality managers of the companies surveyed (perception of a single subject) (Boiral and Roy, 2007; Nawrocka and Parker, 2009). In this sense, Ketokivi and Schroeder (2004) suggest collecting data from various sources such as managers, intermediate managers, employees, etc. In order to overcome this limitation, the Harman single-factor test was applied, which is a test suggested by Podsakoff and Organ (1986) and used by other researchers such as Kafetzopoulos and Gotzamani (2014), Prajogo et al. (2014). The existence of a common variance or bias of the method was examined and the results show that the variance of the common method is not a problem in research (in the factorial analysis of principle components none of the factors explain most of the variance in any of the analyzed constructs). The second limitation refers to the geographical area (Autonomous Community of Galicia-Spain), so the results must be extrapolated with caution and finally, its cross-section. As regards future lines of research, the proposal by Tourais and Videira (2016) about the strengthening of relationships between organizations and stakeholders has been considered to be very relevant, so far, it has been seldom explored in the literature.

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