



Determinants and relevance of internalisation of environmental management systems

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ABSTRACT

The internalisation of Environmental Management Systems (EMS) is raising interest among scholars. Authors have identified it as the reason of controversial results in literature about the relation between EMS and environmental performance. Often, certified companies without an internalised system are labelled to have symbolic behaviour in environmental management. However, the literature lacks of studies aimed to identify other justifications that could influence the performance of certified companies, also in absence of an internalised EMS. This study wants to analyse the role of the environmental manager satisfaction in the internalisation of EMS and in achieving environmental performance. The paper uses data from a survey of 438 EMAS registered organisations. The results show that the managers' satisfaction positively influence the environmental reputation and competitiveness also without considering the mediating role of internalisation. The paper opens new research avenues on the understanding of the real importance of EMS internalisation and on the need to further investigate the relation between EMS and performance.

1. Introduction

Environmental management systems (EMSs) like ISO14001 and Eco-Management and Audit Scheme (EMAS) have become one of the most used strategies to face environmental issues. Dedication to prevention of environmental damages and environmental innovation (Khan et al., 2022), both in terms of environmental (Daddi et al., 2018) and competitive performance (Feng et al., 2016), are two of the main reasons of adopting an EMS (Marrucci et al., 2022; Vashishth et al., 2021).

Even though with the last revision of the ISO14001 the two EMSs are very similar, some differences are still present (Johnstone, 2020). While EMAS is a public standard released by the European Commission (EC) (EC, European Commission, 2009), ISO14001 is private. Nevertheless, both the standards are voluntary (Marrucci and Daddi, 2022) and aimed at improving the environmental performance of an organisation by managing all its environmental aspects (Graafland, 2018). ISO14001 and EMAS present differences also on communication and certification process (Heras-Saizarbitoria et al., 2016a,b). Despite these small requirements differences, two EMSs registered very different trends in terms of certification issued (Salim et al., 2018). Moreover, the gap between the two EMS is still growing due to the EMAS decrease (Daddi et al., 2017a; Merli and Preziosi, 2018).

EMSs have been investigated following a threefold approach. They were analysed from a practitioner (Merli et al., 2018a,b; Daddi et al., 2018), from the policymakers (Pérez-Torres et al., 2019) and from an academic point of view (Guenther et al., 2016; Marrucci et al., 2021b). The high number of literature review upholds the strong interest of the academics. In particular, Todaro et al. (2019b) investigated EMSs focusing on management theories. In the framework of the sustainable consumption and production (SCP) tools, Marrucci et al. (2019) highlighted the linkages between EMAS and the circular economy. Many studies focussed on drivers (Tourais and Videira, 2016; Boiral et al., 2017), barriers (Merli et al., 2018a,b; Preziosi et al., 2016) and benefits (Rino and Salvador, 2017) of EMSs. The bonds between EMSs and other specific topics like green supply chain management (GSCM), products and management systems integration have been also studied through literature review.

More recently, scholars have turned their attention on the internalisation of the EMSs within an organisation (Castka and Prajogo, 2013). Indeed, academics have noticed that, by fully integrating the requirements of the standards, organisations have obtained better environmental performance (Testa et al., 2018a). On the contrary, in the past, scholars have analysed EMSs effects on organisation performance by simply considering the mere achievement of the certification or, at

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least, by taking the EMS “maturity” as a proxy of the level of internalisation (Nishitani et al., 2012). Although. The effects of EMSs on environmental performance were one of most debate topics in the academic literature (Testa et al., 2014; Nikolaou and Matrakoukas, 2016), scholars often assumed that EMSs were adopted by organisations homogeneously (Mungai et al., 2020). On the contrary, as highlighted by Yin and Schmeidler (2009), EMSs lead to heterogeneous environmental outcomes.

To date, according to the Scopus and Web of Science database, there is not so many studies which have focused on the determinants of EMSs internalisation. Furthermore, scholars mainly measured EMS internalisation using specific EMSs requirements or all the key elements of the Deming Cycle (Testa et al., 2018a). On the contrary, we further expand the discussion “by adopting a more comprehensive measure of EMS internalisation compared to previous studies” as done by Todaro et al. (2019a). As the level of internalisation could influence the performance, the level of satisfaction perceived by the environmental manager of the organisation from the application of EMS could sway the level of internalisation. For these reasons, we aimed at evaluating the influence of EMS commitment on EMS internalisation and how this internalisation lead to better stakeholders’ appreciation and to better market competitiveness. Thus, to fill the gap on the literature on EMS internalisation, we administered a survey to the EMAS-registered organisations. Our research question was centred on the role of EMS internalisation and its connection with managers’ satisfaction and organisational performance and stakeholders’ appreciation.

In the next section we review the literature and we formulate our research hypothesis. After explaining how we measure the variables and how we estimate them, we show the main results. In the fifth section we discuss the results and we underline the main findings, the limitations and some possible future research agenda.

2. Literature review and research hypothesis

Both ISO14001 and EMAS requires a cross sectional commitment among all the organisations departments starting from the Top Management, passing through the environmental manager, up to each employee. A strong focus is on the internal communication which should go beyond the single environmental manager of each organisations, but should pervade all over the company (Reyes-Rodríguez, 2021). Nevertheless, the reasons which lead an organisation to adopt an EMS do not always derive from internal pressures like the need to increase the resource efficiency or to reduce costs (Johnstone, 2019), but it is often dictated by the objective of gaining reputation (Mazzi et al., 2016) in order to face institutional pressures. As stated by Daddi et al. (2016), normative pressures are important for market competitiveness and reputation of an organisation. Pham and Baird (2015) recognized the coercive pressures as one of the most successful motivators to push for the EMS adoption. Lastly, also the mimetic pressures from the institutional theory boost the adoption of an EMS. Indeed, as demonstrated by Testa et al. (2015), many organisations adopt an EMS in order to follow the choice of competitors as results of the mimetic isomorphism.

Nevertheless, showing the environmental commitment of an organisation is not the only reason to adopt an EMS. In fact, scholars have identified several reasons that drive organisations towards this choice. Drivers, barriers and benefits of EMSs have been widely investigated considering also the EMSs adaptability and flexibility to different sectors. Focusing on Spanish EMAS-registered organisations, Álvarez García et al. (2018) showed how the motivations and barriers jointly affect the possible benefits that are obtained from the implementation of EMAS. Still on EMAS, but in the Italian context, Murmura et al. (2018) assessed motivations, benefits and barriers. A wider study on these topics was done by Heras-Saizarbitoria et al. (2016a,b) who investigated the outcomes of EMSs considering the role of motivations and organisations characteristics.

Scholars also in-depth investigated the performance of EMS-certified

organisations. Dragomir (2017) investigated firm performance and the role of environmental management. Even Comoglio and Botta (2012), who analysed ISO14001 companies recognized the positive effects of the standard on environmental performances. Matuszak-Flejszmana et al. (2019) turned their attention on the EMAS-registered organisation performance in the Polish context. Matuszak-Flejszmana et al. (2019) underlined that “there is no linear relationship between the time the EMAS is implemented and its effectiveness and that there is a weak correlation between establishing environmental objectives and changes in environmental performance indicators”.

The debate on the effectiveness of EMSs in terms of improving performances is still highly discussed and controversial. Both the studies on EMAS and ISO14001 leads to contrasting results. For this reason, scholars started investigating the causes of this discrepancy of results. Heras-Saizarbitoria and Boiral (2013) suggested that the different performance results are conditioned by the assumption, made in several studies, that EMSs are developed indifferently within the various organisations. In order to face this aspect, scholars started including in their analysis the EMSs level of internalisation. In fact, every certified organisation has the possibility to substantially or symbolically adopts an EMS (Christmann and Taylor, 2006; Boiral et al., 2017). For this reason, EMSs internalisation has become more and more important in the academic debate and the authors have begun considering this aspect within their theoretical framework.

2.1. The study’s hypotheses

To date, the academic debate has mostly focused on external drivers that nudge organisations to adopt an EMS. Policymakers have always been in the forefront in spreading EMS adoption and the theme of regulatory incentives was one of the first investigated. Over the years, several types of regulatory reliefs have been promoted by the policy-makers. Avoiding the overlapping between regulatory and certification procedures (Mosgaard and Kristensen, 2020) or other forms of regulatory flexibility, government incentives (Massoud et al., 2010) and support programs (Whitford and Provost, 2019) are the main examples of regulatory reliefs used to prompt the diffusion of the EMSs. Nevertheless, scholars have limitedly considered the internal drivers. Indeed, one of the motivators that may lead to concretely integrate an EMS within the organisation’s processes is the level of EMS satisfaction perceived by the organisation. This aspect has been rarely investigated in relationship with EMSs internalisation, even though it has been lightly raised up by some scholars. Prajogo et al. (2016) demonstrated how different motives for seeking certification lead to different satisfaction levels. Daddi et al. (2017b) considered the relationship between the satisfaction levels of an environmental manager and the corporate environmental performance recognizing a positive influence. EMS adoption appeared to be a viable means to develop business goals and improve corporate social responsibility activities (Ikram et al., 2019). Todaro et al. (2019a) studied exogenous and endogenous contextual factors that influence EMAS internalisation. The authors observed that stakeholders’ concern for the natural environment directly influences substantive internalisation, while it is not influenced by governmental regulatory relief. Starting from these academic contributions, but expanding the perspective, this study suggests that the environmental manager’s satisfaction may boost organisations to integrate EMSs within their processes considering the internalisation of the EMSs as a key strategy to concretely face the environmental responsibility of the organisations. Thus, following, but reversing, the approach used in Chowdhury and PrajogoJayaram (2018), who measured the effects of a symbolic or substantive implementation of international standards on the level of satisfaction with ISO14001, our first hypothesis is:

H1. Higher level of the Environmental Manager’s satisfaction lead to a greater internalisation of EMS requirements within an organisation.

Once we hypothesized the reasons that may lead to a greater EMSs

internalisation, we investigated the effects of internalisation. To further expand the academic debate, we decided to analyse the influence on stakeholders' appreciation and market competitiveness. Even though these topics have been in-depth investigated in relation to the EMS adoption, their linkages with EMSs internalisation have not yet fully analysed. In fact, EMS internalisation has been mainly studied in association with environmental performance as dependent variable. On the contrary stakeholders' role have been mainly considered as determinant of EMS adoption. In short, according to our approach and internalised EMS is capable to achieve an effective and credible external communication, thus achieving reputational benefits. Stakeholders have almost always been studied considering their pressures on organisations for adopting an EMS (Shahzad et al., 2020), to fulfil legal compliance (González-Benito et al., 2011), or to prompt circular economy (Kristensen et al., 2021) and innovation (He et al., 2018). Some studies divided stakeholders considering their level of influence (primary or secondary) or their belonging within an organisation (internal or external). Both Qi et al. (2011) and Lannelongue and González-Benito (2012) used a mixed version of these two stakeholders' categories. But while, Qi et al. (2011) recognized a positive relationship, Lannelongue and González-Benito (2012) claimed that certification could be only a smokescreen for stakeholders. However few studies have considered the effects of EMSs on stakeholders as dependent variable, linking this concept to the reputational benefits gained with the adoption of the environmental certification (Daddi et al., 2017b; Testa et al., 2016). Trying to contribute to this part of literature, it is important to understand if stakeholders' appreciation can be associated as a benefit of EMS internalisation. So, our second hypothesis is:

H2. A greater internalisation of EMS requirements within an organisation increase the level of stakeholders' appreciation.

Like environmental performance also the bonds between organisation competitiveness and EMSs adoption have been widely investigated (Nawrocka and Parker, 2009), even with an in-depth focus on specific firm's features such as industrial sector (Zhou et al., 2018) or size (Campos, 2012). Nevertheless, similarly to stakeholders' appreciation, EMS internalisation has not yet been related to the organisation competitiveness. Moreover, even though most of the studies have recognized the positive influence of EMSs on the economic performance of the organisation (Wang and Zhao, 2020), this topic is still highly debated. Nishitani (2011) highlighted that the effects of EMS implementation vary among different industries and that the economic performance depends on the path chosen by the organisation for the EMS implementation. Even Rennings et al. (2006) concluded that "a careful design of EMAS is important for both the environmental and economic performance of a facility". While Darnall et al. (2008) recognized the importance of EMS internalisation to achieve better economic performance. The authors posited that adopting a more comprehensive EMS allow organisation to observe greater economic performance. In order to enrich the contribution on the topic EMS and competitiveness with the consideration of internalisation variable, our fourth hypothesis reads as follows:

HP3. A greater internalisation of EMS requirements within an organisation increase the green competitiveness of the organisation.

Although EMS internalisation have obtained a central role in the academic debate on EMS effectiveness, scholars have not yet established if the internalisation is fundamental to gain market share and to achieve high level of consensus among the different stakeholders. Almost all the previous academic studies on EMS internalisation have confirmed the positive role of a complete integration of the EMS requirements within the organisation processes (Castka and Prajogo, 2013; Testa et al., 2015, 2018a). However, this not necessarily means that organisations cannot obtain good performance without adopting an internalisation strategy. Indeed, the organisation might be able to benefit about its environmental proactive strategy also without highlighting a clear internalisation of its EMS. So, our last hypotheses aim to answer to the following

provocative question: is the attention toward EMSs internalisation in the frame of EMSs literature fully justified? Thus, to verify if EMS internalisation has a relevant mediating role in the relationship between the environmental manager's satisfaction and the benefits used as dependent variables, we also formulated the following hypotheses:

H4. A greater Environmental Manager's satisfaction increases the level of public and private stakeholders' appreciation.

H5. A greater Environmental Manager's satisfaction increases the environmental competitiveness of the organisation.

To facilitate the understanding of the connections between the different hypotheses, Fig. 1 summarizes the conceptual model and the relative hypotheses.

3. Method

3.1. Data collection and sample

To investigate the model of Fig. 1 we used data obtained from an online survey on EMAS registered organisations. We obtained e-mail contacts for all EMAS-registered organisations from the EU EMAS Register and we asked for the support of EMAS Competent Bodies, many of whom also contacted organisations to inform them of the survey. The questionnaire has been translated Italian, English German, Polish and Spanish by mother-tongue speakers in order to facilitate respondents from different countries. The questionnaire was online and available from April 2017 to May 2017. During this time span, reminder emails were sent every two weeks.

The questionnaire was designed in order to minimize common method bias in the questionnaire design (Podsakoff et al., 2003). Several procedural remedies were adopted to reduce potential problems of common method variance that can affect behavioural research. Thus, we avoided vague concepts, complicated syntax and unfamiliar terms to minimize item ambiguity; keeping questions simple, specific, and concise; avoiding the use of bipolar numerical scale values and providing verbal labels for the midpoints of scales; and guaranteeing respondent anonymity.

A total of 742 EMAS-registered organisations filled out the online questionnaire. Considering the total EMAS population at that time it represents an overall participation rate of 18.7%, which is a little low the average response rate suggested by Sellitto et al. (2020), but in line with previous studies on EMSs (Heras-Saizarbitoria et al., 2020). An in-depth analysis of the questionnaires was conducted in order to eliminate the incomplete questionnaires. A total of 438 have been considered valid for our study, representing 11% of the EMAS population.

The three countries with the highest numbers of registrations - Germany, Spain and Italy - provided 82.6% of the total responses.

SMEs represented the majority of respondents (62.7%), with over a third coming from small and micro enterprises. Considering the size of EMAS registered organisations, large organisations participated at a proportionally higher rate than the other organisation size groups, whereas micro-organisations were slightly underrepresented by this survey.

More than 80% of the EMAS-registered companies in the sample are also certified with ISO 14001. In terms of "maturity" of the EMS, 21.4% of the sample were certified from more than 20 years, while 17.2% from more than 10 years.

3.2. Variables development

As detailed in Fig. 1 our model includes some independent and dependent variables. The variable "environmental management system satisfaction" is independent variable in H1, H4 and H5. Environmental management system internalisation is dependent variable in H1 and independent variable in H2 and H3. Finally, the study foresees two main dependent variables: stakeholders' appreciation and environmental

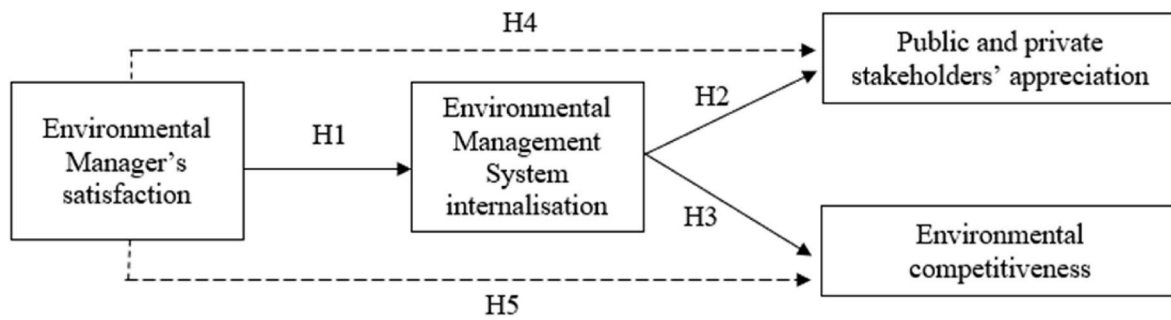


Fig. 1. The conceptual model and its hypotheses.

competitiveness. They aim to measure the benefits of EMS and are dependent variable in H2, H3, H4 and H5.

Other factors than the mentioned variables can influence the EMS internalisation and the stakeholders' appreciations and environmental competitiveness. For instance, in some cases, size could influence the capability of the company to have a high internalisation or to reach green competitiveness (Daddi and Iraldo, 2016; Vásquez et al., 2019). For this reason, we included the control variable EMPLOY that consider the number of employees of the sample (Fig. 2).

In addition, some exogenous factors could impact on the decision of certified companies to achieve, for instance, a high level of internalisation. Considering these approaches and estimation techniques, we focused on three exogenous factors introducing following variables: "policy sensitiveness" (POLSE) measure by the answers provided to the statement "Local government is very concerned about environmental issues"; "environmental sensitiveness" (ENVSE) considering the statement "My organisation is located nearby a valuable ecosystem"; "social sensitiveness" (SOCSE) using the statement "Local communities living where my organisation is located consider the natural environment as an asset to preserve".

3.2.1. Estimation of environmental manager satisfaction and environmental management system internalisation

Literature has deeply analysed the relation between satisfaction of managers/employees and firm performance (Sabokro et al., 2021). For instance, satisfaction of employees can bring to better performance in terms of profitability (Amrutha and Geetha, 2021). More recently some

authors have started to consider the satisfaction as a variable that could affect EMS performance. Delmas and Pekovic (2013) observed a higher labour productivity in ISO14001 companies. Daddi et al. (2018) demonstrated the influence of the environmental managers satisfaction on environmental performance of EMAS registered companies. To estimate environmental manager satisfaction (EMSSAT) we considered the findings of these studies, thus we included in the questionnaire a request to rate specific statements aimed to measure the satisfaction of the environmental managers with the EMS (Table 1). Respondents were asked to rate on a 5-point Likert scale their agreement with each sentence, ranging from "1 - totally disagree" to "5 - totally agree". In particular we asked to the EMS environmental managers to rate the level of agreement with the following 4 items aimed to investigate different perspectives of their satisfaction with EMS: "My organisation will keep the EMS certification alive for several years", "The investment of human and financial resources in the implementation of EMS has been a good choice", "I would recommend to other non-certified companies to adopt an EMS", "I would increase the resources devoted to the EMS in order to increase its capacity to produce positive results for my organisation". The factor analysis for EMSSAT considered 431 observations, and the Cronbach alpha coefficient was 0.771. According to Hinton et al. (2014), a coefficient over 0.7 shows high reliability so we judged our variable as reliable. The variable EMSINTERN was calculated using eight items. Since some papers have been published on this topic in the last years, this literature debate has been considered to measure this variable (e.g., Qi et al., 2012; Castka and Prajogo, 2013). More recently Tessitore et al. (2019) and Daddi et al. (2021) provided useful insights about the

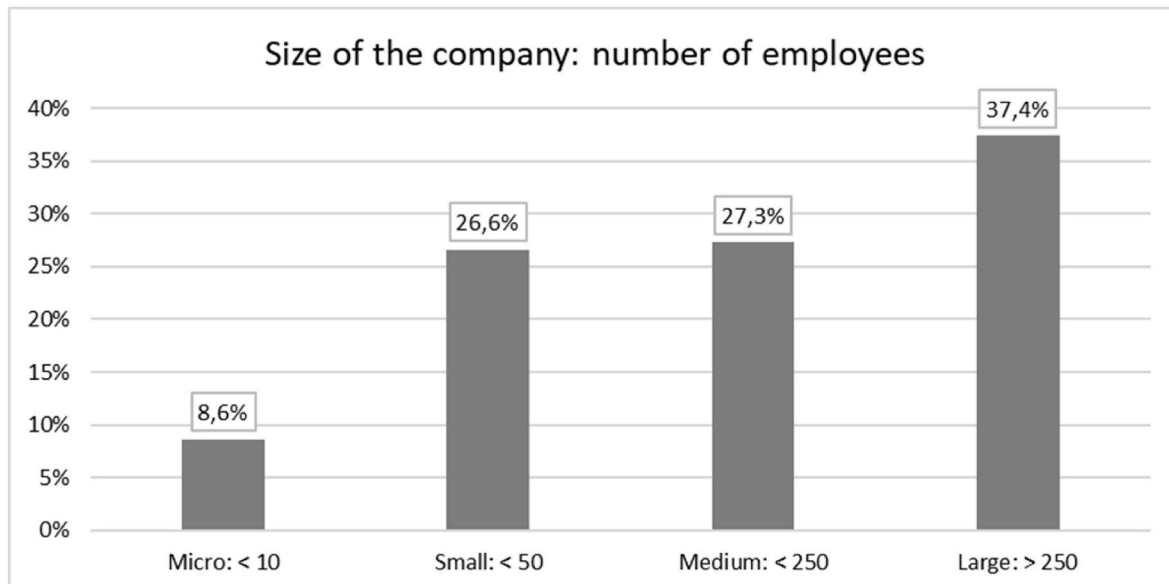


Fig. 2. Sample breakdown in terms of company size (number of employees).

Table 1
Displays the questionnaire items and factor loadings for each variable in the model.

Variable	Questionnaire items	Factor loadings				Uniqueness
		1	2	3	4	
Environmental manager's satisfaction	My organisation will keep the EMS certification alive for several years	0.66				0.46
	The investment of human and financial resources in the implementation of EMS has been a good choice	0.77				0.40
	I would recommend to other non-certified companies to adopt an EMS	0.74				0.45
Environmental management system internalisation	I would increase the resources devoted to the EMS in order to increase its capacity to produce positive results for my organisation	0.60				0.64
	The Top Management of my organisation participates actively in the EMS also beyond the Management Review periodical meeting		0.73			0.34
	The Top management ensures the integration of the environmental management system requirements into the organisation's business processes		0.75			0.28
	The organisation considers the results from analysis and evaluation of environmental performance, evaluation of compliance, internal audits and management review when taking action to improve		0.70			0.34
	The improvement objectives are monitored through quantitative indicators (when applicable) and with a frequency higher than every 4 months		0.63			0.46
	The organisation assures a transparent and pro-active communication toward external stakeholders (i.e. local communities, public authorities, etc.)		0.68			0.35
	The organisation involves contractors in the awareness and training activities		0.59			0.54
Public and private stakeholders' appreciation	The organisation has carried on-site or documental audits involving supplier/contractors	0.61				0.51
	The organisation test environmental emergencies (e.g. oil/chemical spills) at least once a year	0.60				0.43
	National government (e.g., ministry of the environment etc.)			0.66		0.35
	Local and regional policy makers (e.g., regions, municipality etc.)			0.64		0.46
	Industrial and trade associations			0.68		0.42
	Inspection agencies			0.65		0.37
	Trade unions			0.61		0.50
Environmental competitiveness	ISO14001/EMAS Verifiers			0.67		0.41
	Improve company's reputation, therefore attracting new clients				0.73	0.45
	Support EMAS organisations during procurement procedures by proving compliance with Green (environmental) criteria				0.80	0.34
	Improve relations with banks and insurance companies by providing evidence of the capacity of the organisation to manage environmental and climate risks				0.78	0.42

approach to be followed to estimate the internalisation of EMS. Adopting again a likert scale from 1 to 5, the environmental managers were asked to rate the followings items: "The Top Management of my organisation participates actively in the EMS also beyond the Management Review periodical meeting", "The Top management ensures the integration of the environmental management system requirements into the organisation's business processes", "The organisation considers the results from analysis and evaluation of environmental performance, evaluation of compliance, internal audits and management review when taking action to improve", "The improvement objectives are monitored through quantitative indicators (when applicable) and with a frequency higher than every 4 months", "The organisation assures a transparent and pro-active communication toward external stakeholders (i.e. local communities, public authorities, etc.)", "The organisation involves contractors in the awareness and training activities", "The organisation has carried on-site or documental audits involving supplier/contractors", "The organisation test environmental emergencies (e.g. oil/chemical spills) at least once a year". The Cronbach's coefficient was satisfactory (0.820) and we obtained 428 useable questionnaires.

3.2.2. Estimation of stakeholders' appreciation and environmental competitiveness

Environmental management systems allow to obtain a third-party certification that can be used to increase the reputation of the firms towards its different stakeholders. One of the key steps of EMAS regulation is to publish an Environmental Statement in order to increase the transparency of the certified firms. The need to respond to stakeholders' pressures is one of the main drivers for obtaining an environmental certification (Lannelongue and González-Benito, 2012). Stakeholders' expectations are considered in the planning and implementation of the EMS (Le et al., 2014) and the stakeholders' appreciation can be considered as one of the targeted benefits by the certified firms. To measure stakeholders' appreciation (STAKEAPP) we started from the suggestions provided by Daddi et al. (2017b) to estimate environmental

reputation. In particular to estimate the variable we asked to the managers: "Please rate the following stakeholders according to their level of appreciation of EMAS". Then we listed the followings stakeholders asking for a rate from 1 (strongly disagree) to 5 (strongly agree): "National government (e.g., ministry of the environment etc.)", "Local and regional policy makers (e.g., regions, municipality etc.)", "Industrial and trade associations", "Inspection agencies", "Trade unions", "ISO14001/EMAS Verifiers". As we can observe, the target of our variable was exclusively external stakeholders. We obtained 417 useable questionnaire and the alpha coefficient was 0.758. The last variable of our model was environmental competitiveness (ENVCOMPE) i.e., the competitive advantage obtained thank to the environmental certification. The relation between EMS and competitiveness has been studied in manufacturing firms (Martín-Peña et al., 2014) as well as service sectors (Disterheft et al., 2014). Considering the inputs from the literature we decided to include in the questionnaire the following question: "Do you think that the transparent disclosure of validated environmental data by means of the Environmental Statement may facilitate the emergence of new business opportunities?". We used three items to build the variable: "Improve company's reputation, therefore attracting new clients", "Support EMAS organisations during procurement procedures by proving compliance with Green (environmental) criteria", "Improve relations with banks and insurance companies by providing evidence of the capacity of the organisation to manage environmental and climate risks". The alpha coefficient achieved again a good value (0.814) using 438 observations.

4. Results

4.1. Testing hypothesis

Hypothesis were tested by means of two three-stage least squares regression models: this estimation method is indeed suited to estimate models of structural equations, where some endogenous explanatory

variables (as, in our case, EMSINTERN) are dependent variables from other equations in the system. The first model – Model 1 – tests H1, H2 and H3, while the second model – Model 2 – aims at testing H3 and H4. Both models also include the control variables (i.e., EMPLOY, ENVSE, POLSE and SOCSE). Table 1 displays the results of Model 1, while Table 2 displays the results of Model 2.

According to regression results in Model 1, the relation between EMSSAT and EMSINTERN is significant and positive ($\beta = 0.304$, SE = 0.056, and statistical significance at $p < 0.000$). Thus, H1 is supported. As far as concerns the effects of EMSINTERN on STAKEAPP and ENVCOMPE, both relations are significant and positive ($\beta = 0.617$, SE = 0.202, $p < 0.01$ and $\beta = 0.750$, SE = 0.208, $p < 0.000$, respectively). Based on these results, both H2 and H3 are supported.

As far as concerns the control variables included in the model, it is interesting to notice that EMPLOY does not appear to influence any variable in Model 1. On the other hand, the remaining control variables (i.e., POLSE, ENVSE and SOCSE) exert diverse effects on each dependent variable examined: specifically, ENVSE is the only significant control variable in relation with EMSINTERN, while POLSE and SOCSE are the only significant control variables in relation with STAKEAPP and ENVCOMPE, respectively. However, all significant relations exhibit lower regression coefficient and significance levels compared to the other independent variables examined; thus, it is reasonable to claim that control variables play a marginal role in explaining the total variance of the model.

Model 2 examines the direct relations between EMSSAT and the two independent variables, i.e., STAKEAPP and ENVCOMPE, without considering the internalisation of EMS. Regression results in Table 2 evinces that both relations are significant and positive ($\beta = 0.182$, SE = 0.050, $p < 0.000$ and $\beta = 0.225$, SE = 0.052, $p < 0.000$, respectively); accordingly, both H4 and H5 are supported. As in case of Model 1, control variables appear to explain very limited variance in Model 2: specifically, POLSE is confirmed as the sole significant control variable in relation with STAKEAPP, and SOCSE is confirmed as the only significant control variable in relation with ENVCOMPE (see Table 3).

4.2. Robustness of the model

To assess the robustness of the model, several tests were performed. First, the normality of residuals was verified by plotting the non-parametric Kernel density estimator, which evinced symmetry in the distribution of the residuals (Fan and Gencay, 1995). A Shapiro Wilk test was also performed to verify normality in residuals distribution. Second, a Breusch-Pagan test was conducted to assess homogeneity of the variance of the residuals, which revealed that heteroscedasticity does not affect the model estimation. Lastly, variance inflation factor (VIF) was computed for all variables to assess multicollinearity of the dataset: results exhibit a mean VIF significantly lower than 5, variance inflation

Table 2
Regression results for Model 1. SE = standard error.

Dependent variable	Independent variables	β	SE	$p > z$
EMSINTERN	EMSSAT	0.304	0.056	0.000
	EMPLOY	-0.061	0.048	0.206
	POLSE	0.052	0.052	0.313
	ENVSE	0.902	0.042	0.055
	SOCSE	-0.031	0.062	0.616
STAKEAPP	EMSINTERN	0.617	0.202	0.002
	EMPLOY	0.029	0.054	0.597
	POLSE	0.207	0.059	0.000
	ENVSE	-0.015	0.050	0.756
	SOCSE	0.084	0.067	0.210
ENVCOMPE	EMSINTERN	0.750	0.208	0.000
	EMPLOY	-0.011	0.056	0.839
	POLSE	-0.010	0.061	0.863
	ENVSE	0.033	0.051	0.520
	SOCSE	0.135	0.069	0.050

Table 3
Regression results for Model 2. SE = standard error.

Dependent variable	Independent variables	β	SE	$p > z$
STAKEAPP	EMSSAT	0.182	0.050	0.000
	EMPLOY	-0.008	0.054	0.597
	POLSE	0.249	0.046	0.000
	ENVSE	0.029	0.037	0.429
	SOCSE	0.065	0.055	0.239
ENVCOMPE	EMSSAT	0.225	0.052	0.000
	EMPLOY	-0.053	0.044	0.232
	POLSE	0.037	0.048	0.438
	ENVSE	0.096	0.039	0.513
	SOCSE	0.111	0.057	0.052

factors lower than 2.0 are associated with all variables, and tolerance levels higher than 0.1. Accordingly, it is reasonable to claim that multicollinearity does not significantly concern the dataset (Kennedy, 2003).

4.3. Tackling common method variance

Several procedural remedies were adopted while designing the questionnaire to reduce risk of common method variance and social desirability bias. Questions regarding the name of the respondent or the name of the organisation were avoided to preserve respondents' anonymity and thus reduce risk of social desirability bias. Similarly, the introductory letter to the questionnaire granted the independent aim of the research and that data would be presented only in aggregated form (King and Bruner, 2000). In order to avoid vagueness, all questions were based on a 1–5 Likert scale, and were kept simple and concise. Likert scales aimed at reducing ambiguity in answers by providing respondents with a range of values to choose from, and thus included verbal labels for the endpoints and midpoints of the scales (Podsakoff et al., 2003). Besides procedural remedies, control tests were performed: specifically, Harman's one-factor test revealed six factors with eigenvalues higher than 1.0, of which the largest accounted for 18% of the variance. Thus, it is reasonable to assert that common method variance is not present in the dataset.

5. Discussion and conclusions

5.1. Contribution to the literature

The results of the two models investigated in this study provide new insights in the literature about the relation between EMS internalisation and environmental performance.

A lot of recent studies have focused on the relevance of EMS internalisation. This variable has been adopted by scholars of this research area as the main reason to justify controversial results about the relation between EMS and environmental performance (Chowdhury and PrajogoJayaram, 2018). The scholars have accepted this thesis as right for the last 4–5 years. A lot of studies have continued to confirm the positive relation between internalisation and environmental performance without pushing the discussion forward. The results of this paper allow to move forward, trying to focus better on the relation between EMS and performance. In the last years some authors have already tried to follow that direction.

A first group of papers have started to study the determinants of the EMS internalisation and not only its relationship with performance. For instance, Daddi et al. (2021) studied the effects of a specific capability of EMAS organisations to influence the internalisation of environmental management systems. In specific, the authors highlighted how the capability to manage the supply chain from environmental perspective could positively influence the internalisation. With this approach, the internalisation was not simply measured and studied in relation with performance, but it was analysed in order to understand what could

stimulate it. A second group of authors have focused their studies at the individual level analysing the cognitive framings of managers as a leverage for the internalisation of the EMS. For instance, [Todaro et al. \(2019a\)](#) studied how environmental concern of managers could influence EMS internalisation. Finally, some authors analysed how the internal knowledge and capabilities of the organisations could leverage the internalisation of EMS. [Marrucci et al. \(2021a\)](#) studied how absorptive capacities could influence EMS internalisation facilitating the implementation of circular economy in EMAS organisations. Both groups of studies are linked with our findings especially with the Hypothesis 1. However, considering that framework, our results contribute to the literature in additional ways. First, the paper contributes to the studies that aim to understand the determinants of EMS internalisation. Our results add one determinant: the environmental managers satisfaction. An environmental manager of EMAS registered organisation strongly committed toward its EMS stimulates a stronger internalisation of EMS requirements. Second, the paper confirms with **H2** the previous literature about the positive relation between EMS internalisation and environmental performance. In particular, the results show that a more internalised EMS has the potential to increase the green reputation of the organisation. The increase of reputation through a higher stakeholder's appreciation is more and more important for organisations that operate in a market more and more demanding about environmental features of productions and products. Connected with the reputation **H3** investigates the benefit in term of green competitiveness. Again, the EMS internalisation is able to increase the green competitiveness of EMAS companies. Lastly, our paper aims to move forward the literature debate on EMS internalisation opening in our view a new area of literature in this field. According to the results of our paper, the new question to answer is: does internalisation really matters in the relation between EMS and environmental performance? Surprisingly, recent studies have never questioned this aspect. With the results of **H4** and **H5** this study wants to stimulate the debate investigating if some variables (such as the managerial satisfaction) are capable to improve environmental performance also without considering the mediating role of EMS internalisation. The confirm of Hypotheses 4 and 5 raises some doubts about the role of EMS internalisation suggesting the need of further studies aimed to investigate its relevance. The doubts are referred to the need to understand which other variables can influence the effectiveness of EMS in achieving environmental performance improvements. Our study confirm that the internalisation of EMS is important (**H2** and **H3**) but it cannot be considered the unique variable to produce that effect as the literature has done in the last years. The satisfaction of environmental managers could influence positively the performance as well as the internalisation level, but further organisational issues and dynamics should be furtherly analysed.

These findings open also some questions regarding previous studies on symbolic behaviours, greenwashing actions and environmental certifications. In the past some authors labelled as greenwashing cases of companies with a non-internalised EMS ([Martín-de Castro et al., 2017](#); [Nishitani et al., 2021](#)). As we know, the improvement of environmental performance is the key objective of an EMS. For that reason, a company that improves its environmental performance cannot be considered as “superficial and misleading” ([Testa et al., 2018b](#)) in the adoption of EMS even if it does not have an internalised EMS. This last aspect opens the floor for further discussions about the benefits of non-internalised EMS, a very unexplored area of the research on EMS.

5.1.1. Policy and managerial implication

Policy makers should keep in mind that higher is the satisfaction of an environmental manager in the management of its EMS higher is the probability to achieve good environmental performance. So, the policies should not look only to spread the adoption of the EMS but also to guarantee that the certified companies maintain their commitment toward the environmental certification and the managers feel as important their role within the EMS. The satisfaction of the environmental

manager is low when the expected benefits from the adoption of EMS are not fully experienced. [Daddi et al. \(2017a\)](#) observed that EMAS companies decide to not renew the registration due to the lack of recognition of EMAS from stakeholders and market. Policies aimed to increase the recognition of EMAS could not only reduce the EMAS withdraws but also increase the environmental managers satisfaction and consequently, according to our findings, the environmental performance achieved with the EMS.

The internalisation of EMS is confirmed as a variable that allows to achieve better performance. So, the European Commission and the Accreditation and Licensing bodies of EMAS system could consider this aspect in the policies referred to EMAS system. For instance, the Accreditation bodies could deliver technical standards and guidelines for EMAS verifiers in order to suggest them how to assess the internalisation during the EMAS audits or to invite them to include an evaluation of the internalisation of the EMS in the audit report. EMAS companies with an assessment of EMS internalisation during the audits could be stimulate and facilitate to increase the level of internalisation and consequently the performance that they will achieve.

Similarly, to the policy makers, top managers should keep high the recognition of the environmental certification among their staff. A high internal recognition and strong commitment of the top management could increase the satisfaction of the environmental manager that coordinates the EMS and, according to our findings, the environmental performance. Different approaches could be adopted by the top management to keep high the company's commitment toward the EMS. Possible actions are: provide the necessary human and financial resources to the functioning of the EMS, facilitate the interaction of the environmental manager with the managers of the other functions (e.g. purchasing department, marketing, operations), adopt periodically initiatives to involve the employees, to report periodically to the shareholders and stakeholders the results achieved with the EMS, etc. In the last revision of the standard ISO14001 (that is the reference standard also for the EMS of EMAS) in the years 2015 has been included a specific paragraph related to the “leadership”. That section invites the top managers to be engaged and informed about the effectiveness of EMS. The requirements included in that paragraph applied properly, can surely increase the internalisation of the EMS as well as the satisfaction of the environmental managers.

5.1.2. Limitations and future research

The geographical coverage of our survey can be considered a limitation. The sample has achieved a good representativeness of the population of EMAS registered companies, however, the respondents are mainly located in Spain, Italy and Germany, the three main countries in terms of EMAS numbers. A second limitation could be associated with the measurement of the performance. In the study we focus to environmental reputation and competitiveness as performance leveraged by EMS internalisation and managers' satisfaction. Unfortunately, we did not have data to assess the environmental improvement of key performance indicators (KPI) i.e., the environmental performance associated with the different environmental aspects originated by the EMAS companies. Future research could explore with a similar approach of our study the effects on improvement of KPI. In addition, one of the key variables of the study i.e., managers satisfaction could probably better be measured with an in-depth interview instead of a survey. For this reason, we invite scholars to adopt qualitative methods to study the relations among our Hypotheses in future research. Also the measurement of the variable internalisation could be improved. As highlighted in [Table 1](#) we did not include the active involvement of employees as a feature to consider an EMS as internalised. This topic is particularly important in EMAS companies, so we recommend future scholars to include in the survey questionnaire items to better measure that aspect. In terms of quantitative methods, the adoption of PLS-SEM or covariant-based SEM assessment may provide useful insights as well. Finally, as written at the beginning of this paragraph, we invite scholars to

furtherly investigate the real value of internalisation and its “too easy” association between non-internalised EMS and symbolic behaviour. Can EMS produce benefits also in absence of a fully internalisation? For instance, the fact that certified companies receive yearly environmental audits by environmental verifiers and environmental consultants can be a strength of the EMS even if it is not internalised. Future research should study furtherly this aspect contributing to go forward in the discussion between EMS and internalisation.

CRedit authorship contribution statement

Tiberio Daddi: acquisition of data, analysis and/or interpretation of data, drafting the manuscript, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published. **Niccolò Maria Todaro:** acquisition of data, analysis and/or interpretation of data, revising the manuscript, approval of the version of the manuscript to be published. **Luca Marrucci:** Conception and design of study, acquisition of data, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published. **Fabio Iraldo:** Conception and design of study, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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