



## The impact of female board membership and firm performance on the environmental management system

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### ABSTRACT

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This paper examines the effect of gender diversity on the Environmental Management Systems (EMS) measured as ISO 14001 adoption among Saudi-listed companies. In this study, we propose that female board members significantly influence EMS adoption by employing agency theory, stakeholder theory and resource dependency theory to predict the relationship. The final sample of this study consists of 44 firm-year observations for non-financial companies listed on the Saudi Stock Exchange with ISO 14001 certification from 2016 to 2019. The logistic regression results show that higher representation of women on boards is associated with more extensive use of EMS indicating the importance of gender diversity in enhancing corporate environmental responsibility. Moreover, companies with better financial performance are less likely to adopt comprehensive ecological management practices. This paper contributes to the existing body of knowledge by revealing how board diversity is related to financial performance and environment management systems among firms operating in emerging markets. These findings have policy implications for policymakers, business leaders and researchers engaged in sustainable development initiatives to enhance governance mechanisms.

**Contribution/Originality:** This study examines the impact of female membership on the environment management systems (particularly ISO 14001 certification) in Saudi companies. A female on board is a new corporate governance practice among Saudi companies. Thus, a study linking women's representation on boards and EMS does not exist.

## 1. INTRODUCTION

There has been a growing concern for issues regarding sustainability and CSR leading to increased emphasis on Environmental Management Systems (EMS) within corporate governance frameworks in today's contemporary business world. One way organizations have attempted to achieve their goals is by adopting or implementing Environmental Management Systems (EMS) such as International Standard Organization (ISO) 14001 which plays a critical role in managing and minimizing negative effects on the environment while encouraging sustainable business practices. As firms seek ways of integrating environmental considerations within their operations much research has focused on what influences EMS implementation. An important element that has emerged recently is gender diversity within boardrooms. One can be seen as having a clear definition of women in terms of gender diversity. According to agency theory, the presence of diverse board members can enhance corporate governance by

offering a range of perspectives to mitigate agency conflicts and improve decision-making processes (Jensen & Meckling, 1976). Moreover, stakeholder theory argues that firms should take into account all those that have an interest in it such as environmental concerns (Freeman, 1984). One may expect women on the boards to have positive impacts on environmental strategies and performance because gender-diverse boards are likely to have more robust EMS systems.

Research has consistently demonstrated that having a gender-diverse board of directors has a positive impact on environmental management and EMS implementation. For instance, studies by Li, Wang, and Zhao (2023) and Martínez, Fernández, and Ruiz (2022) suggest that corporations with more women on their boards are likely to take up proactive environment strategies that will enable them to attain certifications such as ISO 14001. This is in line with resource dependency theory which emphasizes that diverse boards offer crucial resources and capabilities to enhance corporate responsibility towards the environment (Pfeffer & Salancik, 1978). However, literature concerning Saudi Arabia is significantly deficient in this regard. Despite progress made in improving corporate governance including the promotion of gender diversity under the Vision 2030 initiative (Albassam, 2014) representation of women on boards remains lower than global benchmarks (Al-Asfour & Khan, 2014). Thus, this provides an opportunity to assess how women's representation affects EMS within this specific regional context and also gives important insights into how gender diversity shapes environmental management among emerging economies.

An organization's performance is incomplete without an Environmental Management System (EMS). Research indicates that organizations that make significant profits are more inclined to implement EMS as these systems give them both strategic and financial flexibility (González-Benito & González-Benito, 2005). Successful organisations expect help in operational efficiency and competitiveness in the market because they view EMS as an investment rather than a cost (Darnall, Henriques, & Sadorsky, 2010; Iraldo, Testa, & Frey, 2009). In addition, organizations that prioritize financial stability should adopt advanced environmental practices. This study seeks to address this gap by examining the impact of firm performance on the relationship between female directors' representation on boards and the adoption of EMS by Saudi firms. Accordingly, it comprises non-financial listed companies traded at the Saudi Stock Exchange that were awarded ISO 14001 certifications for the period between 2016 and 2019.

This research is primarily aimed at investigating how board gender composition as well as corporate performance impact environmental management practices. It also provides useful insights to policymakers, business managers and researchers who are interested in sustainable and ethical corporate governance regimes. In addition, this study extends the discussion on gender diversity's role in promoting environmental responsibility particularly in the context of fast-growing economies.

This paper is organized as follows: Section 2 provides a review of the relevant literature and develops the hypotheses. Section 3 highlights the research methods. The empirical results and discussion are presented in the fourth section. The final section concludes this paper.

## **2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT**

The growing focus on sustainability and corporate social responsibility (CSR) has highlighted the importance of environmental management systems (EMS) in corporate governance structures. Various factors related to EMS have been examined while there has been increasing interest in gender diversity on boards. Therefore, this review examines the relationship between women's representation on boards of directors and the implementation of EMS with a specific focus on Saudi Arabian companies. The hypothesis posits that women's inclusion on boards leads to positive impacts on environmental strategies as well as performance and evaluation of EMS will be based upon the adoption of ISO 14001 certification.

Agency theory suggests that a varied board of directors can uphold corporate governance by providing multiple perspectives, reducing principal-agent conflicts and enhancing decision-making processes (Jensen & Meckling, 1976). Similarly, stakeholder theory underscores the need to consider the interests of all stakeholders including the environment (Freeman, 1984). Research indicates that higher levels of female representation on boards may be associated with increased accountability for environmental performance since women are more sensitive to ethical and social issues. According to resource dependency theory, boards offer critical resources such as knowledge, expertise and networks (Pfeffer & Salancik, 1978). Improving environmental governance and sustainability practices is a result of boards having access to more resources when women and other different perspectives are involved.

There is a wide range of empirical evidence that suggests that the diversity of women on the boards of companies can bring about greater efficiency in the companies as a result of the deployment of other perspectives and approaches in the quest for solutions. There are effective monitoring methods that are made by attention boards that are examples of gender diversity and promote attendance thereby enhancing governance and are likely to crosscut environmental issues leading to better environmental management systems. EMS certification, an international standard recognized worldwide provides a structure through which corporations can perform their environmental obligations. Specifically, Bansal and Hunter (2003) noted that such businesses brandishing ISO 14001 are committed to enhancing the state of the environment. As a concept, such active environmental management implies that such businesses also care about their certificates as they undergo a thorough assessment. Various aspects affect the decision to adopt an EMS including active government pressure, customer needs and organizational factors (Darnall, Henriques, & Sadorsky, 2008) and increasingly gender diversity on boards is viewed as one of those aspects.

The studies that explored the relationship between EMS and gender diversity tend to take a quantitative stance especially in regression modelling of the impact of female board member representation on environmental performance. The works of Liao, Luo, and Tang (2015) and Post, Rahman, and Rubow (2011) used large datasets to demonstrate the statistical relationships between board gender diversity and environmental performance. Existing studies suggest that the representation of women in executive boards is positively linked to companies' environmental performance. This is in line with Liao et al. (2015) who found that firms with female directors tend to pursue proactive environmental strategies. In this regard, Post et al. (2011) found that diverse boards are associated with increased environmental disclosures. Gender diversity on boards brings along many improvements in the EMSs. First, "women elicit and respond to ethical principles differently and are more willing to assume influence dangers." Byrnes, Miller, & Schafer (1999) imply that women may possess special ethical manners as well as risk-avoiding behaviors which would make them more likely to consider aspects of environmental sustainability that are not addressed by male leaders. Second, women directors may advocate for the implementation of policies that are stakeholder-oriented and include pollution control measures (Williams, 2003). Gender inclusivity on the boards should improve corporate image and thus engender faith from consumers in company products thereby advancing green strategies (Bear, Rahman, & Post, 2010).

Li et al. (2023) argue that the greater the percentage of females on board, the lower the emission and the better the energy use efficiency. This study demonstrates the positive impact of the inclusion of diverse governing structures on the achievement of healthy business practices. Furthermore, some studies have also shown that Martínez et al. (2022) suggest that such companies which have at least some women on the board of directors are more likely to develop a high-standard environmental management system (ISO 14001). Hence, this paper underscores the contribution of women's leadership in the development of sustainability practices. Perception of company performance improves with greater gender representation on boards of directors establishing corporate environmental policies and related practices (Smith & Johnson, 2021). Thus, such a study explains and elaborates on the reasons and processes that lead to enhance gender diversity implementation in the company's pro-

environmental policies and practices. According to Garcia and Husted (2021) firms with numerous female directors are more likely to invest in green technologies as well as gain ISO 14001 certification which implies compliance with international standards. This study provides evidence for increased corporate responsibility through gendered boardrooms. Zhou and Li (2020) discovered that organizations with diversified boards have high likelihoods of adopting EMS and attaining ISO 14001. Therefore, the present work emphasizes the importance of having females participate in environmental governance improvement processes for emerging market countries.

Saudi Arabia has made significant strides towards corporate governance reforms recently particularly through Vision 2030, its initiative aimed at economic diversification and enhancing company transparency. There have been regulatory changes by the Saudi Capital Market Authority (CMA) to enhance board diversity including gender equality (Albassam, 2014). Consequently, the rate of women's representation on boards within Saudi Arabia remains low when compared to the global level even though these regulations were implemented. Therefore, cultural and socioeconomic factors pose constraints on increasing female board representation (Al-Asfour & Khan, 2014). However, the region's growing interest in sustainable development and corporate social responsibility (CSR) presents an opportunity where gender diversity can be applied towards better EM.

The following hypothesis is stated based on the above discussion:

*H<sub>1</sub>: There is a positive relationship between women's representation on the board and the adoption of environmental management systems.*

The importance of evaluating the relationship between a company's performance and the adoption and effectiveness of Environmental Management Systems (EMS) such as ISO 14001 cannot be overstated. Research suggests that financially robust firms are more likely to invest in EMS because they have the necessary resources and these systems offer strategic advantages. González-Benito and González-Benito (2005) contend that businesses with strong financial performance can raise enough funds to create a comprehensive EMS for improving their environmental image and meeting regulatory obligations. They believe that it is profitability that allows companies to fund sustainability projects, thereby making EMS an important instrument for long-term success.

Iraldo et al. (2009) observe that environmental compliance and public perception matter in industries where financially secure organizations tend to adopt EMS. In such instances, businesses viewed this as investing over spending because of the long-term impact on operational effectiveness and competitiveness in the market. Similarly, Darnall et al. (2010) suggest that firms having a higher return on assets (ROA) as well as solid financial health are more prone to introduce advanced environmental practices. The authors show that these firms use motivation such as cost savings potential, risk management tools and better customer relations in addition to other benefits of implementing the EMS.

Delmas and Toffel (2008) supported the relationship between economic performance and decision-making towards adopting the system by manufacturing organizations. They showed that organizations with higher returns could handle the one-time installation expenses associated with implementing an effective EMS program. These organizations also acknowledge that compliance with regulations or separating themselves from the competition can provide lasting benefits too through improved efficiencies. Christmann (2000) similarly claimed that firms with substantial monetary resources were more likely to adopt EMS to achieve competitive advantage in terms of excellent environmental performance. This investigation presents evidence of how these corporations employ their financial clout to incorporate environmental constitutions into corporate strategy as a way of boosting their overall company performance.

The following hypothesis is stated based on the above discussion:

*H<sub>2</sub>: There is a positive relationship between firm performance and the adoption of environmental management systems.*

### 3. RESEARCH METHODS

#### 3.1. Sample Description, Sample Statistics and Data Collection

The sample data set for the EMS model consists of non-financial entities listed on the Saudi Stock Exchange that received ISO 14001 certification from 2016 through 2019. Out of the 15 selected firms, 34.1% were suitable for the study.

**Table 1.** Sample selection

Sample attributes	Samples
Listed companies with ISO14001	15 observations
Listed companies without ISO14001	29 observations
Number of observations selected for testing	44 observations

Table 1 shows that 29 observations out of 44 were eligible companies without ISO 14001. The analysis included thirty companies without ISO 14001. As a result, this will lead to reduced significant differences between having and not having an ISO 14001 certification.

The two main variables in the model are women on the board and firm performance. In Table 2, these are given along with descriptive statistics for continuous-scale measures of these variables. Table 2 contains summary statistics for all companies ranging from those without to those with ISO 14001 certification which appear as separate columns in the table. All continuous variables were presented with their mean, minimum, maximum and standard deviation values.

#### 3.2. Model Specification and Analysis

The framework of this study is based on the predictions of agency, stakeholder and resource dependency theories as follows:

$$EMS = \beta_0 + \beta_1 WOBD + \beta_2 ROA + e \quad (1)$$

Where

Dependent variable

EMS: Environmental management system = ISO 14001 certification ownership assessed using dummy variables (Hardiyansah, Agustini, & Purnamawati, 2021; Nurjanah, 2015).

Independent variables

WOBD: Women on the board = Total number of female members sitting on the board.

ROA: Firm performance = Return on assets.

e = Error term.

This study used the Statistical Package for Social Sciences (SPSS) software to analyze the logistic regression analysis.

### 4. EMPIRICAL RESULTS AND DISCUSSIONS

#### 4.1. Descriptive Statistics

The primary independent variables in the model are women on the board and firm performance presented in Table 2 with their descriptive statistics for variables measured on a continuous scale. Table 2 provides summary statistics for the entire sample as well as separate data for companies with and without ISO 14001 certification organized in distinct columns. This report provided the mean, minimum, maximum and standard deviation values of all continuous variables.

**Table 2.** Descriptive statistics (Continuous variables)

Variables	Full sample (n= 44)				Companies with ISO 14001 (n= 15)		Companies without ISO 14001 (n= 29)	
	Mean	Min.	Max.	Std. dev	Mean	Std. dev.	Mean	Std. dev.
WOB	0.06	0.00	0.25	0.08	0.07	0.08	0.06	0.09
ROA	0.3	-0.48	0.25	0.10	-0.02	0.14	0.05	0.06

Table 3 provides descriptive statistics for variables measured as dichotomous variables.

**Table 3.** Descriptive statistics (Binary variables)

Companies	Number (%)
Listed companies with ISO14001	15 (34%)
Listed companies without ISO14001	29 (66%)
Total	44 (100%)

However, Pallant (2020) has rated sample size as one of the logistic regression assumptions that must be met for the test to be successfully conducted. Models require at least ten observations per independent variable and this number increases as the number of predictor variables rises. The total number of observations used in this study is 44 with an average of 22 per independent variable.

About one-third (34%) of listed companies have been awarded ISO14001 certification indicating a strong commitment to effective environmental management practices based on the information given in Table 3 of the specimen. In contrast, another section accounting for 66% or two-thirds has not received such awards implying other forms of environmental management and sustainability strategies may be used respectively by these firms. Therefore, from this distribution, it can be concluded that some companies others implement and adhere to international environmental standards while others do not have such certifications which as ISO14001.

The simplest way to detect multicollinearity is by using a correlation matrix to check if there are any high correlations among all independent variables which generally show collinearity at 0.90 and above (Hair, Black, Babin, & Anderson, 2010; Pallant, 2020). However, on this occasion, none of the variables had a correlation above 0.90 showing the absence of multi-collinearity among these variables as reflected by the correlation matrix presented in Table 4 where all coefficients were below or equal to 0.354.

**Table 4.** Correlation matrix of independent variables

Variables	WOB	ROA
WOB	1	
ROA	0.354	1

#### 4.2. Multivariate Results

A multivariate logistic regression was employed to assess the effect of the hypothesized variable on the environmental management system. Table 5 presents the estimated coefficients of the model corresponding statistical significance test results and holdout accuracy rates. The p-value for the chi-square test with two degrees of freedom was statistically significant at the 5% level ( $p = .038$ ) indicating a good fit. The logit model correctly classified 65.9% (29) out of 44 cases in this dataset. Table 5 reflects the Hosmer–Lemeshow Goodness-of-Fit Test. Both models' fit is acceptable as indicated by a Hosmer-Lemeshow test statistic exceeding .05 which is 0.496 respectively for each model.

Two statistical measures were used to assess model fit: Cox and Snell's  $R^2$  and Nagelkerke's  $R^2$ . Higher values of the Cox and Snell  $R^2$  indicate better fitting models but this measure is limited as it does not have a maximum value of 1. On the other hand, Nagelkerke's  $R^2$  ranges from 0 to 1 with 1 indicating that a model is perfect. In this



research study, the Cox and Snell  $R^2$  values were 0.237 and 0.328 while the Nagelkerke  $R^2$  was 0.328 implying that the EMS model differentiates firms having EMS from those without it effectively. The p-value for this chi-squared test statistic was less than or equal to .010 (chi-square=11.923) supporting an acceptable fit at  $p < .01$  level.

The relationship between women on board (WOB) and environmental management systems (EMS) has been consistently shown to be significant (Wald value =3.426; p-value = 0.064). The positive coefficient associated with WOB supports H1 which argues that increased representation of women in boards leads to the adoption of effective environmental management systems. This finding is consistent with our theory of change and consistent with studies by other scholars that suggest more ecological practices when women are included in company boards. Women bring unique perspectives and experiences that can lead to improved environmental governance and can influence the strategic adoption of EMS through their distinct resources and insights.

These results can also be analyzed under stakeholder theory as well as resource dependence theory frameworks previously discussed above for theoretical grounding purposes. For instance, the stakeholder theory posited by Freeman (1984) states that companies should take responsibility for all their stakeholders' concerns including those connected to environmental conservation problematics. Similarly, these results emphasize the perception that women participating on boards are more concerned with social-ethical issues such as the environment. Female directors can accomplish this by advocating for sustainable practices that have positive impacts on a wide range of stakeholders. The resource-dependency theory articulated by Pfeffer and Salancik (1978) posits that boards consisting of members with diverse backgrounds are a valuable asset in the form of knowledge, skills and networks to the organization. In addition, women would provide new perspectives and life experiences that could promote the implementation of the Environmental Management System (EMS) and enhance environmental management from a strategic perspective.

Several studies have revealed that the participation of women on boards of directors (WOB) is a positive factor in the evolution of environmental management systems (EMS). In particular, Li et al. (2023) determined that a higher share of female directors on boards in the Asia Pacific region is associated with better environmental outcomes, including emissions reduction and higher energy efficiency. Similarly, Martínez et al. (2022) found that female directors' presence on company boards increases the chances that firms will implement wider environmental policies and seek ISO 14001 certification. Smith and Johnson (2021) found that gender diversity in corporate boards relates positively to environmental information disclosure practices by firms in Europe. Moreover, Garcia and Husted (2021) claimed that US corporations that have women as directors tend to invest in green technologies. Zhang and Liu (2010) contributed a different discovery from their study of emerging markets. Women's board presence has a relationship with the introduction of environmental management systems like the ISO 14001 series. All these research taken together supports the fact that mixed-gender boards play a role in environmental management.

**Table 5.** Logit analysis results

<b>Variables</b>	<b>Expected sign.</b>	<b>B.</b>	<b>Wald</b>	<b>Sig.</b>
WOB	+	9.326	3.426	<b>0.064</b>
ROA	+	-28.215	5.360	<b>0.021</b>
Log likelihood		44.541		
Hosmer-Lemeshow		0.496		
Chi <sup>2</sup> (2)		0.003		
Prob > Chi <sup>2</sup>		11.923		
Nagelkerke $R^2$		0.328		
Coxsnell $R^2$		0.237		
Correctly classified (%)		65.9		
No. of observations		44		
Bold = Significance at 1%, 5% and 10%.				

In terms of return on assets (ROA), the direction of the coefficient is inverse (i.e., negative) (Wald-value = 5.360; p-value = 0.021) which indicates that greater profitability corresponds to lower adoption rates for comprehensive environmental management. This result is in line with agency theory (Jensen & Meckling, 1976) that managers are short-term focused and prioritize financial performance at the expense of long-term sustainability initiatives required by shareholders. So, H2 was not supported. High profitability enables complacency diminishing the need to invest in EMS since firms may focus more on immediate financial gains instead of strategic environmental planning over time. This finding is consistent with empirical research that has found similar results suggesting highly profitable firms feel less pressure to adopt proactive environmental practices. Several studies suggest counterintuitively that profitability is negatively related to EMS implementation. Darnall et al. (2008) discovered that companies under low financial constraints might have fewer incentives to set up comprehensive environmental management systems as their main focus remains on sustaining or increasing profits. Zhang and Liu (2010) noted that Chinese firms having higher profit margins were less likely to employ advanced environmental management techniques thereby indicating a trade-off between financial performance and environmental investment capitalization activities. These studies indicate that the negative relationship between ROA and EMS adoption may be explained by such factors as resource allocation, inertia, and short-termism. Different aspects can influence the relationship between return on assets (ROA) and the implementation of an environmental management system (EMS). Firms making profits may consider investing in areas affecting their bottom lines directly like marketing, developing new products or expanding rather than developing EMSs whose benefits are not felt immediately financially. Furthermore, highly profitable organizations can sometimes develop a sense of complacency where they consider their existing operations sufficient hence making them not see the need for tight environmental standards adoption practices. Moreover, companies with high ROA are likely to prioritize short-term financial stability over long-term sustainability strategies. Implementation of an EMS is usually accompanied by huge upfront costs and longer payback periods which are not in line with the short-term financial objectives of such highly profitable firms.

## 5. CONCLUDING MARKS

### 5.1. Conclusion

This research aims to examine the impact of the proportion of women sitting on the boards of directors on the implementation of ISO 14001 certification of environmental management systems among Saudi-listed companies on the Saudi Stock Exchange (Tadawul). In addition, this study investigates the relationship of firm performance as defined by return on assets (ROA) with the level of EMS implemented by the sample companies. The final sample of the study comprises 44 firm-year observations from the Saudi Stock Exchange between the years 2016-2019. Findings revealed that representations of women as members of the board had favorable impacts on the level of adoption of suitable environment management systems (EMS). This result is in line with stakeholder theory and resource dependency theory in that it is seen that diverse boards will offer valuable insights and resources that improve environmental governance. Conversely, the analysis showed that more profitable firms in terms of return on assets (ROA) were less willing to implement EMS. This reflects the agency theory which suggests that in highly profitable firm's managers concentrate on the short falls of the one-term financial gain and longer time sustainability initiatives are neglected.

### 5.2. Implications

This study offers significant implications for both corporate governance and environmental policymaking. Initially, WOB's positive effect on EMS indicated that improving female representation in the boardrooms might improve a firm's environmental performance. This gives credence to the argument that gender diversity should be promoted to enhance sustainability at the corporate level. Policymakers need to consider gender diversity quotas as



mandatory or voluntary measures to address environmental concerns more effectively. Secondly, when ROA decreases, it indicates an inverse relationship between profitability and investment into environmental protection areas like EMSs. Thus, they must strike a balance between profits earned over a year and achieving sustainable development goals within their operations if they are not to sacrifice short-term profits. To be integrated into financial accounting is a very crucial concept since it relates to the use of both financial and non-financial data for reporting on an organization's performance.

### 5.3. Limitations and Future Research

This study had limitations despite having important insights. For instance, the sample of 44 observations is relatively small and is specific to the Saudi Stock Exchange which may limit generalizability of these findings to other contexts or broader markets. Finally, using data from ISO 14001 certification as a solitary gauge of EMS adoption might be limiting because it does not account for all dimensions of a company's environmental management practices. Future studies should increase the sample size and include firms from other regions or industries to improve external validity to overcome these limitations. Longitudinal studies covering more recent time periods are significant for understanding how board gender diversity has changed in terms of its effect on EMS adoption over time. Moreover, future studies may consider the more global aspects of environmental management beyond the scope of ISO 14001 certification such as carbon footprint reduction initiatives or investigations into the environmental performance impacts on sustainable development in various sectors and industries. Moreover, research that delves into the relationship of board demographics, economics and the environment will further the impact of corporate governance on environmental performance across different regulatory and cultural regimes.

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**Authors' Contributions:** The identification of the problem was determined, the data collection and analysis, J.S. the literature review and designing the study, J.S. and K.A. Both authors have read and agreed to the published version of the manuscript.

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