



## The effect of Board Independence on Environmental disclosure; the moderating role of Gender Diversity in Amman stock exchange

أثر استقلال مجلس الإدارة على الإفصاح البيئي؛ الدور المؤثر للتنوع بين الجنسين في بورصة عمان

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### Abstract

Depending on the agency theory view and response to the modern invitations to speculate gender diversity role. How it can enhance the relationship between board independence and environmental disclosure due to prior studies focus on direct relationship between them. This study seeks to ascertain how gender diversity moderates the association between board independence and environmental disclosure among non-financial firms listed on the emerging Amman stock exchange market (ASE) between 2014 and 2019. The direct and indirect relationships were examined using multiple regressions on panel data analysis; the empirical findings indicate that board independence and environmental disclosure have a positive and substantial direct link. Additionally, the findings demonstrated that gender diversity is a significant moderator in this relationship. However, this study provides managers, owners and policymakers with a set of main recommendations related to the major need for a more board independence and gender diversity in order to enhance environmental disclosure in emerging markets. Our results are useful to policymakers interested for an important framework on environmental disclosure.

**Keywords:** Board independence, gender diversity, environmental disclosure, and Amman stock market.

### المستخلص :

بناءً على نظرية الوكالة والاستجابة للدعوات الحديثة للتأمل في دور تنوع الجنسين، وكيف يمكن أن يعزز العلاقة بين استقلالية مجلس الإدارة والإفصاح البيئي نظرًا لأن الدراسات السابقة ركزت على العلاقة المباشرة بينهما. تسعى هذه الدراسة إلى تحديد كيف يعدل تنوع الجنسين العلاقة بين استقلالية مجلس الإدارة والإفصاح البيئي بين الشركات غير المالية المدرجة في سوق عمان المالي (ASE) خلال الفترة من 2014 إلى 2019. تم فحص العلاقات المباشرة وغير المباشرة باستخدام الانحدار المتعدد على تحليل البيانات اللوحية؛ تشير النتائج التجريبية إلى أن استقلالية مجلس الإدارة

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والإفصاح البيئي لهما ارتباط إيجابي وملحوظ مباشر. بالإضافة إلى ذلك، أظهرت النتائج أن تنوع الجنسين هو عامل تعديلي مهم في هذه العلاقة. ومع ذلك، توفر هذه الدراسة للمسؤولين والمديرين وصانعي السياسات مجموعة من التوصيات الرئيسية المتعلقة بالحاجة الكبيرة إلى تعزيز استقلالية مجلس الإدارة وتنوع الجنسين من أجل تحسين الإفصاح البيئي في الأسواق الناشئة. نتائجا مفيدة لصانعي السياسات المهتمين بإطار عمل مهم حول الإفصاح البيئي.

**الكلمات المفتاحية:** استقلالية مجلس الإدارة، تنوع الجنسين، الإفصاح البيئي، وسوق عمان المالي.

## 1. Introduction

Business house boards are now focusing on a number of social, moral, and environmental issues in addition to their own economic development (Agarwala, Pareek, & Sahu, 2023). Over the years, there has been a growing need for environmental impact assessments and disclosures from businesses (Ofoegbu, Odoemelam, & Okafor, 2018). According to Al-Jaifi, Al-Qadasi, and Al-Rassas (2023), it is currently widely accepted that businesses must prioritize their environmental performance. At present, the Jordan government has linked considerable significance to the environmental challenges caused by economic business. The government of Jordan, a tiny nation with little natural resources, has given social and environmental disclosures a lot of attention (Ibrahim & Hanefah, 2016). The Jordanian government has improved corporate social responsibility in a big way in order to guarantee the quality and dependability of the annual report as a way to draw in international investment. Among these actions include the establishment of laws and rules requiring Jordanian companies to incorporate social and environmental data in their yearly reports (Ismail & Ibrahim, 2008). Any disagreement that could emerge between the management and the shareholders is typically resolved by the board of directors, especially the board independence (BI) (Agarwala et al., 2023). BI play a vital role of good corporate governance (Khairiddine, Salhi, Aljabr, & Jarbou, 2020). The importance of BI leads to decrease conflict of interest between different parts such as company's management, its stakeholders and the society. Moreover, the existences of more BI members on the board are anticipated to attention toward environmental disclosure.

According to Habbash (2016), BI are crucial in overseeing and guiding management to ensure that stakeholders' interests are met. The board of directors now represents all stakeholders rather than just the interests of the shareholders (Harjoto, Laksmana, & Lee, 2015). Demonstrated that BI support the needs of stakeholders by being fully aware of the need to provide information about a company's governance, social, and environmental performance in order to prevent conflicts with stakeholders (Al Amosh & Khatib, 2022). Additional proof, according to French Khairiddine et al. (2020), shows BI significantly and favorably affects disclosure of ethics, the environment, and governance. According to the Jordan Securities Commission (2009), In Jordan, a company's disclosure and transparency policies are set by the BI, who also have the authority to supervise the publication of information in annual reports. This consist with another study, the BI has a significant impact on raising the caliber of environmental disclosure (Al Amosh & Khatib, 2022).

Conflicting results from prior studies on BI and environmental disclosure exist such as, Aliyu (2019) and Masud, Nurunnabi, and Bae (2018) found positive relationship, while, Janggu, Darus, Zain, and Sawani

(2014) had no discernible impact on environmental disclosures. Furthermore, Mahmood, Kouser, Ali, Ahmad, and Salman (2018) found no link between BI and the environmental disclosure in another investigation. Furthermore, BI and environmental disclosure have a negative but significant link (Michelon & Parbonetti, 2012). A separate study found that there was minimal impact of Rashid (2021) BI on corporate social responsibility programs overall. Based on this results, the study seek to add the literature new evidence from Jordan situation.

However there is another factor may affect environmental disclosure. Furthermore, gender diversity (GEN) significantly improves environmental disclosure, According to Kanadli, Alawadi, Kakabadse, and Zhang (2022) BI with GEN have more attention toward address environmental disclosure issues. Moreover, it is explained that the effect of BI with sharing GEN more attention to environmental disclosure is depend on contextual (board openness) and structural (chairperson leadership) elements which make smooth to environmental sustainability exchanges inside boardrooms(Kanadli et al., 2022).According to (Fayaz, Abbas, & Zahid, 2021).It is proposed that businesses with more (GEN) boards were more environmentally conscious (Fayaz et al., 2021).In addition to that the inclusion of GEN on corporate boards will enhance strategic relations between businesses and improve financial performance(Shanak, 2024).

Over the past 10 years, GEN has drawn the interest of governments, businesses, the media, and academics in several nations (Yarram & Adapa, 2021).The board's vital role of overseeing management is also impacted by the variety of its resources (Bear, Rahman, & Post, 2010).Within the accounting literature, GEN is a corporate governance mechanism that is frequently studied, particularly in relation to social and environmental challenges that corporations face(Nguyen, Ntim, & Malagila, 2020). Globally, corporate board diversity has grown in importance recently(Harjoto et al., 2015).

There is little evidence in the literature about GEN's regulating function between BI and environmental disclosure. Prior research has mostly concentrated on how GEN affects environmental disclosure (Fayaz et al., 2021). Additionally, GEN's impact on corporate social responsibility has been the subject of several research, which have shown notable positive results(Ibrahim & Hanefah, 2016). According to Almarayeh (2023) research, GEN has no bearing on the financial performance of a company. Furthermore, having female directors on the Jordanian corporate board tends to enhance board comprehension of corporate social responsibility reporting rules, according to study by(Al Fadli, Sands, Jones, Beattie, & Pensiero, 2019). Furthermore, it is made clear by Alshirah et al. (2022) that while having more women on the executive boards of Jordanian companies improved, the effect on business performance was not statistically significant. Al-Jaifi et al. (2023) Found a high association between GEN and environmental performance in eleven Asia-Pacific countries.

This study contributes to the current literature by examining the indirect relationship between BI and environmental disclosure. Broadly speaking, in sum, as discussed above, prior studies focus on the direct relationship between BI and environmental disclosure, GEN and environment disclosure. For this reason, having more GEN members reflects more in the relationship between BI and environmental disclosure. We based on agency theory as an approach of the theoretical framework on the close association

between GEN as moderator in the relationship between BI and environmental disclosure. We contend that GEN may have an impact on the connection between BI and environmental disclosure, based on the explanation above. To the best of our knowledge, no research has looked at this interacting impact; hence, our study aims to close this gap in the body of information about BI and environmental disclosure. As such, this study is the first to look at how GEN affects the connection between BI and environmental disclosure. In order to investigate the link between GEN and environmental disclosure as well as the impact of BI, the study is grounded in agency theory. The government and authorities may dependant on the findings useful in improving the current regulations.

The remainder of the paper is arranged as follows. In Section 2, theories are developed and pertinent literature is reviewed. The sample, data, and study methodology are covered in Section 3. The empirical findings and analysis are presented in Section 4, and the paper's summary and conclusion are provided in Section 5.

## **2. Literature Review and hypotheses development**

The agency theory is the foundation of this study since it has been the most often applied theory by earlier studies (Alipour, Ghanbari, Jamshidinaid, & Taherabadi, 2019). The assumption that management have an opportunistic behavior and may have aims that vary from those of shareholders. According to Agency theory Fama and Jensen (1983), the main assumptions of this theory explain a logical approach for the board's main purpose of monitoring higher management and executive managers on behalf of shareholders. Moreover, Agency theory Fama and Jensen (1983) is one of the most widely utilized theoretical underpinnings for GEN explanations. It is predicated on the idea that more diverse boards tend to be more autonomous.

Different researches around the world Fayaz et al. (2021); Issa and Fang (2019); Muhammad and Migliori (2022) have concentrated on the impact of a major percentage of female directors on profession decisions, showing that female managers' monitoring give significant safety of the shareholder's interests. Therefore, GEN play a key role in lowering agency conflict by supporting higher management to be more interest toward environmental disclosure (Zaid, Wang, Adib, Sahyouni, & Abuhijleh, 2020). According to Carter, D'Souza, Simkins, and Simpson (2007), a board diversity will enhance managerial oversight since GEN results with more BI members. As a result, there is more control, which lowers the expenses related to agency issues. But by revealing more, BI lessens information asymmetry, preventing agency issues (Naseem, Rehman, Ikram, & Malik, 2017). As per the agency theory, proficient corporate governance serves to fortify the organization's internal control and provide a comprehensive monitoring package that mitigates opportunistic behaviors and information asymmetry for a corporation (Alipour et al., 2019). According to research by Siew, Balatbat, and Carmichael (2016), the amount of non-financial (social and environmental) disclosures lowers information asymmetry.

As a result, having more women on the board may also improve reporting procedures, board effectiveness, debate, and decision-making quality (Sartawi, Hindawi, & Bsoul, 2014). According to Maglio, Rey, Agliata, and Lombardi (2020), female directors are more likely than male directors to

increase the corporate board's monitoring efficacy over the caliber of reporting methods, elevate the ethical behavior of directors, and enhance the quality of earnings. The findings corroborate the agency theory's assertion that having more women on the board improves their ability to supervise the organization (Ghaleb, Qaderi, Almashaqbeh, & Qasem, 2021). Consequently, a more diverse board of directors develops better understanding and problem-solving abilities, enabling the board to effectively oversee the corporate environment and encourage excellent corporate social responsibility ratings (Bear et al., 2010).

Furthermore, a different Indian study by Alipour et al. (2019) demonstrated that BI strongly supports the performance-enhancing benefits of high-quality environmental disclosure, and that companies with a higher proportion of BI members engage in environmental disclosure to achieve better results. This is in line with Ofoegbu et al. (2018) findings, which show a strong positive correlation between environmental disclosure and BI in South Africa and Nigeria. According to agency theory, which is supported by Alipour et al. (2019), having a larger board independence can enhance performance by lowering incentives for pursuing personal interests and improving oversight of environmental disclosure quality. We anticipate that BI as one of key internal governance components would support toward environmental disclosure

### **2.1 Board independence and environmental disclosure**

Making sure the company has an adequate number of independent non-executive directors in the boardroom is one way to achieve BI (Githaiga & Kosgei, 2023). On the other hand, conflicting findings from current research on BI and environmental disclosure exist. Evidence from Nigeria provided by Aliyu (2019) suggested a strong positive correlation between environmental reporting and BI. According to Masud et al. (2018), Three South Asian countries—Pakistan, India, and Bangladesh—reporting on environmental disclosure has significantly improved due to BI. In addition to that, this results support that BI has a main role to toward the company's shareholders and the society as whole without any biases or conflict of interest

Conversely, Janggu et al. (2014) found that board independence had no discernible impact on environmental disclosures in the Malaysian context. Moreover, Mahmood et al. (2018) found no link between BI and the environmental disclosure in another investigation. Furthermore, BI and environmental disclosure have a negative but significant link (Michelon & Parbonetti, 2012). It is possible for board independence to prioritize the company's financial performance over environmental disclosure. A separate study found that there was minimal impact of Rashid (2021) BI on pertinent reporting or corporate social responsibility programs overall. These contradictory results might be caused by various corporate governance systems, empirical specifications and methods, statistical models, temporal ranges, omitted variables, and other reasons. Thus, further empirical research is required to completely understand this phenomenon. Thus, the following may be used to create the first hypothesis:

H1. Environmental disclosure and board independence are positively correlated.

## 2.2 The moderating role of Gender diversity

A rising body of research highlights how crucial GEN is when making decisions. Prior research has indicated that having female directors on the board significantly and favorably affected financial performance (Đăng, Houanti, Reddy, & Simioni, 2020; Salloum, Jabbour, & Mercier-Suissa, 2019). However, other research, such that done by Almarayeh (2023), shows that GEN has no effect on a company's financial success. In the meanwhile, it was discovered by Boukattaya and Omri (2021); Ibrahim and Hanefah (2016), that the social performance of the company was positively and significantly correlated with the presence of female directors. Others, however, find both negatively and positively significant insignificance (Muttakin, Khan, & Subramaniam, 2015). In contrast, a separate study by Khan (2010) found no link between the representation of women on boards and corporate social responsibility. Moreover, Issa and Fang (2019) found a positive relationship between GEN and Bahrain's and Kuwait's level of corporate social responsibility. Furthermore, the findings indicate a weakly positive correlation between the corporate social responsibility reporting index and women's representation on boards in Oman, Qatar, Saudi Arabia, and the United Arab Emirates (Issa & Fang, 2019).

According to the research currently in publication, women are often seen as being more morally and socially conscious than men, and gender parity may have an impact on the degree of environmental information disclosed (Al Fadli et al., 2019; Ibrahim & Hanefah, 2016). Evidence from Pakistan shows that GEN significantly improves environmental disclosure, according to (Fayaz et al., 2021). Furthermore, the results clarify that GEN enhances employees' environmentally conscious attitudes and actions while helping the company attain environmental disclosure. Shakil, Tasnia, and Mostafiz (2021) also provide an explanation for the noteworthy positive correlation between GEN and US banks' social and environmental performance. Nonetheless, the proportion of female directors on boards has a significant impact on encouraging businesses to disclose environmental information (Uyar, Kilic, Koseoglu, Kuzey, & Karaman, 2020). Muhammad and Migliori (2022) provided additional data from the Italian setting, indicating that companies with a critical mass of two or more female directors shown a greater concern for the environmental disclosure of their operations. Another study such as Al-Jaifi et al. (2023) claim that BI has a moderating effect on the relationships between GEN and environmental performance. Furthermore, Muhammad and Migliori (2022) discovered that according to the resource dependence theory, GEN provided businesses with unique resources by actively participating in multiple environmental campaigns, taking on significant responsibilities to oversee both formal and informal environmental activities, and being able to bring these pertinent skills to the board to enhance the performance of the company as a whole. However, Jordan went unnoticed even though it is a well-known developing nation with policies that support good corporate governance. However, since most empirical studies on GEN have been carried out outside of Jordan, it might not be possible to extrapolate these results to other developing countries in general, or to Arab countries specifically, given the diversity of sociocultural systems, legal frameworks, economic contexts, and governance mechanisms that influence boardroom GEN across different countries (Issa & Fang, 2019). Consequently, since the findings on the relationship between GEN and environmental disclosure are inconclusive, additional study conducted in a different institutional setting offers crucial data. Such studies are equally lacking when it comes to emerging nations like Jordan. Thus, it is conjectured that:

H2. The GEN strengthening the association between environmental disclosure and board independence.

### 3. Data, models and Research variables

#### 3.1 Data

The Amman Stock Exchange (ASE) database's secondary data is used in this study to evaluate 92 non-financial companies throughout six time periods, from 2014 to 2019. This study was not take data after 2019 because COVID 19 may be affect the results. The data have been collected from the Amman Stock Exchange (ASE) database. Listed financial companies were left out due to the unique features of their accounting systems. As stated earlier, the sample size for this empirical study consists of the 92 non-financial organizations that are listed on ASE. 460 firm-year observations were therefore gathered. The association between gender diversity, Environmental disclosure, and board independence was investigated using multiple regression analysis by state software as it is the most suitable for secondary data

#### 3.2 Models

First we examined the direct relationship between board independence and environmental disclosure which is represented in model 1 as follows:

$$ED = a_0 + a_1 BI + Lev + Ass + Bsize + \epsilon_{it}$$

Then we introduced the gender diversity as a moderator variable between board independence and environmental disclosure represented in model 2 as follows:

$$D = a_0 + a_1 BIXGen + Lev + Ass + Bsize + \epsilon_{it}$$

#### 3.3 Research variables

The dependent, independent, and control variables of the study, as well as how each variable is measured, are described in table (1).

Table (1) variables measurements and definitions

Variable	Abbreviation	Measurement	Citation
<b>1-Independent variable</b>			
Board Independence	BI	Percentage of the board's independent directors	(Jabari & Muhamad, 2021)
<b>Moderator variable</b>			
Gender diversity	GEN	Percentage of Women number to the number of directors Percentage.	(Kanakriyah, 2021)
<b>2. dependent variable</b>			
Environmental disclosure	ED	Content analysis is used to analyze the Corporate SD index added below in Appendix (1)	(Al Amosh & Mansor, 2020)
<b>3. Control variables</b>			

Firm size	Ass	Total assets of the company stated as a logarithm in US dollars (information from Jordanian dinar firms is converted to USD using the official average exchange rate).	(Al-Gamrh, Al-Dhamari, Jalan, & Afshar Jahanshahi, 2020)
Firm leverage	LE	Total liability to total assets as a percentage.	(Al-Gamrh et al., 2020)
Board size	BSIZE	Number of directors currently serving.	(Kyere & Ausloos, 2021)

#### 4. Findings and Discussion

##### 4.1 Descriptive Statistics

According to Wang and Chang (2008) , the purpose of descriptive statistics is to provide background information about the sample data and an understanding of the data's behavior. The summary statistics for the moderating, independent, dependent, and control variables are shown in Table (2). In descriptive statistics, data are gathered and presented for each variable, including minimum and maximum values, mean, median, and standard deviation.

Table(2) Descriptive statistics

Variable	Mean	Sd	Median	Min	Max
BI	.3821824	.2397404	.33	0	1
GEN	.0661765	.1034212	.0	0	.36
ED	.2811765	.2642368	.2	0	.8
BS	8.982353	2.974196	9	4	17
Lev	.3675578	.2441155	.315385	.00283	.95901
Ass	7.699588	.6708093	7.657092	5.939683	9.158429

Descriptive statistics in table (2) indicate that the average BI percentage is.38, with a range of values from 0 to 1, and a standard deviation of.24. Furthermore, the typical GEN is.066. .36 as the highest and 0 as the minimum. And a.103 standard deviation. Environmental disclosure has a standard deviation of.26, an average of.28, a high of.8, and a low of 0. For the control variables, board size has an average of 9, a median of 9, a maximum of 17, a minimum of 4, and a standard deviation of 2.9. The average leverage is.36, the moderator is.31, the maximum leverage is.95, the minimum leverage is.002, and the standard deviation is.244. The firm's final numbers are as follows: 7.699 on average, 7.65 on moderator, 9.15 at maximum, 5.9 at minimum, and a standard deviation of.67.

##### 4.2 Bivariate analysis.

A Pearson correlation matrix was used to ascertain if the independent variables were multicollinear, as shown in Table 3. Examples of independent variables that shouldn't be collinear include board independence, gender diversity, environmental disclosure, board size, and leverage. When there is a correlation coefficient of more than 0.8 between two input variables, multicollinearity is more likely to happen (Gujarati, 2011) Table 4 shows that multicollinearity among the input variables is not a problem. The variance inflation factor (VIF) can also be used to investigate the multicollinearity problem.



If the VIF number is less than 10, then there is no multicollinearity, according to (Hair Jr, 2006) The outcomes are shown in Table 3. Multicollinearity does not exist since neither independent variable has a VIF value greater than 10.

Table(3) correlation among variables

Variables	BI	GEN	SUS	BSIZE	LEV	ASS
BI	1.00000					
GEN	-.01268***	1.0000				
ES	0.1304***	0.1643***	1.0000			
BSIZE	-0.2253***	0.0325***	0.6674***	1.0000		
LEV	-0.0502***	0.1400***	0.5205***	0.6257***	1.0000	
ASS	0.1072***	-0.0941***	0.3558***	0.2384***	0.6224***	1.0000

Note: \*\*\*Significant at  $\leq 0.01$  level (two-tailed)

Table(4) Multicollinearity tests

Variables	VIF	1/VIF
BI	1.10	0.908957
GEN	1.11	0.897051
BSIZE	1.88	0.530995
LEV	1.88	0.531933
ASS	2.93	0.340728
MEAN VIF	1.78	

#### 4.3 Empirical results

This paper empirically examines the influence of BI. Using secondary data for the non-financial market of the Amman Stock Exchange (ASE) between 2014 and 2019. A direct connection between the independent variable (BI) and the dependent variable environmental disclosure is shown in Table No. 5. ( $t=3.58$ ,  $p=0.000$ ,  $\text{Coef}=.23142222$ ). This conclusion is in line with other research, including the use of the coefficient of determination  $R^2$ , and supports the notion that there is none. The first model's conclusion shows that the independent variables do, in fact, as seen by the strong  $R^2$  value, together account for around 50.37% of the variation in the dependent variables. Overall, Model 1 performs well, as seen by the F-statistics ( $F=46$  and  $P=0.0000$ ). These results are consistent with previous studies (Agarwala et al., 2023; Harjoto et al., 2015; Mahmood et al., 2018).

#### 4.4 Moderating Effect of Gender Diversity

Additionally, by introducing and analyzing (GEN) as a moderator in the interaction between BI and environmental disclosure, this work adds to the body of research now available in developing nations. According to Table 5's findings, GEN significantly ( $p=0.04$ ) affects environmental disclosure. When we included the GEN as a moderator in model 2, the outcomes revealed that the BI's coeff rose to .34617, along with the  $t=4.16$  and the Adj.  $R^2$  increasing to 55.6. These findings support the notion that the GEN

strengthens the positive association between the BI and environmental disclosure. We might thus conclude that GEN has a major moderating function and more women in executive roles are necessary to achieve responsible governance, long-term sustainable workplace reform, and competitiveness in the global economy.

Table (5) Analysis of multiple regression with the OLS model

Variables	Direct relationship			Indirect relationship		
	Model 1			Model 2		
	coefficients	t-value	P-value	coefficients	t-value	P-value
<b>Independent</b>						
BI	0.23***	3.58***	0.000***	0.35***	4.160***	0.000***
GEN				0.09***	0.440***	0.661***
<b>Moderated effect</b>						
BIxGEN				2.88***	2.88***	0.004***
<b>Control variables</b>						
ASS	0.002	0.05***	0.960***	-0.060***	-1.860***	0.065***
LEV	0.17	2.32***	0.020***	0.072***	3.58***	0.000***
BSIZE	0.06	9.74***	0.000***	0.068***	11.28***	0.000***
Adj. R <sup>2</sup>	50.37			55.60		

Notes: \*\*\*Significant at 0.10, 0.05 and 0.01 levels, respectively (two-tailed)

## 5. Conclusion and Future Direction

This study looks into how BI affects environmental disclosure.. The findings demonstrate that there is a strong and positive correlation between BI and environmental disclosure.. The most important discovery is that GEN positively modifies the connection between environmental disclosure. Put differently, the presence of a female board member increases the likelihood that the BI will provide enhanced environmental disclosure. This finding is in line with agency theory and implies that increasing the proportion of female directors on corporate boards will improve environmental disclosure by reducing information asymmetry and fortifying strategic relationships between businesses. To the best of my knowledge, this is one of the first studies to look at how, from a scientific perspective, female board members may increase the advantages of board independence on environmental disclosure. Like other studies, this study has limitations that suggest areas for future research for example the authors used one variable of corporate governance which is board independence it would be interesting to use other variables like CEU and board experience. Other limitation this study focus on industrial sector we suggest to test other sector in Amman exchange market.

### Appendix (1) Environmental disclosure items

No	Items
1	Materials used by weight or volume.
2	Percentage of materials used that are recycled input materials.
3	Direct energy consumption by primary energy source
4	Indirect energy consumption by primary source.

The effect of Board Independence on Environmental disclosure; the moderating role of Gender Diversity in Amman  
stock exchange

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5	Energy saved due to conservation and efficiency improvements.
6	Initiatives to provide energy-efficient or renewable energy-based products and services, and reductions in energy requirements as a result of these initiatives.
7	Initiatives to reduce indirect energy consumption and reductions achieved.
8	Total direct and indirect greenhouse gas emissions by weight
9	Emissions of ozone-depleting substances by weight.
10	Significant environmental impacts of transporting products and other goods and materials used for the organization's operations, and transporting members of the workforce

## 1 REFERENCES:

- Agarwala, N., Pareek, R., & Sahu, T. N. (2023). Does board independence influence CSR performance? A GMM-based dynamic panel data approach. *Social Responsibility Journal*, 19(6), 1003-1022.
- Al-Gamrh, B., Al-Dhamari, R., Jalan, A., & Afshar Jahanshahi, A. (2020). The impact of board independence and foreign ownership on financial and social performance of firms: evidence from the UAE. *Journal of Applied Accounting Research*, 21(2), 201-229.
- Al-Jaifi, H. A., Al-Qadasi, A. A., & Al-Rassas, A. H. (2023). Board diversity effects on environmental performance and the moderating effect of board independence: evidence from the Asia-Pacific region. *Cogent Business & Management*, 10(2), 2210349.
- Al Amosh, H., & Khatib, S. F. (2022). Ownership structure and environmental, social and governance performance disclosure: the moderating role of the board independence. *Journal of Business and Socio-Economic Development*, 2(1), 49-66.
- Al Amosh, H., & Mansor, N. (2020). The implications of ownership structure on the environmental disclosure in Jordan. *International Journal of Academic Research in Business and Social Sciences*, 10(3), 330-346.
- Al Fadli, A., Sands, J., Jones, G., Beattie, C., & Pensiero, D. (2019). Board gender diversity and CSR reporting: Evidence from Jordan. *Australasian Accounting, Business and Finance Journal*, 13(3), 29-52.
- Alipour, M., Ghanbari, M., Jamshidinaid, B., & Taherabadi, A. (2019). Does board independence moderate the relationship between environmental disclosure quality and performance? Evidence from static and dynamic panel data. *Corporate Governance: The international journal of business in society*, 19(3), 580-610.
- Aliyu, U. S. (2019). Board characteristic and corporate environmental reporting in Nigeria. *Asian Journal of Accounting Research*, 4(1), 2-17.
- Almarayeh, T. (2023). Board gender diversity, board compensation and firm performance. Evidence from Jordan. *Journal of Financial Reporting and Accounting*, 21(3), 673-694.
- Alshirah, M. H., Alfawareh, F. S., Alshira'h, A. F., Al-Eitan, G., Bani-Khalid, T., & Alsqour, M. (2022). Do corporate governance and gender diversity matter in firm performance (ROE)? Empirical evidence from Jordan. *Economies*, 10(4), 84.
- Bear, S., Rahman, N., & Post, C. (2010). The impact of board diversity and gender composition on corporate social responsibility and firm reputation. *Journal of Business Ethics*, 97, 207-221.
- Boukattaya, S., & Omri, A. (2021). Impact of board gender diversity on corporate social responsibility and irresponsibility: Empirical evidence from France. *Sustainability*, 13(9), 4712.
- Carter, D., D'Souza, F. P., Simkins, B. J., & Simpson, W. G. (2007). The diversity of corporate board committees and firm financial performance. *Available at SSRN 972763*.
- Commission, J. S. (2009). Jordanian Code on Corporate Governance. Retrieved from available at: <http://jsc.gov.jo/library/634365426651890968.pdf>
- Đăng, R., Houanti, L. H., Reddy, K., & Simioni, M. (2020). Does board gender diversity influence firm profitability? A control function approach. *Economic Modelling*, 90, 168-181.
- Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The journal of law and Economics*, 26(2), 301-325.

- Fayaz, M., Abbas, M., & Zahid, M. (2021). Gender Diversity and Environmental Sustainability: Investigating Some Methodological Perspectives. *Journal of Managerial Sciences*, 15.
- Ghaleb, B. A. A., Qaderi, S. A., Almashaqbeh, A., & Qasem, A. (2021). Corporate social responsibility, board gender diversity and real earnings management: The case of Jordan. *Cogent Business & Management*, 8(1), 1883222.
- Githaiga, P. N., & Kosgei, J. K. (2023). Board characteristics and sustainability reporting: a case of listed firms in East Africa. *Corporate Governance: The international journal of business in society*, 23(1), 3-17.
- Gujarati, D. N. (2011). *Econometrics by example* (Vol. 1): Palgrave Macmillan New York.
- Habbash, M. (2016). Corporate governance and corporate social responsibility disclosure: evidence from Saudi Arabia. *Social Responsibility Journal*, 12(4), 740-754.
- Hair Jr, J. (2006). Black, Wc, Babin, Bj Anderson, Re & Tatham, Rl (2006). *Multivariate data analysis*, 6.
- Harjoto, M., Laksmana, I., & Lee, R. (2015). Board diversity and corporate social responsibility. *Journal of Business Ethics*, 132, 641-660.
- Ibrahim, A. H., & Hanefah, M. M. (2016). Board diversity and corporate social responsibility in Jordan. *Journal of Financial Reporting and Accounting*, 14(2), 279-298.
- Ismail, K., & Ibrahim, A. H. (2008). Social and environmental disclosure in the annual reports of Jordanian companies. *Issues in Social and Environmental Accounting*, 2(2), 198-210.
- Issa, A., & Fang, H.-X. (2019). The impact of board gender diversity on corporate social responsibility in the Arab Gulf states. *Gender in Management: An International Journal*, 34(7), 577-605.
- Jabari, H. N., & Muhamad, R. (2021). Gender diversity and financial performance of Islamic banks. *Journal of Financial Reporting and Accounting*, 19(3), 412-433.
- Kanadli, S. B., Alawadi, A., Kakabadse, N., & Zhang, P. (2022). Do independent boards pay attention to corporate sustainability? Gender diversity can make a difference. *Corporate Governance: The international journal of business in society*, 22(7), 1390-1404.
- Kanakriyah, R. (2021). The impact of board of directors' characteristics on firm performance: a case study in Jordan. *The Journal of Asian Finance, Economics and Business*, 8(3), 341-350.
- Khairreddine, H., Salhi, B., Aljabr, J., & Jarboui, A. (2020). Impact of board characteristics on governance, environmental and ethical disclosure. *Society and Business Review*, 15(3), 273-295.
- Khan, H. U. Z. (2010). The effect of corporate governance elements on corporate social responsibility (CSR) reporting: Empirical evidence from private commercial banks of Bangladesh. *International journal of law and management*, 52(2), 82-109.
- Kyere, M., & Ausloos, M. (2021). Corporate governance and firms financial performance in the United Kingdom. *International Journal of Finance & Economics*, 26(2), 1871-1885.
- Maglio, R., Rey, A., Agliata, F., & Lombardi, R. (2020). Connecting earnings management and corporate social responsibility: A renewed perspective. *Corporate social responsibility and environmental management*, 27(2), 1108-1116.
- Mahmood, Z., Kouser, R., Ali, W., Ahmad, Z., & Salman, T. (2018). Does corporate governance affect sustainability disclosure? A mixed methods study. *Sustainability*, 10(1), 207.
- Masud, M. A. K., Nurunnabi, M., & Bae, S. M. (2018). The effects of corporate governance on environmental sustainability reporting: Empirical evidence from South Asian countries. *Asian Journal of Sustainability and Social Responsibility*, 3, 1-26.
- Michelon, G., & Parbonetti, A. (2012). The effect of corporate governance on sustainability disclosure. *Journal of management & governance*, 16, 477-509.

- Muhammad, H., & Migliori, S. (2022). Effects of board gender diversity and sustainability committees on environmental performance: a quantile regression approach. *Journal of Management & Organization*, 1-26.
- Muttakin, M. B., Khan, A., & Subramaniam, N. (2015). Firm characteristics, board diversity and corporate social responsibility: evidence from Bangladesh. *Pacific Accounting Review*, 27(3), 353-372.
- Naseem, M. A., Rehman, R. U., Ikram, A., & Malik, F. (2017). Impact of board characteristics on corporate social responsibility disclosure. *Journal of Applied Business Research (JABR)*, 33(4), 801-810.
- Nguyen, T. H. H., Ntim, C. G., & Malagila, J. K. (2020). Women on corporate boards and corporate financial and non-financial performance: A systematic literature review and future research agenda. *International review of financial analysis*, 71, 101554.
- Ofoegbu, G. N., Odoemelam, N., & Okafor, R. G. (2018). Corporate board characteristics and environmental disclosure quantity: Evidence from South Africa (integrated reporting) and Nigeria (traditional reporting). *Cogent Business & Management*, 5(1), 1551510.
- Rashid, A. (2021). Board independence and corporate social responsibility reporting: mediating role of stakeholder power. *Management Research Review*, 44(8), 1217-1240.
- Salloum, C., Jabbour, G., & Mercier-Suissa, C. (2019). Democracy across gender diversity and ethnicity of Middle Eastern SMEs: how does performance differ? *Journal of Small Business Management*, 57(1), 255-267.
- Sartawi, I. I. M., Hindawi, R. M., & Bsoul, R. (2014). Board composition, firm characteristics, and voluntary disclosure: The case of Jordanian firms listed on the Amman stock exchange. *International Business Research*, 7(6), 67.
- Shakil, M. H., Tasnia, M., & Mostafiz, M. I. (2021). Board gender diversity and environmental, social and governance performance of US banks: Moderating role of environmental, social and corporate governance controversies. *International Journal of Bank Marketing*, 39(4), 661-677.
- Shanak, H. S. H. (2024). Does Gender Diversity Moderator The Nexus Between Board Characteristics And Financial Performance? *Migration Letters*, 21(S3), 307-319.
- Siew, R. Y., Balatbat, M. C., & Carmichael, D. G. (2016). The impact of ESG disclosures and institutional ownership on market information asymmetry. *Asia-Pacific Journal of Accounting & Economics*, 23(4), 432-448.
- Uyar, A., Kilic, M., Koseoglu, M. A., Kuzey, C., & Karaman, A. S. (2020). The link among board characteristics, corporate social responsibility performance, and financial performance: Evidence from the hospitality and tourism industry. *Tourism Management Perspectives*, 35, 100714.
- Wang, H. C., & Chang, H.-J. (2008). The association between accounting information disclosure and stock price. *Global journal of business research*, 2(2), 1-10.
- Yarram, S. R., & Adapa, S. (2021). Board gender diversity and corporate social responsibility: Is there a case for critical mass? *Journal of cleaner production*, 278, 123319.
- Zaid, M. A., Wang, M., Adib, M., Sahyouni, A., & Abuhijleh, S. T. (2020). Boardroom nationality and gender diversity: Implications for corporate sustainability performance. *Journal of cleaner production*, 251, 119652.