

THE RELATIONSHIP BETWEEN BOARD CHARACTERISTICS AND ENVIRONMENTAL DISCLOSURE: EVIDENCE FROM TURKISH LISTED COMPANIES

Halil Emre Akbas

Abstract

This study primarily aims to analyze the relationship between selected board characteristics and the extent of environmental disclosure in annual reports of Turkish companies, using a sample of 62 non-financial firms listed on the BIST-100 index at the end of 2011. The content analysis is used to measure the extent of environmental disclosure. Four board characteristics, namely board size, board independence, board gender diversity and audit committee independence, are considered as the independent variables that may have an impact on the extent of the environmental disclosures of Turkish companies. According to the results of the regression analysis, only board size has a statistically significant and positive relationship with the extent of environmental disclosure. This result implies that firms with larger boards disclose more environmental information than firms with smaller boards. On the other hand, the rest of the independent variables are found to be unrelated to the extent of environmental disclosure. The low degree of independence and gender diversity on the boards of the sample companies for the time period analyzed in the study could be one possible explanation for this result.

Keywords: Environmental disclosure, board characteristics, corporate governance, Turkish companies

JEL: M00, M40, Q00, G30

1. INTRODUCTION

As the major power of economic development, firms have been seen as accountable for the environmental impacts of their activities. Many stakeholders, such as customers, governments and regulatory bodies, non-governmental organizations, local communities, investors, financial agencies and institutions, employees and society as a whole have paid great attention to the environmental impacts of firms, i.e., emissions of greenhouse gases, carbon footprint, their disposal of toxic wastes. Furthermore, over the past few years, financial crises, accounting and auditing scandals such as those at Enron, WorldCom, Global Crossing, HIH Insurance and Parmalat have led to a growing demand for transparency about the

operations of firms (Wulf et al. 2014; Cormier et al. 2015; Brammer and Pavelin 2006; Kolk 2008). In that context, corporate environmental disclosure has emerged as an effective tool that enables firms to communicate their environmentally friendly activities and as an important information source about the

Halil Emre Akbas, PhD

Associate Professor

Yıldız Technical University, Faculty of
Economics and Administrative Sciences

E-mail: eakbas@yildiz.edu.tr

environmental impacts of firms' operations for their stakeholders (Cormier et al. 2015). Consequently, an increasing number of firms all over the world have started to disclose environmental information, making environmental information disclosure an important dimension of accounting information systems. (Da Silva Monteiro and Aibar-Guzmán 2010a; Da Silva Monteiro and Aibar-Guzmán 2010b; Pahuja 2009; Holland and Foo 2003; Belal 2000; Ahmad and Mousa 2010).

In this sense, it is not surprising that corporate environmental disclosure has attracted substantial growth in attention from academic researchers (Bubna-Litic 2008; Ahmad and Mousa 2010; Holland and Foo 2003; Deegan 2002; Sen et al. 2011; Da Silva Monteiro and Aibar-Guzmán 2010b; Sahay 2004; Saha and Akter 2013; Kolk et. al 2001; Brammer and Pavelin 2006). Despite a growing body of literature on corporate environmental disclosure, most of the previous studies have investigated possible determinants or motivations of environmental disclosure, especially focusing on corporate characteristics, such as financial performance, size, age, industry membership, firm reputation, market reaction or country of origin (Haniffa and Cooke 2005; Brammer and Pavelin 2006; Michelin and Parbonetti 2012). On the other hand, it is possible to say that there has been relatively few attempts to investigate the relationship between corporate governance structure and environmental information disclosure, especially in the context of emerging economies (Michelon and Parbonetti 2012; Khan et al. 2013). However, corporate governance mechanisms, in particular board structure, could be an important determinant of environmental disclosure, since firms' disclosure policies are basically determined by the board of directors (Ernstberger and Grüning 2013; Allegrini and Greco 2013; Cheng and Courtenay 2006; Gul and Leung 2004; Cormier et al. 2015; Iatridis 2013; Arcay and Vazquez 2005; Michelin and Parbonetti 2012).

The primary purpose of this study is therefore to extend prior research on environmental disclosure by analyzing the relationship between corporate governance and the extent of environmental disclosures made by companies operating in a developing country, Turkey. Specifically, this paper empirically examines whether the key characteristics of the board of directors, namely board size, board independence, gender diversity and audit committee independence, are associated with the level of Turkish firms' environmental disclosures. In order to test this relationship, the annual reports of 62 non-financial firms listed on the Borsa Istanbul 100 (BIST-100) – formerly named the Istanbul Stock Exchange 100 (ISE-100) - index for the year 2011 are analyzed through content analysis.

The results of the study indicate that in the context of Turkey, only board size is found to be positively related to the extent of environmental disclosure. The findings of the study reveal that there is no statistically significant relationship between the extent of environmental disclosure and other board characteristics, namely board independence, board gender diversity and audit committee independence.

The present study contributes to the existing literature on environmental disclosure by providing some empirical results about the relationship between characteristics of the board of directors, which is an important corporate governance mechanism and the extent of environmental disclosure from a developing country, Turkey. In particular, this is the first attempt that solely focuses on empirically analyzing the association between the key characteristics of the board of directors and the environmental disclosures of Turkish companies, as far as the author is aware.

The rest of the paper is organized in the following manner. After this introduction, Section 2 provides an overview of the previous related literature and introduces the hypotheses of the study. Section 3 outlines the data and methodology. Section 4 presents the empirical findings of the study. Finally, Section 5 discusses the conclusion, limitations and future research opportunities.

2. LITERATURE REVIEW AND HYPOTHESES

Corporate governance basically consists of proper mechanisms that allow stakeholders to exercise control over management and aims to create an optimum balance among different economic, individual and social goals and increase transparency (Sharif and Rashid 2014; Rupley et al. 2012; Khan 2010; Arcay and Vazquez 2005). In this sense, it can be easily said that both corporate governance and environmental disclosure tend to reduce information asymmetries between managers and stakeholders, (Ernstberger and Grüning 2013; Iatridis 2013), however relatively less attention has been paid to link these two research areas (Khan et al. 2013).

Agency theory provides a framework to link corporate governance to environmental disclosure, as corporate governance mechanisms intend to control the agency problem and align the interests of management and stakeholders by reducing information asymmetry (Allegrini and Greco 2013; Ho and Wong 2001). In this framework, it is suggested that the board of directors is the ultimate internal control mechanism for overseeing managers (agents) on behalf of shareholders and other stakeholders (Rupley et al. 2012; Eng and

Mak 2003; Said et al. 2009; Ben-Amar and McIlkenny 2015). From this point of view, this study primarily aims to merge corporate governance literature and environmental disclosure literature by analyzing the relationship between corporate governance, in particular board characteristics, and the extent of environmental disclosures of Turkish companies.

Based on the previous literature, four board characteristics are examined in this study. These are board size, board independence, gender diversity and audit committee independence. The previous literature related to these four board variables are reviewed and hypotheses on their relation with the extent of environmental disclosure are proposed below.

2.1. Board Size

As an important determinant of board effectiveness (Allegrini and Greco 2013; Amran et al. 2014), board size can be seen as a crucial corporate governance mechanism that may influence the level of corporate voluntary disclosure, including environmental disclosure (Ntim et al. 2013). On the other hand, both the theoretical and empirical literature provide contradictory explanations regarding the relationship between board size and environmental disclosure. From the agency theory perspective, a greater number of directors on the board may contribute to its monitoring effectiveness, since larger boards provide diversity in terms of expertise and more capacity for monitoring management (Larmou and Vafeas 2010; Uwuigbe et al. 2011; Sun et al. 2010). Furthermore, Elzahar and Hussainey (2012) stated that the increased board size may lead to an increase in the number of directors who have a financial or accounting background, which could have a positive influence on corporate environmental disclosure (Elzahar and Hussainey 2012). Consistent with these arguments, the results of the empirical studies such as Jangu et al. (2014), Ntim et al. (2013), Jizi et al. (2014), Haji (2012), Akhtaruddin et al. (2009), Buniamin et al. (2011), Sun et al. (2010), Cheng and Courtenay (2006), Liao et al. (2014), Allegrini and Greco (2013), Samaha et al. (2015), Lim et al. (2007), Kathyayini et al. (2012), Hidalgo et al. (2011) documented a positive relationship between the board size and the level of disclosure.

Contrary to these suggestions, Jensen (1993) argues that larger boards are less likely to be effective and easier to be controlled and manipulated by the CEO than smaller boards (Jensen 1993). In a similar vein, it is suggested that as the number of the directors on the board increases, the monitoring capacity of the board also increases, but this benefit may

be outweighed by the incremental cost of poorer communication and a slower decision making process (John and Senbet 1998; Lipton and Lorsch 1992; Hidalgo et al. 2011). Furthermore, Kathyayini et al. (2012) state that decisions related to the content and extent environmental information disclosure need effective communication and coordination among board members. Because of these reasons, a negative relationship between board size and the level of environmental disclosure can be expected and this argument is supported by the results of the empirical studies such as Uwuigbe et al. (2011) and Bouaziz (2014).

Besides these results, some of the empirical studies found a non-significant relationship between board size and the extent of voluntary disclosure (e.g., Ienciu et al. 2012; Arcay and Vazquez 2015; Saha and Akter 2013; Fathi 2013; Amran et al. 2014 and Sartawi et al. 2014).

Based on these contradictory conclusions from both theoretical and empirical studies, a positive, negative or no relationship between the board size and the extent of environmental disclosure can be expected. Therefore, the first research hypothesis is formulated as follows:

H1: There is a relationship between the board size and the extent of the environmental disclosure.

2.2. Board Independence

Another major corporate governance mechanism that is widely investigated in the environmental disclosure literature is board independence (Khan et al. 2013; Amran et al. 2014). The board of directors generally consists of dependent and independent members. Dependent members either have direct responsibility for business management or are the members of the family that owns the firm. On the other hand, independent members basically represent the interests of minor shareholders since they are not directly involved in firm activities and their only affiliation with the firm is their directorship (Rouf 2011; Mohamad and Sulong 2010; Haji 2012; Sharif and Rashid 2014). Thus from an agency theory perspective, it is widely accepted that as the proportion of independent directors on the board increases, the effectiveness of the board in monitoring and controlling management also increases (Jizi et al. 2014; Liao et al. 2014; Chau and Gray 2010). It is also argued that as independent directors are less aligned to management, they can be seen as a balance mechanism to ensure that companies act in the best interests of shareholders, other stakeholders and society generally (Sharif and Rashid

2014; Khan 2010). From this point of view, independent directors may encourage companies to disclose more information to outside stakeholders. Therefore, a positive relationship between board independence and environmental disclosure can be expected (Michelon and Parbonetti 2012; Eng and Mak 2003).

In line with these theoretical arguments, the results of empirical studies usually indicate that the proportion of independent directors on the board has a positive impact on the volume of voluntary disclosure, including environmental disclosure (e.g., Ntim et al. 2013; Gisbert and Navallas 2013; Rupley et al. 2012; Arcay and Vazquez 2005; Sharif and Rashid 2014; Jizi et al. 2014; Barros et al. 2013; Khan et al. 2013; Cheng and Courtenay 2006; Liao et al. 2014; Allegrini and Greco 2013; Cai et al. 2014).

Based on theoretical explanations and empirical results, the second research hypothesis is proposed as follows:

H2: There is a positive relationship between the proportion of independent directors on the board and the extent of environmental disclosure.

2.3. Gender Diversity

As women and men have traditionally, culturally and socially different backgrounds, the gender diversity of the board has been considered an important dimension of corporate governance that can influence the extent of environmental disclosure (Liao et al. 2014). Huse and Solberg (2006) ascertain that women may make contributions on corporate boards by creating alliances, preparation and involvement, taking part in important decisions, taking leadership roles and being visible. Barako and Brown (2008) state that an increased proportion of women on the board leads to better corporate communication. On the other hand, Liao et al. (2014) argues that as women have a different role from men in society, female directors on the board may take a different approach to environmental issues. In line with these arguments, Rupley et al. (2012) documented a positive relationship between the proportion of women directors on the board and the quality of environmental disclosure. Also, Liao et al. (2014), Fernandez-Feijoo et al. (2014), Frias-Aceituno et al. (2013), Ben-Amar and McIlkenny (2015) and Barako and Brown (2008) found a positive relationship between the extent of disclosure related to environmental issues and the number of women members on the corporate board. Thus the third hypothesis of the study is formulated as follows:

H3: There is a positive relationship between the proportion of women directors on the board and the extent of environmental disclosure.

2.4. Audit Committee Independence

The audit committee has a crucial role in achieving the objectives of corporate governance (Said et al. 2009). From an agency theory perspective, the audit committee represents one of the functional tools that can be used for attenuating agency costs (Forker 1992), since it serves as a monitoring mechanism that aims to improve the quality of information reported to stakeholders and the auditing process (Pincus et al. 1989; Collier 1993). In this framework, empirical research generally report a positive relationship between the existence of an audit committee and the volume and the quality of environmental disclosure (e.g., Ho and Wong 2001; Iatridis 2013; Khan et al. 2013; Ettredge et al. 2011; Akhtaruddin et al. 2009).

On the other hand, the literature also highlights the composition of audit committees with dependent and independent members as an important factor that can have an influence on the level of disclosure (Akhtaruddin et al. 2009). In this framework, it is suggested that for the purpose of establishing more efficient and effective boards in monitoring the disclosure policies and processes of companies, auditing committees should be mostly composed of independent directors (Mohamad and Sulong 2010; Bouaziz 2014). Consistent with this suggestion, Iatridis (2013) found a positive relationship between environmental disclosure quality and the percentage of independent directors sitting on an audit committee in Malaysia. Likewise, Samaha et al. (2015) reported a positive relationship between the level of voluntary disclosure and the percentage of independent directors in the audit committee. In light of these results, the fourth hypothesis is formulated as follows:

H4: There is a positive relationship between the proportion of independent directors on the audit committee and the extent of environmental disclosure.

3. DATA AND METHODOLOGY

3.1. Sample

This study primarily aims to investigate the relationship between the key characteristics of the board of directors and the extent of environmental disclosures of Turkish companies. For this purpose, the sample of

the study is drawn from firms listed on the BIST-100 index in the financial year 2011.

A sample of the BIST-100 index firms is employed for two reasons. First, the results of the previous studies show that larger firms tend to disclose more environmental information (Cormier and Magnan 2003; Deegan and Gordon 1996). In this framework, BIST 100 index represents approximately 90% of the BIST market capitalization. Second, the firms that are included in the BIST 100 index represent a diverse range of industry sectors, including food and beverage, wood, paper and printing, metal products and machinery, electricity, wholesale and retail trade and telecommunications.

On the other hand, because of their limited effect on the environment and the existence of significant differences in their corporate and operation structures, financial companies are excluded from the sample (Da Silva Monteiro and Aibar-Guzmán 2010a; Frias-Aceituno et al. 2013). After this elimination, the final sample consists of 62 companies across 15 sectors according to the Borsa Istanbul classification.

Table 1 reports the distribution of the sample. According to Table 1, the chemical, petroleum and plastic sector, with 13 companies, has the highest percentage of companies within the sample (20.97%) while with 1 company the textile and leather and other services sectors have the smallest number of companies in the sample.

Table 1: Distribution of Companies by Sectors

Sector	Number of Companies	Percentage
Food and Beverage	4	6.45
Textile and Leather	1	1.61
Wood, Paper and Printing	5	8.06
Chemical, Petroleum and Plastic	13	20.97
Nonmetal Mineral Products	4	6.45
Basic Metal	5	8.06
Metal Products and Machinery	10	16.13
Other Manufacturing	2	3.23
Electricity	2	3.23
Transportation	2	3.23
Wholesale and Retail Trade	5	8.06
Telecommunications	2	3.23
Sports	4	6.45
Technology	2	3.23
Other Services	1	1.61
Total	62	100

3.2. Variables

3.2.1. Dependent Variable – The Extent of Environmental Disclosure

The extent of Turkish firms' environmental disclosure constitutes the dependent variable of the study. The annual reports of sampled firms for the year of 2011 are analyzed through content analysis in order to measure the extent of the environmental disclosure of Turkish companies. Content analysis was defined by Abbott and Monsen (1979) as: "A technique for gathering data that consists of codifying qualitative information in anecdotal and literary form into categories in order to derive quantitative scales of varying levels of complexity" (Abbott and Monsen, 1979, p.504). The annual reports are chosen as a basis for data collection on environmental disclosure because they are produced regularly, especially by all of the listed companies (Tilt 2001) and so they represent the most often used communication channels of companies (Hughes et al. 2001). Finally, compared to all other disclosure formats, annual reports are considered the most credible medium for environmental disclosures (Tilt 1994).

Guthrie and Abeysekera (2006) and Gamerschlag et al. (2011) emphasize that selection of a "unit of analysis" presents another critical issue in the process of measuring the extent of environmental disclosure through content analysis. In this respect, Holsti (1969) p. 116 defined recording unit as "the specific segment of content that is characterized by placing it into a given category" (Holsti 1969). As the number of words in a recording unit has the advantage of being categorized more easily (Damak-Ayadi 2010) and needs less subjective judgment by the researcher (Gamerschlag et al. 2011), the extent of environmental disclosures is measured by counting the number of words related to the environmental disclosure.

3.2.2. Independent Variables – Board Characteristics

Table 2 summarizes the measurement of the independent variables used in this study. As discussed in the literature review in section four, board characteristics are examined as independent variables, namely, board size, board independence, gender diversity and audit committee independence. The data relating to these board characteristics are collected from the annual reports of the sampled companies.

Board size (BSIZE) is measured by the total number of directors on the board. Board independence (BIND) is measured by the percentage of the independent directors to the total number of directors on the board.

Table 2: Summary of Independent and Control Variables

Variables	Code	Measurement
Independent Variables		
Board Size	BSIZE	The total number of directors on the board of a company
Board Independence	BIND	The percentage of independent directors of the total number of directors on the board of a company
Gender Diversity	GEND	The percentage of female directors of the total number of directors on the board of a company
Audit Committee Independence	ACIND	The percentage of independent directors of the total number of directors on the audit committee of a company
Control Variables		
Company Size	SIZE	The natural logarithm of total assets at the end of fiscal year 2011
Profitability (Return on assets)	PROF	The ratio of net profit after tax to total assets at the end of fiscal year 2011
Industry Membership	INDM	Dummy variable which is equal to 1 if the company operates in an environmentally sensitive industry and 0 otherwise.

Gender diversity (GEND) is measured by the percentage of female directors of the total number of directors on the board. Finally, audit committee independence is measured by the percentage of independent directors of the total number of directors on the audit committee of a company.

3.2.3. Control Variables

In order to avoid model misspecification and control other factors that may have an influence on environmental disclosure (Jizi et al. 2014), some corporate characteristics are included as control variables in the study. Previous literature documents that company size, profitability and industry membership may affect the extent of environmental disclosure (e.g., Deegan and Gordon 1996; Brammer and Pavelin 2006; Cormier and Magnan 2003; Ho and Taylor 2007; Liu and Anbumozhi 2009).

In this study, company size is measured as the natural logarithm of total assets of the company. Profitability is measured as the ratio of net profit after tax to total assets. Finally, industry membership is a dummy variable that takes 1 for companies belonging to environmentally sensitive industries and 0 for those belonging to non-sensitive industries. Based on previous empirical studies, the food and beverage, textile and leather, wood, paper and printing, chemical, petroleum and plastic, nonmetal mineral products, basic metal, metal products and machinery, other manufacturing, electricity and other services industries are considered environmentally sensitive industries. For the control variables, in the Turkish context, Akbas (2014) found that both company size and industry membership are positively related to the extent of environmental disclosure of Turkish firms. On the other

hand, the same study documented that profitability has a negative relationship (Akbas 2014).

3.3. Model and Method of Estimation

For the purposes of investigating the relationship between board characteristics and the extent of environmental disclosure and testing the validity of the aforementioned hypotheses, the following ordinary least square (OLS) regression model with cross-sectional data is estimated:

$$EID_i = \alpha_0 + \beta_1 BSIZE_i + \beta_2 BIND_i + \beta_3 GEND_i + \beta_4 ACIND_i + \beta_5 SIZE_i + \beta_6 PROF_i + \beta_7 IND_i + \varepsilon_i$$

Where:

EID: the extent of environmental disclosure of company *i* in 2011 (Total number of words related to the environmental issues in the annual report of the company)

α_0 : intercept

BSIZE: board size of company *i*

BIND: board independence of company *i*

GEND: board gender diversity of company *i*

ACIND: audit committee independence

SIZE: size of company *i*

PROF: profitability of company *i*

IND: industry membership of company *i*

ε_i : random error term

4. RESULTS

4.1. Descriptive Statistics

Table 3 reports the descriptive statistics. The mean, median, standard deviation, minimum and maximum values and measures of skewness and kurtosis for the

Table 3: Descriptive Statistics

Panel A – Dependent, Independent and Control Variables								
Variable	Obs.	Mean	Median	Std. dev.	Min.	Max.	Skew.	Kurt.
EID	62	623.952	300.500	849.113	0.000	3854.000	2.103	4.545
BSIZE	62	7.532	7.000	1.989	5.000	12.000	0.499	-0,676
BIND	62	0.102	0.000	0,152	0.000	0.570	1.208	0.311
GEND	62	0.054	0.000	0.094	0.000	0.400	1.719	2.402
ACIND	62	0.155	0.000	0.264	0.000	1.000	1.555	1.653
SIZE	62	20.927	20.937	1.375	17.824	23.565	0.194	-0.607
PROF	62	0.049	0.064	0.190	-1.188	0.433	-4.477	29.881

Panel B – Dummy Variable		
Industry Membership	Frequency	Valid Percentage
Sensitive (1)	47	75.8
Non-Sensitive (0)	15	24.2
Total	62	100

numerical variables are presented in Panel A and the frequencies and percentages for the dummy variable, industry membership, are displayed in Panel B.

The mean value of the dependent variable of the study, the extent of environmental disclosure (EID) is 623.952 with a range of 0 to 3854. Based on these figures, it is evident that there are large variations in the volume of the environmental disclosures of the sampled companies in their annual reports. With regard to the independent variables, Table 3 shows that the mean value of board size ranges from a minimum of 5 to a maximum of 12 with a mean of 7.532, about 8 members. On the other hand, the percentage of the independent directors of the total number of directors on the board of the sampled firms varies between 0.00 to 57%, with an average of 10.2 %. This finding indicates that the sampled firms have a majority of dependent directors on their boards and that a majority of firms do not have independent members on their boards. For the third independent variable, gender diversity, the average percentage of women representation on the board is 5.4% and most of the companies do not have a woman member on their boards (median=0.00). In line with board independence, the

percentage of independent directors on the audit committee is relatively low with a mean value of 15.5 %.

Regarding the control variables, Table 3 shows that the mean value of size that is measured by the natural logarithm of total assets at the end of year 2011 is 20.927, implying that the average total assets in Turkish Lira terms of 3.008 bn, thus it can be easily said that the sample consists of relatively large companies. Furthermore, companies in the sample have an average ROA of 4.9 %, with a range from -118.8 to 43.3 %. Finally, Panel B of Table 3 presents that the majority of the (75.8%) sampled companies are from environmentally sensitive industries. These results indicate that a wide variation in the independent and control variables.

4.2. Correlation Matrix

Table 4 presents the correlation matrix for the variables used in the study. The results of the Pearson correlation analysis indicate that the extent of environmental disclosure is positively correlated to board size, with a correlation coefficient of 0.486 ($p < 0.001$),

Table 4: Pearson Correlation Matrix

Variables	EID	BSIZE	BIND	GEND	ACIND	SIZE	PROF	IND
EID	1							
BSIZE	0.486*	1						
BIND	-0.210	-0.238	1					
GEND	0,068	-0,001	0,109	1				
ACIND	-0,225*	-0,149	0,831*	0,052	1			
SIZE	0.435*	0.407*	-0.071	0.052	-0.075	1		
PROF	-0.030	0.015	-0.007	0.110	-0.037	0.213	1	
IND	0.232	-0.038	-0.241	0.034	-0,386*	-0,019	0.242	1

*Correlation is significant at the 0.01 level (2-tailed)

in line with the first hypothesis of the study.

On the other hand, the results also show that the other independent variables (board independence, gender diversity and audit committee independence) are not statistically correlated to the extent of environmental disclosure, contrary to the hypotheses. For the control variables, firm size is found to be positively correlated to disclosure with a correlation coefficient of 0.435.

4.3. Regression Results

Table 5 reports the results of OLS regression analysis testing the relationship between the extent of environmental disclosure and board characteristics. According to Table 5, the F-statistic is 5.17 ($p=0.0001$) and this result supports that the estimated model is statistically significant, while the adjusted R-squared of 0.3239 indicates that the independent and control variables explain 32.39% of the variability of the extent of environmental disclosure.

The results also indicate that, as hypothesized (H1), board size has a positive and statistically significant relation ($p=0.004$) with the extent of environmental disclosure. This result provides supporting evidence for the first hypothesis and implies that firms with larger boards are likely to disclose more environmental information than firms with smaller boards. This result is consistent with the findings of the many previous studies (e.g., Janggu et al. 2014; Jizi et al. 2014; Haji 2012; Sun et al. 2010; Liao et al. 2014; Allegrini and Greco 2013; Samaha et al. 2015; Lim et al. 2007; Kathyayini et al. 2012).

On the other hand, the coefficients for the variables board independence, gender diversity and audit committee independence are not statistically significant. These results suggest that the presence of

independent directors and women directors on the board and the presence of independent directors on the audit committee are unrelated to the level of environmental disclosures of the sampled companies. These findings are in line with the results of the studies conducted by Michelon and Parbonetti (2012), who found a non-significant relationship between the proportion of independent directors and sustainability disclosure and Khan (2010), who documented that women representation on the board is not statistically significantly associated with corporate social responsibility reporting, Bouaziz (2014) reported a non-significant relationship between the audit committee independence and the voluntary financial disclosures of Canadian listed firms. The non-significant relationship between these board characteristics and environmental disclosure can be explained by the fact that the majority of the boards of the sampled firms were mainly dominated by dependent and male members for the time period covered in the study.

For the control variables, the results of the study indicate that there is a positive relationship between the company size and the extent of environmental disclosure ($p=0.008$). This result is consistent with previous studies, such as Al-Tuwaijri et al. (2004), Brammer and Pavelin (2006), Cormier and Magnan (1999 and 2003), Da Silva Monteiro and Aibar-Guzmán (2010a), Deegan and Gordon (1996), Gao et al. (2005), Huang and Kung (2010), Michelon and Parbonetti (2012), Milanés-Montero and Pérez-Calderón (2011), and Wang et al. (2012). Akbas (2014) and shows that as the company size increases the volume of environmental disclosure also increases. Similarly, the results of the regression analysis show a significant positive relationship between industry membership and the extent of environmental disclosure. This result is also in line with previous research (e.g., Patten 2002; Cho and Patten

Table 5: Results of OLS regression analysis testing the relationship between “the extent of environmental disclosure” and “board characteristics”

Variable	Coefficient	Std. Error	t-Stat.	p-value
Intercept	-5115.135	1458.248	-3.51	0.001
BSIZE	153.1607	51.07824	3.00	0.004
BIND	-17.84956	1102.012	-0.02	0.987
GEND	587.2368	965.6196	0.61	0.546
ACIND	-155.1246	653.8516	-0.24	0.813
SIZE	201.1825	73.55448	2.74	0.008
PROF	-806.1275	502.7215	-1.60	0.115
IND	539.7818	235.8831	2.29	0.026
R-Squared	0.4015			
Adjusted R-Squared	0.3239			
F-statistic	5.17			
p-value of F-Statistic	0.0001			

2007; Brammer and Pavelin 2006; Aerts and Cormier 2009; Cormier and Magnan 2003; Choi 1999; Ho and Taylor 2007; Liu and Anbumozhi 2009; Akbas 2014) and suggests that companies operating in environmentally sensitive industries disclose more environmental information than companies operating in non-environmentally sensitive industries. On the other hand, the coefficient for the profitability variable is not statistically significant, suggesting that there is no relationship between the profitability of the company and the volume of environmental disclosure. This result is in the same vein with the findings of Zeng et al. (2012), Sun et al. (2010), Ahmad et al. (2003), Cho et al. (2010), Brammer and Pavelin (2006), Freedman and Jaggi (2005), Clarkson et al. (2011) and Eng and Mak (2003).

5. CONCLUSION, LIMITATIONS AND FUTURE RESEARCH

This study attempts to merge corporate governance literature and environmental disclosure literature. In this context, the relationship between board characteristics and the extent of environmental disclosures of Turkish non-financial firms listed on the Borsa Istanbul 100 (BIST-100) index at the end of 2011 has been investigated. The dependent variable of the study, the extent of environmental disclosure, is measured by the total number of words that are dedicated to environmental issues in the annual reports of the sampled Turkish companies. On the other hand, in the light of previous literature, four board characteristics are considered those independent variables that may have a relationship with the extent of environmental disclosures of companies, namely, board size, board independence, board gender diversity and audit committee independence. Furthermore, in order to avoid a spurious relationship between dependent and independent variables, company size, profitability and industry membership are included as control variables in the study.

The findings of the study reveal that for board characteristics, only board size has a statistically significant and positive relationship with the extent of environmental disclosure, hence only the first hypothesis of the study is accepted. This result supports the argument that the increased number of members may contribute to the monitoring effectiveness of the board and have a positive impact on the level of environmental disclosure since larger boards lead to a diversity in terms of expertise, including financial and accounting (Larmou and Vafeas 2010; Uwuigbe et al. 2011; Sun et al. 2010; Elzahar and Hussainey 2012).

On the other hand, for the rest of the independent variables (board independence, board gender diversity and audit committee independence), the results of the OLS regression analysis indicate that these board characteristics are unrelated to the extent of environmental disclosure. The low degree of independence and gender diversity on the boards of the sampled firms for the time period covered in the study could provide an explanation for the statistically non-significant relationship between these variables and environmental disclosure.

This study may contribute to the existing literature by providing insights from a developing country and represents the first attempt to solely analyze the relationship between board characteristics and the extent of environmental disclosures of Turkish companies, as far as the author is aware.

As with most empirical studies, this study has a number of limitations. First, the analyses are conducted with cross-sectional data since the research is based on only one year data. Second, only the annual reports of companies are considered as the source of environmental disclosure. Thus, future research could use longitudinal data in order to investigate the relationship between board characteristics and the volume of environmental disclosures of Turkish companies. Future studies could also investigate this relationship by considering environmental disclosures in other communication channels, such as web sites or separate environmental, social responsibility or sustainability reports. Additionally, the quality of the environmental disclosures of Turkish companies represents an unaddressed research area. Hence, future research could investigate the impacts of company and board characteristics on the quality of environmental disclosure in the context of Turkey.

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