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The influence of board characteristics on sustainability reporting

Empirical evidence from Sri Lankan firms

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Abstract

Purpose – Drawing on agency theory and legitimacy theory perspectives, the purpose of this paper is to investigate the influence of board characteristics on sustainability reporting of listed companies in the Colombo Stock Exchange (CSE), Sri Lanka.

Design/methodology/approach – A sample of 148 listed companies was drawn from the CSE using stratified random sampling method and data were collected from the 2012 annual reports. The proposed hypotheses were tested using a hierarchical binary logistic regression.

Findings – This study documents that board size and dual leadership are positively associated with sustainability reporting and boards with female directors are negatively associated with sustainability reporting. This study also found that sustainability reporting is likely to be influenced by firm size and firm growth. Additionally, the study also reveals that younger firms are likely to adopt sustainability reporting.

Originality/value – This is the first study to examine the influence of board characteristics on sustainability reporting in Sri Lanka, considered as a developing economy with an emerging equity market.

Keywords Corporate governance, Sustainability reporting, Legitimacy theory, Agency theory, Logistic regression, Board characteristics

Paper type Research paper

1. Introduction

Research on social and environmental reporting continues to garner interest and a research stream has emerged, investigating the effect of firm-specific characteristics onsocial and environmental reporting (Adams *et al.*, 1998; Brammer and Pavelin, 2008; Chapple and Moon, 2005; Gao *et al.*, 2005; Hackston and Milne, 1996; Haniffa and Cooke, 2005; Ness and Mirza, 1991; Newson and Deegan, 2002; Reverte, 2009; Tsang, 1998). Among firm-specific characteristics, board composition is considered important because the board of directors is integral to corporate governance framework. Agency theory, the dominant theoretical framework in corporate governance literature suggests that the monitoring role of boards influence firms to disclose information to reduce agency cost and information asymmetry (Brennan and Solomon, 2008; Hillman and Dalziel, 2003; Hendry, 2005; Dalton *et al.*, 2003; Roberts *et al.*, 2005). Based on the above proposition, many studies have provided empirical evidence on the effect of board composition on voluntary disclosures (Gul and Leung, 2004; Eng and Mak, 2003; Chau and Gray, 2010; Lim *et al.*, 2007; Barako *et al.*, 2006; Samaha *et al.*, 2012).

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Despite empirical evidence on the corporate governance and voluntary disclosure link, only few studies have attempted to empirically test the link between corporate governance and social and environmental disclosure (Said *et al.*, 2009; Haniffa and Cooke, 2005; Rashid and Lodh, 2008; Huafang and Jianguo, 2007; Esa *et al.*, 2012; Ntim and Soobaroyen, 2013; Hahn and Kuhnen, 2013). Furthermore, these studies have adopted the legitimacy theory to explain their empirical findings. This theory suggests that firms engage in sustainability reporting to seek legitimacy and it is of strategic importance to firms (Donovan, 2002; Haniffa and Cooke, 2005; Tsang, 1998; Wilmshurst and Frost, 2000; Islam and Deegan, 2008; Monfardini *et al.*, 2013; Milne and Patten, 2002). Adams *et al.* (2010) found that boards are involved in strategic activities in addition to their monitoring role and this suggests that boards can contribute to the legitimacy claims of firms by promoting broader voluntary disclosures to include sustainability reporting.

Grounded on agency and legitimacy theory perspectives, the purpose of this study is to investigate the association between board characteristics and sustainability reporting, employing a sample of listed firms from the Colombo Stock Exchange (CSE) in Sri Lanka in 2012. Sustainability reporting is an emerging voluntary reporting initiative in the developing and emerging capital market of Sri Lanka. Studies suggest that it is important to investigate how large firms in developing economies disclose information on sustainability because there is little information about sustainability practices in developing economies (Wanderley *et al.*, 2008; Jamali and Mirshak, 2007). Weak institutional framework have been identified as one of the causes for lower levels of sustainability reporting in developing economies (Kemp, 2001; Yatim *et al.*, 2006) and sustainability reporting in Asia-Pacific remains lower compared to Europe and USA (KPMG International, 2011). Thus, it is noteworthy to explore what factors are driving firms to voluntarily adopt sustainability reporting and how important is corporate governance as a determinant in emerging Asian contexts.

The choice of Sri Lanka for this study is motivated by several factors. First, Sri Lanka is classified as a middle income developing country in Asia (The World Bank, 2012) and historically, financial regulation and accounting practices in Sri Lanka have been influenced by the British regulatory framework and accounting practices. Second, Sri Lanka's corporate governance framework is derived from Anglo American governance model and is primarily principle based. Furthermore, listed firms in Sri Lanka comprise of one tier boards, and literature suggests that one tier boards are directly involved in firm decisions, initiatives and outcomes. Third, block holder ownership (institutional and family) is prevalent among listed firms in Sri Lanka, similar to other Asian and emerging economies. Fourth, sustainability reporting is voluntarily undertaken by listed firms in Sri Lanka and the Code of Best Practice on Corporate Governance (Institute of Chartered Accountants of Sri Lanka and Securities and Exchange Commission of Sri Lanka, 2013) advocate firms to adopt sustainability reporting by developing formal reporting procedures. Recommending firms to adopt sustainability reporting is one of the major inclusions in the Code of Best Practice on Corporate Governance (Institute of Chartered Accountants of Sri Lanka and Securities and Exchange Commission of Sri Lanka, 2013) compared to the Code of Best Practice on Corporate Governance (Institute of Chartered Accountants of Sri Lanka and Securities and Exchange Commission of Sri Lanka, 2008). Finally, Sri Lanka has also introduced National Green Reporting Guidelines in 2011 (Ministry of Environment, 2011).

Sri Lanka's governance framework includes Companies Act No. 7 of 2007, Finance Companies (Corporate Governance) Direction No. 3 of 2008, Listing Rules of CSE

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and Code of Best Practice on Corporate Governance 2013. The principles proposed by the Code of Best Practice on Corporate Governance (Institute of Chartered Accountants of Sri Lanka and Securities and Exchange Commission of Sri Lanka, 2013) of Sri Lanka covers board composition; remuneration of directors; relationship with shareholders; and accountability and audit. Key principles of board composition includes: separation of roles of chairman and CEO; appointment of a senior independent director if the roles of chairman and CEO are not separated; appoint at least two or one-third of number of directors as independent non-executive directors whichever is higher; and include directors with knowledge on finance. However, it is mandatory for listed firms and firms in the financial services sector in Sri Lanka to include in the annual report a section on compliance to corporate governance principles (Colombo Stock Exchange (CSE), 2012a, b; Finance Companies (Corporate Governance) Direction, 2008). Furthermore, the Finance Companies (Corporate Governance) Direction No. 3 of 2008 includes much more stringent corporate governance guidelines compared to the principles on the Code of Best Practices on Corporate Governance (Institute of Chartered Accountants of Sri Lanka and Securities and Exchange Commission of Sri Lanka, 2013).

This study makes several important contributions. It is the first study to empirically test the association between board characteristics and sustainability reporting in Sri Lanka, and contributes to the knowledge on the link between corporate governance and sustainability reporting in emerging economies and Asian contexts, since most studies on sustainability reporting research have originated from developed economies (Guthrie and Parker, 1989; Adams *et al.*, 1998; Gray *et al.*, 1995; Neu *et al.*, 1998; Reverte, 2009; De Villiers and Van Staden, 2010; Branco and Rodrigues, 2008; Brammer and Pavelin, 2008; Holder-Webb *et al.*, 2009; Hackston and Milne, 1996; Wilmshurst and Frost, 2000; Tilt, 1994). The study incorporates board diversity attributes, presence of female directors on board and ethnically diverse boards to reflect on socio-cultural values of the context, in addition to board size and board independence. Additionally the study adopts a multi-theoretic approach to explain the association between board characteristics and sustainability reporting, since it has been argued that the multifaceted nature of sustainability reporting requires a multi-theoretic approach instead of a single theory approach which is considered inadequate (Cormier *et al.*, 2005). The study also contributes to the growing use of logistic regression in business research.

2. Literature review

The agency theory is concerned with owner (principal) – manager (agent) relationship (Jensen and Meckling, 1976). Conflict of interest between owners and managers results in agency problems and agency costs (Eisenhardt, 1989). To mitigate agency problems and costs a board of directors is appointed to monitor the actions of managers (Jensen and Meckling, 1976; Fama and Jensen, 1983; Eisenhardt, 1989; Aguilera and Jackson, 2003). In response to internal monitoring mechanisms and to reduce agency costs, managers improve quality of disclosures.

Moreover, it is stated that, managers benefit from information advantage and would trade information in efficient markets to enhance firm value and management incentives. Extending the above conception to sustainability disclosures, it can be stated that managers provide sustainability disclosure to reduce agency costs, minimize stringent internal monitoring and benefit from providing sustainability disclosures in capital markets.

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Sustainability disclosure is a response to pressure exerted upon firms to conduct their activities in a way acceptable to the society (Aguilera, 2005). Among the theories adopted to explain sustainability disclosures, the legitimacy theory has been found to be the most successful (Islam and Deegan, 2008; Reverte, 2009). Similar to the principal-agent relationship, the legitimacy theory conceives that a contract exists between the firm and society and firms seek legitimacy by complying with societal expectations (Newson and Deegan, 2002). Legitimacy theory extends the principal-agent relationship to include a wider group of stakeholders representing societal interests, and this conceptualization broadens the role of corporate governance mechanism to align firm activities with the wider interest of stakeholders. Thus, managers are motivated to disclose more information to support their claim on legitimacy.

Large firms have been the focus of disclosure studies. Agency theorists state that agency problems and costs are higher in large firms because of diffuse ownership structure. Alternatively, on the grounds of political cost hypothesis, legitimacy theorists argue that public visibility of large firms leads to political cost (Reverte, 2009; Watts and Zimmerman, 1978). The above theoretical underpinnings suggest that managers of large firms are motivated to increase disclosures to reduce agency costs and claim legitimacy. Thus, large firms are more likely to provide sustainability disclosures and these claims of theorists have been supported by empirical evidence.

Agency theory has a financial stakeholder perspective and is unable to provide a comprehensive theoretical explanation on sustainability disclosures beyond agency relationship (Neu *et al.*, 1998; Reverte, 2009). Whereas, legitimacy theory is likely to suggest that sustainability disclosures are a prerequisite for a firm's claim on legitimacy and provides a wider explanation for firms to disclose sustainability related information (Hahn and Kuhnen, 2013). Further, agency theorists argue that efficient markets provide the opportunity to trade information. But, most users of sustainability disclosures do not participate in efficient markets to trade information (Cormier *et al.*, 2005; Reverte, 2009). Although legitimacy theory provides a strong explanation to report sustainability information, the concept of legitimacy is considered problematic because societal expectations are evolving and ambiguous (Ashforth and Gibbs, 1990) and identifying the principal to whom the agent is accountable is challenging (Woodward *et al.*, 1996). Hence, this study applies agency theory and legitimacy theory to provide a broader and complementary perspective on the link between corporate governance attributes and sustainability disclosures.

2.1 Development of hypotheses

2.1.1 Board size. Extant literature on board size suggests two contrasting views. One view argues for larger boards and the other view argues for smaller boards. The first view argues that larger boards are inefficient because they result in weaker control of management and increases the agency cost. However, this view is countered by stating that large boards are less likely to be influenced by management. Although small boards are considered efficient they are likely to be influenced by managers. Furthermore, it is argued that large boards allow including directors with different expertise (Laksmana, 2008; Said *et al.*, 2009). Previous studies have found a positive association between board size and voluntary disclosures (Lim *et al.*, 2007; Laksmana, 2008). Similarly, studies exploring the association between board size and CSR disclosures have reported a positive association (Said *et al.*, 2009; Ntim and Soobaroyen, 2013; Esa *et al.*, 2012). Hence, it is hypothesized that:

H1. There is a positive association between board size and sustainability reporting.

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2.1.2 Board independence. Board independence is an important aspect of corporate governance. Proponents of the agency theory suggest increasing independent directors in boards to mitigate agency problems and improving the quality of board monitoring (Jensen and Meckling, 1976; Fama and Jensen, 1983; Barako *et al.*, 2006). Boards with a higher proportion of independent directors exert pressure on managers to disclose more information and reduce agency costs.

The findings of empirical studies on the association between proportion of independent directors and disclosures are mixed. Studies by Ho and Wong (2001), Haniffa and Cooke (2002) and Boesso and Kumar (2007) found no association between board independence and voluntary disclosure. However, a negative relationship between board independence and voluntary disclosure was reported by Eng and Mak (2003) and Barako *et al.* (2006). More recently, Chau and Gray (2010) found a positive association between proportion of independent directors and voluntary disclosures. Extending the governance and voluntary disclosure research to social and environmental disclosures, Said *et al.* (2009) found no evidence on significant association between board independence and CSR disclosures; Haniffa and Cooke (2005) found a negative association between board independence and CSR disclosure; and Barako and Brown (2008) found a positive association between board independence and CSR disclosures. Based on the above evidence the following hypothesis is proposed:

H2. There is a positive association between board independence and sustainability reporting.

Board independence is further strengthened by separating the roles of chairman and CEO in firms. Agency theorists argue that CEO duality compromises board functions and board independence, and proposes a dual leadership structure separating the functions of chairman and CEO. Thus, a dual leadership structure improves board independence and monitoring and influence managers to disclose more information.

Chau and Gray (2010) reported a positive association between dual leadership and voluntary disclosure, where as Forker (1992) and Gul and Leung (2004) had reported a negative association between CEO duality and voluntary disclosures previously. Haniffa and Cooke (2002) and Barako *et al.* (2006) found no evidence of an association between dual leadership and voluntary disclosures. Studies examining the link between dual leadership and CSR disclosures have either reported a negative association or no association (Said *et al.*, 2009; Ntim and Soobaroyen, 2013). Based on the above arguments and empirical evidence, the following hypothesis is proposed:

H3. There is a positive association between dual leadership and sustainability reporting.

2.1.3 Board diversity. Board diversity is a contemporary topic of debate that has gained importance within corporate governance research, and proponents of board diversity suggest that a heterogeneous board has a broader understanding of complexities in the environment compared to a homogenous board (Carter *et al.*, 2003). From an agency theory perspective, board diversity nurtures board independence and improves quality of monitoring (Carter *et al.*, 2003). Similarly, a largely independent and diverse board can contribute to firm legitimacy as it can approach a wider stakeholder group and strengthen relations between the firm and stakeholders (Ntim and Soobaroyen, 2013).

Within the board diversity discussions, promoting gender diversity continues to be the centre of focus and is driven by the fact that having female directors on boards is

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likely to have a positive impact on firms (Adams and Ferreira, 2009; Mahadeo *et al.*, 2012; Carter *et al.*, 2003). Going beyond gender diversity, few studies have emerged exploring the impact of ethnic diversity of directors on disclosures (Haniffa and Cooke, 2002; Ntim and Soobaroyen, 2013). Appointment of female directors and appointment of directors from different ethnic groups has been argued to be an act of legitimation (Farrell and Hersch, 2005).

Barako and Brown (2008), Bear *et al.* (2010) and Zhang (2012) found a positive link between boards with female directors and CSR disclosures. Ntim and Soobaroyen (2013) found no relationship between gender diversity and CSR disclosures and Post *et al.* (2011) found having three or more women on board did not relate to social and environmental disclosures. Based on the above arguments and empirical findings, it is hypothesized that:

H4. There is a positive association between boards with female directors and sustainability reporting.

Studies exploring the association between ethnically diverse boards and voluntary disclosures are relatively few. Studies by Haniffa and Cooke (2005), Ntim and Soobaroyen (2013) and Zhang (2012) report a positive relationship between board ethnicity and CSR disclosures. Based on the above findings the following hypothesis is proposed:

H5. There is a positive association between ethnically diverse boards and sustainability reporting.

3. Data and methodology

3.1 Sample and data

The sample of 150 companies for the study was drawn from the 287 companies listed on the CSE in 2012 (CSE, 2012a, b). Initially, the stratified sampling method was applied to identify the number of companies representing the 20 sectors on CSE; companies representing each sector were then randomly selected. Out of the 150 companies in the selected sample, 148 companies were selected for the analysis because of the availability of the annual reports of 2012 on CSE web site. Table I provides information on the sample profile.

Data pertaining to board characteristics were collected from the annual reports of 148 companies for the year 2012. Similarly, financial data of the companies were also

Sector	No. of companies	Sector	No. of companies
Bank, finance and insurance	32	Land and property	10
Beverage, food and tobacco	11	Manufacturing	19
Chemicals and pharmaceuticals	05	Motors	3
Construction and engineering	02	Oil palms	3
Diversified holdings	10	Plantations	10
Footwear and textiles	02	Power and energy	4
Healthcare	03	Services	4
Hotels and travels	18	Stores supplies	2
Information technology	01	Telecommunications	1
Investment trusts	04	Trading	4

Table I. Sample profile by industry (p. 11)

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collected from the annual reports of 2010, 2011 and 2012. The availability of the published sustainability reports was sourced from the annual reports and corporate websites. It was observed that most companies published sustainability reports as a part of the annual reports which are made available for the public on the CSE web site. In addition, listed companies that publish stand alone sustainability reports are also made available on the CSE web site.

3.2 Measurement of variables

The dependent variable, sustainability reporting, was operationalized as a binary variable. A firm that publishes a sustainability report was allotted "1" and a firm which does not publish a sustainability report was allotted "0". The independent variables of the study were board size (Lim *et al.*, 2007; Said *et al.*, 2009; Ntim and Soobaroyen, 2013; Esa *et al.*, 2012), board independence (Eng and Mak, 2003; Haniffa and Cooke, 2002, 2005; Chau and Gray, 2010; Barako and Brown, 2008), dual leadership (Forker, 1992; Chau and Gray, 2010; Haniffa and Cooke, 2002; Barako *et al.*, 2006), boards with female directors (Adams and Ferreira, 2009; Rose, 2007) and board ethnicity (Haniffa and Cooke, 2005; Ntim and Soobaroyen, 2013; Hafsi and Turgut, 2013). Board size in this study was measured by the natural log of number of directors because board size and firm size has been found to have a positive correlation and often firm size is measured using the natural log of total assets. (Anderson *et al.*, 2004; Ujunwa, 2012). Operationalization of the dependent and independent variables are provided in Table II.

Previous studies have found firm profitability (Ho and Wong, 2001; Zhang, 2012; Said *et al.*, 2009; Lim *et al.*, 2007; Haniffa and Cooke, 2002; Akhtaruddin and Haron, 2010; Hafsi and Turgut, 2013; Reverte, 2009), firm size (Ho and Wong, 2001; Haniffa and Cooke, 2002; Brammer and Pavelin, 2008), firm growth (Chau and Gray, 2010; Gul and Leung, 2004; Boesso and Kumar, 2007; Eng and Mak, 2003), firm leverage (Chau and Gray, 2010; Gul and Leung, 2004; Haniffa and Cooke, 2005; Brammer and Pavelin, 2008; Cheng and Courtenay, 2006; Esa *et al.*, 2012; Ho and Wong, 2001) to be associated with voluntary disclosures and sustainability related disclosures. Furthermore, studies have found industry to be an important determinant of corporate disclosures (Haniffa and

Table II. Description of variables (p. 12)

Variable	Measurement
Dependent variable	
Sustainability reporting (SR)	Firm does not publish a sustainability report = 0 Firm publishes a sustainability report = 1
Independent variables	
Board size (BSz)	Natural log of number of directors
Board independence (PIND)	Proportion of independent directors
Dual leadership (DL)	Chairman and CEO roles are combined = 0 Chairman and CEO roles are separated = 1
Boards with female directors (BFD)	Boards without female directors = 0 Boards with female directors = 1
Board ethnicity (BE)	Homogenous = 0, heterogeneous = 1
Control variables	
Firm profitability (RoE)	Net income/equity (3 year average)
Firm size (TA)	Natural log of total assets (3 year average)
Firm growth (MB)	Market value of shares/book value of equity
Firm leverage (LEV)	Long term debt/book value of equity
Firm age (LY)	Number of listed years
Industry (IND)	Non-sensitive sectors = 0, sensitive sectors = 1

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Cooke, 2005; Barako *et al.*, 2006; Lim *et al.*, 2007; Branco and Rodrigues, 2008; Hackston and Milne, 1996; Ho and Wong, 2001; Elsayed and Hoque, 2010). Based on the studies of Hackston and Milne (1996) and Branco and Rodrigues (2008) industry was operationalized as a binary variable. If the primary activity of the firm is sensitive to environment and sustainability concerns then the firm was categorized as belonging to the sensitive sector (1). If the primary activity of the firm was not sensitive to environment and sustainability concerns then the firm was categorized as belonging to the non-sensitive sector (0). Accordingly, manufacturing, chemicals, construction, real estate, plantations and energy sectors were identified to be sensitive sectors and financial services, hospitality, healthcare, information technology, trading and other services were identified as non-sensitive sectors. Additionally, the study also employed the listing age of the firm as a control variable (Haniffa and Cooke, 2002, 2005; Elijido-Ten, 2007). Operationalization of the control variables are provided in Table II.

3.3 Method of analysis

Binary logistic regression was selected as the method of analysis to test the hypotheses, because the study comprised a binary dependent variable and a combination of continuous and categorical variables. The logistic regression was executed as a hierarchical logistic regression. To perform the hierarchical logistic regression, the control variables were entered and tested first and then the independent variables were entered to perform the full logistic regression analysis. Accordingly two logistic regression equations were tested.

Model 1:

$$\text{Logit}\,[P(SR)] = \ln\{P(SR)/[1-P(SR)]\} = \beta_0 + \beta_1 RoE + \beta_2 \text{TA} + \beta_3 MB + \beta_4 LEV + \beta_5 LY + \beta_6 IND$$

Model 2:

$$\text{Logit}\,[P(SR)] = \ln\{P(SR)/[1-P(SR)]\} = \beta_0 + \beta_1 BSz + \beta_2 PIND + \beta_3 DL + \beta_4 BFD + \beta_5 BE + \beta_6 RoE + \beta_7 TA + \beta_8 MB + \beta_9 LEV + \beta_{10} LY + \beta_{11} IND$$

3.4 Sampling adequacy

The study comprised of 148 observations and 11 explanatory variables. The observation to explanatory variable ratio is 13.5:1. The observations to explanatory variable ratio met the requirements to perform a logistic regression as per extant literature. Also, the number of observations exceeded the minimum sample requirement of 100 observations, to conduct a logistic regression analysis (Peng *et al.*, 2002).

4. Empirical results and discussion

4.1 Descriptive statistics

Descriptive statistics and Spearman correlation coefficient of all variables are presented in Tables III and IV. The dependent variable sustainability reporting has a mean of 0.5 suggesting that 50 per cent of the listed firms in the sample are adopting sustainability reporting. The mean of board size is 7.77 and this is comparable to the mean board size reported by Esa *et al.* (2012), Said *et al.* (2009), Yatim *et al.* (2006) and Barako *et al.* (2006) for firms in developing economies in Asia and Africa. The mean of board independence is 0.39, indicating that the proportion of independent directors

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Table III.
Descriptive statistics (p. 15)

	Mean	SD	Dichotomous variables 0	1
Sustainability report	0.50	0.50	74 (50%)	74 (50%)
Board size	7.77	1.976		
Board size (Ln)	2.02	0.27		
Prop. of ind. directors	0.39	0.14		
Dual leadership	0.79	0.41	31 (21%)	117 (79%)
Boards with female directors	0.38	0.49	92 (62%)	56 (38%)
No of female directors	0.53	0.83		
Prop. of female directors	0.07	0.10		
Board ethnicity	0.64	0.48	54 (36%)	94 (64%)
RoE	0.14	0.32		
Total assets (Ln)	21.61	2.02		
MB ratio	11.23	74.93		
Leverage	0.23	2.15		
Firm age	21.18	17.54		
Industry	0.48	0.50	77 (52%)	71 (48%)

represents only 39 per cent out of the total directors in the sample firms. This is comparable to evidence on the proportion of independent directors reported by Kim and Lim (2010), Chau and Gray (2010) and Gul and Leung (2004) for firms in Asian economies. The mean of dual leadership indicates that 117 (79 per cent) firms in the sample have separated the roles of chairman and CEO. Chau and Gray (2010) reported CEO duality of 54 per cent for a sample of 298 Hong Kong firms based on data from 2002. Samaha *et al.* (2012) reports 61 per cent CEO duality based on a sample of 100 firms in Egypt. Accordingly, it can be stated that listed firms in Sri Lanka have adopted the dual leadership structure compared to listed firms in other emerging economies. The mean of boards with female directors suggest that 56 (38 per cent) firms in the sample have at least one female director and the mean of board ethnicity suggest that 94 (64 per cent) of the firms in the sample have directors belonging to multiple ethnic groups in Sri Lanka. Additionally, the Table III also includes the mean of number of female directors and proportion of female directors. These were included to provide a better understanding on the appointment of female to corporate boards in Sri Lanka. The mean of number of female directors suggest that 53 per cent of firms in the sample have at least one female director on the board. Similarly, the mean of proportion of female directors suggest that the total number of female directors on corporate boards of the 148 firms is 7 per cent of the total number of directors. Carter *et al.* (2003) reported that 75 per cent of Fortune 1,000 firms had female directors and 50 per cent of firms had minority directors. Barako and Brown (2008) also documents that the proportion of female directors on corporate boards are very low in many countries. The mean of the three year average of RoE is 14 per cent. The averages of natural log of total assets, market to book ratio and leverage are 21.61, 11.23 and 0.23, respectively. Mean listing age of firms in the sample is 21 years. The mean of the industry indicates that 71 (48 per cent) firms in the sample belong to sectors sensitive to environment and sustainability concerns.

In the correlation matrix, sustainability reporting has a statistically significant positive association with board size, dual leadership, firm size and leverage. The association between sustainability reporting and boards with female directors is negative and statistically significant ($p < 0.05$). Among the firm characteristics, firm size has a significant positive association with profitability and leverage. Furthermore,

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Table IV. Spearman correlation coefficients (p. 15)

	1	2	3	4	5	6	7	8	9	10	11	12
Sustainability report	1											
Board size (Ln)	0.214**	1										
Prop. ind. dir.	−0.001	−0.235**	1									
Dual Leadership	0.216**	0.091	0.050	1								
Boards with fem. dir.	−0.167*	0.039	−0.046	0.025	1							
Board ethnicity	0.028	0.124	−0.084	−0.080	−0.161	1						
RoE	0.080	−0.068	0.032	0.069	0.077	0.083	1					
Total assets (Ln)	0.446**	0.239**	0.006	0.069	0.067	0.058	0.249**	1				
MB ratio	−0.017	−0.036	−0.046	−0.141	0.040	−0.047	0.169*	−0.157	1			
Leverage	0.179*	0.203*	−0.092	−0.007	0.095	−0.109	−0.041	0.248**	0.053	1		
Firm age	−0.077	0.025	−0.008	−0.092	−0.334**	0.187*	−0.111	−0.006	0.064	−0.101	1	
Industry	0.068	0.019	−0.194*	−0.004	−0.247**	0.138	−0.099	−0.139	−0.064	−0.053	0.286**	1

Note: *, **Significant at 0.05 and 0.01 levels, respectively

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profitability and firm growth and firm age and industry have significant positive associations. Accordingly, evidence of bivariate associations among the proposed variables in the correlation matrix provides a basis to continue with multivariate analysis. Moreover, the correlation coefficients of variables indicate that multicollinearity is not a problem.

4.2 Logistic regression results

4.2.1 Model robustness. Prior to interpreting the logistic regression model results, robustness checks were performed to examine whether model results were affected by multicollinearity, outliers and influential cases and the assumption of logistic regression was met. The linearity between the logit and continuous independent variables was examined by performing the Box-Tidwell transformation (Hosmer and Lemeshow, 2000; Menard, 2002). The Box-Tidwell transformation was performed prior to executing the logistic regression and the results showed that Box-Tidwell transformation of total assets was significant ($p < 0.01$). This suggests that total assets needs to be transformed and validates the inclusion of natural log of total assets for analysis.

The correlation coefficient among variables was below the critical level of 0.8 (Gujarati, 1988; Hair *et al.*, 1995) and standard error of β coefficients of predictor variables in the full model was below 2 (Hong and Zhou, 2006). Additionally, a linear regression analysis was also performed to examine collinearity among variables as proposed by Menard (2002). VIF values of explanatory variables were below 2. These diagnostics indicate that the logistic regression results were not affected by multicollinearity.

Studentized residuals, deviance and Cook's distance (D) were examined to see whether the full logistic regression model was affected by outliers and influential cases. Since studentized residuals and deviance values were within ± 3.0 (Menard, 2002), it was concluded that the model was not affected by extreme outliers. Investigating the Cook's D values of observations revealed that two observations had values $> +1$. Accordingly, the full logistic regression model was performed excluding the influential observations to examine whether removing the influential observations significantly improved the model parameters. Results suggested that removing the influential observations somewhat improved the model's χ^2 coefficient ($\chi^2 = 60.028$) and, Pseudo R^2 measures (Cox and Snell R^2 33.7 per cent and Nagelkerke R^2 44.9 per cent) and predictive accuracy (80 per cent). Since the results excluding the influential observations were not significantly different from model 2 (Table IV), the two identified influential observations were retained for final analysis. Based on robustness diagnostics tests, the logistic regression model results were considered fit for interpretation.

4.2.2 Model fit statistics. Table V presents the results of the logistic regression model fit statistics. Model 1 includes only the control variables and the χ^2 coefficient ($\chi^2 = 31.581$) of the model is significant ($p < 0.01$). This indicates that control variables in the model 1 can significantly discriminate between sustainability reporting and non-reporting firms against the constant only model. Further, the Hosmer and Lemeshow Test χ^2 ($\chi^2 = 8.336$, $p = 0.401$) suggests that the model fits the data. The Cox-Snell R^2 (19.2 per cent) and Nagelkerke R^2 (25.6 per cent) suggest that firm characteristics are important to explain whether firms are adopting sustainability reporting. The predictive accuracy of model 1 is 72.3 per cent, which is a considerable increase compared to the predictive accuracy of the constant only model.

Model 2 which includes all the independent variables and the control variables reports a χ^2 coefficient of 53.907 and is significant at 0.01, hence rejecting the null hypothesis that coefficients of the variables equals 0 (H_0: $\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = 0$). Additionally, the log likelihood statistic

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	Null model	Model 1	Model 2
Model coefficient χ^2		31.581	53.907
Significance		0.000	0.000
−2LL	205.172	173.591	151.265
Cox and Snell R^2		0.192	0.305
Nagelkerke R^2		0.256	0.407
Hosmer and Lemeshow Test χ^2		8.336	12.523
Hosmer and Lemeshow Test significance		0.401	0.129
Predictive accuracy	50.0	72.3	77.7

Notes: The null model is a constant only model; model 1 includes only the control variables; model 2 includes all the independent and control variables; and model 3 includes only significant variables

Table V. Logistic regression model fit statistics (p. 16)

(−2LL) in the full model decreases to 151.265 from 205.172 in the null model corresponding to the increase in the χ^2 coefficient. This explains that the variables in the full logistic regression model are able to significantly discriminate between sustainability reporting and non-reporting firms against the constant only model. Moreover, the Hosmer and Lemeshow Test χ^2 ($\chi^2 = 12.523$) is not significant ($p = 0.129$), indicating that the proposed model fits the data and is better than the null model. The Pseudo R^2 measures, Cox-Snell R^2, suggest that the predictor variables can explain 30.5 per cent of the variability in the dependent variable, whereas the Nagelkerke R^2 suggests it can explain 40.7 per cent of the variability in the dependent variable. The full logistic regression model has a predictive accuracy of 77.7 per cent.

4.2.3 Hypotheses tests results. Table VI presents the results of the logistic regression models. Logistic regression results of model 2 show that the Wald statistic of board size

	B	SE	Wald	Sig.	Exp(*B*)
Model 1					
RoE	−0.952	0.772	1.521	0.218	0.386
Total assets (Ln)	0.613	0.143	18.280	0.000	1.845
MB ratio	0.006	0.003	3.703	0.054	1.006
Leverage	0.017	0.119	0.021	0.884	1.017
Firm age	−0.019	0.011	2.880	0.090	0.981
Industry	0.787	0.394	4.001	0.045	2.198
Constant	−13.217	3.128	17.855	0.000	0.000
Model 2					
RoE	−0.856	0.800	1.144	0.285	0.425
Total assets (Ln)	0.648	0.153	18.002	0.000	1.911
MB ratio	0.007	0.003	5.145	0.023	1.007
Leverage	0.053	0.112	0.225	0.635	1.055
Firm age	−0.034	0.013	6.511	0.011	0.967
Industry	0.643	0.441	2.123	0.145	1.903
Board size (Ln)	1.521	0.862	3.112	0.078	4.575
Proportion of independent directors	0.140	1.550	0.008	0.928	1.150
Dual leadership	1.352	0.538	6.320	0.012	3.865
Boards with female directors	−1.546	0.468	10.921	0.001	0.213
Board ethnicity	0.240	0.442	0.295	0.587	1.271
Constant	−17.381	3.733	21.678	0.000	0.000

Notes: *B*, estimated coefficient; SE, standard error; Exp(*B*), odds

Table VI. Logistic regression model results (p. 17)

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is significant at 0.1, the Wald statistic of dual leadership is significant at 0.05 and the Wald statistic of boards with female directors is significant at 0.01. Accordingly, the null hypotheses that the coefficients of the above independent variables equals 0 ($\beta_1 = 0$, $\beta_3 = 0$, $\beta_4 = 0$) is rejected.

Coefficients of board size and dual leadership is positive suggesting that board size and dual leadership have a positive influence on sustainability reporting and supports the *H1* and *H3* proposed in the study. Above findings on the influence of board size and dual leadership on sustainability reporting is consistent with findings reported by Lim *et al.* (2007), Ntim and Soobaroyen (2013), Said *et al.* (2009) and Esa *et al.* (2012). The Exp(*B*) statistic for board size implies that the odds of sustainability reporting increase by 4.575 when the natural log of board size increases by 1 unit. Similarly, the Exp(*B*) for dual leadership indicates that the odds ratio of sustainability reporting in firms with dual leadership is 3.865 times compared to a firm without a dual leadership.

Coefficient of boards with female directors suggests a negative influence on sustainability reporting and suggests that the direction of *H4* is negative. However, Bear *et al.* (2010) and Barako and Brown (2008) reported a positive relationship between the variables. The Exp(*B*) for boards with female directors implies that the odds of sustainability reporting in firms with female directors on board is 0.213 times, compared to firms without female directors on boards.

The Wald statistic of other independent variables, proportion of independent directors and board ethnicity is not significant, suggesting that there is no evidence to support *H2* and *H5* proposed in the study. Lack of evidence on the relationship between board independence and corporate disclosures was previously reported by Ho and Wong (2001) and Boesso and Kumar (2007). Although the results of the study do not provide any evidence on a significant relationship between board ethnicity and sustainability reporting, Ntim and Soobaroyen (2013) has reported a positive relationship between board ethnicity and CSR disclosures.

Among the control variables, Wald statistic of natural logarithm of total assets is significant at 0.01and the coefficient indicates a positive association between firm size and sustainability reporting. This is consistent with the results reported by Ho and Wong (2001), Lim *et al.* (2007), Brammer and Pavelin (2008), Branco and Rodrigues (2008), Haniffa and Cooke (2005), Hackston and Milne (1996), Akhtaruddin and Haron (2010) and Ntim and Soobaroyen (2013). Thus, it can be stated that large firms are more likely to adopt sustainability reporting (Exp(*B*) >1). Results also suggest that market to book ratio and firm age are significant at 0.05. The positive association between market to book ratio and sustainability reporting suggest that firm growth is likely to influence firms to adopt sustainability reporting (Exp(*B*) >1). This finding is consistent with Gul and Leung (2004). The negative coefficient of firm age suggests that younger firms or newly listed firms are more likely to produce sustainability reports (Exp(*B*) <1). However, previous studies reported no evidence on the association between firm age and corporate disclosures (Haniffa and Cooke, 2002; Alsaeed, 2006; Elijido-Ten, 2007).

Profitability (RoE), leverage and industry are not significantly associated with sustainability reporting. Studies by Hackston and Milne (1996), Alsaeed (2006), Branco and Rodrigues (2008), Gul and Leung (2004), Haniffa and Cooke (2005), Chau and Gray (2010) and Cheng and Courtenay (2006) have found similar evidence that profitability, leverage and industry had no significant association with corporate disclosures.

Additionally, ROC curve and coefficient of discrimination (*D*) were examined to further validate the logistic regression results. The area under the curve (AUC) in the

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ROC curve is 0.831 ($p < 0.01$) suggesting that the model is able to discriminate between sustainability reporting and non-reporting firms better than by chance. According to Hosmer and Lemeshow (2000) an AUC between 0.8 and 0.9 is considered excellent discrimination.

The Tjur's coefficient of discrimination (*D*) was calculated to examine whether the variables proposed in the study can discriminate between sustainability reporting and non-reporting firms. The mean predicted value for sustainability reporting firms is 0.662 and the mean predicted value for firms not reporting sustainability is 0.339. The mean predicted value for sustainability reporting firms are higher compared to non-reporting firms, suggesting good discrimination between the groups. Alternatively, it can also be stated that the model has a predictive power of 32.3 per cent (0.662−0.339) (Tjur, 2009).

5. Conclusion, limitations and future research

Drawing on agency theory and legitimacy theory perspectives, this study examined the influence of board characteristics on sustainability reporting. A sample of 148 listed companies from the CSE in Sri Lanka was selected for this study. The results of the study show that board size and dual leadership has a positive association with sustainability reporting whereas boards with female directors have a negative association with sustainability reporting. The negative association between boards with female directors and sustainability reporting is contradictory to previous findings. Additionally, the study did not find sustainability reporting to be associated with board independence and board ethnicity. Empirical findings provide support for the agency theory and legitimacy theory perspectives, although there needs to be a stronger theoretical explanation on how board diversity attributes can be linked to sustainability disclosures, especially in emerging economy contexts.

The study also provides support to claims put forward by agency theorists and legitimacy theorists on disclosures in large firms. The study found a significant positive association between firm size and sustainability reporting, suggesting that large firms are likely to provide sustainability reports to reduce or avoid agency costs and political costs. Additionally, the study also found positive association between firm growth and sustainability reporting and negative association between firm age and sustainability reporting. Additional measures employed to validate the results of the study indicates that the independent variables in the study can discriminate between sustainability reporting firms and non-reporting firms.

Findings of this study have several implications. This is the first study from Sri Lanka to examine whether sustainability reporting is influenced by board characteristics. The study also provides insights on board characteristics of listed firms in Sri Lanka. Further, it should be stated that firms in Sri Lanka voluntarily undertake social and environmental disclosures in the absence of mandatory disclosure requirements and the concept is relatively new to listed firms in Sri Lanka. The link between firm size, board size and sustainability reporting found in this study suggest that large firms are likely to have large boards and these factors are most likely to predict whether firms are likely to adopt sustainability reporting. From an agency theory perspective, large firms needs to be effectively monitored and requires a relatively large board to support corporate disclosures and reduce agency costs. Similarly, having a large board enables firms to recruit expertise from diverse backgrounds. From a resource dependence theory perspective, large boards provide firms with more opportunities and resources. Empirical evidence provided in this

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study suggests that corporate governance mechanism can play an important role in small and underdeveloped equity markets and these markets are likely to benefit from strengthening corporate governance because boards are likely to influence firms to adopt sustainability related disclosure and this could enable the markets to attract investors and firms to access capital. For example, the findings of the Intergovernmental Working Group of Experts on International Standards of Accounting Reporting found that corporate responsibility and compliance had the least number of disclosure requirements in 21 countries with relatively small or new equity markets (UNCTAD, 2010). Thus, it appears to be advantageous for developing economies and economies with less developed equity markets to strengthen corporate governance mechanisms.

This study also provides empirical support for agency theory and legitimacy theory perspectives in developing economies and ratify findings of previous studies emerged from developing economies. However, it should be noted that the study does not examine contextual factors that influence firms to adopt sustainability reporting and determines board structures. Moreover, between board structures and disclosure, board effectiveness is an important element that needs to be understood. Hence, there needs to be further debate on the effectiveness of boards in developing economies and how above theoretical underpinnings can provide insight to link board characteristics, board effectiveness and corporate disclosures.

5.1 Limitations and future research

Findings reported in this research are subject to certain limitations. One of the limitations is that the dependent variable is operationalized as a binary variable and it does not provide insight on the quality of sustainability reporting. There is a need to investigate how board characteristics influence quality of sustainability reporting and this would contribute to developing a broader governance and disclosure framework. Other than for total assets and RoE, all other data were collected only for one year. Conducting a longitudinal study to investigate the link between board characteristics and sustainability disclosures using data from years before and after 2013 would further validate the findings of this study. The data in the study are limited to public limited companies in Sri Lanka and expanding the study to include data from other emerging economies in Asia is beneficial for corporate governance and social and environmental disclosure literature, as it would provide insight on how differences in contexts and board characteristics influence social and environmental disclosure.

Future studies also need to examine the impact of ownership structure, board effectiveness, committees and profile of directors on sustainability reporting since previous studies have found that they affect corporate disclosures. Further, studies need to consider controlling for the impact of board size. Finally, board characteristics only explain 41 per cent of what drives firms to adopt sustainability reporting, thus it is required to explore the influence of other internal and external factors on sustainability reporting in a voluntary context.

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