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Who cares about climate change reporting in developing countries? The market response to, and corporate accountability for, climate change in Bangladesh

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Abstract Undoubtedly, climate change is one of the greatest problems facing today's world. Despite this, traditional research has ignored the market response to, and accountability for, climate change reporting in developing countries. Hence, this study critically examines climate change reporting practices in the most affected countries in the world, with specific reference to Bangladesh. In the study, 32 semi-structured interviews and 71 annual reports are evaluated. Using legitimacy theory, the study contributes to building an understanding of companies' attitude toward stakeholder accountability regarding climate change. The study finds that Bangladeshi companies are reporting climate change information on an average of 2.23 %. More specifically, the study demonstrates that large companies are reporting on more climate change issues than others because of their legitimized positions in the market. Again, a lack of regulation and a culture of low social accountability among the companies contribute to a very low level of disclosure on climate change. Surprisingly, multinationals are not providing satisfactory disclosure. The study has policy implications in developing countries for both local policy makers (the government) and international policy makers (the Intergovernmental Panel on Climate Change, the European Union, the World Bank, the UN Environment Programme, the International Energy Agency and the World Economic Forum) as to how to engage local companies so that they become more socially accountable to climate change reporting.

Keywords Accountability · Bangladesh · Climate change reporting · Legitimacy theory

1 Introduction and background

With the dramatic recent increase in the impacts of climate change, continuous pressure for businesses to be socially responsible has been established. Climate change has gone from bad

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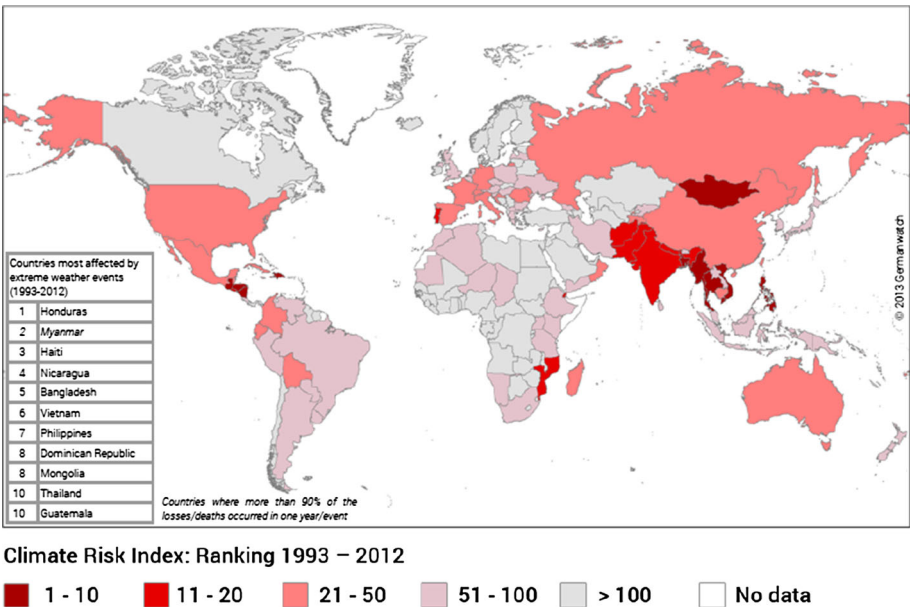


Fig. 1 World Map of the Global Climate Risk Index 1993–2012. *Source* Kreft and Eckstein (2013). Available at: http://germanwatch.org/en/download/8551.pdf

to worse (Canadell et al. 2007; Kreft and Eckstein 2013; Luo and Tang 2014; Schmid 2009) (see Fig. 1 for the Global Climate Risk Index 1993–2012), with the consequence that climate change reporting has become more intensely significant in today's globalized business than it has been in the past. Due to climate change (increasing carbon intensity and the regular degradation of ecosystems), it has been found by scientists that continuous changes in temperature and rainfall result in increases in the intensity and frequency of floods, cyclones and droughts (Intergovernmental Panel on Climate Change—IPCC 2007a, b, 2013). In the 1990s, global carbon emissions increased by 0.9 % in comparison with 2000s by 3.5 % (IPCC 2013). This situation has affected the livelihoods, society, culture and health of people all over the world (Meng et al. 2014) and is also threatening global economic growth, sustainable development and poverty reduction (IPCC 2013). Kintisch (2009, p. 1546) stated that 'Emissions are soaring, projections of sea level rise are higher than expected, and climate impacts around the world are appearing with increasingly frequency.' The UN Framework Convention on Climate Change (UNFCCC 2014) predicted that billions of people in developing countries will face shortages of water, food and greater risks to health.

Given the significance of climate change, developed countries have also established related Acts to counter it (see Table 1). According to the UN Framework Convention on Climate Change (UNFCCC) (2014), these countries are legally forcing companies (in particular, those listed on the stock exchange) to disclose climate change issues and information.

The study is focused upon Bangladesh for several reasons. Bangladesh is one of the most vulnerable countries in the world to climate change (BBC 2006, 2010; Maplecroft 2014; The Guardian 2012, 2013; World Bank 2014) (see Fig. 2 for the Climate Change Vulnerability Index 2014). In Bangladesh, 60 % of the deaths caused by climate change worldwide (e.g., as a result of cyclones and floods) in the last 20 years have occurred. Bangladesh is the eighth most populous country in the world, with a total population of 163 million people. Its GDP has grown

Table 1 Climate change regulation in developed countries

Country	Climate change regulation	Overview of regulation
UK	Climate Change Act 2011	It focuses on low-carbon economy, particularly specific emissions reduction targets [at least 80 % reduction from 1990 levels by 2050] and creating 5-yearly carbon budgets; and Energy Act 2013, focuses on encouraging low-carbon electricity generation through contracts for differences
USA	Clean Air Act 1963 [amended 1976 and 1990]; American Clean Energy and Security Act of 2009 (H.R. 2454 of the 111th Congress)	Environmental Protection Agency is required to regulate gases for their GHG potential
Germany	The Nuclear Energies Act; The Renewable Energies Act 2011	It focuses on GHG emissions by 40 % by 2020 in comparison with the 1990 level
France	Grenelle laws I and II, 2009–2010; Energy Transition 2014/Transition énergétique 2014 which is submitted to the government and draft legislation is expected in early 2015	Grenelle laws focus on emissions targets, renewable energy, energy efficiency and research and development. The bill of Energy Transition 2014/Transition énergétique sets a goal to cut GHG emissions by 40 % by 2030
Denmark	Energy Agreement 2012–2020	It focuses on achieving the target of approximately 50 % of electricity consumption to be supplied by wind power, more than 35 % renewable energy in final energy consumption, 34 % reduction in greenhouse gas emissions in relation to 1990 and 7.6 % reduction in gross energy consumption. This will help to achieve the target of 100 % renewable energy in the energy and transport sectors by 2050
Switzerland	The revised CO_2 Act 2013 [CO2 Ordinance, Art. 3]	GHG should be reduced by 20 % from the 1990 level by 2020)
Sweden	Energy Tax Act 1994:1774; Government Bill 2010/11:152	The bill focuses on tax incentives for biofuels
New Zealand	Climate Change Response Act 2002[a]	There are seven regulations and four orders under this Act covering a broad scope of technical regulations including general exemptions, fishing allocation plan, eligible industrial activities, removal activities, stationary energy and industrial processes, synthetic greenhouse gas levies, the New Zealand Refining Company Limited, unique emissions factors, Unit Register, waste, forestry, and fossil fuels
Australia	Clean Energy Act 2011	It focuses on GHG emissions by 80 % by 2050

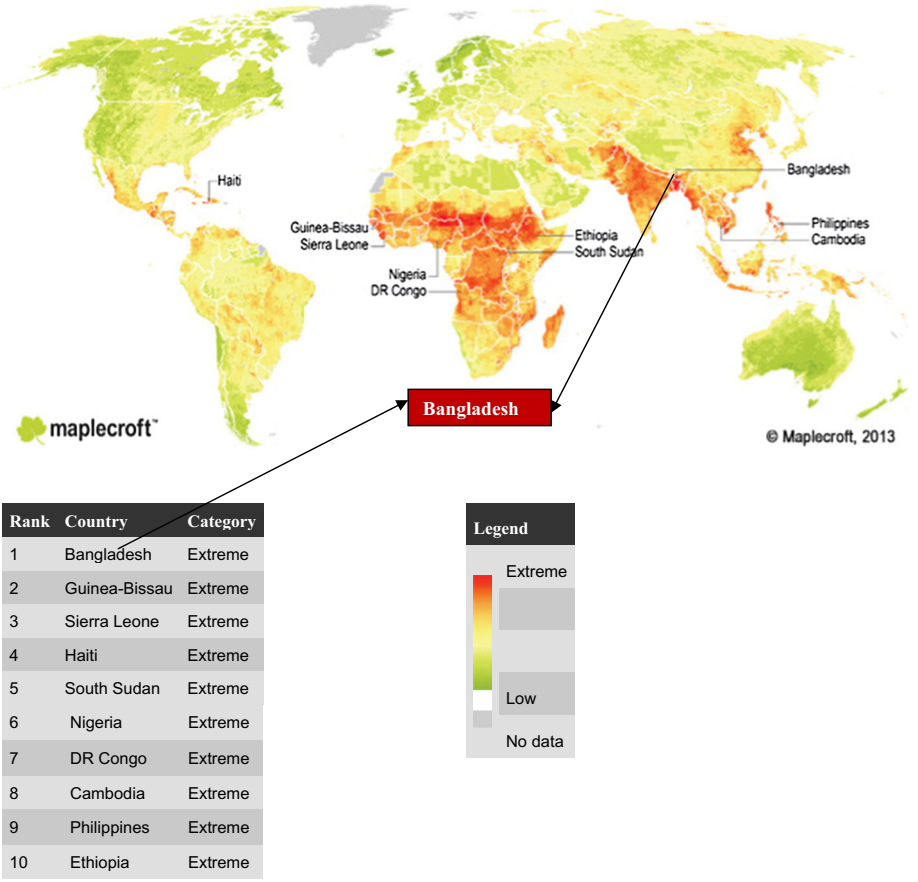
Table 1 continued

Country	Climate change regulation	Overview of regulation
Canada	Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations PC 2013 (Earlier version: *Canadian Environmental Protection Act, 1999)*	It focuses on reducing GHG emissions to 17 % below its 2005 levels by 2020: a target that is identified in the Copenhagen Accord and the Cancun Agreements. By establishing mandatory GHG emission standards for new on-road heavy-duty vehicles and engines beginning in 2014, Canada will move closer to its Copenhagen 2020 target
European Union	EU Emissions Trading System—EU ETS; Renewable Energy Directive; Energy Efficiency Directive 2012; Decision No 529/2013/EU of the European Parliament on accounting rules	The Decision No 529/2013/EU focuses on GHG emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities and also acting as driving force for developing UN Framework Convention on Climate Change - UNFCCC and the Kyoto Protocol)

[a] It incorporated amendments and lays out the legislative framework for the NZ Emissions Trading Scheme (NZ ETS): Climate Change Response Act 2002 (as at September 18, 2012); Climate Change Response Amendment Act 2006; Climate Change Response (Emissions Trading) Amendment Act 2008; Climate Change Response (Emissions Trading Forestry Sector) Amendment Act 2009; Climate Change Response (Moderated Emissions Trading) Amendment Act 2009; Climate Change Response (Emissions Trading and Other Matters) Amendment Act 2012; Climate Change Response (Unit Restriction) Amendment Act 2014

by 6 % in comparison with an average of 5.2 % for all of South Asia (in Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka, the combined population is 1.4 billion, and half of them are among the world's poor) in 2013 (World Bank 2014). Fifty-six million people live below the poverty line, and 45 % of the Bangladeshis are employed in the agricultural sector, but this sector is threatened by increases in the frequency and severity of extreme events and of course by climate change (Gogoi and Kakakhel 2014). Only 47 % of households have an electricity connection (see Table 2 for CO_2 emissions from 1990 to 2011 in Bangladesh). It is also expected that Bangladesh's agricultural GDP will decrease by 3.1 % (approximately $36 billion) for the period 2005–2050 due to climate change (World Bank 2011). Bangladesh has more than 230 major rivers, and their tributaries crisscross a low-lying country with a total land area of 147,570 km^2, with one of the highest population densities in the world. Additionally, according to the World Bank (2011), a third of the country is at risk of tidal inundation and nearly 70 % gets flooded during heavy monsoons with an average elevation of 4–5 m above mean sea level (MSL) (see Fig. 3). An IPCC report (2013) predicted the displacement of 17–20 m Bangladeshis by 2050.

This study critically examines companies' attitudes toward stakeholder accountability regarding climate change reporting practices in Bangladesh. The study adopts a mixed methodology. Firstly, 32 semi-structured interviews were conducted in 2011–2012. Secondly, 71 annual reports for the period 2010–2011 are evaluated. The study confirms the legitimacy theory. Its major finding is that, with the exception of large companies, most companies are not inclined (at a level of only 2.23 %) to report on climate change issues in their annual reports. Surprisingly, multinational companies report very little on climate change. The study



Rank	Country	Category
1	Bangladesh	Extreme
2	Guinea-Bissau	Extreme
3	Sierra Leone	Extreme
4	Haiti	Extreme
5	South Sudan	Extreme
6	Nigeria	Extreme
7	DR Congo	Extreme
8	Cambodia	Extreme
9	Philippines	Extreme
10	Ethiopia	Extreme

Fig. 2 Climate Change Vulnerability Index 2014. *Source* Maplecroft (2014). Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/Climate_Change_Vulnerability_Index_%202014_Map_0.pdf and http://maplecroft.com/portfolio/new-analysis/2013/10/30/31-global-economic-output-forecast-face-high-or-extreme-climate-change-risks-2025-maplecroft-risk-atlas/

contributes to the existing literature and also has policy implications for local and international policy makers with regard to making companies more accountable to society and to help to mitigate climate change effectively. The study also calls for further research in this area.

The study is organized as follows. The next section discusses the related literature, legitimacy theory and the development of the study's hypothesis. The third section explains the research methodology. The results and discussion are presented in the fourth section. The final section offers conclusions, contributions and the limitations of the study.

2 Related literature, theory and hypotheses

2.1 Related literature

Prior literature in the field predominantly focuses on developed countries over the past five decades—1960s to date (see Table 3 for the time period of literature and reporting

Table 2 CO_2 emissions and energy in Bangladesh (1990–2011)

	1990	1993	1996	1999	2002	2005	2008	2009	2010	2011
Energy use (kg of oil equivalent) per $1,000 GDP (constant 2011 PPP)	111.0917	107.5032	107.5479	102.0445	103.0713	100.0059	96.91378	95.78805	95.34392	90.91382
CO_2 emissions from gaseous fuel consumption (% of total)	48.81964	59.743	56.21853	61.92967	59.05135	65.892	69.47801	67.07779	67.27617	–
CO_2 emissions (kt)	15,533.41	17,407.25	24,029.85	25,236.29	33,707.06	37,553.75	46,435.22	52,328.09	56,152.77	–
CO_2 emissions from liquid fuel consumption (% of total)	43.20113	38.78239	39.61544	33.24615	29.61271	26.90167	22.38806	25.04555	25.38366	–
CO_2 emissions (metric tons per capita)	0.14465	0.151502	0.196321	0.194175	0.246026	0.262366	0.313815	0.350013	0.371564	–
CO_2 emissions from solid fuel consumption (% of total)	6.893296	0.695176	2.823134	0.697472	3.949086	0.43941	2.763958	3.111423	2.899497	–
CO_2 emissions from residential buildings and commercial and public services (million metric tons)	2.2	2.06	2.74	3.34	4.28	5.35	5.7	6.02	6.55	6.86
CO_2 emissions from electricity and heat production, total (million metric tons)	4.44	5.77	6.7	8.76	11.46	14.83	20.3	22.48	25.41	25.04
CO_2 emissions from manufacturing industries and construction (million metric tons)	4.51	4.45	7.29	6.9	8.86	9.72	12.28	12.53	11.46	12.09

Table 2 continued

	1990	1993	1996	1999	2002	2005	2008	2009	2010	2011
CO_2 emissions from other sectors, excluding residential buildings and commercial and public services (million metric tons)	0.77	0.99	1.28	1.54	1.9	2.25	2.04	1.93	1.84	1.71
CO_2 emissions from transport (million metric tons)	1.65	2.15	2.91	3.07	3.81	4.65	6.52	7.29	8.07	8.4
Population (in million)	107	115	122	130	137	143	148	150	151	153

Source: World Bank (2014). Available at: http://databank.worldbank.org/data/

–, Data are not available in the World Bank data source

Fig. 3 Climate change affected area of Bangladesh. *Source* World Bank (2011). http://sdwebx.worldbank.org/climateportalb/doc/GFDRRCountryProfiles/wb_gfdrr_climate_change_country_profile_for_BGD.pdf

characteristics of organizations). From the millennium to date, the research has shifted to developing countries' attitudes to corporate social responsibility, but with a limited context (Tien 2013).

Table 3 Time period and reporting characteristics of organizations

Time period	Reporting characteristics of organizations	Author(s)
1960s and 1970s	There was a reporting shift from financial to non-financial disclosure	Abbott and Monsen (1979), Alexander and Buchholz (1978), Bowman and Haire (1976), Brockhoff (1979), Dierkes (1979), Epstein et al. (1976), Fry and Hock (1976), Parket and Eilbrit (1975), Preston (1978), Schreuder (1979), Ullmann (1979), Vance (1975)
1980s	Due to the demand for information, researchers generally use regular annual reports as their main source to empirically examine voluntary disclosure of Corporate Social Responsibility (CSR)	Belkaoui and Karpik (1989), Chen and Metcalf (1980), Cochran and Wood (1984), Cowen et al. (1987), Freedman and Jaggi (1988), Ingram and Frazier (1980, 1983), McGuire et al. 1988; Rockness (1985), Trotman and Bradley (1981), Ullmann (1985), Wiseman (1982)
1990s	The focus shifted from social disclosure reporting to environmental reporting as businesses gradually became conscious about the comparative advantages of environment-friendly products. Consequently, environmental reporting became standard among large and multinational companies	Adams et al. (1998), Azzone and Bertele (1994), Azzone et al. (1996a, b), Clarke and Gibson-Sweet (1999), Dechant and Altman (1994), Deegan and Gordon (1996), Deegan and Rankin (1999), Di Norcia et al. (1993), Gray et al. (1990), Neu et al. (1998), Patten (1991), Roberts (1991, 1992a, b), Robertson and Nicholson (1996), Stanwick and Stanwick (1998a, b), Tilt (1994), Welford and Gouldson (1993), Welford (1995), Zéghal and Ahmed (1990)
2000s to date	The research has shifted to developing countries' attitudes to corporate social responsibility, but with a limited context	Alló and Loureiro (2014), Carlton and Jacobson (2013), Ite (2004), Jamali et al. (2009), Khan et al. (2013), Kolk and Lenfant (2010), Kostova and Roth (2002), Luo and Tang (2014), Sovacool et al. (2012), Tien (2013)

Some recent studies have examined voluntary social responsibility disclosures, specifically in relation to carbon disclosure and firms' behavior. For instance, based on more than 100 semi-structured interviews, Sovacool et al. (2012) found that the response to climate change issues is a complex process in developing countries including Bangladesh, Bhutan, Cambodia and the Maldives. They argued that the ongoing adaptation process should be more robust and that legitimate organizations should be put in place to enable it. In a similar vein, Alló and Loureiro (2014, p. 563) reviewed 58 international studies and found that mitigation actions were preferred over adaptation actions, and these actions were largely affected by social norms. They also mentioned that societies with a long-term orientation demonstrate greater support toward climate change policies. Carlton and Jacobson (2013) investigated risk perception (in relation to climate-related coastal risks and cognitive, affective and risk-specific predictors) of climate change in Florida. Using a survey of 558 undergraduates, the study found that greater economic risks were significantly associated with having more negative environmental attitudes and that greater physical environment risks were significantly associated with having more pro-environmental attitudes. The findings suggest that 'climate change beliefs and risk perceptions are multi-factorial and complex and are shaped by individuals' attitudes and basic beliefs' (Carlton and Jacobson 2013, p. 32).

Again in terms of low levels of disclosure, Tien (2013) investigated firms' actions and responsibility in resisting climate change in Taiwan. They found that only 8.1 % of firms had undertaken corporate social responsibility measures when dealing with climate change and energy consumption while 81.4 % of firms had not done so. They also found that respondents' opinions were mixed on renewable energy reducing GHG emission, energy and environmental tax, oil and power subsidies and green tax systems.

With regard to mixed evidence of firms' behavior toward social responsibility, Wakabayashi (2013, p. 1086) argued that 'In Japan, voluntary business activities are considered to be viable policy instruments alongside regulations and economic incentives (e.g., taxes and emissions trading schemes).' She examines three case studies in which voluntary activities have played a successful role in mitigating climate change. Based on the interviews, the study found that flexibility in voluntary activities by firms allows them to tackle climate change issues more aggressively. Interestingly, the study strongly pointed out that voluntary activities are more environmentally effective than alternative policy measures under a proper institutional framework (such as effective motivation mechanisms for businesses, governmental measures to encourage their compliance and capable industrial associations). Luo and Tang (2014) recently examined whether voluntary carbon disclosure reflected firms' true carbon performance in the USA, Australia and the UK. Based on a content analysis of 474 firms, they found a significant positive association between carbon disclosure and firms' carbon performance. They concluded that firms' voluntary carbon disclosure is indicative of their actual carbon performance. Meng et al. (2014) investigated how corporate environmental performance affects not only the level of detail of a company's environmental disclosures, but also the nature of the information disclosed. Based on a content analysis of 533 Chinese listed companies, they found that both poorly and well performing firms disclosed more than the median (mixed) performers. They also found that a nonlinear relationship existed between corporate environmental performance and environmental disclosure in China. They concluded that poorly performing firms enhanced their environmental disclosure after being exposed as environmental violators. Qi et al. (2014) investigated the relationship between corporate environmental performance and financial performance. Using a dataset from Chinese industrial firms, they found that improving corporate- or industrial-level environmental performance significantly influences financial performance and that slack resources play a significant role in this link.

Regarding regulating the social responsibility of firms, Rankin et al. (2011) acknowledged the importance of regulation regarding climate change. Surmeli and White (2009) argued that the Securities and Exchange Commission (SEC) in the USA has provided disclosure requirements, as under the SEC rules and regulations, 'a publicly listed company must disclose to its investors material information regarding the company—that information a reasonable investor would consider important in making its investment decision. In particular, a company is required to disclose, among other things, (i) the material effects on the company's financial performance of regulations relating to the protection of the environment; (ii) legal proceedings known to be contemplated by governmental authorities; and (iii) any known trends or uncertainties which are reasonably likely to result in a material decrease in the company's liquidity' (p. 11). Also, 'if companies fail to disclose material business risks, shareholders can bring lawsuits seeking to recoup losses in stock prices (all the more likely when stock prices are declining significantly)' (p. 12).

In terms of multinational corporations' (MNCs) social responsibility, it has been found that such firms can have a positive impact in developing countries through corporate social responsibility initiatives focusing on sustainable development (Ite 2004; Jamali et al. 2009;

Kostova and Roth 2002). Ite (2004) presents evidence demonstrating that 'although there is a good business case for Shell to contribute to poverty alleviation in the Niger Delta, Nigeria, there is also a danger that in the long term Shell could effectively be leading the pace of, and directing the paths to, socioeconomic development in the region with little or no contribution from the Nigerian government' (p. 1). He calls for good governance in developing countries and concluded that 'the macro-economy is under-performing due to government failure, there is a likelihood that the contributions of MNCs to poverty alleviation could fail to achieve the desired outcomes.' Jamali et al. (2009), on the other hand, compared the CSR orientations of SMEs and MNCs in developing countries and found, 'CSR in SMEs [is] still lacking institutionalization and catalyzed largely by religious motivation' (p. 355). They argued that the strength of MNCs derives from stronger CSR integration and better institutionalization (Kostova and Roth 2002). Kolk and Lenfant (2010, p. 241) explored how MNCs report on CSR and conflict in three Central African countries (Angola, the Democratic Republic of the Congo and the Republic of the Congo). The findings on company information revealed that opportunities are widely seen and that most MNCs report on their economic and social impacts. They concluded that 'The potential for MNCs' involvement in (co)creating sustainable economies is recognized and needs further research attention in the coming years' (p. 241). Jamali and Neville (2011, p. 610) argued that 'MNC subsidiaries tended to design explicit CSR interventions to respond to the MNC directives on one hand and to increase their legitimacy in the eyes of local stakeholders on the other, susceptible to global institutional pressures, although not totally immune to local isomorphism, whereas local organizations are more intimately enmeshed in national structures/institutions which flavor their peculiar orientations to CSR, while also not totally immune to mimetic isomorphism.'

In the case of Bangladesh, Khan et al. (2013, p. 1460) documented that 'All existing and future power plants and their generation across the country in Bangladesh will be affected by global climate change.' They also predicted that increasingly frequent and intense natural calamities including sea-level rises will cause an adverse impact on economic and social aspects of millions of people's lives in Bangladesh. Islam and Walkerden (2014) argued that bonding relationships, in particular with family members, relatives, neighbors and friends, are key elements of social networks and may play a vital role in responding to climate change effects (such as cyclones and storm surges) in a developing country like Bangladesh (Al Mamun and Al Pavel 2014).

In summary, when considering how social accountability is related to environmental performance, prior literature on voluntary social responsibility behaviors is mixed. Accountability is essentially about power: the division of rights and responsibilities between state, market and civil society actors, and the means for realizing these (Muchlinksi 1999; Pellizzoni 2004). Corporate accountability toward climate change is essential (Rankin et al. 2011). In 2013, it has been found that just 90 companies caused two-thirds of man-made global warming emissions and thus contributed to the ongoing climate crisis. These companies have produced nearly two-thirds of the greenhouse gas emissions generated since the dawning of the industrial age. The companies range from investor-owned firms (such as Chevron, Exxon and BP) to state-owned and government-run firms (The Guardian 2013). The debate on the relationship between corporate accountability and climate change reporting is, ultimately, inconclusive. Very few studies have demonstrated firms' attitude toward the climate change in both developed and developing countries. The motivating question is: What is the relation between climate change reporting and firms' attitudes toward social accountability? The specific research questions (RQ) of the present study are therefore as follows:

RQ1: How is social accountability related to environmental performance?
RQ2: What motivates businesses to take socially responsible action on climate change?

2.2 Theory

Regarding voluntary disclosure, Pellizzoni (2004, p. 545) argued that, 'taking for granted the autonomy of economic and technical choices from public scrutiny… the self-specification of what is to be accounted for, and how, acts as a means of preventing any substantial empowerment of the relevant stakeholders, to the extent that their own questions and concerns remain unexpressed and unaccounted for.' Rankin et al. (2011, p. 1037) found that large companies and also companies in the energy, mining, industrial and service sectors tend to disclose more voluntary information on climate change issues. They observe that some proactive but pragmatic Australian firms are disclosing their GHGs voluntarily for competitive advantage and legitimatization in the current market governance system. Given the importance of stakeholders, Alló and Loureiro (2014, p. 563) have also argued that the role of social factors is crucial in understanding the acceptability of climate change policies at a worldwide level.

Voluntary climate change information disclosure is potentially costly to t firms (Verrecchia 1983). However, the potential benefits may be long term. Legitimacy has long been considered an important organizational resource (Dowling and Pfeffer 1975; Meyer and Rowan 1977; DiMaggio and Powell 1991). The main purposes of pursuing legitimacy are to facilitate the attraction of economic resources and to gain the social and political support necessary for viability (Suchman 1995). Most of the prior research on legitimacy has focused upon the use of annual reports and socially responsible disclosures as tools to legitimize organizations (Meyer and Rowan 1977). This reinforces the choice of using legitimacy theory in the present study.

Legitimacy theory entails consideration of aspects of public impressions in the market (Clarkson et al. 2008; McGuire et al. 1988; Neu et al. 1998; Owen et al. 2000; Papagiannakis and Lioukas 2012; Patten 1991, 2002). Ullmann (1979, 1985) defined legitimacy as the degree to which stakeholders claim immediate and urgent action. Suchman (1995, p. 574) defined legitimacy as 'a generalized perception or assumption that the actions of an entity are desirable, proper or appropriate within some socially constructed system of norms, values, beliefs and definitions.' Clarkson et al. (2008) regarded legitimacy strategies as reactive than proactive. Pressure may be exerted from the social and political side, and the firms may fear this pressure to disclose more information (Gray et al. 1990; Tilt 1994). Additionally, if the firms do not operate within the bounds of appropriate values and behavior expected by the society, they will be more likely to be removed by the society (Deegan and Gordon 1996; Deegan and Rankin 1996, 1999; Epstein et al. 1976). Neu et al. (1998) viewed legitimacy as the communication channel representing an organization's image. The annual report as a communication channel may provide symbolic aspects of organizational social action (Adams et al. 1998; Adams and Kuasirikun 2000; Hughes et al. 2001).

Firms will often only make more disclosures when their legitimacy is threatened. The legitimacy of their managers' decisions involves a trade-off between the delivery of shareholder value and benefit to wider stakeholders (McGuire et al. 1988; Stanwick and Stanwick 1998a, b; Welford 1995; Welford and Gouldson 1993). Cho and Patten (2007) have argued that poorly performing firms face more pressure to provide extensive positive climate and environmental disclosures. So, this voluntary disclosure is seen as a useful tool to meet stakeholders' demand for social responsible business practices (Ingram and Frazier

1980, 1983; Patten 2002). This also reflects firms' positive public image and addresses society's expectations.

Some contradictory evidence is found across prior research in relation to legitimacy theory. No association was found between environmental disclosure and firm performance (Freedman and Jaggi 1988; Ingram and Frazier 1980, 1983; Wiseman 1982). Studies by Hughes et al. (2001), Patten (2002), and Cho and Patten (2007) found a negative association. On the other hand, Al-Tuwaijri et al. (2004) and Clarkson et al. (2008) found that well performing firms disclose more environmental and climate change information.

To achieve their organizational legitimacy goals, companies need to demonstrate that they are meeting stakeholders' expectations and pressure in the area of social accountability. To facilitate this process, companies need to disclose more information in their climate change reporting. In the present study, this theory will explain why businesses are motivated to take socially responsible actions regarding climate change as well as describing the reasons for their non-disclosure of such activities. Further, underlying firm attributes explain the socially constructed moderators of climate change reporting. As such, this study argues that the importance placed on legitimacy may vary based on differences in the institutional setting of a country.

2.3 Hypotheses

As mentioned in the literature review section above, large firms tend to disclose more voluntary information in order to reduce the sociopolitical pressure they face. Similarly, multinational firms operating in developing countries tend to maintain their legitimacy by disclosing more voluntary information than local companies. The purpose of doing so is to expand their business globally. Again, family ownership businesses in developing countries exhibit low levels of voluntary disclosure because of a lack of demand from shareholders for accountability and information. Hence, prior research has found that non-family-owned firms have more motivation to disclose voluntary information. Further, corporate governance mechanisms may reduce management-stakeholder conflict by voluntarily disclosing more information. Based on prior research and on legitimacy theory, the following four hypotheses are proposed by this study:

H_1 There is a positive association between the size of a firm and its climate change disclosure, ceteris paribus.

H_2 There is a positive relation between the multinational structure of a firm and its climate change disclosure, ceteris paribus.

H_3 There is a positive relation between the non-family ownership of a company and its climate change disclosure, ceteris paribus.

H_4 There is a positive relation between the corporate governance attributes of a company and its climate change disclosure, ceteris paribus.

3 Research methodology

3.1 Data collection and sampling

The study selects 71 publicly listed companies on the Dhaka Stock Exchange, Bangladesh, for the period 2010–2011. It signifies that final sample of the present study represents 42 %

(71/169) of the total number of companies. The researcher contacted all 169 listed companies to collect their annual reports; however, despite two reminders via email and telephone, only 30 of the 169 companies replied. Forty-one companies' annual reports were hand-collected. It is worthy of note that the collection of annual reports in a developing country like Bangladesh is not an easy task, because most companies do not publish their annual reports online. Therefore, the researcher had to hand-collect the other 41 annual reports. Nevertheless, the sample of the study includes all 13 industrial sectors in the Dhaka Stock Exchange, Bangladesh. Figure 4 shows the sampled firms, categorized into their industry groups. The industry sectors include cement (3 of 7), ceramics (2 of 4), engineering (10 of 22), food and allied (8 of 23), fuel and power (3 of 10), jute (3 of 3), paper and printing (1 of 2), pharmaceuticals and chemicals (10 of 20), services and real estate (3 of 6), tanneries (3 of 5), textiles (13 of 27), miscellaneous (4 of 11) and banking (8 of 29). Companies whose reports were analyzed were selected on the basis of the following criteria:

(a) The companies are listed on the Dhaka Stock Exchange, Bangladesh.
(b) Their annual reports for the period 2010–2011 are available.

3.2 Dependent variable

In this study, the Climate Change Reporting Score (CCRS) is the dependant variable. As mentioned in Sect. 1, various countries have developed regulations on climate change issues (UNFCCC 2014). In Bangladesh, no such regulations have been implemented. Therefore, the CCRS has been developed based on international guidelines and prior

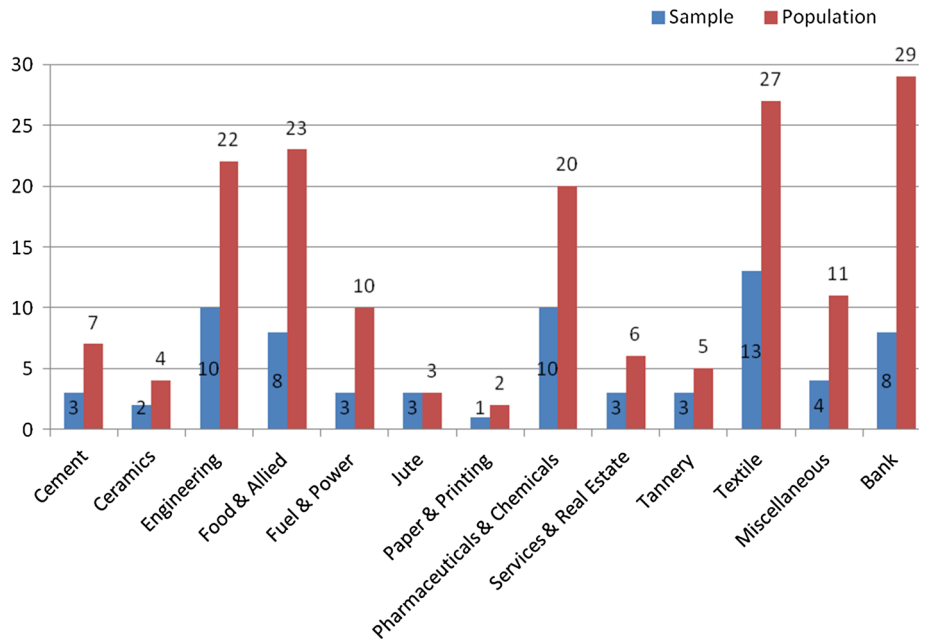


Fig. 4 Population and sample companies for the study

research (Cho and Patten 2007; Hughes et al. 2001; Luo and Tang 2014; Meng et al. 2014; Papagiannakis and Lioukas 2012; Patten 1991, 2002; Wakabayashi 2013; Wiseman 1982). These international guidelines include:

- Global Reporting Initiative (GRI) Sustainability Index
- The G3 guidelines, and the GHG Protocol of the World Business Council for Sustainable Development (WBCSD),
- Climate Disclosure Standards Board (CDSB)
- The United Nations Division for Sustainable Development, 2003

A total of 55 items are split into five-criterion groups (see Appendix 1 for all 55 items):

- Policy and Strategy (10 items)
- Risks (12 items)
- Greenhouse gas (GHG) emissions (15 items)
- Mitigation and adaptation (10 items)
- Credibility (8 items)

A disclosure index was developed to quantify the level of climate change reporting in the form of a score (Cho and Patten 2007). In an earlier study, Wiseman (1982) had introduced an environmental disclosure index also based on scores. Two approaches were mainly used in prior research on voluntary disclosure: weighted and unweighted disclosure indexes (Al-Tuwaijri et al. 2004; Clarkson et al. 2008; Hughes et al. 2001; Meng et al. 2014; Patten 2002). In common with some of those prior studies, this study also employs an unweighted disclosure index. By this approach, an item is scored according to its disclosure, ranging between 0 and 1: 1 if the item was described in the annual report; 0 if the item is not mentioned/no information is provided in the annual report. The main advantage of the unweighted disclosure index is that each item is scored equally. The researcher twice read all 55 items in the sampled 71 annual reports to ensure the validity of the Climate Change Reporting Scores allocated. Again, to provide reliability and internal consistency (for instance, the nonexistence of indiscriminate and random errors), Cronbach's coefficient alpha (α) has been used in this study for all 55 items in the CCRS index. Cronbach's coefficient alpha (α) is 0.54, which indicates a set of 55 climate change reporting items of five categories captured by the same underlying construct. The total CCRS for a company is calculated as follows:

$$\mathrm{CCRS}_j = \frac{\sum_{i=1}^{m} \mathrm{d}i}{m} \tag{1}$$

where CCRS_j Climate Change Reporting Score (CCRS) of the firm j for the year 2010–2011; $di = 1$ if the item di is disclosed, 0 if the item di is not disclosed; and $m =$ the unweighted number of items a company may disclose, where $m \leq 55$; So, $0 \leq \mathrm{CCRS}_j \leq 55$.

3.3 Independent variables

Four independent variables (SIZE, MULTI, NFO, AC) are used in this study. A model of the general form of ordinary least squares (OLS) regression is used to test the association between the Climate Change Reporting Score (CCRS) and the four determinants (independent variables). The validity of the regression model, in terms of a test for multicollinearity based on the correlation matrix and the variance inflation factor, is reported in Sect. 4. The regression model of this study is as follows:

$$\text{CCRS} = \beta_0 + \beta_1 \text{SIZE}_1 + \beta_2 \text{MULTI}_2 + \beta_3 \text{NFO}_3 + \beta_4 \text{AC}_4 + \varepsilon \quad (2)$$

where CCRS, Climate Change Reporting Score for the year 2010–2011; SIZE, dummy variable: 1 if the company is in the top 30 companies (DSE30), 0 if otherwise; MULTI dummy variable: 1 if the company is multinational, 0 if otherwise; NFO, dummy variable: 1 if the company is subject to non-family ownership directors, 0 if otherwise; AC, dummy variable: 1 if the *j* company has an audit committee which is ≥20 % (one-fifth of the total number of directors) of the BOD size in year, 0 if otherwise; β_0, constant; $\beta_{1\ldots4}$, the parameters or regression estimates; and ε, the stochastic disturbance term.

Note that according to Bangladesh Corporate Governance (CG) Ordinance (2012), the following audit committee conditions should be met: '(i) The Audit Committee shall be composed of at least 3 (three) members; (ii) The Board of Directors shall appoint members of the Audit Committee who shall be directors of the company and shall include at least 1 (one) independent director; (iii) All members of the audit committee should be "financially literate" and at least 1 (one) member shall have accounting or related financial management experience; (iv) When the term of service of the Committee members expires or there is any circumstance causing any Committee member to be unable to hold office until expiration of the term of service, thus making the number of the Committee members to be lower than the prescribed number of 3 (three) persons, the Board of Directors shall appoint the new Committee member(s) to fill up the vacancy(ies) immediately or not later than 1 (one) month from the date of vacancy(ies) in the Committee to ensure continuity of the performance of work of the Audit Committee; (v) The company secretary shall act as the secretary of the Committee; (vi) The quorum of the Audit Committee meeting shall not constitute without at least 1 (one) independent director.'

3.4 Semi-structured interviews

A total of 32 semi-structured interviews were conducted with representatives from all 13 industries in Bangladesh. Specifically, 27 company officials and 5 government officials were interviewed. The selection of interviewees was focused on achieving a sample that would reflect perspectives from all industries and the high-level governance institutions responsible for climate change issues in Bangladesh (Deegan and Rankin 1996, 1999). The duration of the interviews ranged from 90 min to 120 min. The names of the interviewees were anonymized for ethical reasons. The interviewees were guaranteed the right to withdraw at any time during the research process. The interviewees were coded as company officials (A) and government officials (B).

4 Results and discussion

4.1 Descriptive statistics

Table 4 reports the descriptive statistics for the sample of the study. The average level of Climate Change Reporting Score (CCRS) is 2.23 % (1.58), with a maximum of 12.68 % (9) and a minimum of 0 % (0). The median value of the CCRS is 1.41 % (1.0). Table 4 also shows the 11 top companies (DSE30 index), representing 15.49 % of our sample. The DSE30 index is based on market capitalization, paid-up capital, earnings per share, net asset value, reserves, dividend yield and corporate governance. Further, 10 of the 71 companies are multinationals (14.08 %); non-family ownership companies totaled 21

Table 4 Descriptive statistics

Variables	*N*	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
CCRS	71	0	9	1.58	1.546	2.607	8.968
SIZE	71	0	1	0.15	0.364	1.949	1.849
MULTI	71	0	1	0.14	0.318	2.503	4.388
NFO	71	0	1	0.30	0.460	0.914	−1.198
AC	71	0	1	0.68	0.471	−0.769	−1.451

CCRS Climate Change Reporting Score, *SIZE* top 30 companies (DSE 30), *MULTI* multinational, *NFO* non-family ownership, *AC* audit committee

(30 %). This is not surprising because the majority of listed companies in Bangladesh are owned by families (Nurunnabi 2014). Most of the companies (48 of 71) had an audit committee for the period 2010–2011. However, 23 companies in the sample violated the corporate governance code (2012), indicating that the Bangladesh Securities Commission is not effectively implementing the corporate governance code, which is supposedly mandatory.

In terms of industry classification, Table 5 reports that there is a diverse level of disclosure across the 13 industries. Only four industries score more than 1.5 out of 55: pharmaceuticals and chemicals (4.73 %); banking (3.64 %); textiles (3.22 %) and cement (3.03 %). On the other hand, five industries disclosed less than or equal to 1 item out of 55 items: jute (1.21 %); services and real estate (1.21 %); paper and printing (1.82 %); ceramics (1.82 %); and tanneries (1.82 %). Surprisingly, the fuel and power (2.42 %), and engineering (2.36 %) sectors disclosed between 1 and 1.5. This is quite shocking given that it implies that energy companies in Bangladesh are not highly concerned about climate change issues. Khan et al. (2013) argued that high levels of politicization and corruption contribute to low disclosure. There is also a significant difference between financial (3.64 %) and non-financial (2.35 %) companies' disclosure patterns. Again, two multinationals (Reckitt Benckiser (Bd.) Ltd. and Bata Shoes) disclosed only 1 item out of 55 items (see Appendix 2 for the CCRS disclosures of all 71 sample companies). The other

Table 5 Total Climate Change Reporting Score and percentage by industry

Industry	CCRS	CCRS (%)
Cement	1.67	3.03
Ceramics	1.00	1.82
Engineering	1.30	2.36
Food and allied	1.25	2.27
Fuel and power	1.33	2.42
Jute	0.67	1.21
Paper and printing	1.00	1.82
Pharmaceuticals and chemicals	2.60	4.73
Services and real estate	0.67	1.21
Tannery	1.00	1.82
Textile	1.77	3.22
Miscellaneous	1.25	2.27
Bank	2.00	3.64

nine multinationals disclosed more than two items. Ten local companies did not disclose any information on climate change issues. The overall disclosure scenario indicates very low or no accountability toward climate change issues in Bangladesh. Prior studies have found higher overall climate change disclosure and thus higher accountability, for instance, Luo and Tang (2014) reported 65.28 % (USA, UK and Australia), and Meng et al. (2014) reported 15.25 % (China).

4.2 Correlation matrix

Table 6 presents the results of the correlation matrix. The Climate Change Reporting Score (CCRS) index is positively correlated with SIZE (Top 30 companies, DSE30) [$\rho = 0.346$] and MULTI (multinational) [$\rho = 0.301$]. The other two variables are not correlated: non-family ownership (NFO) [$\rho = 0.098$] and audit committee (AC) [$\rho = 0.045$]. However, the value of any pair of variables is well below the critical value of 0.80, thus indicating no evidence of multicollinearity (Judge et al. 1985; Luo and Tang 2014).

4.3 Regression results

Table 7 reports the OLS regression results testing the relationship between CCRS and four independent variables for the period 2010–2011. The adjusted coefficient of determination (R^2) of this study is 59.4 %. This represents that 59.4 % of the variation in the total CCRS may be explained by the four independent variables. This is considerably higher than the results of prior studies (Meng et al. (2014) found 47 % in 2010 and 42 % in 2009; Luo and Tang (2014) found 10.1, 8.3, 9.6 and 12.3 %, respectively, in four models). Again, the F ratio of 2.812 ($\rho < 0.05$) supports the significance of the OLS regression model, and the Durbin–Watson score of 1.893 also confirms the validity of the regression model. The size of the firm (SIZE) is positively associated with the CCRS and thus supports hypothesis H_1 (the coefficient $\beta = 0.269$; and significant at $\rho < 0.05$). This implies that the large companies in Bangladesh, in particular the top 30 companies, tend to disclose more than other companies.

Interestingly, this study does not find an association between multinationals (MULTI) and CCRS ($\beta = 0.182$; and not significant at $\rho > 0.05$). Surprisingly, this study finds a negative association with regard to two of the hypotheses: H_3 (NFO—non-family ownership companies, the coefficient $\beta = -0.010$) and hypothesis H_4 (AC—audit committee, the coefficient $\beta = -0.024$).

4.4 Robustness checks

To assess the model's robustness, a series of additional tests was carried out. In particular, tests on multicollinearity variance inflation factors (VIF) and tolerance levels were performed. The VIF of all four variables were less than 10, and the tolerance level of all

Table 6 Correlations matrix

Variables	CCRS	SIZE	MULTI	NFO	AC
CCRS	1				
SIZE	0.346**	1			
MULTI	0.301*	0.463**	1		
NFO	0.098	0.149	0.355**	1	
AC	0.045	0.213	0.056	−0.145	1

* Correlation is significant at the 0.05 level (2-tailed);
** Correlation is significant at the 0.01 level (2-tailed)

Table 7 Regression analysis

Variables	Unstandardized coefficients		Standardized coefficients	*t*	Sig.	Collinearity statistics	
	B	SE	Beta			Tolerance	VIF
Constant	1.365	0.342		3.988	0.000		
SIZE	1.139	0.557	0.269	2.044	0.045	0.750	1.333
MULTI	0.883	0.659	0.182	1.339	0.185	0.702	1.424
NFO	−0.034	0.416	−0.010	−0.081	0.936	0.847	1.181
AC	−0.079	0.389	−0.024	−0.204	0.839	0.923	1.084
Model summary							
R			0.782				
R^2			0.636				
Adjusted R^2			0.594				
F Change			2.812				
Sig. *F* Change			0.032				
Durbin–Watson			1.893				
Sig.			0.032				

Dependent variable—*CCRS* Climate Change Reporting Score, Independent variables—*SIZE* top 30 companies (DSE 30), *MULTI* multinational, *NFO* non-family ownership, *AC* audit committee

variables was more than 0.10 (Luo and Tang 2014). The results indicate that there is unlikely to be a multicollinearity problem between the dependent and four independent variables in this study.

4.5 Interview findings

According to the findings from the interviews, two issues contribute to companies' non-disclosure attitudes toward climate change reporting in Bangladesh; 90.63 % of the respondents (29 of 32 interviews) viewed that a lack of regulation does not attract companies to disclose climate change reporting issues. There is a lack of regulation or best practice guidelines from the regulatory bodies for climate change reporting. Bangladesh has only adopted The Climate Change Trust Fund Act of 2010 which focuses on funding adaptation-related activities. The Bangladesh Climate Change Trust (BCCT) is a statutory body to administer the Climate Change Trust Fund (CCTF). The CCTF should put more effort into encouraging companies to be socially responsible. Some opinions on this are given below:

> Our management does not feel this issue is important because climate change reporting is not a legal obligation in the market (Interviewee Code: A, from a small and medium company)

> The present government is forming an agenda regarding that. However, this is still at the discussion stage, rather than in the legislative process (Interviewee Code: B, a government official)

With the exception of nine industries, representatives of four industries, including pharmaceuticals and chemicals, fuel and power, tanneries and textiles, did not agree that regulation is essential (see Table 8). This finding demonstrates that these major industries

Table 8 Interview findings

Industry	Interview findings	
	Lack of regulation	Lack of willingness of companies management
Cement	Yes	Yes
Ceramics	Yes	Yes
Engineering	Yes	No
Food and allied	Yes	No
Fuel and power	No	No
Jute	Yes	Yes
Paper and printing	Yes	Yes
Pharmaceuticals and chemicals	No	No
Services and real estate	Yes	Yes
Tannery	No	Yes
Textile	No	Yes
Miscellaneous	Yes	Yes
Bank	Yes	No

in the Bangladeshi market do not want regulation. This also signifies the socially responsive behavior of the major industries in Bangladesh.

Further, 93.75 % (30 of 32 interviews) of the interviewees expressed the belief that there is a lack of willingness in companies' management to disclose information (in other words, a culture of low social accountability) in Bangladesh. It is also found that 8 of 13 industry representatives feel that the lack of willingness of companies' management is contributing to the low level of climate change reporting in Bangladesh (see Table 8). Interestingly, small companies feel that their management is reluctant to perform socially responsible activities like climate change reporting. It is argued that owners have little knowledge of the implications of socially accountable business. This is also because the majority of firms in Bangladesh are family owned. Some respondents expressed their views in the following ways:

> We are small companies. We are concerned about costs. What is the benefit to us in disclosing climate change reporting? (Interviewee Code: A, from a small and medium company)

> Compliance definitely comes at a cost. But, companies should open their eyes to the long term benefits rather than (focusing on) short term benefits (Interviewee Code: B, a government official)

> As a member of the DSE30 index, we would like to inform our shareholders and wider stakeholders about our responsibilities to society (Interviewee Code: A, from a large company)

> You see that garment companies are making more profits each year. However, some of them are not paying salaries to their employees on time. Some of them do not even follow safety instructions from the government. In this culture, how can we expect voluntary climate change reporting? (Interviewee Code: B, a government official)

> Bangladesh is receiving climate change funds from donors. These funds are not being used for the intended purposes. There is huge corruption in (connection with)

these funds. The companies, therefore, do not care about climate change reporting (Interviewee Code: A, from a small and medium company)

5 Conclusions, contribution and limitations

> From making government (at all levels) and business answerable for their (in)actions on climate change and providing a range of incentives and disincentives towards compliance with social demands, political action on the issue has undoubtedly gone further than it would otherwise do (Newell 2008, p. 149)

Climate change is one of the most significant environmental issues across the globe faced by mankind in present times; it is perhaps even the most serious problem in the twenty-first century. Bangladesh is a 'frontline state' and is deemed most vulnerable to climate change (BBC 2006, 2010; The Guardian 2012; The Independent 2013; Gogoi and Kakakhel 2014). Hence, this study is one of the few empirical studies in developing countries to critically examine local companies' accountability toward climate change reporting. The study adopts a mixed methodology by which 71 annual reports were evaluated and 32 semi-structured interviews with company and government officials were conducted. The study contributes to knowledge in the field by confirming a very low level of social accountability among listed companies in Bangladesh. Overall, on average, companies disclosed information on only 2.23 % of possible items (1.58 items of 55 items).

Similar to prior studies, the study reports a positive association between the size of the company and its CCRS (Al-Tuwaijri et al. 2004; Clarkson et al. 2008; Luo and Tang 2014; Meng et al. 2014). Large companies are disclosing more climate change information in their reporting in order to legitimize their market position (Meng et al. 2014; Patten 2002; Wiseman 1982). The evidence of this study shows that the largest companies generally offer a better quality of climate change disclosure and that they are likely to use their annual reports to communicate information on their environmental performance and social involvement (Cho and Patten 2007; Deegan and Gordon 1996; Deegan and Rankin 1999; Patten 2002). As shown by Suchman (1995), cognitive legitimacy is a powerful tool of legitimization as the company attempts to construct its identification with symbols, values or institutions which have a strong base of social legitimacy (Dowling and Pfeffer 1975, p. 127).

However, the study does not find an association between multinationals and high CCRS. This indicates that multinationals are not disclosing more information on climate change in their reporting as had been expected in Bangladesh. This finding raises a critical question to the multinationals' operations and strategies toward social accountability in developing countries: are they only operating on a profit motive in developing countries? As reported in Sect. 4.1, two multinationals are disclosing very little information. The findings contradict those of prior studies (Al-Tuwaijri et al. 2004; Luo and Tang 2014) and do not support legitimacy theory; this is because multinationals are not legitimizing their position by voluntarily disclosing socially accountable information (Hughes et al. 2001). For many MNCs, social responsibility is an outcome of public pressure arising from their operations in developing countries in relation to human rights, environmental pollution and labor issues (Ite 2004; Jamali et al. 2009; Jamali and Neville 2011). Although MNCs face pressures to conform both to their parent company's expectations (home country institutional pressures) and to isomorphic pressures specific to the host country (Kostova and Roth 2002), the findings of the present study demonstrate variation and complexity in

conflicting institutional messages regarding the known sources of legitimacy (Jamali et al. 2009). The social responsibility of MNC subsidiaries is therefore likely to differ. The findings presented here need further research attention. The study particularly contradicts with the pragmatic or substantive formulation of legitimacy (Suchman 1995). This is due to the fact that multinationals operating in Bangladesh do not regard legitimacy as a response to external pressure and are not aiming to fill an image gap by taking real measures/actions to conform to their stakeholders' expectations.

Additionally, the study reports that non-family-owned companies and the corporate governance element (audit committee) were negatively associated with companies' levels of disclosure. The findings have a major implication in light of the existing literature because they do not support prior findings (Al-Tuwaijri et al. 2004; Luo and Tang 2014; Meng et al. 2014). This is because family businesses and corporate governance mechanisms (namely audit committee) violators may exert pressure on the stakeholders, and, in order to reduce conflict, these firms are pressured to disclose more climate change issues. This may require further research as to why the companies behave this way regarding voluntary disclosure. The study also contributes to understanding of reasons for corporate non-disclosure of climate change information. The interview findings suggested two factors for this: a lack of regulation and a culture of low social accountability among the companies.

The findings of the study have several policy implications. In Bangladesh, key gaps remain among listed companies toward social accountability and, by extension, climate change reporting. In the absence of appropriate regulation, companies in Bangladesh view action on climate change either as a rational risk management strategy or as a possible source of brand value. Pellizzoni (2004, p. 545) argued that voluntary regulation produces a form of unresponsiveness through the 'self-referential, self-validating dentitions of goals and evaluation of results,' while Newell (2008, p. 134) argued that 'Accountability demands have been made of governments and corporations by diverse actors regarding process based issues of transparency and disclosure as well as substantive demands regarding regulation and compensation.' Surmeli and White (2009) also stressed that listed companies in the USA are coming under growing pressure to disclose in more detail the financial and physical impacts of climate change and its related regulations in relation to their operations.

Given the nature of progress in negotiations involving western countries regarding climate change regulation (see Table 1; also Bendell and Murphy 2002), the government of Bangladesh should introduce certain regulations governing areas such as energy emissions and climate change disclosure. These regulations would demonstrate the government's own accountability with reference to holding governments to account for their commitments toward climate change and social action. The interview findings strongly emphasize the presence of regulatory issues. Unless and until governments take climate change seriously within their markets, the market response will be laissez-faire and will result in lower levels of climate change disclosure. Furthermore, local policy makers need to provide some orientation programs for listed companies to understand the effects of climate change in Bangladesh and how it will affect their businesses. International policy makers like the Intergovernmental Panel on Climate Change (IPCC), the European Union, the World Bank, the UN Environment Programme, the International Energy Agency and the World Economic Forum should make sure that their agenda includes the question of how to engage local companies to make them more socially accountable to climate change reporting in the most vulnerable countries.

The results of the study should be interpreted with certain limitations in mind. Firstly, the study examines 71 sample companies. Results from more sample companies may

provide other insights about climate change reporting. Secondly, the study uses four independent variables. Future research could be done using other variables including leverage, liquidity ratios and board independence. Thirdly, the study uses a mixed methodology. Future research could be done based on an extensive case study of a few organizations on climate change reporting. Finally, the content analysis on annual reports may be subject to researcher bias. This was mitigated as far as possible by a careful research design. Nevertheless, the contributions and policy implications of the study should not be viewed as tentative.

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Appendix 1

Climate change reporting disclosure items ($n = 55$ items).

(A) Policy and Strategy
1. Policy statement on operations and climate change
2. Public position on climate change science
3. Public position on commitment to binding targets
4. Policy on addressing product impacts
5. CEO/directors articulate views on climate change and GHG emissions
6. Individual with specific responsibility for climate change identified or evidence of how responsibility for climate change is delegated
7. Existence of a board committee with specific responsibility/remit for climate change, or evidence that the board is engaged in these issues
8. Remuneration at executive and board level is linked to climate change performance/issues
9. Information about how climate change trends are linked into future company strategy in some way
10. Overview/statement of company management system (information and control systems) for climate change

(B) Risks
11. Identifying financial risk arising from climate change: the financial implications of climate change and related regulation
12. Mention of climate change risks (other than physical or regulatory) such as litigation and reputational risks
13. Process and systems described for risk identification cover operations
14. Process and systems described for risk identification cover products and services
15. Details of the physical risks (arising from climate change) to which the company is exposed are given
16. Details are given of how those climate change risks are assessed and managed
17. The timescales are given over which climate change risks are expected to materialize
18. The regions or locations that are affected are given
19. The effects of physical risks (arising from climate change) on the company's supply chain and customers are explained

20. Details of the climate change-related regulations, policies or government-sponsored initiatives that affect the company are given
21. Details are given of how those regulations, policies or initiatives affect the business
22. Details of the business implications of existing or prospective legislation to reduce GHG emissions are given

(C) Greenhouse gas (GHG) emissions

23. Total gross GHG emissions in CO_2-equivalent metric tons
24. Report differentiates between Scope 1 and Scope 2 emissions and splits these out in reporting of total gross GHG emissions in CO_2-equivalent metric tons
25. Indirect (Scope 3) emissions from sources not owned or controlled by the reporting organization but which are a consequence of the activities of the reporting organization
26. A measure of GHG intensity by reference to the company's revenue
27. Information in 26 split out into Scope 1 and Scope 2 emissions
28. A measure of GHG intensity by reference to non-financial output
29. Information in 28 split out into Scope 1 and Scope 2 emissions
30. GHG emissions are prepared using one or more standards, national, regional or industry-specific programs
31. Quantified targets set
32. Targets set using both absolute AND intensity-based units
33. Short-term targets set (less than five years)
34. Long-term targets set (more than five years)
35. Includes progress against previously set targets
36. Targets apply to product data
37. Process-driven targets set

(D) Mitigation and Adaptation

38. Energy efficiency measures
39. Purchasing energy from low-carbon sources
40. Transport and travel changes, increased use and development in low-carbon technologies
41. Assessment of, and engagement with, supply-chain GHG emissions
42. Climate change mitigation actions discussed
43. Climate change adaptation measures discussed
44. Generation of renewable energy
45. Product innovation/change
46. New business model
47. Relocation

(E) Credibility

48. Independent assurance of GHG emissions
49. Significant reference to, or use of, WBCSD-WRI GHG protocol
50. Use of GRI climate change-specific indicators
51. Significant reference to, or use of, ISO 14064-1
52. Making general disclosure of corporate objectives/policies relating to the social responsibility of the company to the various segments of society
53. Disclosing corporate governance practices
54. Oversight board on climate change
55. Report on climate change by oversight Board

Appendix 2

See Table 9.

Table 9 List of companies with total Climate Change Reporting Score (CCRS) and percentage of score ($n = 71$)

Company	Total CCRS	CCRS percentage (%)	Local/multinational company
BEXTEX	9	12.68	L
Square Pharmaceuticals Ltd.	7	9.86	L
BATBC	**6**	**8.45**	**M**
Glaxo SmithKline	**4**	**5.63**	**M**
Mithun Knitting	4	5.63	L
Heidelberg Cement Bd.	**3**	**4.23**	**M**
Singer Bangladesh	**3**	**4.23**	**M**
ACI Limited	**3**	**4.23**	**M**
The Ibn Sina	3	4.23	L
Renata Ltd.	**3**	4.23	**M**
Dhaka Bank Ltd.	3	4.23	L
Atlas Bangladesh	**2**	**2.82**	**M**
Bd.Thai Aluminium	2	2.82	L
Olympic Industries	2	2.82	L
Quasem Drycells	2	2.82	L
Gemini Sea Food	2	2.82	L
BOC Bangladesh	**2**	**2.82**	**M**
Orion Infusion	2	2.82	L
Aramit Ltd.	2	2.82	L
Sotheast Bank Ltd.	2	2.82	L
AB Bank Ltd.	2	2.82	L
The City Bank Ltd.	2	2.82	L
Al-Arafah Islami Bank	2	2.82	L
Islami Bank Bangladesh	2	2.82	L
ICB Islami Bank Ltd.	2	2.82	L
Confidence Cement	1	1.41	L
Meghna Cement	1	1.41	L
Standard Ceramic	1	1.41	L
Monno Ceramic	1	1.41	L
Anwar Galvanizing	1	1.41	L
Bangladesh Lamps	1	1.41	L
National Tea	1	1.41	L
Yousuf Flour	1	1.41	L
Eastern Lubricants	1	1.41	L
Padma Oil Co.	1	1.41	L
Jute Spinners	1	1.41	L
Northern Jute	1	1.41	L

Table 9 continued

Company	Total CCRS	CCRS percentage (%)	Local/multinational company
Azadi Printers	1	1.41	L
Bangla Process	1	1.41	L
Beximco Pharma	1	1.41	M
Reckitt Benckiser (Bd.) Ltd.	**1**	**1.41**	**M**
Therapeutics	1	1.41	L
Eastern Housing	1	1.41	L
Samorita Hospital	1	1.41	L
Apex Tannery	1	1.41	L
Bata Shoe	**1**	**1.41**	**M**
Samata Leather	1	1.41	L
Al-Haj Textile	1	1.41	L
Alltex Ind. Ltd.	1	1.41	L
Anlima Yarn	1	1.41	L
Apex Spinning	1	1.41	L
Desh Garmants	1	1.41	L
Dulamia Cotton	1	1.41	L
Monno Fabrics	1	1.41	L
Prime Textile	1	1.41	L
Rahim Textile	1	1.41	L
Tallu Spinning	1	1.41	L
The Engineers	1	1.41	L
Sinobangla Industries	1	1.41	L
Usmania Glass	1	1.41	L
IFIC Bank	1	1.41	L
Aftab Automobiles	0	0.00	L
Aziz Pipes	0	0.00	L
National Tubes	0	0.00	L
Pran	0	0.00	L
Gulf Foods	0	0.00	L
Hill Plantation	0	0.00	L
Zeal Bangla Sugar	0	0.00	L
Sonali Aansh	0	0.00	L
Bangladesh Hotels	0	0.00	L
Quasem Silk	0	0.00	L

Bold indicates multinational companies; 10 of the companies are multinationals and 61 are local companies

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