

**RESEARCH ARTICLE**

Corporate voluntary greenhouse gas reporting: Stakeholder pressure and the mediating role of the chief executive officer

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Abstract

The study sheds light on the extent to which various stakeholder pressures influence voluntary disclosure of greenhouse gas (GHG) emissions and how the impact is explained and moderated chief executive officer (CEO) characteristics of 215 FTSE 350 listed U.K. companies for the year 2011. The study developed a classification of GHG emission disclosure based on the guidelines of GHG Protocol, Department for Environment, Food and Rural Affairs, and Global Framework for Climate Risk Disclosure using content analysis. Evidence from the study suggests that some stakeholder pressure (regulatory, creditor, supplier, customer, and board control) positively impacts on GHG disclosure information by firms. We found that stakeholder pressure in the form of regulatory, mimetic, and shareholders pressure positively influenced the disclosure of GHG information. We also found that creditor pressure also had a significant negative relationship with GHG disclosure. Although CEO age had a direct negative effect on GHG voluntary disclosure, its moderation effect on stakeholder pressure influence on GHG disclosure was only significant on regulatory pressure.

KEYWORDS

institutional theory, sustainable greenhouse gas policies, upper echelons theory and stakeholders engagement, voluntary disclosure

JEL CLASSIFICATION

Q01; Q56; M41; M48

1 | INTRODUCTION

In light of the rising prominence of climate change and greenhouse gas (GHG) emission issues on world agenda, corporate transparency and accountability are viewed as key to ensuring that the global warming trend is reversed. Consequently, the question of what leads corporations to provide more climate and GHG emissions information than others has emerged as a topic of considerable interest in both

scholarly and business literature (Department for Environment, Food and Rural Affairs [DEFRA]). Prior empirical evidence has consistently found that a diverse range of stakeholder groups may pressure/influence a firm to widen its disclosure scope to include social and environmental information (Chuang & Qianfei, 2013; Cormier & Magnan, 2004; Kuo, Yeh, & Hui-Cheng, 2012; Sandoval, 2015). Indeed, there is growing evidence that corporations are now positioning themselves to respond to various institutional pressures

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emanating from external stakeholder pressure (Liesen, Hoepner, Paten, & Figge, 2015) such as regulators (Kuo et al., 2012; Zhu & Sarkis, 2007), community/society (Braham, Butcher, Kurtz, Roudsari, & Vyas, 2016), customers, competitors (Darnall, Henriques, & Sadorsky, 2010), and even shareholders (Reid & Toffel, 2009).

However, despite facing homogeneous institutional pressures, questions remain as to why organisations' responses, as evidenced by their disclosures, are heterogeneous (Doshi, Dowell, & Toffel, 2013). Collectively observed in the literature, prior evidence depicts that stakeholder pressures substantially influence the response and in this case disclosure of GHG (see Liesen et al., 2015). Despite this, however, it remains the fact that the voluntary disclosure phenomenon is still fraught with uncertainty and has both known unknowns and unknown unknowns (Lewis, Walls, & Dowell, 2013). However, critical knowledge voids remain within the realm of financial disclosure research. Critical among these knowledge voids is the paucity of evidence regarding the role of individual actors in voluntary climate change disclosure decisions (Bamber, Jiang, & Wang, 2010). To date, current literature has failed to shed light on the joint effects of chief executive officer (CEO) characteristics, stakeholders' pressures, and GHG disclosure.

A critical argument made by Carter, Kale, and Grimm (2000) is that top managers are often guardians of a firm's image, and as such, they are particularly careful on how information is disseminated to stakeholders. As a result, managers' characteristics are likely to influence the pattern of disclosure of GHG (Haque & Ntim, 2018; Shahab et al., 2019; Shahab, Ntim, Chengang, Farid, & Samuel, 2018). A priori, the importance of investigating the role played by various managerial characteristics needs no emphasis in the area of disclosure decisions given that the allocation of scarce resources to manage stakeholder pressure often involves complex decision making, which is primarily based on managerial perception (Cooper, Raman, & Yin, 2018; Tauringana & Chithambo, 2015). According to Huang and Kung (2010), disclosure of environmental information is very much a product of the manager-stakeholder relationship. Therefore, managers, in turn, think about stakeholders based upon their perception, which in itself is a product of many aspects, including ones experiences or orientation (Mazutis, 2013; Shahab et al., 2019).

From a theoretical point of view, examining the cross-level nature of the relationship between a CEO's characteristics such as age and organisation voluntary reporting strategy enriches our understanding of the role of managers' differences in organisation processes and outcomes. Only a handful of studies (e.g., Elmagrhi, Ntim, Elamer, & Zhang, 2019; Krishnamurti & Eswaran, 2018; Shahab et al., 2019) have examined the role played by top executives' characteristics such as age and tenure on organisational outcomes and strategies. Hence, this study partly addresses that gap. From a practical standpoint, as regulators grapple with viable policy options to enhance GHG emissions accountability and firms are racing to embrace "green credentials" as a competitive tool, understanding how top personality characteristics such as CEO age influence organisational responses to stakeholder pressure on GHG disclosure may help firms to establish well-informed GHG reporting strategies thoughtfully.

Therefore, in this paper, we examine the relationship between stakeholder pressure and GHG disclosures and how specific managerial characteristics moderate such a relationship. To achieve this, we adopted a cross-sectional sample of 215 U.K. companies on the FTSE 350 index listed on the London Stock Exchange using the 2011 annual and sustainability reports. The sample period of 2011 was selected for this study because disclosure of GHG emissions by FTSE 350 was largely voluntary during this period. Following Department for Environment, Food and Rural Affairs (DEFRA) guidance in 2009, the first year that reflected companies' voluntary disclosure of GHG emissions was 2011. After its introduction in 2009, companies that applied DEFRA guidance in 2010 had it reflected in the 2011 disclosure report. Therefore, the year 2011 provides a much realistic year that one of the frameworks, that is, DEFRA, could have been realistically applied in disclosure. As a result, investigating how the voluntary reporting policy period influenced policymakers to achieve the desired outcome during this period is relevant.

Evidence from the study suggests that there is no substantial shareholder and employee pressure on a firm to disclose GHG information. However, there is a significant positive pressure from the market status of a firm against those firms with additional market share disclosing more GHG information. Also, we found that coercive pressure, that is, regulatory pressure and mimetic pressures emanating in some industries, notably industrials and consumer services, have a significant favourable influence on firms' GHG disclosure decisions. The findings also found creditor pressure to have a significantly negative relationship with GHG disclosure. In terms of the CEO characteristics, the study finds CEO age to have a direct negative effect on GHG voluntary disclosure and positively moderate the impact on regulatory pressure on GHG disclosure.

The research makes the following contributions to the disclosure literature. First, the study provides evidence of the effect of stakeholder's pressure on GHG reporting. By using the lens of institutional theory and the insights from the upper echelons theory, we contribute to a growing body of literature that examines heterogeneous disclosure responses by firms to the same institutional pressures. Second, the study sheds light on the joint effects of CEO characteristics, stakeholders' pressures, and GHG disclosure. Just like prior literature (e.g., Lewis et al., 2013), our inclusion of CEO characteristics, that is, age, helps to highlight whether variations in corporate responses to mimetic, normative, and coercive pressure can be explained by the characteristics of the actors. Finally, unlike most previous studies, which tended to focus predominantly on the so-called "environmentally sensitive" industries, ours focuses on a diverse range of industries. Emphasising the role of CEO characteristics on the effect of stakeholder's pressure on GHG reporting in such a diverse range of industries enhances the understanding of the subject matter (De Villiers, Naiker, & Van Staden, 2011).

The rest of the paper is structured as follows: Section 2 presents the literature review and hypotheses development, and Section 3 describes the research design. Empirical results of the research are

then discussed in Section 4, and the summary and conclusions are presented in Section 4.

2 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 | Theoretical framework

Current research has used many theories including institutional and upper echelons theories to establish a link between stakeholder pressures and environmental (including GHG) disclosure (Elmagrhi et al., 2019; Haque & Ntim, 2018; Shahab et al., 2018; Shahab et al., 2019). Deegan (2002) argued that there is often an overlap between the various theories explaining disclosure. So it is not uncommon to use more than one theory. For instance, the institutional theory is partly premised on the assumption that organisations respond to pressures from institutional environments and adopt structures/procedures that are socially accepted. With the organisational tendency to conform to prevailing norms and traditions, the theory predicts that such behaviour will lead to homogeneity in structures and practices by organisations and that the same will be considered legitimate benchmarks for any player within the industry. This similarity in form and processes is what DiMaggio and Powell (1983) termed as “institutional isomorphism.”

DiMaggio and Powell (1983) categorised the pressures faced by organisations into three parts: mimetic, coercive, and normative. Mimetic forces are pressures to copy other organisations' activities, systems, and structures, and this arises when there is uncertainty or no clear course of action. The uncertainty leads a firm to check competitor/peer actions, and some researchers have documented evidence that in uncertain times, firms tend to copy similar but more abundant or more successful firms (Greve, 2000). Coercive forces refer to external pressures primarily exerted by regulatory regimes or other agencies on a firm leading them to follow a prescribed preferred system. The pressure might also be as a result of contractual obligations restricting a firm to act in a particular pattern. Shahab et al. (2018) and Wang, Jun, and Dingtao (2018) noted that the state's ability to impose its will upon organisations through the use of sanctions is a primary regulatory mechanism of control and one that can induce conformity. Normative forces are those pressures emerging from professional standards or a professional community within the network of the organisation. Professional ties or networks within an industry act as a self-policing mechanism and have what Abrahamson and Rosenkopf (1997) termed a “trickle-down” effect, which persuades the firms to pursue similar actions as their colleagues.

Prior evidence indicates that firms do indeed respond to stakeholder institutional pressures related to environmental matters. Lu and Indra (2014) investigated the influence of stakeholders' power and corporate characteristics on social and environmental disclosure practices of socially responsible Chinese listed firms identified by a social responsibility ranking list. Their studies found that shareholders influence corporate social and environmental disclosures, whereas

creditors have an influence on corporate disclosures related to firm's environmental performance. Taurangana and Chithambo (2015) used a sample of 215 companies from a population of London Stock Exchange FTSE 350 companies over 4 years (2008–2011), to examine the effect of the 2009 guidance of the Department for Environment, Food & Rural Affairs on GHG disclosure.

Their findings show that the publication of the 2009 guidance led to a significant increase in GHG-level disclosure. Using the structural equation modelling, Kalu, Buang, and Aliagha (2016) used a sample of 126 property sector companies listed in the Malaysia Stock Exchange market based on the 2003 annual reports to determine the factors influencing carbon disclosure in real estate companies in a developing economy. The findings suggest that social and financial markets are critical in influencing factors for carbon disclosure, whereas the economic and institutional determinants do not achieve a significant effect on voluntary carbon disclosure. Brammer and Pavelin (2006) investigated voluntary environmental disclosures by U.K. companies. They concluded that disclosure decisions were often a reflection of managerial response to stakeholder pressure and that in part the response was based on mitigating any possible government intervention. Investigating the role of stakeholder pressure on environmental disclosures, Darnall et al. (2010) came to the conclusion that factors such as visibility, shareholding, and employee demands exert pressure on management to disclose environmental information.

Overall, based on the prediction of institutional theory, managerial decisions are influenced by coercive, mimetic, and normative isomorphism that tends to force firms experiencing similar pressure to adopt prevailing norms and practices (Haque & Ntim, 2018; Shahab et al., 2018). Among the three forces, coercive isomorphism is considered the primary/dominant force that moves managers to act (Delmas & Toffel, 2004). However, although the expectation is that coercive pressure should result in firms demonstrating homogenous practices, there is growing evidence that, in practice, firms respond heterogeneously (Lewis et al., 2013). Hence, there remains an empirical question as to why firms facing the same pressure should respond differently. What we now know is that this could be as a result of particular characteristics of the firm, for example, history and culture (Delmas & Toffel, 2008), and differences in how managers prioritise in dealing with conflicting institutional pressures. A number of studies have now begun to investigate the critical role of managerial attitude plays in shaping the disclosure characteristics or culture of their respective firms. However, as noted by Lewis et al. (2013), not much has been done to highlight how certain managerial characteristics influence a firm's response to institutional pressures relating to environmental practices including disclosures.

The success of a modern corporation rests on how management meets the demands and expectations of a diverse range of players other than shareholders with available resources. Therefore, faced with demands/pressure for more accountability and transparency, managers have the responsibility to use means such as disclosures to manage these demands. However, the way a manager responds to the different kinds of stakeholder pressure is a product of many matters, one of which is the managerial attitude towards the subject (Elmagrhi

et al., 2019; Haque & Ntim, 2018; Shahab et al., 2018; Tauringana & Chithambo, 2015).

According to the upper echelons theory (Hambrick, 2007), heterogeneous firm responses to the same institutional pressures can be explained by the fact that managers have individual interpretations of the same situation, and such interpretations are a product of the managers' values, experience, and personality. Thus, the upper echelons theory argues that in seemingly complex and uncertain situations, particular characteristics of responsible persons, that is, management, tend to shape how a firm responds to the challenge it faces.

Voluntary disclosures are by nature discretionary and subjective; hence, other than reflecting pressure a firm faces, it also demonstrates the knowledge and interpretation that management assigns to such a phenomenon (Delmas & Toffel, 2008). This partly explains why, when faced with similar pressures, firms' disclosure responses are heterogeneous. Finkelstein, Hambrick, and Cannella (2009) argue that disclosure decisions are influenced by managerial backgrounds such as age, tenure, and education. Therefore, based on both institutional and upper echelons theories, the relationship to be investigated here is illustrated in Figure 1.

2.2 | Empirical evidence and hypotheses development

2.2.1 | Stakeholder pressure and GHG disclosure

Generally, shareholders are thought to be a constraining factor on managers to engage in discretionary activities for fear of incurring costs that may affect their wealth maximisation (Cooper et al., 2018). However, there seems to be a change of mindset due to the number of shareholders advocating ethical investment (da Rosa, Lunkes, Margarete, & Brizzola, 2019). With the increase in public awareness regarding the need for firms to be environmentally responsible, shareholders realise that they risk losing their value/money if their company is identified as environmentally irresponsible (Buysse & Verbeke, 2003). Therefore, in circumstances where a firm is deemed

environmentally risky, shareholders may demand a high-risk premium or may avoid or sell their shares (Lu & Indra, 2014).

Several prior studies (Cormier & Magnan, 2004; García-Sánchez, Rodríguez-Domínguez, & Gallego-Álvarez, 2013; Lu & Indra, 2014; Roberts, 1992) document that specific stakeholder groups appear to influence corporate social and environmental disclosures. For instance, Deegan and Blomquist (2006) documented evidence that the publication of the environmental scorecard by the non-governmental organisation (NGO), the World Wildlife Fund, led to changes in firms' environmental disclosures among Australian mining companies. Similarly, Freedman and Jaggi (2005) found evidence of how the ratification of the 2005 Kyoto protocol induced several companies to disclose their GHG emissions. Additionally, Reid and Toffel (2009) demonstrated a positive association between stakeholder pressures and environmental disclosure. Specifically, the authors found companies', which participated in the Carbon Disclosure Project, voluntary disclosure choice to be faced with more state-level pressure regarding climate change concerns.

In a similar vein, Rankin, Windsor, and Wahyum (2011) adopted a two-stage regression approach to examine how GHG reporting is related to internal organisation systems, external privately promulgated guidance, and European Union Emissions Trading System trading among Australian companies. Evidence from the study found that the presence and adoption of International Organization for Standardization 14001-certified environmental management systems had a significant impact on the extent and quality of GHG disclosures by Australian companies. Other disclosure studies have documented similar evidence (see Canace, Caylor, Johnson, & Lopez, 2010; Heflin, Kross, & Suk, 2012).

Several other recent studies have also explored this relationship from several perspectives. For instance, in an attempt to tie together stakeholder and legitimacy theory arguments, examined the relationship between stakeholder pressures and corporate environmental disclosure on the Canadian firm Abitibi Consolidated. Evidence from the study shows that in contrast to some of the stakeholder groups, Abitibi Consolidated exhibited little interaction with

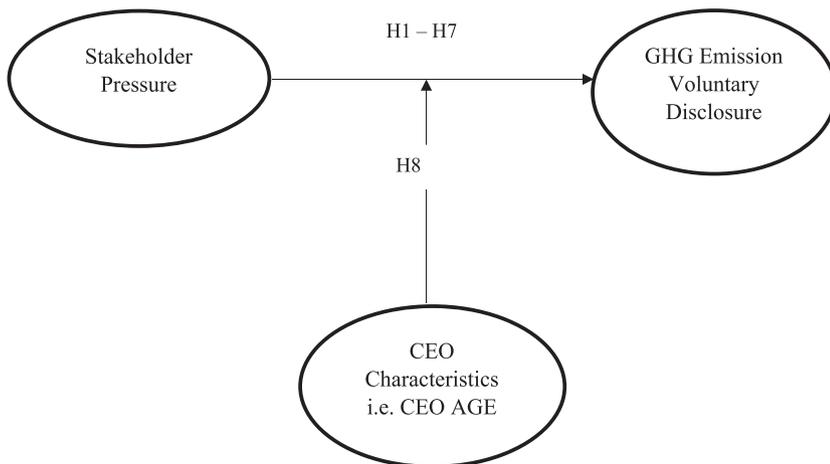


FIGURE 1 Theoretical model illustrating the relationship between stakeholder pressure, CEO age, and GHG emission voluntary disclosure. CEO, chief executive officer; GHG, greenhouse gas

respect to the timing of information flow. This was in contrast to prior stakeholder-based investigations. The author attributes these findings to the firm, not considering those groups as particularly relevant for its legitimacy.

In this vein, Liesen et al. (2015) focused on stakeholder pressures and the use of disclosure in a legitimating fashion across a broader sample of 431 European firms. Evidence from their regression analysis suggests that external stakeholder pressure is a determinant of the existence but not the completeness of emissions disclosure. The findings were consistent not only with stakeholder theory arguments that suggest that companies respond to external stakeholder pressure to report GHG emissions but also with legitimacy theory claims that firms can use carbon disclosure as a symbolic act to address legitimacy pressures.

Given the overall evidence from prior studies on the relationship between stakeholder pressures and other environmental disclosures, we expect firms with more significant stakeholders' pressure concerns to be more likely to disclose their GHG emission information. Against this backdrop, the following hypothesis is formulated.

H1. *Stakeholder pressure is positively associated with companies' choice to disclose quantitative GHG emissions data.*

2.2.2 | Ownership concentration and GHG information disclosure

The pressure exerted by shareholders on firms' environmental disclosure behaviour is dependent on the shareholding structure of the firm. A company with a diverse range of shareholders is expected to deal with wide-ranging demands for accountability and transparency (Fraile & Fradejas, 2014). With dispersed ownership, there is no evidence of a tight grip by shareholders on managerial activities as such, that is, they do not possess insider information on most activities. Therefore, to reduce information asymmetry between management and shareholders, disclosure becomes paramount. Thus, the more dispersed the share ownership, the higher the need to monitor managerial actions.

Alternatively, where there is a high concentration of ownership, shareholders are deemed to have the power to possess insider information, which tends to reduce their appetite for voluntary disclosure by management (Chau & Gray, 2002). Thus, block holders' alignment with management undermines their monitoring responsibility and often results in a conflict of interests with other groups, such as minority shareholders. In this respect, high ownership concentration is considered detrimental to voluntary disclosures. Some prior studies have found evidence of this effect. Matolcsy, Shan, and Seethamraju (2012) found that a high concentration of ownership (represented by the percentage of shares owned by the top 20 shareholders) had a negative association with disclosures. Similarly, Brammer and Pavelin (2008) found that firms with high ownership concentration in the United Kingdom had

fewer disclosures of the quantity and quality of environmental information. In this respect, we, therefore, anticipate that firms with a high ownership concentration will have low levels of GHG emission disclosures.

H2. *High share ownership concentration will be negatively associated with GHG emission voluntary disclosures.*

2.2.3 | Employees and GHG information disclosure

Increased awareness of environmental issues has made employees realise that any negative perception of a firm being environmentally irresponsible risks its going concern and also threatens their employment prospects. Besides, Chiu and Sharfman (2011) argue that firms deemed environmentally irresponsible are likely to find it hard to attract high-quality employees and customers who value green credentials. The pressure exerted by employees is dependent on their number and organisation within a firm. The greater the number of employees, the higher the chances that their environmental concerns will be taken seriously by management. Employees with well-established unions are also expected to hold more bargaining power that can force management to adopt and disclose more environmental or GHG information (Huang & Kung, 2010).

It is also understood that, as part of the resource base of a firm, employees hold the key to a firm's success regarding its environmental initiatives. Prior evidence demonstrates that participation and involvement of employees help a firm develop and embed its green competencies within its operations (Cooper et al., 2018; Ramus & Steger, 2000). We therefore anticipate that firms with a large number of employees have both the pressure and the resources/manpower to enable them to build the competencies to report more GHG information.

H3. *Companies with large numbers of employees will disclose more GHG information voluntarily.*

2.2.4 | Creditors and GHG information disclosure

Creditors influence on a firm rests on the need to safeguard their interests so much so that when they notice any deviation from agreed terms, they can alter their support/relationship with the firm, thereby affecting its operations (Brammer & Millington, 2004). This may take the form of recalling loans or preventing credit extensions (Huang & Kung, 2010; Taurigana & Chithambo, 2015). More importantly, anything that negatively affects a firm such as environmental cases, which may attract penalties and adverse public reaction, concerns creditors as these may prevent a firm meeting its outstanding obligation to them. Therefore, to ensure that they are kept updated on the status of a firm, creditors demand firms be transparent and disclose more information, including environmental risks. Failure to disclose more

details may force the creditors to withdraw their support from the firm (Huang & Kung, 2010).

H4. *Gearing is expected to have a positive and significant association with voluntary GHG disclosures.*

2.2.5 | Regulatory pressure and GHG information disclosure

According to Delmas and Toffel (2004, p. 213), regulatory pressure refers "to the extent to which regulators threaten to or actually impede a company's operations based on their environmental performance." Thus, regulatory stakeholders have the power to penalise and constrain a firm from engaging in environmentally damaging activities. Managers can, therefore, use disclosure of information, such as GHG emission and environmental management, to help improve the perception of regulators and as a way of limiting frequent regulatory intervention (Elmagrhi et al., 2019). Thus, firms failing to adhere to regulatory pronouncements risk severe penalties, licence revocation, and intense public scrutiny through the media.

Prior evidence indicates that managers engage in voluntary environmental initiatives and disclosure in response to regulation (Stanny & Ely, 2008). In recent times, there has been an increased level of government activities aiming to encourage initiatives towards climate change and GHG emission. This includes the enactment of the Climate Change Act 2008 and subsequent issuance of DEFRA (2009) guidance on measurement and reporting of GHGs. Furthermore, the government announced the mandatory reporting of GHGs beginning April 2013.

Besides, regulatory pressure has also been instrumental in encouraging firms to adopt privately initiated reporting regimes as a way of encouraging good behaviour. Delmas (2002) argues that government influence was behind the adoption of International Organization for Standardization 14001 by many firms because by endorsing the standard, coercive pressure was exerted on firms to adopt the same if they were to be deemed environmentally responsible. In literature, regulatory pressure has been proxied by several variables. These include the name of regulatory inspections or violations and enforcement action taken on a firm, the number of government-level environmental initiatives launched in a period, and the firm size (Huang & Kung, 2010).

In this study, we adopt corporate size. We argue that the larger the firm, the more susceptible it may be to public scrutiny and hence governmental intervention (Haque & Ntim, 2018). It is also understood that large firms are deemed resource capable of meeting the pollution abatement costs and related disclosure costs (Freedman & Jaggi, 2005). The availability of resources is paramount when dealing with climate-related issues, which in most cases require significant changes to the way a firm conducts its business.

H5. *Regulatory pressure is expected to have a positive and significant association with voluntary GHG disclosures.*

2.2.6 | Suppliers and customers and GHG information disclosure

Suppliers and customers are often referred to as value chain stakeholders. They are also known to be influential in making a firm adopt transparency and accountability within its operations (Darnall et al., 2010; Sarkis, Gonzalez-Torre, & Adenso-Diaz, 2010). Noted that there is an increasing trend towards green consumerism, which can only be ignored by firms at their peril. Consumers, aware of the devastating effects of environmental damage, demand that their suppliers of goods and services are transparent and accountable in their operations' impact on the environment. Delmas and Montiel (2007) noted that it was becoming fashionable for corporate customers to demand their suppliers' certification in environmental management practices. This is done to limit any reputation risk damage that may arise as a result of sourcing from firms/clients deemed environmentally irresponsible, which may result in increasing environmental liability.

When suppliers or customers perceive or realise that a firm is deemed a high environmental risk, they may terminate their contract or revise the terms of their relationship with the firm. However, as noted by Hill and Jones (2004), there is always an interdependent relationship between a firm and its supplier chain so much that each has the motivation to ensure that the other party does engage in activities that may not strain the relationship. Thus, buyers/customers are often accustomed to transacting with their suppliers, so change is not always easy. In contrast, a firm whose supplier contract has been terminated abruptly might suffer financial consequences when attempting to enter new deals. Therefore, it is argued that a firm with a high stock turnover and which places heavy reliance on its supplier chain will ensure that the suppliers' demands are satisfied in order to avoid disrupting its business interests in the event of a boycott due to environmental credentials. Therefore, when firms are disclosing GHG environmental information, while addressing the needs of other stakeholders, they ensure that the needs of customers and suppliers are met. Nonetheless, it is the extent to which a firm controls the market that helps shape its value chain relationship (Porter, 2008); hence, in this study, we use market share to represent value chain pressure on firm GHG disclosure decisions.

H6. *Firms with a large supply chain are expected to disclose more GHG information.*

2.2.7 | Social stakeholders (media, NGOs, and community) and GHG information disclosure

Social stakeholders have the power and means to exert pressure on a firm to adopt environmentally friendly policies. These among other things include mobilising public opinion against patronising the services and products of a firm, participating in their local elections to ensure that people who share their environmental beliefs are ushered into office and will legislate against irresponsible firm behaviour, and

by also filing individual lawsuits against a firm (Delmas & Toffel, 2004). Prior studies have indicated that managers take social stakeholder pressure seriously, and in return, they respond through adequate disclosure of their actions (Kock, Santaló, & Diestre, 2012; Lu & Indra, 2014). NGOs and media often target firms deemed as environmentally irresponsible with negative publicity, which is potentially damaging.

Pollution-related issues are controversial and attract a great deal of public opinion when a firm is deemed environmentally irresponsible. Several private environmental organisations have been established alongside various governmental departments to help monitor pollution levels. Evidence shows that pressure differs depending on the industry with those classified as environmentally sensitive being under more scrutiny than their counterparts. In turn, firms operating in these industries disclose more information as a way of passing the scrutiny test (Cho & Patten, 2007). Spar and La Mure (2003) demonstrated that NGO pressure had become a dominant part of the senior executives psychology to the extent that they are pushed to make more environmentally related disclosure without considering the cost benefit of the same.

H7. *Social stakeholder pressure will have a positive and significant association with a firm's voluntary GHG disclosure.*

2.2.8 | CEO characteristics, stakeholder pressure, and GHG information disclosure

Prior literature indicates that concern for the environment often varies with age, with younger generations showing more concern for the environment than older generations (Shahab et al., 2019). Age has also been used as a proxy for managerial risk attitude, with older managers considered more risk averse than younger managers (Taurigana & Chithambo, 2015). In other studies, other than disclosure, the impact of age has been explored and found to exert statistically significant influence. These include older age individuals having a positive association with risk aversion in portfolio holdings (Shahab et al., 2019) and former managers being conservative in matters of corporate expenditure and gearing levels (Bertrand & Schoar, 2003). Psychology-based evidence suggests that risk aversion increases with age (Farag & Mallin, 2016), implying that as an individual grows older, they tend to be less aggressive in their approach. Consistent with these findings, our study suggests that the age of the CEO will have a bearing on the GHG disclosure style that is meant to manage stakeholder pressure, with older CEOs exhibiting disclosure constraining styles compared with younger ones.

Drawing on the upper echelons theory, we understand that executives' tenure affects their cognition, which in turn affects their behaviour (Finkelstein et al., 2009). Thus, the more established the managers are, the more they are used to routines and practices, thereby making them loath to adopt new styles. So our proposition for control is that the longer the CEO stays in post, the

more reluctant they will be to manage stakeholders' pressure for climate change through voluntary disclosure. On the other hand, CEO education is included on the basis that those who are well educated will have a good understanding of climate change issues and also the ability/skill to champion voluntary GHG emission reporting.

H8. *CEO characteristics positively moderate the relationship between stakeholder pressure and the extent of GHG disclosures information.*

3 | RESEARCH DESIGN

3.1 | Sample selection

The population for the study consists of London Stock Exchange FTSE 350 listed firms as of September 30, 2011. The data were taken from the annual reports and DataStream database. The sample period is selected because the disclosure of GHG emissions by FTSE 350 was largely voluntary during this period. To arrive at our sample, 93 financial sector firms, which included banks, insurance companies, investment trusts, unit trusts, and real estate companies, were excluded from the sample because they are subject to different disclosure and statutory requirements (Ntim & Soobaroyen, 2013). Of the remaining 257 firms, 42 firms were excluded based on either undergoing significant restructuring in the year or had no corporate office in the United Kingdom. This meant that our sample consisted of 215 firms.

3.2 | Quantifying GHGs disclosure

Unlike previous studies (e.g., Prado-Lorenzo, Rodriguez-Dominquez, Gallego-Alvarez, & Garcia-Sanchez, 2009), which based their list of items from one GHG disclosure guidance framework, we included all relevant elements from several GHG reporting frameworks such as DEFRA (2009). The final index had 60 items consisting of 34 items relating to qualitative disclosures and 26 quantitative disclosures. To quantify the GHG disclosures made in the annual reports, sustainability reports, and websites of the firms in 2011, content analysis technique was used. Literature suggests that the quantification of the disclosure can either be done on a weighted or un-weighted basis (Jaggi, Allini, Macchioni, & Zagaria, 2017). An un-weighted approach has been adopted for this study, which is most appropriate when no importance is given to any specific user groups. A company is awarded a score of "1" for the disclosed item and "0" if not disclosed. However, the company is not penalised if the item does not apply. The total disclosure index score is then captured for each sample firm as a ratio of the overall disclosure score divided by the maximum possible disclosure for the company. The disclosure index for each company is then expressed as a percentage.

3.3 | Econometric modelling

Due to the nature of the data, the study employed a series of cross-sectional multiple regression techniques to estimate the relationship. The results are presented in two models. Model 1 estimates the impact of stakeholders' pressure on GHG disclosure information. Model 2 presents the results of the interaction effect of CEO characteristics on the relationship between stakeholder pressure and GHG disclosure information. These models are presented below:

$$\text{GHG DIS}_x = \beta_0 + \beta_1 \text{Stakeholder Pressure}_x + \beta_2 \text{CEO Characteristics}_x + \text{Controls}_x + \varepsilon, \quad (1)$$

$$\text{GHG DIS}_x = \beta_0 + \beta_1 \text{Stakeholder Pressure}_x + \beta_2 \text{CEO Characteristics}_x + \beta_3 \text{Stakeholder Pressure}_x * \text{CEO Characteristics}_x + \beta_4 \text{Controls}_x + \varepsilon, \quad (2)$$

where GHG DIS denotes GHG disclosure index, Stakeholder Pressure is a matrix of the main independent variable of interest denoted by Ownership Concentration (OWCON) Employees, Gearing, Company size (Size), and Marktshare. CEO characteristics include CEOage_x, CEO education_x, and CEO tenure_x, whereas the controls include Profitability and Board size; ε is the error term, and β represents the vectors of parameters to be estimated. A detailed description of all the variables is presented in Table 1.

TABLE 1 Variable measurement description

Symbol	Full name	Stakeholder pressure	Measurement
GHG DIS _x	GHG disclosure index	N/A	Disclosure score expressed as a ratio of the total possible score, that is, 60
OWCON _x	Ownership concentration	Shareholder pressure	Proportion of ownership by shareholders with 3% or more
Employees _x	Employees	Employee pressure	Number of people employed by the company
Gearing _x	Gearing	Creditor pressure	Ratio between total debt and total shareholders' equity
Size _x	Company size	Regulatory pressure	Total assets expressed as natural log
Marktshare _x	Market share	Supplier and customer pressure	Total turnover expressed as proportion of total turnover of firms in the sample drawn from the same industry
Industry _x	Industry	Social stakeholders (media, non-governmental organisations, and community pressure)	An industry to which a firm belong represented as dummy, that is, 1 if belonging to that industry otherwise 0
CEOage _x	CEO age	N/A	Age of the CEO expressed in years
CEOtenure _x	CEO tenure	N/A	Period the CEO has been in office (expressed in months)
CEOeducation _x	CEO education	Control	Type of qualification possessed by CEO (expressed as dummy, i.e., 1 with a bachelor's degree and/or above and 0 if only in possession of any qualification lower than bachelor's degree)
Profitability _x	Profitability	Control	Profit after tax, divided by total assets
Boardsize _x	Board size	Control	Company x's total number of people making up the board of directors

Abbreviations: CEO, chief executive officer; GHG, greenhouse gas.

4 | EMPIRICAL EVIDENCE

4.1 | Descriptive statistics

Descriptive statistics of the variables used in the paper are provided in Tables 2 and 3. Table 2 mainly focusses on the extent of disclosure with respect to the disclosure index used in this study. Overall, more qualitative disclosures are made compared with quantitative ones. On the qualitative disclosures, the most frequently reported item was the actions/measures taken to reduce/mitigate climate change impact with almost 96% of the firms reporting this. This could suggest the desire on the part of firms to shift the focus of their target audience away from their actual impact on climate change to intended actions. The least disclosed qualitative information was the supplier and the name of the purchased green tariff. The results also show that 71% of firms disclosed their reporting framework guidelines, whereas only 31% revealed that they had obtained assurance services on their GHG emissions reporting.

The most frequently reported quantitative item was the total GHG emissions in CO₂ metric tonnes, which was published by 84% of the companies. However, evidence indicates low levels of GHG quantitative disclosure per scope. For example, only 29% of the firms reported their GHG emissions per scope 1. Dragomir (2012) reported similar findings and noted that a sample of companies comprising BP, Total, Shell, BG Group, and Eni had largely disclosed

TABLE 2 Consolidated disclosure scores for all companies

Disclosure item		Numbers of disclose firms	Percentage of disclosure to total firms (%)
Qualitative disclosures			
1	Institutional background	213	99
2	Period covered by the report	212	98
3	Statement on company position on climate change and related responsibilities	202	94
4	Corporate governance on climate change	191	88
5	Climate change opportunities and company strategies	137	63
6	Climate change impact on business operations including supply chains	111	51
7	Identification of regulatory risks as a result of climate change	67	31
8	Identification of all other risks as a result of climate change	92	43
9	Actions/measures taken to reduce/mitigate climate change impact	207	96
10	Adaptation strategies to climate change effects	103	48
11	Regulated schemes to which a firm belongs	79	37
12	Reporting guidelines used in GHG reporting	135	63
13	An assurance statement on disclosed information	58	27
14	Contact or responsible person for GHG reporting	163	75
15	Organisation boundary and consolidation approach	98	45
16	Base year	126	58
17	Explanation for a change in base year	69	32
18	GHGs covered including those not required by Kyoto protocol	68	31
19	Sources and sinks used/excluded	88	41
20	Conversion factors used/methodology used to measure or calculate emissions	83	38
21	Explanation for any changes to methodology or conversion factors previously used	64	30
22	A list of facilities included in the inventory for GHG emissions	37	17
23	Information on the quality of the inventory e.g. causes and magnitude of uncertainties in estimates	13	6
24	Information on any GHG sequestration	37	17
25	Disclosure of the supplier and the name of the purchased green tariff	13	6
26	Explanations for changes in performance of total GHG emissions in CO ₂ metric tonnes	154	71
27	Explanation of any country excluded if global total is reported	111	51
28	Explanations for changes in performance of scope 1 emissions	69	32
29	Details of any specific exclusion of emissions from scope 1	55	25
30	Explanation for the reason of any exclusion from scope 1	45	21
31	Explanations for changes in performance of scope 2 emissions	65	30

(Continues)

TABLE 2 (Continued)

Disclosure item		Numbers of disclose firms	Percentage of disclosure to total firms (%)
32	Details of any specific exclusion of emissions from scope 2	53	25
33	Explanation for the reason of any exclusion from scope 2	44	20
34	Explanations for changes in performance of scope 3 emissions	59	27
Quantitative disclosures			
35	Total GHG emissions in CO ₂ metric tonnes	170	79
36	Comparative data of total GHG emissions in CO ₂ metric tonnes	159	74
37	Future estimates of total GHG emissions in CO ₂ metric tonnes	15	7
38	GHG emission by business unit/type/country	123	57
39	GHG removals quantified in tonnes of CO ₂ e	43	20
40	Scope 1 emissions	63	29
41	Comparative data on scope 1 emissions	56	26
42	Future estimates of scope 1 emissions	3	1
43	Scope 2 emissions	62	29
44	Comparative data on scope 2 emissions	54	25
45	Future estimates of scope 2 emissions	5	2
46	Scope 3 emissions	50	23
47	Comparative data on scope 3 emissions	45	21
48	Future estimates of scope 3 emissions	3	1
49	Emission of direct CO ₂ reported separately from scopes	95	44
50	Emission not covered by Kyoto and reported separately from scopes	95	44
51	Emission attributable to own generation of electricity/heat/steam sold or transferred to another organ	116	54
52	Emission attributable to own generation of electricity/heat/steam purchased for resale to end users	63	29
53	For purchased green tariff state the reduction in tonnes of CO ₂ e per year	17	8
54	Additional carbon saving associated with the tariff as a percentage	5	2
55	Quantitative data estimates of the regulatory risks as a result of climate change	1	0
56	Quantitative data estimates of all other risks as a result of climate change	2	1
57	GHG emission performance measurement against internal and external benchmarks including ratios	105	49
58	GHG emission targets set and achieved	139	64
59	GHG emission offsets information	48	22
60	Comparative information on targets set and achieved	133	62

Abbreviation: GHG, greenhouse gas.

GHG emissions in total rather than in scopes. Overall, there was a lack of quantitative information relating to future estimates of emissions and quantifiable estimates of regulatory risks arising from climate change.

From Table 3, in 2011, the mean disclosure of GHG information was about 38% (0.38), whereas the lowest and highest disclosure levels were 5% (0.05) and 88% (0.88), respectively. The mean disclosure level being barely less than 40% (average of the relative

TABLE 3 Correlation and descriptive statistics

Variables	1	2	3	4	5	6	7	8	9	10	11
1 GHG disclosures	1.00										
2 Size	0.22***	1.00									
3 Gearing	-0.05	-0.02	1.00								
4 Ownership concentration	-0.3***	-0.01	-0.04	1.00							
5 CEO age	-0.03	0.06	0.08	0.01	1.00						
6 Board size	0.41***	0.43***	-0.03	-0.3***	0.19***	1.00					
7 Profitability	-0.10	0.05	-0.04	0.05	-0.03	-0.02	1.00				
8 Employees no.	0.25***	0.21***	-0.02	-0.2***	-0.01	0.25***	-0.06	1.00			
9 CEO education	0.14**	0.09	0.06	-0.09	-0.09	0.05	-0.08	-0.05	1.00		
10 Market share	0.32***	0.43***	-0.04	-0.3***	-0.02	0.45***	-0.03	0.31***	-0.02	1.00	
11 CEO tenure	-0.15**	-0.10	0.05	0.04	0.39***	0.01	0.05	-0.08	-0.04	-0.02	1.00
M	0.38	10,622.72	1.54	41.58	52.18	9.08	10.72	27,720.47	2.54	12.44	77.25
SD	0.23	35,399.65	12.05	18.29	5.81	2.41	11.11	65,423.74	0.58	18.74	68.92
Minimum	0.05	51.50	0.03	3.55	38.00	5.00	-16.14	14.00	1.00	0.001	1.00
Maximum	0.88	345,257.00	173.99	89.20	77.00	17.00	120.38	639,964.00	4.00	98.15	456.00
Kurtosis	2.10	58.75	197.29	2.35	4.41	3.53	46.53	52.63	2.43	8.75	8.60
Skewness	0.41	6.97	13.83	0.13	0.69	0.95	4.78	6.48	0.25	2.40	1.98
Variance inflation factors	—	4.13	1.05	1.23	1.10	1.70	1.20	3.10	1.1	1.96	1.02

Note. N = 215.

Abbreviations: CEO, chief executive officer; GHG, greenhouse gas.

** $p < .05$. *** $p < .01$.

disclosure), the extent of voluntary GHG disclosure by FTSE 350, is still considered marginal or unsatisfactory. Our sampled firms ranged from £51.50 million to £345.257 million with a mean of £10,622.72 million in size, indicating that overall, the sample had relatively large firms. Our CEO mean age of 52.18 years suggests that FTSE 350 firms are to a large extent dominated by mature CEOs. There was also a significant variability with regard to profitability, gearing, and ownership structure. For instance, firms in the sample had reported a return on assets ranging from a minimum of -16.14% to a maximum of 120.38% in 2011. On average, the majority of the sampled firms were highly geared (mean of 1.54) and had high levels of ownership concentration (maximum of 89.20) taking into account the fact that the maximum number of shareholders with more than 3% was 15.

4.2 | Correlation between dependent and independent variables

Table 3 also shows the correlation between all variables used in the study. As expected, GHG disclosure is positively related to size, employees, market share, and board size. CEO age, gearing, ownership concentration, and profitability are negatively correlated with GHG disclosures. However, it is only ownership concentration whose relationship is significant. There were also some significant correlations between independent variables, with the highest being that of firm size and board size, and firm size and market share both at 0.43. However, this is considered no threat as it falls below the maximum threshold of 0.8 or 0.9, as recommended by Field (2009). Although our correlation matrix does not depict very high significant correlations among the independent variables, we also analysed the variance inflation factor (VIF). According to Field (2009), low values of VIF are expected if multicollinearity problem is to be under control. Our mean VIF was 1.93, and the highest VIF was 4.13 for size, and this is below the maximum benchmark of 10. This then means that multicollinearity is not prevalent in our model.

To control for heteroscedasticity in the standard errors, we used the option of robust in Stata (Greene, 2008). Thus, apart from just addressing heteroscedasticity issues, the robust option deals with other minor concerns bordering on failure to meet other assumptions such as normality or excessively large residuals or influence from a particular variable. Therefore, without altering the point estimates of the coefficient as derived from ordinary least squares, with the robust option, standard errors adjust for any concerns of data abnormality or heteroscedasticity.

4.3 | Multivariate results and discussion

Firm size was significant at $p < .001$, hence confirming the basis of our hypothesis that due to greater visibility and associated political costs, larger firms disclose more GHG information as a matter of diffusing public attention. Gearing has a negative and significant relationship with GHG disclosures ($p < .001$). This then implies that

creditor pressure on a firm may result in less disclosure of GHGs. Our results also show a positive but insignificant relationship between market share and GHG disclosures. Although we find insignificant results, previous studies (Mahadeo, Oogarah-Hanuman, & Soobaroyen, 2011; Lu & Indra, 2014) show that firms that are considered industry leaders take a leading role in setting the disclosure pace. The negative and significant relationship between ownership concentration and GHG disclosures confirms our hypothesis and means that firms with a high concentration of ownership structure have little shareholder pressure on them to disclose more GHGs information.

The relationship between employees and GHG disclosures is negative and nonsignificant, meaning that there is a lack of evidence of employees demanding more GHG disclosures from their employers. One reason for this could be the timing of the study. The year 2011, being in the aftermath of the 2008 financial crisis and the subsequent recession, saw companies downsizing that might have affected the priorities of employees. Of all the variables representing industry sensitivity, only those under industrials and consumer services were positive and statistically significant. Concerning CEO characteristics, our results indicate a negative and significant relationship at $p < .05$ between GHG disclosures and CEO age, which was a proxy for managerial risk attitude. This implies that the older the CEO, the less GHG disclosures their firms make. As well as being risk averse, the result confirms assertions that older CEOs have less concern for the environment than their younger counterparts (Schaper, 2002). Though in line with our set hypothesis, it contradicts some prior studies on disclosure: Bamber et al. (2010) failed to find support for the relationship between managers' observable demographic characteristics and the disclosure of accounting information. When the variable CEO age is interacted with the respective stakeholder pressure variables in order to understand how stakeholder pressure on firm's GHG disclosure behaviour varies with the characteristics of the accountability officers, that is, CEO. Overall, our results show no significant effect of the interaction of CEO age and the stakeholder pressure on GHG disclosures with the exception of regulatory pressure as proxied by size.

Of the control variables, only board size turned out significant and positive, suggesting that the large-sized board often leads to a more disclosure of GHG information. The results are consistent with prior studies (Peters & Romi, 2012). As argued by Taurigana and Chithambo (2015), board size has a positive relationship with environmental performance and GHG disclosures. The coefficient for profitability is statistically insignificant, meaning that the level of profitability does not influence the level of voluntary GHG disclosures. This result is in line with prior studies (Freedman & Jaggi, 2005; Rankin et al., 2011; Stanny & Ely, 2008; Wegner, Elayan, Felton, & Li, 2013).

4.4 | Robustness checks

The robustness of results was obtained through the transformation of the industry variable. Prior studies (Freedman & Jaggi, 2005; Rankin et al., 2011) categorise the industries differently, and in this

study, our classification is primarily based on Industry Benchmark Classification, which resulted in nine industries after excluding financial sector. Cho, Guidry, Hageman, and Patten (2012) noted that variations in industry classification might affect the outcome, hence calling for careful scrutiny as to how industry variables are included in models. We then reclassified the industry variable into just one dummy variable using the Times 1000 industry categorisation, based on environmental risks.

When the industry variable is transformed into one dummy variable, and the primary regression model is rerun, there is a minor change to the results. The industry dummy becomes negative and nonsignificant. Apart from industry transformation, we also noticed that prior research had proxied size and profitability with different measures; hence, we reran our main model with varying measures for size and profitability. Thus, we used total revenue for size (instead of total assets) and return on equity for profitability (instead of return on assets), and the results (not included here) are consistent with the primary model. In addition, various corporate governance characteristics, that is, the presence of independent nonexecutive directors and environmental committee, have also been included in prior studies (see Tauringana & Chithambo, 2015); therefore, we also ran a separate model with these as controls, and the results were not materially different from the main model.

4.5 | Discussion

Regulatory pressure, as proxied by firm size, has a positive and significant relationship with voluntary GHG disclosure. As noted, being large means being very visible and subject to intense public scrutiny, which may then force a firm to make more disclosures as a way of deflating criticism. The regulatory pressure in the United Kingdom could also be seen from the activities of the government with respect to GHG reporting. So far, the voluntary reporting regime through DEFRA (2009) guidance and following mandatory requirements for GHG disclosure issued in September 2013 have targeted the top FTSE 350 companies. Besides, being large is also synonymous with being resource-rich, which may enable managers to exercise more flexibility in their disclosure decisions, unlike in small firms where resources are deemed in short supply (Reverte, 2008). More voluntary disclosure by large firms is also often seen as a means of keeping pace or help define/pre-empt the extent to which any regulation may be set. The result also agrees with prior evidence (Berthelot & Robert, 2012; Freedman & Jaggi, 2005; Prado-Lorenzo et al., 2009; Rankin et al., 2011).

Concerning creditor pressure, our results suggest that firms with significant creditor pressure, as reflected in their capital structure, are inclined to disclose less GHG emissions voluntarily. Arguably, creditors may be interested in other disclosures that may have a direct bearing on their financial interest in the firm; hence, firms may meet those expectations by providing more of the financial disclosures at the expense of the environmental disclosures.

The result both contradicts and agrees with some empirical evidence. Huang and Kung (2010) reported that creditors had a significant favourable influence on Taiwanese firms' disclosure of environmental information. On the other hand, Brammer and Pavelin (2008) found that firms' disclosure of environmental information had a negative relationship with financial gearing. Others have found gearing insignificant (Freedman & Jaggi, 2005; Prado-Lorenzo et al., 2009; Rankin et al., 2011).

The results show that the pressure exerted by suppliers and customers results in a positive and significant effect on voluntary GHG disclosure. One explanation could be that industry leaders understand that due to their visibility, they are likely targets for any future regulation in this respect; hence, their disclosure could be interpreted as a tactic or ploy to pre-empt or limit regulatory intervention that could be costly. It could also be a sign that part of the strategy to maintain their market share is through satisfactorily addressing the ever-increasing "green" demands of their suppliers and customers. Despite prior literature documenting evidence of an increase in investors interested in ethical and green investments, existing shareholders of FTSE 350 (mostly those categorised as being highly concentrated) have a negative and significant relationship with voluntary GHG disclosure. This could be due to the fact that these shareholders have other means of accessing information on the firm than through public disclosure (Chau & Gray, 2002). In the case of GHGs, it could be argued that other avenues like Carbon Disclosure Project disclosures are used or encouraged by institutional investors; hence, they may not find it worthwhile to encourage managers to disclose GHG information in other media.

Social stakeholder pressure as represented by industry categorisation has had a mixed outcome with only two industries, that is, industrials and consumer services as having a positive and significant effect on voluntary GHG disclosure whereas the rest were not statistically significant. Although these may not be classified as "heavy polluting" industries in the strict sense, they interface with a highly sensitive consumer base whose reaction to environmental matters might have significant economic consequences for these firms. There is evidence that consumers are increasingly demanding firms to demonstrate their green credentials (Lee, Park, & Klassen, 2013). Nonetheless, those firms in heavy polluting industries may feel that more disclosures may further expose them. Hence, they may not be forthcoming when it comes to transparency and accountability of their emissions (Wegner et al., 2013). In contrast, less environmentally risky industries may disclose more as a way of pre-empting any potential regulation that might be costly to comply with.

Being a variable that was also used to reflect the pressure exerted by NGOs, media, and other environmental lobbyists, the nonsignificance of most industry categories may suggest less influence of these groups or the ability of those industries to deal with such pressures. Friedman and Miles (2002) argued that the relationship between a corporation and NGOs is often noncontractual, and in most cases, they do not need each other to survive. Hence, management often disregards the wishes of these groups by simply

branding them as “fanatics.” Sarkis et al. (2010) made a similar observation, arguing that pressure from the media is not enough to force firms to invest in systems that help the implementation of environmental practices. Similarly, Fiedler and Deegan (2002) found that pressure from specific vital stakeholders, such as the government, is what forces some firms to begin to respond to the pressure exerted by NGOs. Thus, through their engagement or communication with public and governmental organisations, environmental lobby groups can exert pressure on firms (Broadstock, Collins, Hunt, & Vergos, 2018).

The negative but significant association between CEO age and voluntary GHG disclosure means that managerial characteristics play a role in disclosure decisions. Under the upper echelons theory, older CEOs are likely to exhibit conservative traits and hubris (Dang, Henry, & Hoang, 2017). Thus, being old is also associated with resistance to change (Musteen, Vincent, & Virginia, 2006). This means that faced with stakeholder pressure, the response of older CEOs is likely

to differ from that of younger, short-tenured ones. Generally, it is expected that the former will resist any pressure to disclose more GHG information and instead rely on other tactics in managing stakeholder expectations. Found evidence of older and conservative CEOs resisting change and innovation in favour of their trusted existing strategies, and the same might be the case with GHG disclosure.

However, our results also show no significant impact of the interaction of CEO age and the stakeholder pressure on GHG disclosures except for regulatory pressure as proxied by size. The effect of CEO age on regulatory pressure makes a significant negative impact on GHG disclosures. Mature CEOs are considered a “safe” pair of hands with an extensive network extending to the corridors of regulatory agencies, which may then make them handle pressure emanating from that source with more competency than their younger counterparts. In the light of our earlier findings, we interpret this as implying that CEO intervention in the disclosure

TABLE 4 Multiple regression models

Variable	Model 1		Model 2	
	Coefficient	SE	Coefficient	SE
Size	0.064***	0.021	0.311**	0.128
Gearing	-0.002***	0.001	0.037	0.158
Ownership concentration	-0.002**	0.001	-0.003	0.007
CEO age	-0.005**	0.003	0.008	0.02
Board size	0.151**	0.07	0.165**	0.073
Profitability	-0.001	0.001	0.0001	0.001
Employees	-0.003	0.016	-0.122	0.087
Market share	0.017	0.012	-0.008	0.009
CEO education	0.0278	0.023	-0.008	0.009
CEO tenure	-0.0105	0.014	-0.011	0.014
Industrials	0.192***	0.071	0.199***	0.067
Consumer services	0.145**	0.075	0.163**	0.073
Consumer goods and services	0.089	0.073	0.093	0.071
Utilities	0.0052	0.082	0.095	0.095
Oil and gas	0.053	0.086	0.078	0.085
Basic materials	0.082	0.086	0.084	0.083
Technology	0.056	0.071	0.067	0.068
Telecommunication	0.002	0.118	0.018	0.114
Size × CEO age	—	—	-0.004**	0.002
Ownership × CEO age	—	—	0.00005	0.0001
Gearing × CEO age	—	—	-0.001	0.002
Employees × CEO age	—	—	0.003*	0.001
Market share × CEO age	—	—	0.0001	0.0002
R ²	.379		.394	
Adjusted R ²	.318		.313	

Abbreviation: CEO, chief executive officer.

* $p < .10$.

** $p < .05$.

*** $p < .01$.

pattern is independent of any particular stakeholder pressure. Thus, their negative association with GHG disclosures and their lack of influence when interacted with stakeholder pressure may imply that their characteristics may have a bearing on the final product, that is, disclosures than stakeholder pressure due to other institutional factors. It could be argued that in most cases, the task or role of managing stakeholders is entrusted to different departments or individuals other than the CEO. Delmas and Toffel (2008) found that among others, marketing and legal departments influence firms' responses to institutional pressures.

The other CEO characteristics such as education and tenure interacted with the respective stakeholder pressure variables but did not have any significant association. As a result, these have not been reported in Table 4.

5 | CONCLUSION AND POLICY IMPLICATIONS

There is a recognition that more need to be done to reverse the trend of environmental pollution, in particular, the emission of GHGs. Companies, amidst policy uncertainty, have been engaging in various voluntary initiatives to demonstrate their green credentials and have been publicising their efforts through disclosures. Empirical studies investigating the rationale for these voluntary disclosures are growing. However, there are still unanswered questions relating to which stakeholders exert significant pressure on firms to make these disclosures. In this study, using institutional theory and insights from the upper echelons theory, we investigated the role of various stakeholders in influencing firms' GHG disclosure behaviour.

The findings indicate that regulatory pressure (firm size), customer and supplier pressure (market share), and social stakeholder pressure (industry categorised as industrials and consumer services) have a statistically significant positive relationship with GHG disclosure, whereas creditor pressure (gearing), shareholder pressure (ownership concentration), and CEO age had a significant negative influence. CEO age moderation effect on stakeholder pressure, notably regulatory pressure, was found. Generally, the results suggest that there is no substantial shareholder and employee pressure on a firm to disclose GHG information. However, there is a significant positive pressure from the market status of a firm from those firms with more market share, disclosing more GHG information. Consistent with the predictions of institutional theory, the study finds evidence that coercive pressure, that is, regulatory pressure and mimetic pressures emanating in some industries notably industrials and consumer services, have a significant positive influence on firms' GHG disclosure decisions.

This study contributes to a growing body of literature investigating why, when facing seemingly homogenous pressure from stakeholders, firms respond heterogeneously (Lewis et al., 2013). Just like Lewis et al. (2013), our inclusion of CEO characteristics, such as age, helps to highlight whether variations incorporating the characteristics

of the actors can explain responses to mimetic, normative, and coercive pressure. The findings on the significant negative relationship between GHG disclosures and CEO age suggest that besides exclusively focussing on investments in new technology and systems to help collect and report GHG information with the intention of eventual emission control, company owners, through the board structures, can also focus on the characteristics of the CEO in their recruitment drive. As Lewis et al. (2013) argued, environmental disclosure decisions are fraught with uncertainty so much so that they reflect the perception of decision-makers, which in turn is influenced by their characteristics.

Other prior studies have also found CEOs to be influential in setting the tone of an organisation strategy towards innovation and other entrepreneurial activities; hence, a full picture of GHG disclosure decisions can be obtained if particular characteristics of CEOs are carefully scrutinised. The practical implication of our study is therefore that CEOs should not just be recruited or appointed haphazardly or just with financial goals in mind. Instead, the board should also take into consideration characteristics that will align with broader organisational goals that encompass environmental or GHG emissions control targets. The significance of board size is also of paramount importance/interest to policymakers as it highlights potential areas of regulatory focus on firms if real emission reductions are to be achieved through any future disclosure regulation. The study has also gone beyond the tradition of exclusively focussing on industries deemed as heavy polluters and has included all the possible sectors in determining the extent of disclosure. De Villiers et al. (2011) argued against just studying specific industries under the justification that those industries are heavy polluters because such results tend to be precise and limited. This then means that our study with such a broad industry base and disclosure index increases the generalisability of the results.

Notwithstanding, insights gained from this study identify that there were a number of limitations upon which future studies might be concentrated. The cross-sectional nature of our research limits how far we can generalise and understand the extent to which dynamic CEO-stakeholder relationship is built over time. Also, because CEO age, just like CEO tenure, often influences CEO hubris and risk attitude (Zona, 2014), then there is a need to consider another suitable measurement for the same. Krische (2011) noted that although research using these proxies is growing, there is a need to find alternative measures to examine the relationship. In the same vein, the measurement or proxies can also be established through managerial survey questionnaires as has been done on previous studies (Buyse & Verbeke, 2003; Darnall et al., 2010).

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REFERENCES

- Abrahamson, E., & Rosenkopf, L. (1997). Social network effects on the extent of innovation diffusion: A computer simulation. *Organization Science*, 8, 289–309.

- Bamber, L., Jiang, J., & Wang, I. (2010). What's my style? The influence of top managers and their personal backgrounds on voluntary corporate financial disclosure. *The Accounting Review*, 85, 1131–1162.
- Berthelot, S., & Robert, A. M. (2012). Climate change disclosures: An examination of Canadian oil and gas firms. *Issues in Social and Environmental Accounting*, 5(1/2), 106–123.
- Bertrand, M., & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *The Quarterly Journal of Economics*, 118, 1169–1208.
- Braham, W. W., Butcher, L., Kurtz, J. S., Roudsari, M. S., & Vyas, J. (2016). The new Chautauqua game: designing the renewable city and region using E[m]ergy accounting. *Journal of Environmental Accounting Management*, 4(2), 209–221.
- Brammer, S., & Millington, A. (2004). The development of corporate charitable contribution in the UK: A stakeholder analysis. *Journal of Management Studies*, 41, 1412–1434.
- Brammer, S., & Pavelin, S. (2006). Voluntary environmental disclosures by large UK companies. *Journal of Business Finance & Accounting*, 33, 1168–1188.
- Brammer, S., & Pavelin, S. (2008). Factors influencing the quality of corporate environmental disclosure. *Business Strategy and the Environment*, 17(2), 120–136.
- Broadstock, D. C., Collins, A., Hunt, L. C., & Vergos, K. (2018). Voluntary disclosure, greenhouse gas emissions and business performance: Assessing the first decade of reporting. *The British Accounting Review*, 50(1), 48–59.
- Buyse, K., & Verbeke, A. (2003). Proactive environmental strategies: A stakeholder management perspective. *Strategic Management Journal*, 24, 453–470.
- Canace, T. G., Caylor, M. L., Johnson, P. M., & Lopez, T. J. (2010). The effect of regulation fair disclosure on expectations management: International evidence. *Journal of Accounting and Public Policy*, 29(5), 403–423.
- Carter, C. R., Kale, R., & Grimm, C. M. (2000). Environmental purchasing and firm performance: An empirical investigation. *Transportation Research Part E: Logistics and Transportation Review*, 36(3), 219–228.
- Chau, G. K., & Gray, S. J. (2002). Ownership structure and corporate voluntary disclosure in Hong Kong and Singapore. *The International Journal of Accounting*, 37, 247–265.
- Chiu, S.-C., & Sharfman, M. (2011). Legitimacy, visibility, and the antecedents of corporate social performance: An investigation of the instrumental perspective. *Journal of Management*, 37(6), 1558–1585.
- Cho, C. H., Guidry, R. P., Hageman, A. M., & Patten, D. M. (2012). Do actions speak louder than words? An empirical investigation of corporate environmental reputation. *Accounting, Organizations and Society*, 37, 14–25.
- Cho, C. H., & Patten, D. M. (2007). The role of environmental disclosures as tools of legitimacy: A research note. *Accounting, Organizations and Society*, 32, 639–647.
- Chuang, L., Qianfei, L. (2013). The motivation analysis of enterprises voluntarily implementing environmental management system. In: 25th Chinese Control and Decision Conference. CCDC, pp. 4855e4858.
- Cooper, S. A., Raman, K. K., & Yin, J. (2018). Halo effect or fallen angel effect? Firm value consequences of greenhouse gas emissions and reputation for corporate social responsibility. *Journal of Accounting and Public Policy*, 37(3), 226–240.
- Cormier, D., & Magnan, M. (2004). The impact of the web on information and communication modes: The case of corporate environmental disclosure. *International Journal of Technology Management*, 27, 393–416.
- da Rosa, F. S., Lunkes, R. J., Margarete, M., & Brizzola, B. (2019). Exploring the relationship between internal pressures, greenhouse gas management and performance of Brazilian companies. *Journal of Cleaner Production*, 212, 567–575.
- Dang, M., Henry, D., & Hoang, V. A. D. (2017). Target CEO age, ownership decisions, and takeover outcomes. *Research in International Business and Finance*, 42, 769–783.
- Darnall, N., Henriques, I., & Sadorsky, P. (2010). Adopting proactive environmental strategy: The influence of stakeholders and firm size. *Journal of Management Studies*, 47, 1072–1094.
- De Villiers, C., Naiker, V., & Van Staden, C. J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, 37(6), 1636–1663.
- Deegan, C. (2002). Introduction. The legitimising effect of social and environmental disclosures—A theoretical foundation. *Accounting, Auditing & Accountability Journal*, 15(3), 282–311.
- Deegan, C., & Blomquist, C. (2006). Stakeholder influence on corporate reporting: An exploration of the interaction between WWF-Australia and the Australian minerals industry. *Accounting, Organizations and Society*, 31(4), 343–372.
- Department for Environment, Food and Rural Affairs, (2009). Guidance on how to measure and report your greenhouse gas emissions. Available at www.defra.gov.uk/environment/business/.../ghg-freight-guide.pdf.
- Delmas, M., & Montiel, I. (2007). *The adoption of ISO 14001 within the supply chain: When are customer pressures effective? Institute for social, behavioural, and economic research, paper 10*. Santa Barbara: University of California.
- Delmas, M., & Toffel, M. (2004). Stakeholders and environmental management practices: An institutional framework. *Business Strategy and the Environment*, 13, 209–222.
- Delmas, M. A. (2002). The diffusion of environmental management standards in Europe and in the United States: An Institutional Perspective. *Policy Science*, 35(2002), 91–119.
- Delmas, M. A., & Toffel, M. W. (2008). Organizational responses to environmental demands: Opening the black box. *Strategic Management Journal*, 29, 1027–1055.
- DiMaggio, P. J., & Powell, W. (1983). The iron cage revisited—Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48, 147–160.
- Doshi, A., Dowell, G., & Toffel, M. (2013). How firms respond to mandatory information disclosure. *Strategic Management Journal*, 34, 1209–1231.
- Dragomir, V. D. (2012). The disclosure of industrial greenhouse gas emissions: A critical assessment of corporate sustainability reports. *Journal of Cleaner Production*, 29–30, 222–237.
- Elmagrhi, M. H., Ntim, C. G., Elamer, A. A., & Zhang, Q. (2019). A study of environmental policies and regulations, governance structures, and environmental performance: The role of female directors. *Business Strategy and the Environment*, 28(1), 206–220.
- Farag, H., & Mallin, C. (2016). The impact of the dual board structure and board diversity: Evidence from Chinese initial public offerings (IPOs). *Journal of Business Ethics*, 139(2), 333–349.
- Fiedler, T., and Deegan, C. (2002). Environmental collaborations within the building and construction industry: A consideration of the motivations to collaborate. In *Critical Perspectives on Accounting Conference*, New York.
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: Sage publishers.
- Finkelstein, S., Hambrick, D. C., & Cannella, A. (2009). *Strategic leadership: Theory and research on executives top management teams, and boards*. New York: Oxford University Press.
- Fraile, I. A., & Fradejas, N. A. (2014). Ownership structure and board composition in a high ownership concentration context. *European Management Journal*, 32, 646–657.
- Freedman, M., & Jaggi, B. (2005). Global warming, commitment to the Kyoto Protocol, and accounting disclosures by the largest global public firms from polluting industries. *The International Journal of Accounting*, 40, 215–232.

- Friedman, A. L., & Miles, S. (2002). Developing stakeholder theory. *Journal of Management Studies*, 39, 1–21.
- García-Sánchez, I.-M., Rodríguez-Domínguez, L., & Gallego-Álvarez, I. (2013). CEO qualities and codes of ethics. *European Journal of Law and Economics*, 35(2), 295–312.
- Greene, W. H. (2008). *The econometric approach to efficiency analysis*. Fried HO, Lovell.
- Greve, H. R. (2000). Market niche entry decisions: Competition, learning, and strategy in Tokyo banking, 1894–1936. *Academy of Management Journal*, 43, 816–836.
- Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review*, 32, 334–343.
- Haque, F., & Ntim, C. G. (2018). Environmental policy, sustainable development, governance mechanisms and environmental performance. *Business Strategy and the Environment*, 27(3), 415–435.
- Heflin, F., Kross, W., & Suk, I. (2012). The effect of regulation FD on the properties of management earnings forecasts. *Journal of Accounting and Public Policy*, 31(2), 161–184.
- Hill, C. W. L., & Jones, G. R. (2004). *Strategic management theory: An integrated approach* (6th ed.). Boston, MA: Houghton Mifflin.
- Huang, C., & Kung, F. (2010). Drivers of environmental disclosure and stakeholder expectation: Evidence from Taiwan. *Journal of Business Ethics*, 96, 435–451.
- Jaggi, B., Allini, A., Macchioni, R., & Zagaria, C. (2017). The factors motivating voluntary disclosure of carbon information: Evidence based on Italian listed companies. *Organization & Environment*, 31(2), 178–202.
- Kalu, J. U., Buang, A., & Aliagha, G. U. (2016). Determinants of voluntary carbon disclosure in the corporate real estate sector of Malaysia. *Journal of Environmental Management*, 182, 519–524.
- Kock, C. J., Santaló, J., & Diestre, L. (2012). Corporate governance and the environment: What type of governance creates greener companies? *Journal of Management Studies*, 49(3), 492–514. <https://doi.org/10.1111/j.1467-6486.2010.00993.x>
- Krische, S. (2011). Discussion of do CFOs have style? An empirical investigation of the effect of individual CFOs on accounting practices. *Contemporary Accounting Research*, 28, 1180–1189.
- Krishnamurti, C., & Eswaran, V. (2018). The influence of board committee structures on voluntary disclosure of greenhouse gas emissions: sAustralian evidence. *Pacific-Basin Finance Journal*, 50, 65–81.
- Kuo, L., Yeh, C.-C., & Hui-Cheng, Y. (2012). Disclosure of corporate social responsibility and environmental management: Evidence from China. *Corporate Social Responsibility and Environmental Management*, 19(5), 273–287.
- Lee, S., Park, Y., and Klassen, R., (2013). Market responses to firms' voluntary climate change information disclosure and carbon communication, corporate social responsibility and environmental management.
- Lewis, B., Walls, J., & Dowell, G. (2013). Difference in degrees: CEO characteristics and firm environmental disclosure. *Strategic Management Journal*, 35(5), 712–722.
- Liesen, A., Hoepner, A. G., Patten, D. M., & Figge, F. (2015). Does stakeholder pressure influence corporate GHG emissions reporting? Empirical evidence from Europe. *Accounting, Auditing & Accountability Journal*, 28(7), 1047–1074.
- Lu, Y., & Indra, A. (2014). Stakeholders' power, corporate characteristics, and social and environmental disclosure: Evidence from China. *Journal of Cleaner Production*, 64, 426–436.
- Mahadeo, J. D., Oogarah-Hanuman, V., & Soobaroyen, T. (2011). A longitudinal study of corporate social disclosures in a developing economy. *Journal of Business Ethics*, 104(4), 545–558.
- Matolcsy, Z., Shan, Y., & Seethamraju, V. (2012). The timing of changes in CEO compensation from cash bonus to equity-based compensation: Determinants and performance consequences. *Journal of Contemporary Accounting and Economics*, 8, 78–91.
- Mazutis, D. D. (2013). The CEO effect: A longitudinal, multilevel analysis of the relationship between executive orientation and corporate social strategy. *Business & Society*, 52(4), 631–648.
- Musteen, M., Vincent, L. B., & Virginia, B. L. (2006). CEO attributes associated with attitude toward change: The direct and moderating effects of CEO tenure. *Journal of Business Research*, 59(5), 604–612.
- Ntim, C. G., & Soobaroyen, T. (2013). Corporate governance and performance in socially responsible corporations: New empirical insights from a neo-institutional framework. *Corporate Governance: An International Review*, 21, 468–494.
- Peters, G.F., and Romi, A.M. (2012). The effect of corporate governance on voluntary risk disclosures: Evidence from greenhouse gas emission reporting. Available from <http://www.business.utah.edu/sites/default/files/>. (accessed on 8 June 2012).
- Porter, M. E. (2008). Value-based health care delivery. *Annals of Surgery*, 248(4), 503–509.
- Prado-Lorenzo J.M., Rodríguez-Domínguez, L., Gallego-Álvarez, I., and García-Sánchez, I.M. (2009). Factors influencing the disclosure of greenhouse gas emissions in companies world-wide. Available from www.emeraldinsight.com/0025-1747.htm
- Ramus, C. A., & Steger, U. (2000). The roles of supervisory support behaviours and environmental policy in employee 'Eco initiatives' at leading-edge European companies. *Academy of Management Journal*, 43, 605–626.
- Rankin, M., Windsor, C., & Wahyuni, D. (2011). An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system Australian evidence. *Accounting, Auditing and Accountability Journal*, 24, 1037–1070.
- Reid, E.M., and Toffel, M.W. (2009). Responding to public and private politics: Corporate disclosure of climate change strategies. Harvard Business School Technology & Operations Mgt. Unit Research Paper No. 09-019. Available at SSRN: <https://doi.org/10.2139/ssrn.1237982>. (accessed on 3 February 2012)
- Reverte, C. (2008). Determinants of corporate social responsibility disclosure ratings by Spanish listed firms. *Journal of Business Ethics*, 88, 351–366.
- Roberts, R. W. (1992). Determinants of corporate social responsibility disclosure: An application of stakeholder theory. *Accounting, Organizations and Society*, 17, 595–612.
- Sandoval, M. (2015). From CSR to RSC: A contribution to the critique of the political economy of corporate social responsibility. *Review of Radical Political Economics*, 47(4), 608–624.
- Sarkis, J., Gonzalez-Torre, P., & Adenso-Diaz, B. (2010). Stakeholder pressure and the adoption of environmental practices: The mediating effect of training. *Journal of Operations Management*, 28, 163–176.
- Schaper, M. (2002). Small firms and environmental management: Predictors of green purchasing in Western Australian pharmacies. *International Small Business Journal*, 20(3), 235–251.
- Shahab, Y., Ntim, C. G., Chengang, Y., Farid, U., & Samuel, F. (2018). Environmental policy, environmental performance, and financial distress in China: Do top management team characteristics matter? *Business Strategy and the Environment*, 27(8), 1635–1652.
- Shahab, Y., Ntim, C. G., Yugang, C., Farid, U., Hai-Xia, L., & Zhiwei, Y. (2019). Chief executive officer attributes, sustainable performance, environmental performance, and environmental reporting: New insights from upper echelons perspective. *Business Strategy and the Environment*, 29(1), 1–16.
- Spar, D. L., & La Mure, L. T. (2003). The power of NGOs activism: Assessing the impact of NGOs on global business. *California Management Review*, 45, 78–101.
- Stanny, E., & Ely, K. (2008). Corporate environmental disclosures about the effects of climate change. *Corporate Social Responsibility and Environmental Management*, 15, 338–348.

- Tauringana, V., & Chithambo, L. (2015). The effect of DEFRA guidance on greenhouse gas disclosure. *The British Accounting Review*, 47(4), 425–444.
- Wang, S., Jun, L., & Dingtao, Z. (2018). Institutional pressures and environmental management practices: The moderating effects of environmental commitment and resource availability. *Business Strategy and the Environment*, 27(1), 52–69.
- Wegner, M., Elayan, F., Felton, S., & Li, J. (2013). Factors influencing corporate environmental disclosures. *Accounting Perspectives*, 12(1), 53–73.
- Zhu, Q., & Sarkis, J. (2007). The moderating effects of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research*, 45(18–19), 4333–4355.
- Zona, F. (2014). Board leadership structure and diversity over CEO time in office: A test of the evolution perspective on Italian firms. *European Management Journal*, 32, 672–681.

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