Organizational stakeholders and environmental sustainability investment: does China's regional heterogeneity matter?

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Abstract

Purpose – Given the regional diversity in China, this study aims to provide an empirical evaluation of how organizational stakeholders (i.e. customers, employees, suppliers and shareholders) affect corporate environmental sustainability investment (ESI).

Design/methodology/approach – To empirically investigate the influence of organizational stakeholders on ESI, this study used regional-level data consists of Chinese A-share stocks for the years 2009–2019.

Findings – This study's findings show that pressure from customers, employees and suppliers has a significant effect on corporate ESI, with customers being the most important stakeholder group. Shareholders, by contrast, have no significant influence on ESI. The influence of these pressures is more pronounced in developed regions (the east) than in less developed (the west) localities of China.

Research limitations/implications – This study complements the stakeholder–institutional perspective by implying to consider the differentiated logics of the contesting stakeholders in the nonmarket operations.

Practical implications – Practically, this study poses that managers must realize the heterogeneity of pressures from stakeholders and the differentiated impact of these pressures keeping in view the institutional differences in different regions.

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Originality/value – Our study reports initial empirical evidence that shows how regional differences influence the role of stakeholders in determining corporate environmental strategy.

Keywords Stakeholders, Environmental strategy, ESI, Heterogeneity, Institutions, China

Paper type Research paper

1. Introduction

As environmental problems worsen and citizen awareness of environmental preservation grows, business pro-environmental efforts have become a major priority (De Mendonca and Zhou, 2019). Businesses are increasingly taking these issues (such as excessive pollution output) seriously and investing in environmental sustainability (environmental sustainability investment [ESI]) (Chen and Chang, 2013). ESI is the cornerstone and a key factor of environmental management because it contributes in the development of environmental protection projects, which otherwise are deemed implausible due to their long investment cycle and low return (Li *et al.*, 2021). Many corporations tend to conduct ESI that is both healthy for the environment and instantly beneficial to the bottom line (Khalid *et al.*, 2022a). However, practitioners and scholars continue to dispute whether pressures and secondary advantages lead corporations to embrace increasingly complicated environmental initiatives.

Many scholars have noticed that stakeholder pressure substantially influence corporate environmental protection practices (Murillo-Luna *et al.*, 2008). This impact is explained by the stakeholder theory, which claims that sustainable initiatives are the consequences of corporate practices to satisfy the stakeholders' environment protection demands (Chaudhry and Amir, 2020). In addition, the pressure that comes from stakeholders is a catalyst that is causing a change in strategic paradigms from a passive environmental strategy to a proactive one (Darnall *et al.*, 2010). Accordingly, businesses developing environmental strategies need to give serious consideration to the kind and duration of demands from various stakeholder groups (Betts *et al.*, 2015).

Numerous studies have explained how various stakeholders influence corporate environmental strategy given the single set of contextual pressures. Concerns about the influence of stakeholder demands on the implementation of environmental initiatives have prompted calls for more research into the topic (Wang *et al.*, 2020). For example, Betts *et al.* (2015) identified industry as a significant contextual component in determining anticipated stakeholders' concerns and environmental policy decisions. Moreover, Galbreath (2017) suggested the level of export orientation as the defining criteria for the influence of different stakeholders. Country-level contingencies have also been explored in different studies for their potential effects on the insistence of different stakeholders in the shaping of corporate environmental strategies (Azadegan *et al.*, 2018; Peng and Zhou, 2005).

With regard to the current context, researchers have acknowledged the growth of ESI to be intimately linked to economic development, but it has also been impacted by other variables, such as the local environment and government participation (Huang and Lei, 2021). The drivers of environmental factors have seldom been highlighted in research, with ESI being the most overlooked one (Khalid *et al.*, 2022a, 2022b). Furthermore, extant studies have not paid attention to regional differences in ESI, which are evident and heterogeneously manifested in terms of environmental degradation, and economic and policy situations in China (Yu and Choi, 2015). Considering the heterogenous regional economic development, China's markets are divided into four zones: East China, West China, Northeast China and Central China. The degree of heterogeneity among regions can be attributed to geographical advantages, economic development and environmental management (Khalid *et al.*, 2023). First, East China has taken the lead in marketization, demonstrating efficient resource allocation and setting the

stage for industrial advancements (Yu and Choi, 2015). In contrast, West China has relied on high-cost, polluting industries, lacking capital and technological accumulation. Moreover, neglected market operations and inadequate regulations pose challenges for achieving sustainable development in the region (Wong *et al.*, 2018). Second, the differences between China's regions, particularly East China and West China, extend to their environmental regulations and management of environmental responsibility (Ren *et al.*, 2018). East China, being more economically developed, typically has stricter environmental regulations due to higher industrialization levels and increased environmental awareness. This region often adopts advanced environmental management practices, investing in cleaner technologies and promoting sustainability. In contrast, West China, reliant on resource-intensive industries, may have weaker environmental regulations and less developed responsibility management (Xu *et al.*, 2019). Economic growth has historically taken precedence over environmental concerns (Akram *et al.*, 2020). Recognizing these regional disparities is vital for policymakers to develop targeted strategies that address specific environmental challenges and foster sustainable practices across all regions of China. Likewise, it is evident that the tendency to engage in ESI is inclined toward developed areas in China (see Table 1).

Nevertheless, stakeholders' impact on corporate environmental responsibility is an important consideration in the field of sustainability management (Wang *et al.*, 2020). However, it is essential to recognize that stakeholders' impact may extend beyond regional boundaries. Wong *et al.* (2018) argued that geographical advantages or disadvantages, preferred policies and designated strategy development for certain areas contribute to China's regional heterogeneity. Gao *et al.* (2019) added to this finding by stating that stakeholders' perceptions of pressure are driven by the localities to which they belong. For example, stakeholders who reside in developed regions are more likely to exert pressure on companies to carry out social responsibilities than those who reside in underdeveloped regions. These dynamics introduce complexities and highlight the need to consider regional heterogeneity when examining the influence of stakeholder pressure on corporate environmental responsibility. Considering the interplay of tendencies among stakeholders' environmental governance demands and regional heterogeneity in China, the current study addresses the following research question: *How does regional economic development shape the impact of stakeholder pressure on China's environmental policy execution?* By analyzing these dynamics, we can gain a comprehensive understanding of the role of stakeholders and regional differences in shaping corporate environmental responsibility practices. Thus, the study aims to answer questions raised in the literature on the potential impact of external factors on the role of stakeholders in decisions pertaining to ESI (Azadegan *et al.*, 2018).

This research adds to the prior literature in following ways. First, the paper contributes to the increasing corpus of research on corporate ESI (Azadegan *et al.*, 2018; Li *et al.*, 2020; Song *et al.*, 2020; Xu and Yan, 2020; Gu *et al.*, 2021; Bhuiyan *et al.*, 2021) by highlighting how stakeholder pressure promotes ESI in China. Furthermore, it supplements previous work on stakeholders and corporate environmental strategies (Castka and Prajogo, 2013; Charan and Murty, 2018; Shen *et al.*, 2020a; O'Reilly, 2020). Our study shows the unique effect of each stakeholder, such as customer, employee, supplier and shareholder, on corporate environmental strategy execution in general and ESI in particular. Second, our study is among the first to identify the contingency among corporate stakeholders' and environmental strategy relationships. Particularly, we found that stakeholders' perceptions of corporate ESI are influenced by institutional aspects of corporate environmental responsibility, that is, regional heterogeneity. This study fills a gap in the earlier research (Gao *et al.*, 2019; Wong *et al.*, 2018) by proposing an external mechanism (regional heterogeneity) through which various stakeholders exert distinct effects on corporate environmental strategy (i.e. ESI). Finally, this

Table 1.
Regional distribution of total environmental-sustainability investment (RMB million) from 2007 to 2019

East China	Value	%	West China	Value	%	Inner China	Value	%	Northeastern China	Value	%
Beijing	257.29	13.43	Chongqing	142.52	12.51	Anhui	158.56	16.67	Heilongjiang	149.27	38.02
Fujian	95.44	4.98	Gansu	102.91	9.03	Henan	208.92	21.96	Jilin	130.42	33.22
Guangdong	381.66	19.93	Guangxi	87.19	7.65	Hubei	157.43	16.55	Liaoning	112.87	28.75
Hebei	277.32	14.48	Guizhou	112.21	9.85	Hunan	162.36	17.07			
Hainan	36.8	1.92	Inner Mongolia	166.68	14.63	Shaanxi	154.4	16.23			
Jiangsu	283.86	14.82	Sichuan	198.55	17.43	Jiangxi	109.65	11.53			
Shandong	221.64	11.57	Shaanxi	136.63	11.99						
Shanghai	124.78	6.51	Ningxia	48.8	4.28						
Tianjin	79.21	4.14	Qinghai	66.75	5.86						
Zhejiang	157.37	8.22	Xingjian	77.16	6.77						
			Tibet	34.05	2.99						
			Yunnan	150.82	13.24						
Total	1,915.37			1,139.40			951.32			392.56	
Percentage	43.54%			25.90%			21.63%			8.92%	

Source: Industrial sub-database of China Stock Market and Accounting Research Database

study adds to the stakeholder–institutional perspective by exposing operational differences and logics. Many institutional and stakeholder theories stress legitimacy by perceiving stakeholders as an integrated whole and believing that stakeholders pressure firms to meet environmental duties to gain societal credibility (Sarkis *et al.*, 2010). Disparities in pressure across stakeholders have received less attention. Moreover, subnational institutions differ substantially in emergent nations like China, which has unstable institutional environment (Wong *et al.*, 2018).

The rest of the article is organized as follows: the research background and literature evaluation are explored in Section 2 and hypotheses are formulated on the basis of the study's theoretical premises. Section 3 contains information about the sample, measurements and supporting sample. Section 4 interprets research results and Section 5 elaborates findings with support from theory and literature. Finally, Section 6 concludes with the summary of paper including limitations and further research suggestions.

2. Research context, literature and hypothesis

2.1 Research context – China's regional distribution and environmental policies

China has maintained its rapid economic expansion over the past few decades while making concerted attempts to safeguard its environment and implementing appropriate legislation (Yang *et al.*, 2021). The government has adopted several environmental regulations in an effort to lessen the severity of the consequences of climate change (Khalid *et al.*, 2022b). However, the outcome of such environmental regulations is different across regions (Yu and Choi, 2015). The level of ESI varies greatly throughout China's regions, with the eastern part accounting for more than 43% of ESI over the past decade (Table 1). The imbalanced growth and poor environmental performance of underdeveloped regions can be attributed to the availability of resources, the government's leaning toward the East and the degree of marketization process (Wong *et al.*, 2018). As a result, this imbalance prevents the country's underdeveloped regions, which manage high costs of production, from harvesting profitable outputs while bearing the weight of major polluting industries.

However, to curb corporate opportunism in the guise of environmental preservation, Eastern China has a robust regulatory apparatus. Governments in Eastern China have instituted rules and public awareness campaigns to assist businesses in fulfilling their environmental duties. For example, local administrations have enacted emissions conservation guidelines, set up conservational monitoring systems, implemented specific tax policies and given local infrastructures usage priority to encourage firms to engage in environmentally responsible practices (Wong *et al.*, 2018).

By contrast, environmental policies are not strictly enforced in Western China. Given the few regulatory criteria for controlling environmental risk, businesses may afford to ignore their environmental responsibilities. Businesses often avoid environmental duty to reduce costs and boost short-term financial gains. Consequently, businesses in Western China, which are committed to environmentally friendly practices, may find themselves at a disadvantage relative to their regional rivals, leading to weak environmental performance.

Considering the heterogenous environmental growth among the Chinese regions, we argued that stakeholders play an important role besides regulatory influence on corporate environmentally responsible actions. The difference in the rate of development among regions directly impacts peoples' financial health, which ultimately changes their social expectations (Gao *et al.*, 2019). Similarly, in the context of this study, organizational stakeholders (i.e. consumers, workers, suppliers and shareholders) from various areas of China would have different environmental expectations. However, the extent of their environmental demands, as well as how companies respond to such pressures, are unknown.

2.2 Organizational stakeholders' and corporate environmental responsibility

According to stakeholder theory, a firm's strategy and priorities are driven by its stakeholders, who are any individual or group that impacts or is affected by the firm's activities and outcomes (Freeman, 2017). Stakeholder pressures are significant impetus in the decisions regarding ESI owing to the externalities they inflict upon the internal and external parties of a firm. These externalities urge stakeholders to put explicit and implicit pressures on firms to act in a certain way depending upon the relevance of an externality (positive or negative) to a specific stakeholder (Sarkis *et al.*, 2010). The intricate interplay of stakeholders in contesting externalities necessitates a complementary theory to address the questions that arise in the process (Freeman, 2010; Orts and Strudler, 2009) of applying stakeholder theory on corporate ESI.

According to the stakeholder perspective, firms are strongly motivated to implement certain environmental practices as a consequence of stakeholders' demands (Sarkis *et al.*, 2010). Freeman and Phillips (2002) define a stakeholder as "any group or individual who can affect or is affected by the achievement of an organization's objectives." In developing this concept, Freeman (1984) states that firms impose repercussions that affect several parties both inside and outside of the enterprise. There is a lot of pressure put on firms to mitigate negative impacts while amplifying positive ones due to externalities. The managing of links with the key interested parties that are either directly impacted by or aware of how corporations influence the environment is a critical strategic issue to consider (Bacq and Aguilera, 2022). Therefore, identifying the most influential green stakeholders and gauging their influence are vital for examining how companies respond to environmental issues, which is essentially an empirical topic (Buysse and Verbeke, 2003).

Existing empirical evidence supports the participation of diverse stakeholders as factors driving environmental practices both within and beyond organizations (Wang *et al.*, 2020). Scholars have attached importance to perceived pressures from market, government or environmental regulatory bodies, which drive corporate pro-environmental behavior (Murillo-Luna *et al.*, 2008; Zhang and Zhu, 2019; Cadez *et al.*, 2019). With regard to the classification of stakeholder groups, Charan and Murty (2018) examine how much influence primary and secondary stakeholder groups have on the environmental practices of businesses. Others have investigated the way in which both internal and outside stakeholders might influence an organization's green policies (Graham, 2020; Seroka-Stolka and Fijorek, 2020). Moreover, some scholars explore the combined effect of stakeholder pressures on corporate environmentally sustainable activities (Cadez *et al.*, 2019).

Companies' responses to the demands and expectations of various stakeholder groups vary according to the perceived authority, validity and urgency of such demands (Charan and Murty, 2018). Thus, understanding the environmental protection demands from each stakeholder, particularly how such demands may drive corporate environmental protection efforts (ESI in this study), is crucial. The extant study is based on the stakeholder classification identified by Henriques and Sadorsky (1999) and adopted by many researchers (Baah *et al.*, 2020; Sarkis *et al.*, 2010; González-Benito and González-Benito, 2006). They classified those involved into four groups: government officials, corporations, public and the media. Customers, employees, suppliers and stockholders are all examples of organizational stakeholders. Each of these groups is vital to the success of a business in its own right (Baah *et al.*, 2020). These individual stakeholders are integral to the success of the business, have an immediate effect on its bottom line and determine its survival (González-Benito and González-Benito, 2006). Considering that different interest groups inside an organization have different expectations of what they should gain, we argue that stakeholder demands on corporations vary depending on the specific interests at stake. On the basis of the above discussion, we

propose different hypotheses to understand the direct impact of organizational stakeholder (i.e. customers, employees, suppliers and shareholder) pressure on corporate ESI.

2.3 Hypotheses development

2.3.1 Customer pressure. Customers are typically considered the most important organizational stakeholders (Huang *et al.*, 2016). Increased environmental concerns have led consumers and businesses to demand that companies improve their environmental sustainability (Delmas and Toffel, 2004). Customers often boycott companies that use ecologically harmful manufacturing practices (Charan and Murty, 2018). Thus, customer pressure may encourage businesses to pursue pro-active green innovation initiatives (Zhang and Zhu, 2019). By distinguishing their products, these practices can help businesses establish a competitive edge. Environmental management systems or certified products can offer trustworthy information about their manufacturing process and products (Zhu and Sarkis, 2004) and also promote green innovation (Zhang and Jin, 2022). Considering the preceding arguments, we insinuate that customer demand induces Chinese-listed companies to demonstrate their pro-environmental activity through ESI. We propose:

H1a. Customers pressure positively influences corporate ESI in China.

2.3.2 Employee pressure. Employees are frequently both the founders and beneficiaries of corporate proactivity in mitigating environmental influence (Roscoe *et al.*, 2019). To guarantee organizational commitment to environmental challenges and to effectively use resources to accomplish various environmental management programs, top-level management leadership is essential (Betts *et al.*, 2015). Organizational commitment is essential for implementing new green initiatives and enhancing an organization's overall strategies throughout the course of time. The perceptions and attitudes of the senior management team, in particular, impact employees' environmental values and actions (Unsworth *et al.*, 2021). Therefore, employees play a substantial function as internal stakeholders in the adoption of pro-environment behavior. When organizations yield to employee stakeholder pressure and implement pro-environment tools, a virtuous cycle is induced, leading to a multiplier effect. Furthermore, employees are not simply stakeholders but also make up the human capital of a corporation, which adds to its pro-environment knowledge pool, making it simple to investigate and immediately solve environmental concerns that affect the organization (Tan and Zhu, 2022). Hence, we propose the following hypothesis:

H1b. Employees pressure positively influences corporate ESI in China.

2.3.3 Supplier pressure. Companies create environmental capabilities by implementing various environmental practices in response to supply chain–level constraints to decrease pollution throughout the production process (Pullman and Wikoff, 2017). A business decision to use environmental policies may be influenced by its suppliers, who may be obligated to follow specific guidelines if the firm expects an increase in its environmental performance and environmental proactivity (Zhu and Sarkis, 2004). Supply chain stakeholders, especially clients, are regulated by different institutions and they are required to ensure that their vendors comply to pro-environment practices and regulations (Delmas and Toffel, 2004). To lessen environmental risks during product development, these criteria may include third-party certifications like ISO 14000 (Lee *et al.*, 2015). Therefore, we propose following hypothesis:

H1c. Suppliers pressure positively influences corporate ESI in China.

2.3.4 Shareholder pressure. Financial investors in the firms are another important category of internal stakeholders. Firms should cater to the needs of investors by growing market value (Battilana *et al.*, 2022). The research has found a correlation between environmentally responsible company operations and increased profits and win-win outcomes for both parties involved (Zhu and Sarkis, 2004). In addition, an increase in shareholder value may be achieved through the mitigation of environmental risks and liabilities through the implementation of preventative environmental policies and initiatives (Hsu, 2020). According to Flammer *et al.* (2021), corporate green behavior is frequently a mirror of its shareholders' environmental awareness. The rise of socially responsible investing in recent years implies that environmental performance has an impact on a company's competitiveness and may result in an investment premium. Major shareholders would put pressure on companies to adopt a decent environmental strategy because production efficiency and a good reputation for the environment are linked. Based on the above discussion, following hypothesis is proposed:

H1d. Shareholders pressure positively influences corporate ESI in China.

2.3.5 Effect of regional heterogeneity. An institutional perspective (Scott, 2005) gives a thorough overview of the function of stakeholders and how they relate to ESI from a regional perspective. According to the institutional framework, stakeholder participation is essential for businesses to achieve social legitimacy. Similarly, Moratis (2016) contends that firms prioritize several practices, including ecological and sustainability activities, which are primarily impacted by the institutional context in which they operate. Firms respond to institutional pressures heterogeneously as they interpret these pressures differently due to the differentiated stakeholders (Gao *et al.*, 2019). To construct their investment plans, organizations must consider the legitimacy expectations of diverse stakeholders, which necessitate an understanding of various kinds of institutional logic.

Within the research context, various provinces in China demonstrate a diverse array of institutional environments (Li and Wu, 2022). The main characteristics of regional disparity include levels of economic growth, industrial structures, differences in culture and governing structures (Yu and Choi, 2015). In contemporary context, the amount of market development varies greatly due to the uneven growth of major economies like China (Xu *et al.*, 2019). Furthermore, cultural and cognitive distinctions in China are not yet obvious. Eastern regions are more developed than western regions, for example, indicating that growth in the eastern and western halves is not uniform (Wong *et al.*, 2018).

On the contrary, the regional heterogeneity might impact the dynamics of stakeholder relationships and their influence on corporate social (Gao *et al.*, 2019) and environmental responsibility. These regional differences significantly impact the dynamics of stakeholder relationships and their influence on corporate environmental sustainability practices (Wang *et al.*, 2020). For instance, customers, as influential stakeholders, may have varying expectations and demands for environmentally responsible practices based on their geographic affiliation (Khan *et al.*, 2023). Customers in economically advanced regions, such as East China, are likely to exhibit higher environmental consciousness and demand greater commitment to sustainability from the companies they engage with. In contrast, customers in less developed regions, such as the western provinces, may prioritize other factors over environmental concerns. Likewise, employees, suppliers and shareholders also operate within the context of regional heterogeneity. Employees in different regions may have diverse levels of environmental awareness and personal values related to sustainability (Unsworth *et al.*, 2021). Suppliers, based on their regional location, may face distinct environmental challenges and adopt different practices (Fu *et al.*, 2023). Shareholders, too,

may exhibit varying degrees of environmental consciousness based on regional factors such as economic development and social norms (Khalid *et al.*, 2023). Thus, we argue that stakeholders from various geographical regions will have varying expectations of corporate environmental responsibility. Stakeholders in developed regions would be more concerned with the environment and would call on businesses to embrace green practices, whereas participants from underdeveloped or low-income areas would be more self-interested, believe in their personal benefits or be unconcerned about environmental hazards. Based on this understanding, we hypothesize that regional heterogeneity in China plays a crucial role in shaping the association between organizational stakeholders and corporate ESI:

H2. The institutional environment moderates the association between stakeholder involvement and ESI such that in the eastern, more developed (institutionally mature) Chinese region their impact is stronger than in western, less developed (institutionally mature) region.

3. Method

3.1 Data

The study's sample comprises of listed firms under A category of shares for the years 2009–2019. The financial and nonfinancial data is obtained from China Stock Market and Accounting Research database which is China's largest data source. However, data relating to ESI has been directly obtained and personally gathered from business annual reports, including sustainable environmental reports. All expenditures made in the interest of environmental management efforts (e.g. waste management, resource conservation, environmental protection measures) have been included in the calculation to determine the value of ESI. Our empirical model's estimation relies on data from both of these sources.

However, to determine the final sample for the study, we excluded firms that are under ST or ST* category, firms in the financial industry and (Gilley *et al.*, 2000) firms with missing data of variables. In accordance with the filtration process, for our data analysis we compiled a panel of 8,407 observations.

3.2 Model

We use the following model to investigate empirically the impact of organizational stakeholders' pressure on ESI:

$$ESI_{it} = \beta_0 + \beta_1 Organizational\_stakeholders_{it} + \sum \beta_i \ CNTLS_{it} + \sum IND_{it} + \sum YEARR_{it} + \varepsilon_{it} \quad (1)$$

We measure ESI (the dependent variable) by dividing the total value of investments in environmental protection and sustainable projects to the annual total revenue. The main independent variable of the research is stakeholders' pressure, which is regressed on ESI. On the basis of the classification of Henriques and Sadorsky (1999), our primary regressors are pressures from customers, suppliers, employees and shareholders. To evaluate empirically the influence of stakeholders' pressures on ESI, we measure each variable as follows. Customer pressure (CUST_P) is measured as the ratio of advertising expenses deflated by total sales. Employee pressure (EMP_P) is calculated as the logarithmic value of total employees count of a company. Supplier pressure (SUP P) is proxy for inventory turnover which is calculated by dividing total firm's cost to

average inventory. Shareholders' pressure (SHR_P) is calculated as the ownership concentration, which is the sum of the shareholding percentage of the company's top three shareholders. The proxies used to gauge the effect of organizational stakeholders pressure on ESI were adapted from Shen *et al.* (2020a).

To adjust for the possibility of the effect of other variables on ESI, we incorporated two types of controls. First, the estimation model (1) includes variables at the firm level. For example, we control for firm age (AGE), as the older companies may or may not choose to invest in environmental protection initiatives. These firms are risk-averse, but have the experience and resources to conduct ESI (Siedschlag and Yan, 2021). Firm size (FSIZE) is also included to control the possible influence of bigger firms to engage in ESI to improve their public reputation and comply with environmental standards (Lin *et al.*, 2019). High leverage (FLEV) limits an organization's ability to finance long-term investments with uncertain returns, such as ESI (Chang *et al.*, 2021). Finally, high profitability enables firms to allocate more financial resources and have the flexibility to engage in environmentally friendly projects (Khalid *et al.*, 2023).

Second, given that corporate board structures have a favorable influence on ESI, we added board size, independence and duality as control variables. According to Bhuiyan *et al.* (2021), larger boards (BSIZE) and independent directors (Sahasranamam *et al.*, 2020) enable firms to have broad knowledge and more thorough conversations, resulting in more substantial decisions, particularly with firms' environmental initiatives. Hence, it is proposed that BSIZE and BIND may have an effect on ESI in empirical analysis. CEO duality (CEOD) included to control for the potential influence of executives managerial power in corporate decision-making, particularly firm's decision to adopt initiatives that may enhance environmental performance (Al-Shaer *et al.*, 2023).

Our model also includes year and industry dummies. Industry-fixed effects and time-fixed effects are included in the regression models to control for unobserved heterogeneity across different industries and potential time-specific effects. They help capture industry-specific factors and time trends that may influence the relationship between variables, improving the accuracy of the estimated effects (Brunnermeier and Cohen, 2003).

Finally, we rerun model (1) on subsamples of firms located in China's eastern (developed) and western (underdeveloped) regions to assess the heterogeneous influence of stakeholder demands on corporate ESI. However, on both tails, we winsorize all statistical parameters at 1% levels. This measure was done to lessen the influence of outliers and extreme values. Table 2 provides the detail of all the variables of the study.

4. Results

4.1 Descriptive results

Table 3 outlines the summary statistics of regressors and criterion variable used for empirical estimation. We used three proxies of ESI in our analysis. In addition, all stakeholders' pressures show reasonable mean values, but SHR_P suggests high ownership concentration among the research sample. On average, each firm holds more than 10 years' experience, is of reasonable age and has good financial performance.

The pairwise correlation results in Table 4, Panel-A indicate that CUST_P, EMP_P, SUP_P and SHR_P are significantly positively correlated with ESI, aligning with our expectations. Furthermore, in Panel-B, the coefficients of the variance inflation factor (VIF) for all variables remain below the specified threshold, indicating the absence of multicollinearity (O'Hagan and McCabe, 1975). Hence, we can assert that there is no sign of multicollinearity among the variables based on the VIF values.

No.1	Variable	Symbol	Descriptions
Dependent variable			
1	Environmental–sustainability investment	ESI	A natural logarithm of total environmental and sustainable investment made by company during the year
Independent variables			
2	Customer pressure	CUST_P	Proportion of advertising expenses to sales revenue
3	Supplier pressure	SUP_P	Measured by inventory turnover, which is equal to main business cost divided by average inventory balance
4	Employee pressure	EMP_P	The natural logarithm of the number of employees in a company at the end of each year
5	Shareholder pressure	SHR_P	It is measured by ownership concentration which is the sum of the shareholding proportions of the top three shareholders in the company
Control variables			
6	Firm age	FAGE	It is calculated as the current year minus the date of initial public offerings
7	Firm size	FSIZE	It is measured as the natural logarithm of total assets of company
8	Leverage	FLEV	Ratio of total liabilities divided by total assets
9	Profitability	ROA	Return on asset ratio
10	Board size	BSIZE	Natural logarithm of total directors of company
11	Board independence	BIND	Ratio of independent directors to total directors of company
12	CEO duality	CEOD	A dummy variable, equals to "1" if CEO is also a chairman of the boar and "0" otherwise

Source: Authors' own work

Table 2. Variables descriptions

Variable	*n*	Mean	SD	Minimum	Maximum
ESI	8,407	16.012	2.476	1.284	21.527
CUST_P	8,407	0.056	0.070	0.000	0.459
EMP_P	8,407	7.957	1.218	4.419	11.094
SUP_P	8,407	6.020	4.649	0.819	15.847
SHR_P	8,407	49.174	13.892	24.825	70.543
FAGE	8,407	10.653	6.906	0.000	25.000
FSIZE	8,407	22.429	1.291	19.619	26.048
FLEV	8,407	0.463	0.203	0.049	0.899
ROA	8,407	0.040	0.034	0.003	0.120
BSIZE	8,407	2.165	0.199	1.609	2.708
BIND	8,407	0.372	0.053	0.333	0.571
CEOD	8,407	0.210	0.407	0.000	1.000

Note: For variables' definitions see Table 2
Source: Authors' own work

Table 3. Descriptive statistics

4.2 Preliminary analyses

4.2.1 Hausman test of endogeneity. We use Durbin–Wu Hausman statistical technique to examine the presence of endogeneity in regression model. Endogeneity arises when there is a correlation between regressed, regressors and error term, which violates the assumption of exogeneity (Semykina and Wooldridge, 2010). The test compares estimates obtained from the ordinary least squares (OLS) (Mattingly and Olsen, 2018) model, which assumes

Table 4.
Correlation matrix and VIF coefficients

Variables	*ESI*	*CUST_P*	*EMP_P*	*SUP_P*	*SHR_P*	*FAGE*	*FSIZE*	*FLEV*	*ROA*	*BSIZE*	*BIND*	*CEOD*
Panel A: Pearson correlation												
ESI_log	1											
CUST_P	0.183*	1										
EMP_P	0.377*	−0.060*	1									
SUP_P	0.053*	−0.083*	−0.035*	1								
SHR_P	0.145*	−0.067*	0.209*	0.073*	1							
FAGE	0.124*	−0.042*	0.256*	0.038*	−0.198*	1						
FSIZE	0.512*	−0.182*	0.774*	0.025	0.240*	0.361*	1					
FLEV	0.282*	−0.217*	0.391*	0.017	−0.014	0.325*	0.507*	1				
ROA	0.013	0.063*	0.018	0.018	0.164*	−0.162*	−0.002	−0.395*	1			
BSIZE	0.152*	−0.055*	0.237*	0.004	0.060*	0.118*	0.261*	0.193*	−0.016	1		
BIND	−0.020	0.002	0.024	0.012	0.054*	−0.006	0.044*	−0.003	−0.013	−0.479*	1	
CEOD	−0.044*	0.048*	−0.147*	−0.015	−0.024	−0.195*	−0.158*	−0.127*	0.040*	−0.166*	0.092*	1
Panel B: VIF value												
		CUST_P	*EMP_P*	*SUP_P*	*SHR_P*	*FAGE*	*FSIZE*	*FLEV*	*ROA*	*BSIZE*	*BIND*	*CEOD*
		1.09	2.58	1.02	1.22	1.34	3.33	1.78	1.29	1.47	1.36	1.07

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
Source: Authors' own work

exogeneity, with estimates obtained from an instrumental variable model that addresses endogeneity (Nakamura and Nakamura, 1981). In this study, the Durbin–Wu Hausman test statistics reported in Table 5 indicate that CUST_P, EMP_P, SUP_P and SHR_P are identified as endogenous variables. Consequently, results obtained from OLS may be inconsistent and biased, necessitating alternative estimation techniques, such as instrumental variable regression, to obtain more reliable and unbiased estimates.

4.2.2 Panel causality test. Given the confirmed endogeneity by the Durbin–Wu Hausman test in Table 5, our analyses expanded to identify the source of endogeneity among variables. To achieve this, we used endogeneity among variables. To achieve this, we used the Dumitrescu panel Granger causality test, which assesses causal associations between dependent and independent variables in panel data. The DH test determines if one variable Granger-causes another, considering correlated effects and providing insights into causal relationships in panel data sets (Dumitrescu and Hurlin, 2012). The results, presented in Table 6, confirm the presence of a causal relationship between ESI and CUST_P, EMP_P, SUP_P and SHR_P variables.

4.3 Regression results based on two-stage least squares

4.3.1 Impact of organizational stakeholders on environmental sustainability investment. We adopted the two-stage least squares (2SLS) technique in our regression analysis after recognizing the presence of endogeneity due to causal relationships among the variables (Stock and Watson, 2015). By leveraging instrumental variables, the 2SLS technique addresses endogeneity concerns. In the first stage, instrumental variables are used to estimate endogenous variables while accounting for exogenous variance. These estimated values are then used as regressors in the following stage, allowing us to achieve consistent

Statistics	CUST_P	EMP_P	SUP_P	SHR_P
Durbin statistics	6.51351**	5.61616**	8.78561***	3.08494*
p-value	(0.0107)	(0.0178)	(0.0030)	(0.0790)
Wu–Hausman statistics	6.50975**	5.61208**	8.79404***	3.08192*
p-value	(0.0108)	(0.0179)	(0.0030)	(0.0792)

Notes: The results of the Durbin and Wu–Hausman statistics for endogeneity; *, ** and ***statistically significant at 0.10, 0.05 and 0.01 levels, respectively (two-sided *t*-tests); *p*-values in parentheses
Source: Authors' own work

Table 5.
Hausman test of endogeneity

Null hypothesis	W-stat	Zbar-stat	*p*-value	Causality
CUST_P ≠ > ESI	4.0085	9.2184***	0.0000	Yes
ESI ≠ > CUST_P	3.1338	12.2576***	0.0000	Yes
EMP_P ≠ > ESI	3.4145	13.8705***	0.0000	Yes
ESI ≠ > EMP_P	4.9822	12.1138***	0.0000	Yes
SUP_P ≠ > ESI	3.5178	10.6822***	0.0000	Yes
ESI ≠ > SUP_P	6.504	13.5121***	0.0000	Yes
SHR_P ≠ > ESI	5.0921	17.3615***	0.0000	Yes
ESI ≠ > SHR_P	6.815	24.6708***	0.0000	Yes

Notes: ≠ > denotes variables does not granger cause each other. ***indicates significance at 1%
Source: Authors' own work

Table 6.
Panel causality test results

and unbiased coefficient estimates (Semykina and Wooldridge, 2010). We can successfully handle endogeneity and improve the robustness of our regression analysis by using the 2SLS technique. Hence, we propose that reverse causality may have an effect on the relationship between organizational stakeholders and ESI. Pro-environmental corporations, for instance, invest more in sustainable green projects, which ultimately establishes a positive public image in the eyes of stakeholders (Castka and Prajogo, 2013), resulting in lessened stakeholder pressures on such firms. Thus, we used the lag of ESI as the instrumental variable in our estimation model.

Table 7 provides the regression results of the effects of organizational stakeholders' pressure on ESI using 2SLS regression technique. The empirical results in column 1 suggest that CUST_P positively influences ESI (*H1a* supported). These findings are consistent with previous research (Huang *et al.*, 2016; Yen, 2018) that suggest customers promote environmentally sustainable production activities in corporations. Similarly, column 2 outlines the positive effect of EMP_P on ESI (*H1b* supported). It implies that companies with a larger workforce invest more in ecologically sustainable efforts. However, SUP_P has a weak significant effect on corporate ESI (*H1c* supported). These findings imply that suppliers can influence corporate environmentally friendly behaviors; however, the amount to which suppliers alone contribute to a company's ESI is in its early stages. Interestingly, column 4 provides an insignificant coefficient for SHR_P on ESI (*H1d* not supported). These findings are in agreement with the cross-sectional investigation of Li *et al.* (2020).

4.3.2 Effect of regional heterogeneity. We used the main model (1) on the subsamples to estimate the effect of China's regional disparities in determining the association between organizational stakeholders and ESI (i.e. eastern and western regions). Columns 1 and 2 of Table 8 outline the impact of customer pressures on ESI in eastern and western regions. According to these findings, customers in East China have a stronger influence on ESI than those in western region. Columns 3 and 4 show that employee pressure has a stronger impact on corporate ESI in the East China than in the west. However, columns 5 and 6 provide support for supplier pressure on ESI only in the East China; the western region has

Variables	(1) ESI	(2) ESI	(3) ESI	(4) ESI
CUST_P	3.7477*** (0.3983)			
EMP_P		0.0900* (0.0465)		
SUP_P			0.0044*** (0.0013)	
SHR_P				0.0019 (0.0020)
FAGE	−0.0237*** (0.0057)	−0.0238*** (0.0057)	−0.0246*** (0.0057)	−0.0225*** (0.0059)
FSIZE	0.9320*** (0.0274)	1.0127*** (0.0468)	0.9408*** (0.0275)	0.9358*** (0.0284)
FLEV	0.6798*** (0.1799)	0.8596*** (0.1807)	0.8468*** (0.1798)	0.8555*** (0.1808)
ROA	1.8016*** (0.5076)	1.9612*** (0.5105)	1.8623*** (0.5094)	1.8833*** (0.5131)
BSIZE	−0.1193 (0.1673)	−0.1149 (0.1675)	−0.1037 (0.1682)	−0.1322 (0.1681)
BIND	−2.0033*** (0.5859)	−2.0083*** (0.5891)	−1.9856*** (0.5898)	−2.0491*** (0.5911)
CEOD	0.2845*** (0.0690)	0.2743*** (0.0695)	0.2807*** (0.0698)	0.2819*** (0.0698)
Constant	−4.0255*** (0.6547)	−5.3570*** (0.8011)	−4.5064*** (0.6586)	−4.4309*** (0.6616)
Industry FE	YES	YES	YES	YES
Time FE	YES	YES	YES	YES
Observations	6040	6040	6040	6040
R-squared	0.33	0.33	0.33	0.32

Table 7.
Main regression results using 2SLS

Notes: Robust standard errors in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work

Table 8. Regression results for regional heterogeneity using 2SLS

Variables	(1) East ESI	(2) West ESI	(3) East ESI	(4) West ESI	(5) East ESI	(6) West ESI	(7) East ESI	(8) West ESI
CUST_P	4.0566*** (0.9493)	3.8795*** (0.5355)						
EMP_P			0.1451** (0.0644)	0.1407 (0.0980)				
SUP_P					0.0041*** (0.0015)	0.0042 (0.0030)		
SHR_P							0.0051* (0.0028)	−0.0048 (0.0045)
Constant	−2.4095** (0.9549)	−5.0956*** (1.4416)	−4.3871*** (1.1804)	−7.2969*** (1.6498)	−2.8419*** (0.9608)	−6.1043*** (1.4303)	−2.7042*** (0.9587)	−6.1188*** (1.4304)
Controls	Included	Included	Included	Included	Included	Included	Included	Included
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,436	1,170	3,436	1,170	3,436	1,170	3,436	1,170
R-squared	0.32	0.37	0.31	0.36	0.32	0.36	0.31	0.37

Notes: Robust standard errors in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work

nonsignificant coefficients. However, the effect of supplier pressure is lower than that of customer and employee pressures on ESI. Similarly, columns 7 and 8 do not show evidence of the effect of shareholder pressure on ESI in both regions. These results provide the presence of variations in the influence of stakeholders on ESI across the East and West China. This heterogeneity can be attributed to economic development disparities, industry composition, cultural factors, government policies and supply chain structures (Yu and Choi, 2015; Chen *et al.*, 2022; Cumming and Leung, 2021).

4.4 Robustness

We used an additional proxy of ESI to determine the robustness of main findings. Following, Atif *et al.* (2020), we measure ESI as the proportion of total environmental investment to total annual sales. We reran the regression by using model (1) on the basis of the two proxies to estimate the effect of organizational stakeholders on ESI. The results of the robust regression using the two distinct proxies for ESI are shown in Table 9. Columns 1–4 demonstrate that CUST_P and EMP_P has a considerable, beneficial effect on ESI. SUP_P on ESI is mitigated in comparison to the primary findings, but the nature of the impact remains the same. Similar to main findings, SHR_P does not find any support. Overall, the results remain robust to the use of additional proxy for ESI.

5. Discussion

Taking into account the geographical diversity in China, we provide an empirical evaluation of how organizational stakeholders (i.e. customers, employees, suppliers and shareholders) affect corporate ESI. We contend that stakeholders' demands for environmental preservation differ due to their cultural and cognitive diversity within China's geographical heterogeneity. Therefore, to offer empirical evidence in support of our hypothesis, we used a longitudinal data set (2009–2019) consisting of Chinese A-share listed companies.

Through regression analysis, the primary findings show the impact of each organizational stakeholder's demand on ESI. We discovered that customer pressure strongly influences corporate ESI, indicating that customer pressures drive firms' pro-environmental behavior in China. Likewise, companies with larger workforce invest more in environmentally sustainable initiatives. Having a high number of employees makes companies visible to the public (Shen *et al.*, 2020a), thereby influencing them to conduct ESI.

Variables	(1) ESI_S	(2) ESI_S	(3) ESI_S	(4) ESI_S
CUST_P	0.0405*** (0.0101)			
EMP_P		0.0154*** (0.0025)		
SUP_P			0.0002** (0.0001)	
SHR_P				0.0001 (0.0001)
Constant	0.1386*** (0.0228)	−0.0168 (0.0331)	0.1326*** (0.0227)	0.1367*** (0.0228)
Controls	Included	Included	Included	Included
Industry FE	controlled	controlled	controlled	controlled
Time FE	controlled	controlled	controlled	controlled
Observations	6,040	6,040	6,040	6,040
R-squared	0.09	0.10	0.09	0.09

Notes: Robust standard errors in parentheses; ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work

Table 9.
Robust regression results using 2SLS

However, the contribution of supplier pressure alone to corporate ESI, is in its infancy in China. Surprisingly, the findings indicate that high levels of ownership concentration do not promote ESI as a way of corporate environmental protection initiatives. It could be due to the prevalence of ownership concentration in Chinese enterprises, where large shareholders have full control and are only motivated by self-interest. Corporate environmental initiatives only receive shareholder support if the perceived cost of investing exceeds the anticipated benefits (Shen *et al.*, 2020b). Overall, the primary findings indicate that customers are more likely than other organizational stakeholders to exert pressure on firms to implement environmental protection efforts. By contrast, shareholders seeking self-interest are unable to contribute to the development of a company's environmentally sustainable image.

In addition, ESI's geographical affiliation can have a significant impact on the magnitude of the expectations that are placed on an organization by its different stakeholders. Customers and employees in the eastern region influence the ESI of corporations more than those in the western region. Moreover, suppliers only have a marginal effect on ESI. Stockholders in the eastern area have an insignificant influence on ESI compared to stockholders in the western region where it is negative. These findings complement the work of Wong *et al.* (2018) and Gao *et al.* (2019) by extending how each stakeholder's regional affiliation influences their perceptions about corporate pro-environmental behavior. For example, stakeholders from developed regions are more environmentally conscious than those in underdeveloped regions. In general, organizational stakeholders in China have varying perceptions of corporate environmental activities, and these perceptions differ depending on the regions to which the stakeholders belong to. However, this theorization does not apply to all organizational stakeholders, such as shareholders, who may be only motivated by economic benefits and not interested in corporate social legitimacy. Moreover, these findings show that the impact of stakeholders on ESI varies considerably between East and West China. The regional heterogeneity in China, driven by economic development differences, industrial structures, cultural differences, regulations and supply chain, leads to diverse influence of stakeholders on ESI (Yu and Choi, 2015; Chen *et al.*, 2022; Cumming and Leung, 2021).

This paper contributes to stakeholder–institutional perspective by showing the internal differences and logics in operations. According to institutional theory, complying with social pressure of legitimacy enhances organizational survival and performance, thereby creating isomorphism (Scott, 2005). Numerous works in institutional and stakeholder theories have focused on the role of legitimacy by taking stakeholder as an integrated whole and argued that stakeholders pressure firms to fulfill environmental responsibility for gaining legitimacy from society (Sarkis *et al.*, 2010). Less attention has been given to the differences in pressure from different stakeholders. Institutions in emergent nations like China are notoriously flexible, inconsistent and ambivalent, yet they vary greatly from one region to the next within the country (Wong *et al.*, 2018).

This study offers important practical implications. First, we suggest that managers should realize that not all pressure from stakeholders promotes ESI. Predicting stakeholders' expectations accordingly becomes a precondition for corporate ESI. Second, managers need to be aware of the institutional heterogeneity in the central and western regions. Targeted strategies for specific geographic units should be made to mitigate investment risks better in the local-level institutional context. Third, by offering a more comprehensive and encouraging institutional framework, regional governments and local authorities may enhance enterprises' ESI. The more advanced market institutions, such as rating agencies and consumer watchdogs, are stronger in eastern China than in western China due to the lower level of government intrusion and more favorable policies (Gao *et al.*, 2019). Thus, we

suggest that the government can introduce incentive policies in Western China so that firms can be proactive in performing ESI activities.

6. Conclusion

We provide an objective examination of how different kinds of corporate stakeholders, including customers, employees, suppliers and shareholders, impact ESI based on sample of Chinese firms listed as A-share stocks. Owing to the cultural and cognitive heterogeneity prevalent throughout China, the environmental protection demands of stakeholder groups differ among provinces. According to our findings, the pressure from customers, employees and suppliers has a favorable influence on corporate ESI. The influence of these pressures is more pronounced in developed regions (the east) than in less developed (the west) localities of China.

Aside from its theoretical and scientific contributions, the study has a few limitations that open avenues of future research. Our research framework is focused on subnational differences in China and takes institutional differences into account. Thus, when examining the setting of developed markets, the findings of this study reveal generalizability concerns. The pressures on corporate social and environmental practices exerted by stakeholders vary according to their national and subnational diversity (Azadegan *et al.*, 2018). Furthermore, the role of nongovernmental groups among stakeholders is unclear. Nongovernmental groups assist governments in carrying out environmental governance measures (Tu *et al.*, 2019).

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