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The Effect of Environmental Orientation on Green Innovation: Do Political Ties Matter?

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Abstract: Although the importance of environmental orientation has been recognized, how and under what conditions it influences green innovation is limited. To extend the research on green innovation, our research examines the impacts of two dimensions of environmental orientation on two types of green innovation, as well as the moderating role of political ties. Drawing upon stakeholder theory and resource-based view, we propose research hypotheses. We perform hierarchical regression analysis to validate the hypotheses that is based on survey data collected in 253 Chinese manufacturing companies. Our findings indicate that internal environmental orientation and external environmental orientation are positively linked with both green product innovation and green process innovation. The effect of internal environmental orientation on green process innovation is stronger than that of green product innovation. In addition, political ties strengthen the positive impacts of internal environmental orientation on green product innovation and green process innovation, while attenuating the positive impact of external environmental orientation on green process innovation. These findings contribute to theory and practice by enriching our understanding of how two dimensions of environmental orientation affect two types of green innovation.

Keywords: environmental orientation; green innovation; political ties; moderating role

1. Introduction

Since the increasing environmental pressures from different stakeholders, firms should maintain their products/services and operations to be environment-friendly [1–3]. As a result, management perception of environmental management has transformed from a cost center to a profit center to meet the requirements of environment protection [4–6]. Further, a growing number of firms are considering green innovation to be a critical approach to reduce their negative impacts on natural environment [7–11]. For example, Chang suggested that green innovation is critical for a firm to gain competitive advantage [7]. Tseng et al. found that green innovation practices are effective methods for coping with uncertainty [9]. Recently, Li et al. [10] and Albort-Morant et al. [11] indicated that firms need to improve green innovation performance when facing pressures from various stakeholders. Therefore, there is need to investigate how to promote green innovation.

Environmental orientation is defined as the extent to which managers of the firm recognize the importance of its environmental problems [12]. It is often embodied in corporate mission statements and includes two dimensions: internal environmental orientation and external environmental orientation [12]. Internal environmental orientation is defined as the aspects of the firm's internal

values, norms of moral behavior, and efforts committed to environmental conservation. External environmental orientation refers to the firm's attitude toward environmental conservation that may influence its relationships with external stakeholders, including suppliers, government, and community, etc. Previous studies suggested that the importance of environmental orientation has been realized [13–17]. For example, Menguc and Ozanne [17] and Fraj-Andrés et al. [15] found that environmental orientation has a positive impact on organizational performance. Recently, Aboelmaged further suggested that the effect of environmental orientation on firm performance is indirect and mediated by eco-innovation practices [13]. However, most previous studies focused on the performance outcomes of environmental orientation.

Suggested by stakeholder theory, firms need to sustain their competitive advantages via meeting stakeholders' demands [8,18]. It is critical for firms to consider the expectations and interests of various stakeholders [19,20]. Since environmental orientation reflects the manner and internal climate of a firm responding to environmental issues that are concerned by different stakeholders, it is suggested to be an important antecedent of green innovation [21,22]. However, our understanding of the influence of environmental orientation on green innovation is still limited. Thus, the first research question is: how environmental orientation influences green innovation?

Another research gap lies in that even both internal and external environmental orientations facilitate green innovation, their effects on green product and process innovations may be different. Internal environmental orientation focuses on the internal efforts of firms that are committed to environmental protection, while external environmental orientation focuses on relationship management with firms' external stakeholders [12]. Thus, internal integration may facilitate green process innovation more effectively than green product innovation [10,11]. However, external integration may facilitate green product innovation more effectively than green process innovation [10,11]. This article employs a comparative method and it clarifies the relative contributions of the two dimensions of environmental orientation on two types of green innovation.

Resource-based view (RBV) is also applied by previous studies to investigate the antecedents of green innovation [23,24]. RBV can be used to complement stakeholder theory, because firms may perceive stakeholders' satisfaction as an important asset [8,25]. When firms deem the government as an indispensable resource, they are likely to develop linkages with the government by all means [8,26,27]. Based on RBV, as an important external resource, political capital is expected to strengthen the importance of environmental orientation. However, from the perspective of stakeholder theory, once political legitimacy is established, the importance of environmental orientation is likely to be decreased due to the high cost of dealing with environmental issues [28]. Thus, RBV and stakeholder theory suggest different moderating effects of political ties in the environmental orientation-green innovation link. By combining these two theories, we suggest that political ties strengthen the importance of internal environmental orientation as it enhances firms' capabilities of gain resources, while political ties reduce the importance of external environmental orientation, since firms that heavily depend on the government may engage in more political-related activities to address external stakeholders' environmental concerns [8]. Thus, our third research question is: whether political ties influence the influence of environmental orientation on green innovation?

To address these research gaps, this study explores three questions by integrating RBV and stakeholder theory. First, what are the impacts of two dimensions of environmental orientation (i.e., internal and external environmental orientation) on two types of green innovation (i.e., green product and process innovation)? Second, how internal and external environmental orientations affect two types of green innovation differently? Third, how political ties influence the links between two dimensions of environmental orientation and two types of green innovation? The answers of these questions will contribute to theory and practice in environmental orientation and green innovation.

The structure of this article is organized, as follows. Research hypotheses are established in Section 2. Section 3 describes the methodology, including sample, data, reliability, and validity. The following Section 4 presents the analysis results. Section 5 discusses theoretical contributions and managerial implications of this article. Section 6 summarizes the conclusion and provides future directions.

2. Research Hypotheses

In this article, we combine stakeholder theory and RBV to examine the influence of environmental orientation on green innovation. We develop a model positioning political ties as a moderating variable on the influence of environmental orientation on green innovation. We present the hypothesized relationships in Figure 1.

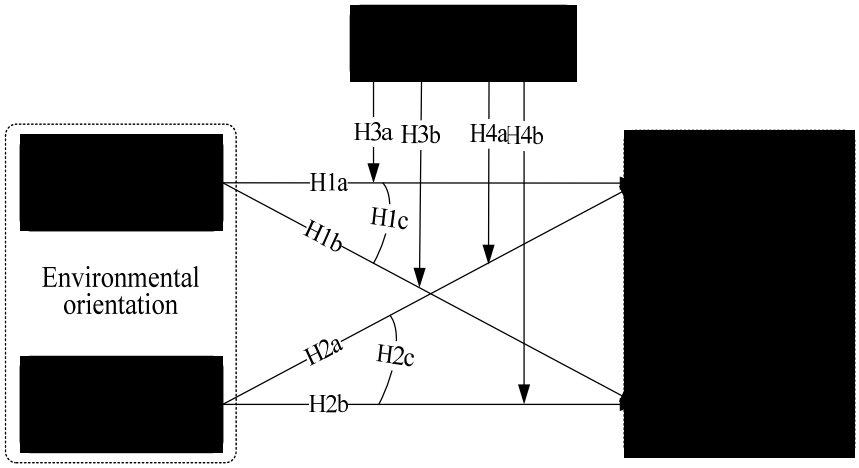

Figure 1. Conceptual model.

2.1. Environmental Orientation and Green Innovation

Due to increasing environmental pressure, firms also increase their consciousness of environmental issues [8]. Based on stakeholder theory, if the wide variety of stakeholders expresses expectations on environment conservation, firms should enhance their environmental practices to meet these demands [8,20]. Thus, environmental orientation is proposed to influence green innovation to deal with the concerns of stakeholders [19,20].

A great number of firms deemed internal environmental orientation as a kind of pro-environmental culture and climate [14,29,30]. According to RBV, organizational culture and climate can be deemed as important resources helping firms gain sustainable competitive advantages [8,23,24]. Perceiving organizational culture and climate as resources can shape firms' strategic vision and motivate employees to care about the environment, which might be conductive to the implementation of green innovation [14]. Stakeholder theory also suggests that internal environmental orientation is conductive to green innovation by satisfying the interests of various stakeholders, such as employees and community [18–20]. Therefore, this study proposes:

Hypothesis 1 (H1): *Internal environmental orientation is positively linked with (a) green product innovation and (b) green process innovation.*

Internal environmental orientation focuses on the internal efforts of firms that are committed to protect the environment [12]. Thus, internal environmental orientation is likely to impose a higher influence on green process innovation, since green process innovation is relatively easier and has less risk [8,10,11]. Whereas, green product innovation is longer-term oriented and it has more risk [10,11]. Internal environmental orientation is likely to be not enough to facilitate green product innovation. Therefore, we propose:

Hypothesis 1c (H1c): *The impact of internal environmental orientation on green process innovation is stronger than that of green product innovation.*

External environmental orientation reflects managerial perceptions of the need to respond to the concerns of external stakeholders on environmental problems [29]. These stakeholders may impose formal (e.g., regulations) and/or informal (e.g., norms) pressures on firms [14]. Based on stakeholder theory, firms should deal with environmental issues in accordance with stakeholders' demands

[8,20]. Organizations tend to implement green product and process innovation to improve their legitimacy [14].

Stakeholder theory argues that managerial perception of stakeholders' demands is a critical driver for organizations' different strategic behaviors [2,8,10]. Thus, firms realizing the need to respond to environmental issues will be more likely to conduct both green product and process innovation [10,19]. In addition, external environmental orientation can be viewed as an important resource creating sustainable competitive advantages [8,14]. Accordingly, this article hypothesizes:

Hypothesis 2 (H2): *External environmental orientation is positively linked with (a) green product innovation and (b) green process innovation.*

Since external environmental orientation involves a firm's relationships with external stakeholders [12], it will be conductive to the achievement of long-term oriented and risky goals. When compared with green process innovation, green product innovation is longer-term oriented and more risky [10,11]. Thus, we propose external environmental orientation to have a greater effect on green product innovation. Accordingly, we hypothesize:

Hypothesis 2c (H2c): *The impact of external environmental orientation on green product innovation is stronger than that of green process innovation.*

2.2. The Moderating Role of Political Ties

Political ties refer to close relationships of managers with the government officials [8], which may help firms to gain benefits, such as special treatment, tax preference, relaxed regulation over their competitors, and other valuable resources [31]. Although the central planning system has been gradually phased out by Chinese government, business activities still need to face many administrative interventions [8,27]. Thus, political ties may play a critical role in affecting environmental protection activities in China. Many firms often depend upon their relations with the government officials for gaining resources by providing unreciprocated gifts [8] or via corporate philanthropy [26,27].

According to RBV, political ties are inimitable and valuable resources that can be used to better respond to external stakeholders' demands [8]. Specifically, political ties may offer financial support and preferential policies (e.g., tax preference, fiscal subsidies, discount, or interest free bank lending) to deal with environmental concerns [8]. The more political resources that can be gained by the firm, the greater expected gains are likely to be obtained from internal environmental orientation [32–34]. Thus, firms with adequate political resources tend to achieve better green innovation performance via internal environmental orientation when compared with firms with little political resources. Accordingly, we hypothesize that:

Hypothesis 3 (H3): *Political ties strengthen the positive link between internal environmental orientation and (a) green product innovation and (b) green process innovation.*

Inversely, stakeholder theory suggests that, if a firm possesses sufficient political resources, it may engage in more political-related activities to meet external stakeholders' demands [8]. The lower the political ties, the more inclination firms have to conduct green innovation in order to address environmental issues [35]. However, in the context of higher political ties, it is likely that firms may have little incentives to deal with environmental concerns via green innovation. In this case, the effect of external environmental orientation on green innovation will be reduced. Thus, we propose:

Hypothesis 4 (H4): *Political ties attenuate the positive link between external environmental orientation and (a) green product innovation and (b) green process innovation.*

3. Research Methods

3.1. Samples and Surevey Data

In our study, we collected data in Chinese manufacturing firms to examine the research hypotheses. As China has many different provinces, and the levels of marketization and economic development are diverse in different provinces, this article strategically chose five regions (i.e., Zhejiang, Guangdong, Shandong, Henan, and Sichuan) to reflect the different degrees of marketization and economic development. Zhejiang and Guangdong are located in Yangtze River Delta and Pearl River Delta, respectively, and they enjoy the highest levels of marketization and economic development. Shandong locates Bohai Coastal Region and reflects the average level of economic development. Henan and Sichuan located in middle China and southwest China, and reflect the lower level of economic development. In this way, we can minimize the potential influence of regional bias.

According to published industry directories, we first randomly selected 2000 companies (400 in each region). Subsequently, we contacted these selected firms by phone or email to appoint the informants and ask for their assistance. After informing the research goal of the study and guaranteeing the confidentiality of responses, 496 informants agreed to engage in our survey. The informants have titles, including CEO, president, and supply chain managers, etc. In the final sample, 28.1% respondents are senior managers, 48.6% respondents are supply chain managers, and 23.3% respondents are managers directly dealing with environment management. These informants are knowledgeable in their firms' internal operations and external environment.

Afterwards, questionnaires were sent to the participants agreeing to take part in our study. We informed the informants that if they are not sure the answers of some questions, they could identify an appropriate person to help them. We also told the participants to answer the questions truthfully to decrease the possible social desirability bias. We also reminded the informants to improve the response rate after the questionnaire was sent. We promised to offer informants a summary report of the study as an incentive of completing the questionnaire.

We finally obtained 253 useful questionnaires, yielding the response rate of 51.0% (253/496). The sampled firms cover several different industries, such as communication and computers related equipment, electrical machinery and equipment, chemical and related products, and machinery and engineering. The average age of the sampling firms is 16.1 years (SD = 16.0) and the average number of employees is 954.1 (SD = 1585.8). In addition, 28.4% of the firms are state-owned and collective enterprises, 52.2% of the firms are private enterprises, and 19.4% of the firms are foreign-invested enterprises.

To examine non-response bias, we conducted two analyses. We first contrasted non-responding companies with responding companies (agreed to take part in the research). We did not find significant differences in firm size and firm age between these two groups. We then contrasted the companies that were responding early with the companies responding late. We also did not find significant differences in firm age, firm size, internal environmental orientation, external environmental orientation, green product innovation, green process innovation, and political ties between these two groups. Therefore, these results suggest that there is not serious non-response bias.

According to the suggestions that were proposed by Podsakoff et al. [36], we employed several methods to reduce or examine the possible influence of common method variance (CMV). First, we mixed the measurement items of distinct constructs when developing the questionnaire. Therefore, context related CMV can be alleviated. Second, this article assessed the factor structure of the variables by conducting Harman's one-factor test. Exploratory factor analysis generated six factors, which explain 75.2% of the total variance. Further, the first factor only explains 23.6% of the total variance. Finally, we performed confirmatory factor analysis (CFA) to examine the possible influence of CMV. A model setting all the measurement items was established to a single factor. The fit indices of this CFA model are not satisfactory: $\chi^2(324) = 2700.40$, RMSEA = 0.20, NNFI = 0.85, CFI = 0.86, and SRMR = 0.12. However, the CFA model correlating every item with its expecting construct fits the data well. Thus, CMV is not an issue in our research.

3.2. Measurements Items

This research first generated measurement items based on the existing literature and then modified according to feedbacks from pre-test and face-to-face interviews with top managers. Items that were used in this research were measured employing a seven-point Likert scale (1 indicates strongly disagree and 7 indicates strongly agree). As we initially developed English version of the questionnaire, translation, and back-translation method was used to assure linguistic equivalence of our scale. In specific, two researchers translated an English version of the scale into Chinese and another two researchers then back translated Chinese version of the questionnaire into English. These two versions of the questionnaires were reviewed by a bilingual scholar. Finally, we conducted pre-test and interviews with eight executives being randomly chosen in Zhengzhou. We modified the wording of several measures according to the feedback to develop the formal scale. List of measurement scales are shown in Appendix A.

Environmental orientation. We measured internal environmental orientation and external environmental orientation using six-item and seven-item scales, respectively, adapted from Banerjee [12]. Cronbach's alpha coefficient of internal environmental orientation is 0.936. Cronbach's alpha coefficient of external environmental orientation is 0.851.

Green innovation. Both green product innovation and green process innovation were measured using four-item scales that were adapted from Chen et al. [37]. Cronbach's alpha coefficient of green product innovation is 0.939. Cronbach's alpha coefficient of green process innovation this scale is 0.945.

Political ties. A four-item scale developed by Sheng et al. [38] was used to measure political ties. Cronbach's alpha coefficient of political ties is 0.868.

Control variables. Green innovation may be influenced by organizational demographics and technology turbulence [39–41]. Therefore, this article considered firm age, firm size, type of industries, as well as technology turbulence as control variables. Firm age and firm size were assessed by computing the natural logarithm of the years of establishment and number of employees separately. We employed a dummy variable to assess the type of industries (high-tech enterprises = 1 and non-high-tech enterprises = 0). Technology turbulence was measured with a four-item scale developed that was based on Sheng et al. [38]. Cronbach's alpha coefficient of technology turbulence is 0.839.

3.3. Reliability and Validity

This article established content validity by developing measurement items based on the previous literature, and performing pre-test. This study employed Cronbach's α and composite reliability (CR) value to verify construct reliability [42]. As Table 1 presents, all the Cronbach's α and CR values in our article are greater than the critical value of 0.70. Therefore, the reliability of this research is ensured.

Table 1. Results of confirmatory factor analysis (CFA).

Constructs	Scale Items	Standardized Factor Loadings	Cronbach's α	AVE	Composite Reliability
Internal environmental orientation	IEO2	0.80	0.936	0.704	0.938
	IEO3	0.91			
	IEO4	0.91			
	IEO5	0.91			
	IEO6	0.81			
External environmental orientation	EEO1	0.58	0.851	0.502	0.854
	EEO3	0.63			
	EEO4	0.60			
	EEO5	0.67			
	EEO6	0.86			
	EEO7	0.87			
Green product innovation	GPT1	0.87	0.938	0.792	0.939
	GPT2	0.91			

	GPT3	0.90			
	GPT4	0.88			
Green process innovation	GPI1	0.88	0.945	0.812	0.945
	GPI2	0.90			
	GPI3	0.93			
	GPI4	0.89			
Political ties	PT1	0.85	0.868	0.667	0.886
	PT2	0.90			
	PT3	0.89			
	PT4	0.58			
Technology turbulence	TT1	0.81	0.839	0.583	0.843
	TT2	0.50			
	TT3	0.90			
	TT4	0.78			

Fit indices: $\chi^2(309) = 863.68$, RMSEA = 0.081, NNFI = 0.96, CFI = 0.97, and SRMR = 0.059.

To evaluate convergent validity, we conducted a CFA [42]. The CFA results suggest that the CFA model fits the data well ($\chi^2(309) = 863.68$, RMSEA = 0.081, NNFI = 0.96, CFI = 0.97, and SRMR = 0.059). Results that are shown in Table 1 also reveal that each factor loading is significant in this article, which offer support for good convergent validity. Furthermore, all the average variances extracted (AVE) values are higher than the threshold value of 0.50, which provide further evidence for justified convergent validity.

To check discriminant validity, this research contrasted the square root of AVE values of constructs with its inter-correlations. As shown in Table 2, the square roots of the AVE values of all the constructs are higher than its inter-correlations. Thus, discriminant validity of this research is satisfactory.

Table 2. Means, standard deviations, and correlations.

Variables	1	2	3	4	5	6	7	8	9
1. Firm size	-								
2. Firm age	0.524 ***	-							
3. Industry type	−0.123	−0.014	-						
4. Technology turbulence	−0.052	−0.118	0.053	**0.764**					
5. Internal environmental orientation	0.013	−0.017	−0.094	0.517 ***	**0.839**				
6. External environmental orientation	−0.064	−0.063	−0.062	0.390 ***	0.669 ***	**0.708**			
7. Political ties	0.172 **	0.103	−0.042	0.323 ***	0.284 ***	0.386 ***	**0.817**		
8. Green product innovation	0.027	0.109	−0.106	0.557 ***	0.582 ***	0.522 ***	0.388 ***	**0.890**	
9. Green process innovation	−0.005	0.012	−0.139 *	0.534 ***	0.644 ***	0.556 ***	0.320 ***	0.726 ***	**0.901**
Mean	5.334	2.471	0.597	4.591	4.737	4.942	4.947	4.939	5.086
SD	1.859	0.769	0.492	1.184	1.209	0.803	1.139	1.157	1.244

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed); bold values on the diagonal are the square root of AVE values.

4. Analysis Results

In this study, we conducted hierarchical regression analyses to examine the hypothesized relationships. To reduce the possible influence of multi-collinearity, we mean-center independent variables and moderator to constitute interaction terms [43]. We present the regression results in Table 3.

Table 3. Results of regression analysis (standardized coefficients)

Variables	Green Product Innovation			Green Process Innovation		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Control variables						
Firm size	−0.072	−0.059	−0.109 *	−0.050	−0.039	−0.083
Firm age	0.213 ***	0.201 ***	0.190 ***	0.101	0.084	0.081

Industry type	−0.142 **	−0.094 *	−0.085 †	−0.173 **	−0.112 *	−0.104 *
Technology turbulence	0.586 ***	0.374 ***	0.358 ***	0.553 ***	0.287 ***	0.297 ***
Independent variable						
Internal environmental orientation (IEO)		0.235 ***	0.232 ***		0.349 ***	0.360 ***
External environmental orientation (EEO)		0.223 ***	0.189 **		0.206 ***	0.209 ***
Moderators						
Political ties (PT)			0.171 **			0.094 †
Interaction terms						
IEO × PT			0.130 **			0.115 *
EEO × PT			−0.028			−0.092 †
R square	0.362	0.491	0.521	0.321	0.510	0.534
Adjusted *R* square	0.352	0.479	0.503	0.310	0.498	0.517
R square change		0.129 ***	0.030 **		0.189 ***	0.024 **

Note: † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed).

For H1a and H2a, we hypothesize that two dimensions of environmental orientation are positively linked with green product innovation. As indicated in Table 3 (Model 2), the effects of internal environmental orientation ($\beta = 0.235$, $p < 0.001$) and external environmental orientation ($\beta = 0.223$, $p < 0.001$) on green product innovation are significant. That is, the level of green product innovation is likely to be higher for firms with greater levels of internal environmental orientation and external environmental orientation. Thus, H1a and H2a are supported.

For H1b and H2b, we propose that two dimensions of environmental orientation are positively linked with green process innovation. As demonstrated in Table 3 (Model 5), the effects of internal environmental orientation ($\beta = 0.349$, $p < 0.001$) and external environmental orientation ($\beta = 0.206$, $p < 0.001$) on green process innovation are significant. These results reveal that the level of green process innovation would be higher for firms with higher levels of internal environmental orientation and external environmental orientation, which provide empirical evidence for H1b and H2b. H1c proposes that the impact of internal environmental orientation on green process innovation is stronger than that of green product innovation. H2c predicts that the impact of external environmental orientation on green product innovation is stronger than that of green process innovation. In this study, we compared the effects of internal and external environmental orientation on green process innovation with those of green product innovation. The results reveal that internal environmental orientation has a higher impact on green process innovation than on green product innovation ($p < 0.05$), while the effects of external environmental orientation on green product and process innovation are not significant ($p > 0.1$). Thus, H1c is supported and H2c is not supported.

H3a and H3b hypothesize that the impacts of internal environmental orientation on green product innovation and green process innovation is likely to be stronger in the case of higher levels of political ties. Our results support both H3a and H3b. Model 3 in Table 3 reveals that the interaction between internal environmental orientation and political ties has a positive effect on green product innovation ($\beta = 0.130$, $p < 0.01$). The significant moderating role of political ties on the internal environmental orientation-green product innovation link is shown in Figure 2. Model 6 in Table 3 suggests that the interaction between internal environmental orientation and political ties has positive effect on green process innovation ($\beta = 0.115$, $p < 0.05$). We depict this significant moderating effect in Figure 3.

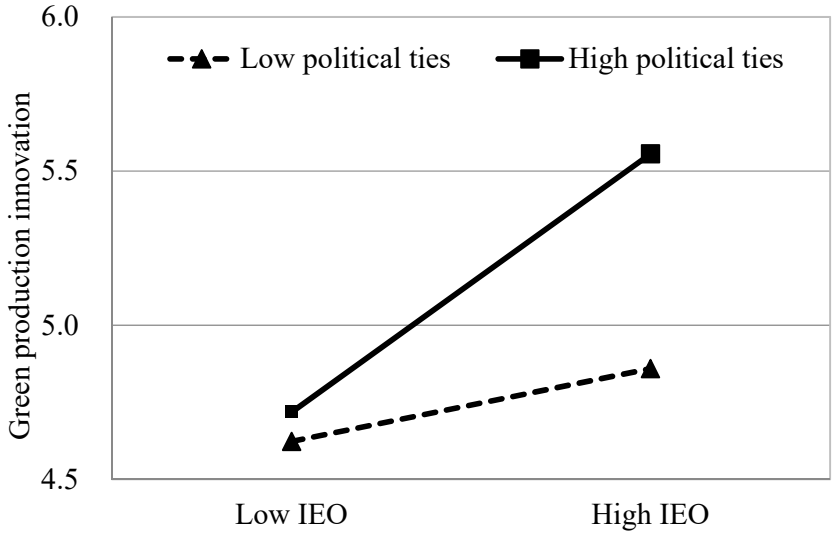

Figure 2. Interactive effects of internal environmental orientation and political ties on green product innovation.

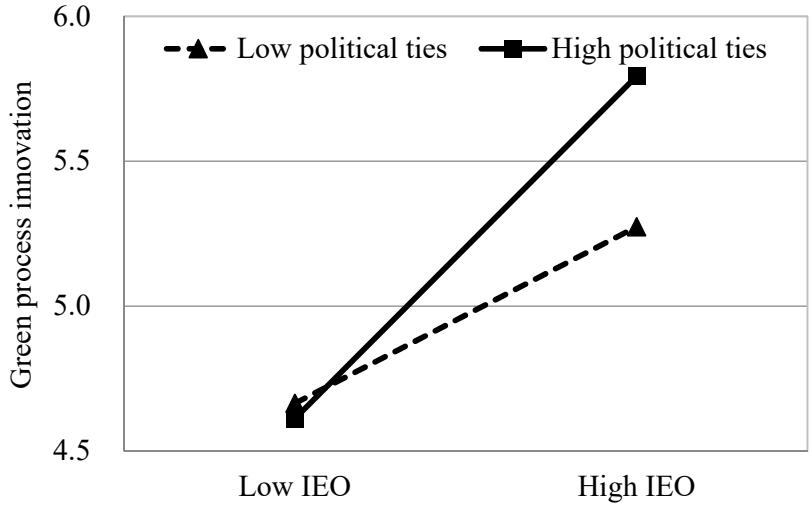

Figure 3. Interactive effects of internal environmental orientation and political ties on green process innovation.

H4a and H4b suppose that the effects of external environmental orientation on green product innovation and green process innovation are likely to be weaker when the levels of political ties are higher. These results provide support for H4b, but not for H4a. Model 3 in Table 3 suggests that the interaction between external environmental orientation and political ties is not significantly linked with green product innovation ($\beta = -0.028$, $p > 0.1$). Model 6 in Table 3 illustrates that the interaction between external environmental orientation and political ties is negatively linked with green process innovation ($\beta = -0.092$, $p < 0.1$). We demonstrate the significant moderating role of political ties on the external environmental orientation-green process innovation link in Figure 4.

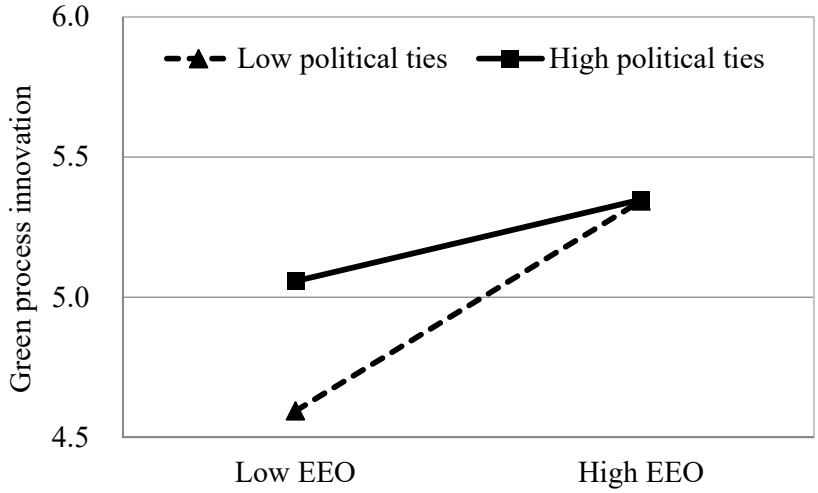

Figure 4. Interactive effects of external environmental orientation and political ties on green process innovation.

5. Discussions

In this article, we investigate whether and under what conditions environmental orientation influences green innovation. Drawing upon stakeholder theory and RBV, we extend environmental orientation and green innovation literature by examining the effects of two dimensions of environmental orientation on two types of green innovation, and the moderating role of political ties. Specifically, this article develops and examines a framework proposing the association between environmental orientation and green innovation depends on political ties.

Our findings indicate positive effects of internal and external environmental orientation on green product and process innovation. These results suggest that firms with a higher level of internal and external environmental orientation are more likely to take part in green product and process innovation activities. Since previous studies have indicated the positive link between environmental and firm performance [13–17,44], green innovation may play mediating role in this link.

Political ties are also important for firms implementing green innovation [8]. This study incorporates political ties into the model to examine its moderating role on the association between environmental orientation and green innovation. Our findings illustrate that political ties strengthen the positive impacts of internal environmental orientation on green product innovation and green process innovation, while attenuating the positive impact of external environmental orientation on green process innovation.

This article collected data from informants with distinct positions within their company. Specifically, 71 of the informants are CEO or president and 182 of the informants are department managers. For a robustness test, this article divided the sample into two groups (group 1: senior managers, group 2: middle-level managers) and repeated the regression analysis. The results of group 1 provide empirical support for H1a, H1b, H2a, H2b, and H3a. However, H1c, H3b, and H4b are also supported in the main analyses. The possible explanation for these differences is the small sample size of group 1 (71 vs. 253). The empirical evidence supporting for H1a, H1b, H2a, H2b, and H3a based on a small sample improves our confidence in the robust of these findings. The results of group 1 provide empirical support for H1a, H1b, H2a, H2b, H3a, and H3b. Only H1c and H4b are not supported when compared with the results of main analyses. Similarly, the possible reason is the reduction of sample used in the analysis (182 vs. 253). Since most of the hypotheses are still supported in the further analyses, the findings of this research are robust.

Although this article provides empirical support for the positive effect of environmental orientation on green innovation, rival hypotheses may exist [45]. For instance, higher levels of green product and process innovation may develop an environmental protection climate and culture. This article mitigates the possibility of such a rival hypothesis. First, previous studies generally suggest

that environmental orientation is conductive to green innovation instead of the opposite [19,20]. Further, interviews with executives indicate that environmental orientation is a critical antecedent facilitating green innovation. Therefore, we develop hypotheses that are based on theory and practice, rather than statistical results.

5.1. Theoretical Contributions

This article makes contributions to theory and literature in several ways. First, our research enriches the environmental orientation and green innovation literature by combining stakeholder theory and RBV. Adopting the combining theoretical perspective, this article explores the effect of environmental orientation on green innovation and the moderating role of political ties. Thus, our research provides novel insights that help in understanding relationships among environmental orientation, green innovation, and political ties.

Second, this article enriches green innovation literature through examining the influences of two dimensions of environmental orientation on two types of green innovation. Since most previous literature focused on the effect of environmental orientation on firm performance [13–17], and neglected its effect on green innovation. By investigating the effect of environmental orientation on green innovation, this study extends our understanding on antecedents of green innovation. This research also contributes to literature by comparing the effects of internal and external environmental orientations on two types of green innovation. Our findings suggest that the impact of internal environmental orientation on green process innovation is stronger than that of green product innovation.

Finally, this article contributes to theory through exploring the moderating effects of political ties. Most previous studies have considered the influence of environmental orientation or political ties on performance in an independent way [8,14]. Our results suggest that both environmental orientation and political ties are important for firms conducting green innovation. These two factors interact to affect green innovation. Political ties are conductive to the internal environmental orientation, while they are harmful for the positive association between external environmental orientation and green process innovation.

5.2. Managerial Implications

This article provides several useful managerial implications. First, our results verify the benefits of environmental orientation by revealing that both internal and external environmental orientation are positively linked with green product and process innovation. Although the performance consequences of environmental orientation have been recognized, firms are often puzzled with the influence of environmental orientation on green innovation. This research suggests that firms should consider environmental issues when making decisions and reduce the negative impacts of their products/services and operational activities. Thus, this study offers empirical evidence for the important role of environmental orientation in facilitating green innovation.

Second, managers should also notice that the effects of internal environmental orientation on two types of green innovation are different. Thus, firm should be cautious in adopting environmental orientation. If the resources of the firm are limited, and its goal is to implement green process innovation, internal environmental orientation may be appropriate.

Third, it is also critical for executives to care about that political ties affect the environmental orientation-green innovation relationship. Overlooking the moderating role of political ties would significantly reduce the benefits of environmental orientation. Especially, the moderating effects of political ties are different for internal environmental orientation and external environmental orientation. Executives should balance their investment into environmental orientation and political ties to facilitate green innovation.

6. Conclusions and Limitations

Environmental orientation is critical for firms to promote green innovation [21,22]. Based on stakeholder theory and RBV, this article extends environmental orientation and green innovation literature through assessing the moderating effect of political ties. Specifically, our results reveal that internal environmental orientation and external environmental orientation are positively related with both green product innovation and green process innovation. Internal environmental orientation has a stronger effect on green process innovation than that of green product innovation. Hence, our research provides empirical support for the important role of environmental orientation in facilitating green innovation. Moreover, political ties strengthen the positive impacts of internal environmental orientation on green product innovation and green process innovation, while attenuating the positive impact of external environmental orientation on green process innovation.

This study also has several limitations that should be further studied in future. First, this article collected data using single informant in each company. Such a design may give rise to self-confirmation bias overstating the link between environmental orientation and green innovation [36]. Although, we employed several approaches to assess or minimize the potential influence of common method bias, further research may collect survey data through multiple respondents to further examine these results. To reduce the influence of endogeneity, future studies should also collect longitudinal data.

Second, this article examines the direct effect of environmental orientation on green innovation. However, this relationship may be indirect. Some mediators (e.g., environmental strategy and top management commitment) through which environmental orientation affect green innovation may exist. Future research may provide more insightful findings by exploring the mediating roles of these factors.

Third, our research tests the moderating effect of political ties. Future studies should explore how other contingency variables, such as supply chain integration, environmental uncertainty, and organizational learning, may influence the association between environmental orientation and green innovation. Furthermore, these moderators may interactively to moderate the effects of environmental orientation on green innovation. Therefore, further research could employ a configurational approach to gain more novel insights.

Appendix A. List of Measurement Items

Constructs	Measurement Items
Internal environmental orientation [10]	IEO1: Environmental issues are not very relevant to the major function of our firm (R) *
	IEO2: At our firm, we make a concerted effort to make every employee understand the importance of environmental preservation
	IEO3: We try to promote environmental preservation as major goal across all departments
	IEO4: Our firm has a clear policy statement urging environmental awareness in every area of operations
	IEO5: Environmental preservation is high priority activity in our firm
	IEO6: Preserving the environment is a central corporate value in our firm
External environmental orientation [10]	EEO1: The natural environment does not currently affect our firm's business activity (R)
	EEO2: The financial well-being of our firm depends on the state of the natural environment*
	EEO3: In our firm, environmental preservation is largely an issue of maintaining a good public image
	EEO4: Our firm's responsibility to its customers, stockholders, and employees is more important than our responsibility toward environmental preservation (R)
	EEO5: Environmental preservation is vital to our firm's survival

	EEO6: Our firm has a responsibility to preserve the environment
	EEO7: Our firm strives for an image of environmental responsibility
Green product innovation [29]	GTI1: Our firm chooses the materials of the product that produce the least amount of pollution for conducting the product development or design
	GTI2: Our firm chooses the materials of the product that consume the least amount of energy and resources for conducting the product development or design
	GTI3: Our firm uses the fewest amount of materials to comprise the product for conducting the product development or design
	GTI4: Our firm would circumspectly deliberate, whether the product is easy to recycle, reuse, and decompose for conducting the product development or design
Green process innovation [29]	GSI1: The manufacturing process of our firm effectively reduces the emission of hazardous substances or waste
	GSI2: The manufacturing process of our firm recycles waste and emission that allow them to be treated and re-used
	GSI3: The manufacturing process of our firm reduces the consumption of water, electricity, coal or oil
	GSI4: The manufacturing process of our firm reduce the use of raw materials
Political ties [30]	PT1: Top managers at our firm have maintained good personal relationships with officials in various levels of government
	PT2: Top managers at our firm have developed good connections with officials in regulatory and supporting organizations such as tax bureaus, state banks, and commercial administration bureaus
	PT3: So far, our firm's relationship with regional government officials has been in a good shape
	PT4: Our firm has spent substantial resources in building relationships with government officials
Technology turbulence [30]	TT1: The technology in our industry is changing rapidly
	TT2: It is very difficult to forecast the technology development direction in our industry
	TT3: Most technological developments in our industry are radical changes on existing techniques
	TT4: The technological changes in our industry can bring many opportunities for firms

* Items are deleted after reliability or validity analysis.

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