



RESEARCH ARTICLE

The Impact of Enterprise Innovation on Enterprise Environmental Performance: From the Perspective of Internal Corporate Governance

Deyang Jing^{1*}, Nazimah Hussin², Rafidah Othman³, Xiaodong Dai⁴

^{1,2,3} Azman Hashim International Business School, Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

⁴ Nankai University Business School, 94 Weijin Road, Tianjin, 300071, P.R. China

ARTICLE INFO

ABSTRACT

Received: Aug 11, 2024

Accepted: Oct 9, 2024

Keywords

Enterprise Innovation

Environment Performance

Internal Corporate Governance

This paper seeks to examine the effect of Chinese domestic listed companies' active enterprise innovation on their environmental performance via the moderating role of internal corporate governance mechanisms. Data on A-share listed companies from the Shanghai and Shenzhen Stock Exchange from 2005 to 2020 was collected from the China Stock Market and Accounting Research Database (CSMAR). The results of the SPSS analysis confirmed the significant positive correlation between enterprise innovation and environmental performance. From the perspective of internal governance, a larger board size strengthens the effect of enterprise innovation on environmental performance, which is consistent with the arguments of other scholars. However, when it comes to the proportion of independent directors, the opposite situation is presented. The results showed that companies with a smaller proportion of independent directors are more conducive for eliciting environmental performance from innovation. The conclusions of this paper do not only validate the positive impact of enterprise innovation on environmental performance, but also supplement the literature on the moderating role of internal corporate governance systems on this relationship in the Chinese context. The findings offer suggestions and support for enterprises to positively influence the environment when carrying out innovation activities and provide a reference for the country to implement green governance in enterprises as well as to formulate corresponding policies.

***Corresponding Author**

djing@graduate.utm.my

1. INTRODUCTION

Since the Chinese government has made a solemn commitment to the world that China will strive to achieve 'carbon peak' status by 2030 and 'carbon neutral' status by 2060, environmental policies and research have emerged to support this goal (Tan and Wang, 2021). In particular, the government has provided strategic guidance and support for environmental protection. Consequently, enterprises, as a specific part of the implementation of these national strategies, now have the dual burden of practical innovation and social responsibility.

Enterprise innovation is an important enterprise activity that helps enterprises break through existing constraints, obtain sustainable competitive advantages, and build invincibility in long-term market competition. Enterprise innovation behavior is also beneficial for firms to improve their internal management effects as well as maintain their market and industry positions. However, more technological innovation and higher production efficiency come with a significant increase in energy consumption (ZHENG Jingli, 2021, Feng et al., 2020). Firms' natural pursuit of economic profit ignores such costs, which are beyond their control (Jensen and Meckling, 1976). It is precisely because of the awareness of such harm that the state and other social subjects actively advocate enterprises to

consider the social responsibility of environmental protection while innovating, to guarantee the sustainable development of people, society, and the country (Lawson, 2005). To be specific, the social responsibility that enterprises should embody in protecting the environment is not merely perfunctory behavior and simple slogans; rather, it needs quantified indicators to accept public regulations. At the same time, in addition to regulations, to mobilize enterprises and make them value environmental policies, (Heal, 2005, Jones et al., 2005, Littlewood, 2014).

This trend requires enterprises to enthusiastically invest in pollution treatment fees to control pollution while innovating in the direction of future development (Hassel et al., 2005). As such, in academic circles, research on ecological environmental protection, ecological environmental governance, and green governance is growing rapidly. For example, Professor Weian Li and team from the Nankai University Institute are leading scholars of corporate governance and have consecutively issued the "Green Governance Index of Listed Companies in China", which is an important measurement standard of listed enterprises' green governance efficiency, green rules, green energy saving, and green recycling.

Despite its significance, at present, there is no unified consensus about how enterprise innovation affects eco-environmental performance. Some studies have focused on the impact of enterprise innovation on environmental performance by emphasizing the interference of enterprises' external environment. For example, in cities with less government intervention and a more lenient legal system, the impact of enterprise innovation on environmental performance is stronger. Moreover, compared to non-state-owned enterprises, state-owned enterprises exhibit a more significant relationship between innovation input and environmental performance (Li Tao, 2019). Some scholars have also mentioned the positive effect of green management on enterprise innovation performance, as well as the divergent impact of environmental monitoring pressure on state-owned enterprises and non-state-owned enterprises (Zhang, 2017). However, few studies specifically discuss the impact of enterprise innovation on environmental performance under the influence of internal governance factors (Dubey et al., 2015, Chiou et al., 2011). Since 1978, China has been on the road of implementing its reform and opening policy. This has included the pursuit of progress from gradual joint-stock reforms centered on state-owned enterprises. Consequently, in 2001, the independent director system was established, making China the only country in the world with a dual supervisory system consisting of a board of supervisors alongside independent directors (Zhou, 2011). This decision marks a major improvement in Chinese listed companies' corporate governance system (Khan et al., 2020). While independent directors themselves do not offer any benefits for an enterprise, their role, and the system to which they belong act on behalf of state and societal regulations (Petra, 2005). Therefore, they represent a fair and objective third party that aids companies in making better strategic decisions that serve both public interest and social responsibility. In addition, after independent directors join the board of directors, the change in the size of the board of directors and the proportion of independent directors may affect whether a company changes its attitude towards environmental protection in the process of enterprise innovation, and then invest in environmental performance.

Based on these arguments, this paper explores the impact of listed companies' innovation performance on their green performance from the perspective of internal governance, namely via the moderating effect of independent director proportion and board size. To examine these relationships, the domestic stock market from 2005 to 2020 was used as the research sample. The contribution and novelty of this paper lies in the following two aspects: 1) it combines the domestic A-share market and takes firms' internal governance environment as a starting point to investigate the relationship between enterprise innovation and enterprise environmental performance, thereby providing a reference for other social unit members; and 2) it studies the moderating impact of varying scales of board size and independent director proportion on the enterprise innovation—environmental performance link.

2. LITERATURE REVIEW

The research literature on the impact of innovation on corporate performance is relatively mature. Some scholars have pointed out that the choice of entrepreneurial model has a positive impact on corporate performance (Jia et al., 2014, Zhu et al., 2018), while others believe that different innovation modes have different degrees of impact on enterprise performance (Nunes and Lopes, 2015, Roud, 2018, Hull and Rothenberg, 2008). Compared with collaborative innovation, (Uzkurt et al., 2013, Feranita et al., 2017). Subsequently, researchers have explored, in depth, how matching innovation modes and technological innovation can improve enterprise performance (Li Mengya, 2021). From the perspective of external influencing factors, a conducive external environment affects the influence of enterprise innovation on enterprise performance (Du et al., 2020). Meanwhile, research on external political connections shows that political connections have limited effects on technological innovation, which weaken the mechanism through which market-oriented innovation drives enterprise performance (ZHENG Jingli, 2021). In addition, the acquisition of external knowledge is crucial for an enterprise's innovation ability. Ultimately, through internalization and absorption, higher investments in R&D and innovation can encourage enterprises to achieve high-quality development and superior performance (Yu et al., 2020). From the perspective of internal processes, supply chain coordination in firm operations promotes both innovation behavior and enterprise performance (Liu et al., 2013). The innovation behavior of enterprises in production and manufacturing processes also accelerates the significant growth of enterprise performance (Gao et al., 2020). Regarding outcomes, some scholars believe that enterprise innovation embodies the results not only of technological innovation, but also of service innovation and service quality improvement (Bitner et al., 2008).

Hypothesis development

It has therefore become the consensus that firms' innovation behavior positively promotes their performance. Similar to how nature and greenery underlie the "*jinshan yinshan*" concept today, scholarly attention is increasingly directed to green governance, in which environmental performance is acknowledged as an important part. More specifically, researchers are interested in the role of enterprise innovation behavior in environmental performance, as some believe that green technology innovation can effectively improve firms' environmental performance via mechanisms like government rewards and penalties (Xie et al., 2019). Furthermore, academicians have used different firm attributes in China, such as state ownership vs non-state ownership, to explain whether technological progress at the enterprise level positively impacts corporate responsibility performance (Tang et al., 2018). As far as the results are concerned, state-owned enterprises appear to exhibit more significant effects. Empirical research has also examined and verified that green product innovation has a positive impact on environmental performance (Chiou et al., 2011, Rehman et al., 2021). Other scholars have established that the number of environmental protection innovation patents positively and significantly affect environmental performance (Yan and Zhang, 2021). Additionally, the change in the external environment brought about by the change in enterprise strategy has been found to lead to environmental performance (Nulkar, 2014). For example, high-tech inputs within a company produce certain administrative subsidies, which positively affect its environmental performance (Song et al., 2017). Based on the conclusions of numerous studies, enterprises that increase their investment in innovation (e.g., new product R&D, new technology testing, new patent development, etc.) are stimulated to identify a new development orientation, acquire corporate benefits, establish social responsibility values, and improve environmental performance (Chen et al., 2020). Therefore, this paper proposed the following hypothesis:

H1 Enterprise innovation positively affects environmental performance.

The independent director system was introduced in China's listed companies in 2001; it has had a far-reaching impact ever since. The system plays an integral role in promoting the professional governance of listed companies' internal decision-making bodies by improving the rationality and scientific integrity of board decisions (Liu et al., 2015). According to the agency theory, the significance of the board of directors is to check and balance decision-makers and protect the rights and interests of shareholders. This is consistent with the participation of independent directors, who form checks and balances within the board of directors to protect the interests of small and medium investors, improve corporate operation standards, and consider the firm's social

responsibilities (McCabe and Nowak, 2008). As important members who account for at least one-third of the board of directors, independent directors constitute a vital component of internal governance in China (Hu et al., 2010). They are typically external professionals who have no substantial interest or relationship with the listed company; therefore, they can express their professional opinions independently (Habbash et al., 2014). The characteristics of independent directors, such as their disciplines, backgrounds, knowledge, and experience, have indeed drawn the attention of scholars aiming to optimize the structure, governance, and decision-making of the board of directors. For example, research has shown that independent directors have a high level of information disclosure willing is under the better sustainable environment (García-Sánchez and Martínez-Ferrero, 2018), which promotes investors' shareholding ratio and increases external trust in the company. Independent directors from different periods of equity reform have also been revealed to improve the board system, providing a more realistic basis for different scenarios to enhance the independent director system (Clarke, 2006).

Nonetheless, conflicting findings have emerged in terms of independent directors' fulfillment of social responsibilities or environmental protection obligations in listed companies' operations. Some scholars have pointed out that the more independent directors in the board, the better the firm's internal control functions and supervision, which should promote the fulfillment of social responsibility. However, there is no evidence that independent director size significantly enhances listed companies' implementation of environmental protection responsibility (Cucari et al., 2018). Several studies have confirmed that the number of independent directors has a positive role in corporate social responsibility disclosure but did not emphasize the implementation of specific environmental policies (HUANG Wen-ze, 2021). Furthermore, though findings suggest that enterprises with more independent directors are more willing to disclose environmental information, no specific measures were mentioned (García-Sánchez and Martínez-Ferrero, 2017). Subsequently, some scholars have pointed out that changes in the high proportion of independent directors at different stages of enterprise growth have positive impact on enterprise innovation (Fu, 2019). Others have further confirmed that in the actual operation of the independent director system, independent directors except the type of retired government officials do not play their due responsibilities to a large extent (Wu and Dong, 2021).

The board meetings of listed companies generally comprise discussions and decisions about major issues like enterprise development, technology innovation, internal business goals, and social responsibility. In theory, the addition of independent directors is beneficial in such meetings as they represent the interests of small and medium-sized shareholders, can objectively scrutinize problems, and can leverage their professional knowledge to make prudent decisions that best meet firm, shareholder, and social responsibility interests. However, studies have proved that independent directors have little such effects. Also, the proportion of independent directors in the board plays an important role in balancing internal and external board members, as it can decide voting outcomes, power balances, and legitimacy. Nonetheless, as can be seen from the financial statements of listed companies, independent directors remain a small group compared to internal directors, and psychological reasons such as the herd effect still make them avoid conflicts with internal directors, thereby minimizing their independence (Wu and Dong, 2020). At this point, research reports indicate that listed companies' innovation investment decisions usually prioritize severe environmental problems and environmental performance. However, when the proportion and backgrounds of independent directors are changed, the board of directors becomes more diverse, causing a shift in firms' focus. As a result, enterprises may withdraw their attention from environmental performance and refuse to shoulder more environmental responsibility. Based on this discussion, the following hypotheses were proposed:

H2a When the proportion of independent directors is large, enterprise innovation has no significant impact on environmental performance.

H2b When the proportion of independent directors is small, enterprise innovation has a significant impact on environmental performance.

As one of the important aspects of internal governance, the size of the board of directors plays a crucial role in the research and decision making of listed companies. Its most direct impact is on

corporate performance, as studies have shown that the number of board members in listed companies is significantly and positively correlated with the companies' performance (Kim et al., 2012). Indeed, an overly small board size inhibits the management of listed companies from making rational scientific judgments in line with external expectations, thus increasing the risk of decision-making (Wang, 2012). For example, some scholars have pointed out that board size has a positive influence on the performance (Isik and Ince, 2016), and is an important role effecting firms' risk-bearing capacity in the context of diversified strategy, which greatly challenges their risk-tolerance capacity (Fakhrunnas and Ramly, 2017). On the contrary, other scholars have found that the size of the board of directors has a negative correlation with enterprise performance and risk-taking (Wang, 2012, Rachdi and Ameer, 2011, Al-Smadi, 2019). The relationship between the size of the board and the performance of the company has therefore been inconclusive. If the board of directors is larger, the advantage of the number of professionals can offer more valuable references and enhance scientific decision-making. A higher number of directors can also effectively form a balance of power and provide more resources for the company. When considering listed companies' investment and direction in innovation, more internal directors and independent directors means more comprehensive thoughts and ideas that are in line with firm and public interests. It also entails more principled decisions and support for R&D investment in innovation to ensure that the company fulfills its green obligations and performs responsibly as a social entity. For instance, a well-rounded board size may channel more attention to environmental performance and achieve an organic balance between innovation and ecological preservation. Therefore, although different conclusions have emerged in different contexts, it is plausible that a moderate board size can positively influence corporate performance and promote the healthy growth of enterprises. The corresponding hypotheses were thus proposed as:

H3a When the board of directors is large, enterprise innovation has a significant impact on environmental performance.

H3b When the board size is small, enterprise innovation has no significant impact on environmental performance.

Theoretical framework

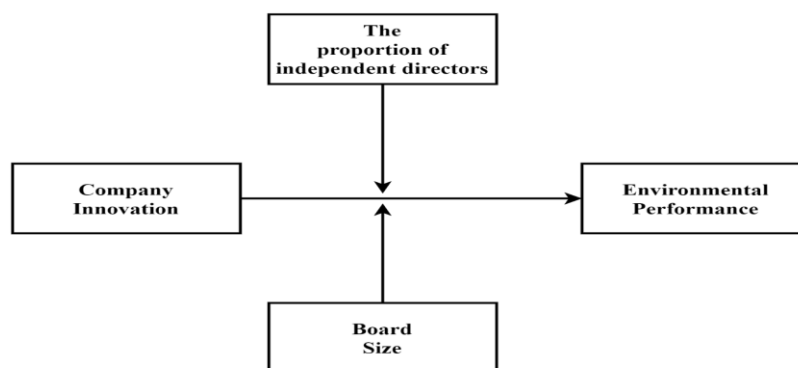


Figure: The research framework

This is where your main text is. This is the first paragraph.

Secondary Heading (12-point Times New Roman, Bold, Justified)

This is the first paragraph under the secondary heading.

Sub-heading under Secondary Heading (12-point Times New Roman, Bold, Italic, Justified)

This is the first paragraph under the sub-heading.

H1 This is how hypothesis is written when necessary Hypothesis should be presented in a hanging indentation by 0.5".

H2 An empty single line should be added between each hypothesis.

3. METHODOLOGY

3.1 Data source

This paper adopted A-share listed companies in the Shanghai and Shenzhen stock markets as the initial sample. All data was drawn from the China Stock Market and Accounting Research (CSMAR) database on these companies from 2005 to 2020. Financial and ST company samples were deleted, along with samples with missing data. A final sample of 721 observations were collected for testing. Data on firms' R&D innovation investment, environmental performance, and internal governance was collected and collated. The financial data obtained included company size (Size), asset-liability ratio (ROA), and Tobin's Q (TQ), while corporate governance data comprised board size (BD) and proportion of independent directors (ID).

3.2 Variable selection

3.2.1. Explained and explanatory variables

The explained variable in this study was environmental performance (EP), which was measured by the CSMAR database's environmental input data. The values' natural logarithm was taken for the regression analysis.

The explanatory variables were as follows: 1) Enterprise innovation (CI), which was proxied by the natural logarithm of R&D investment based on previous studies; 2) Proportion of independent directors (ID), whereby the number of independent directors was converted into proportion in Excel and taken as a natural logarithm measurement index for the regression. According to the relevant provisions of the China Securities Regulatory Commission on the proportion of independent directors in 2001, independent directors should account for at least one-third of all board members. After data analysis, this paper took the median proportion of independent directors as the standard and assumed that the proportion is large if it was above the median and small if it was below the median; and 3) Board size (BD), which was represented by the number of board members, which was converted into natural logarithm in the regression. Similar to the previous variable, the median size of the board of directors was taken as the standard, whereby a size above the median was considered large and vice versa.

3.2.2 Control variables

Referring to the existing literature, this study set up several control variables, including the shareholding ratio of the largest shareholder (Top1), enterprise size (Size), asset-liability ratio (Lev), profitability (ROA), and Tobin's Q (TQ). In addition, this study also controlled for fixed effects.

The setting and definitions of the specific variables are shown in Table 1.

3.3 Model construction

To verify the hypotheses, this study built a model to test the relationship between enterprise innovation and environmental performance, as follows:

$$EP = \beta_0 + \beta_1 CI + \beta_2 ID + \beta_3 BD + \beta_4 TQ + \beta_5 SIZE + \beta_6 ROA + \beta_7 LEV + \beta_8 TOP1 + \varepsilon$$

In the above model, the dependent variable EP represents environmental performance, which was measured through the environmental investment of enterprises. In terms of independent variables, CI represents enterprise innovation via R&D investment, BD represents the size of the board, and ID represents the proportion of independent directors. In terms of control variables, Size represents the size of the company via the natural logarithm of the company's total assets at the end of the period; LEV stands for asset-liability ratio; TQ stands for Tobin's Q, which measures the company's growth; TOP1 represents the shareholding proportion of the largest shareholder; ROA represents the

profitability of the enterprise; and ε is the random error term. This paper adopted the ordinary least squares (OLS) method for the regression.

4. RESULTS

4.1 Descriptive statistics

Descriptive statistical analysis was conducted on the explanatory, explained, and control variables in the model (refer to Table 2). As can be seen from Table 2, the minimum value of environmental performance was -0.916, its maximum value was 18.17, and its standard deviation was 2.395, indicating that there are obvious differences in the environmental performance of listed companies. The minimum, maximum, and standard deviation values of firm R&D investment were 8.453, 23.53, and 1.791, respectively, also showing great variation in the innovation of the companies. The minimum value of board size was 5, while its maximum value was 18, suggesting that the scale of the board of directors varies greatly among enterprises. The minimum value of the independent director proportion was 0.273 and its maximum value was 0.800, again showing substantial differences in the proportion of independent directors across enterprises.

Table 2: Descriptive statistics of variables

Variables	Sample Size	Mean	Median	Std. Deviation	Minimum	Maximum
EP	721	7.828	8.110	2.395	-0.916	18.17
CI	721	18.54	18.57	1.791	8.453	23.53
BD	721	8.958	9	1.865	5	18
ID	721	0.376	0.360	0.0630	0.273	0.800
SIZE	721	23.07	22.95	1.419	19.94	28.25
ROA	721	0.0410	0.0350	0.0600	-0.470	0.333

4.2 Correlation analysis

Table 3 presents the results of Pearson's correlation test. At the significance level of 0.01, enterprise innovation is significantly correlated with environmental performance. However, the correlation coefficients of board size and independent director proportion with environmental performance differ greatly, with the former showing a significant positive correlation and the latter showing a non-significant negative correlation.

Table 3: Pearson correlation test results

	EP	CI	BD	ID	SIZE	ROA	LEV	TQ	TOP 1
EP	1								
CI	0.233	1							
	0.000								
BD	0.232	0.140	1						
	0.000	0.000							
ID	-0.0334	0.145	-0.454	1					
	0.371	0.000	0.000						
SIZE	0.515	0.607	0.221	0.187	1				
	0.000	0.000	0.000	0.000					
ROA	0.0173	0.130	0.006	-0.002	-0.046	1			
	0.643	0.000	0.860	0.965	0.214				
LEV	0.320	0.249	0.167	0.032	0.547	-0.461	1		

	0.000	0.000	0.000	0.3810	0.000	0.000			
TQ	-0.436	-0.211	-0.165	0.002	-0.466	0.237	-0.399	1	
	0.000	0.000	0.000	0.944	0.000	0.000	0.000		
TOP 1	0.162	0.106	-0.042	0.070	0.253	0.0184	0.104	-0.097	1
	0.000	0.004	0.263	0.057	0.000	0.622	0.005	0.009	

4.3 Regression analysis

Table 4 shows the regression analysis results of the direct effects of the explanatory variables on enterprise environmental performance. It can be seen from model (1) that the coefficient of innovation was significantly positive ($p < 0.01$); that is, enterprise innovation positively influences environmental performance. Therefore, hypothesis H1 was verified. According to models (2) and (3), the coefficients of board size and proportion of independent directors were also significant ($p < 0.01$), albeit in opposite directions. Therefore, a larger board size and a smaller proportion of independent directors enhance the environmental performance of enterprises.

Table 4: The enterprise innovation performance statistics regression relationship with the environment

	(1)	(2)	(3)
Variables	EP	EP	EP
CI	0.100* (1.684)		
BD		0.101*** (2.751)	
ID			-2.266** (-2.125)
SIZE	0.722*** (8.382)	0.782*** (11.63)	0.838*** (12.36)
ROA	3.975*** (3.112)	3.995*** (3.149)	4.014*** (3.154)
LEV	0.674 (1.415)	0.489 (1.029)	0.492 (1.029)
TQ	-0.350*** (-4.713)	-0.342*** (-4.628)	-0.336*** (-4.521)
TOP1	0.491 (1.106)	0.661 (1.498)	0.577 (1.308)
Industry Effect	Control	Control	Control
Constant	-10.502*** (-6.203)	-10.847*** (-6.449)	-10.432*** (-6.173)
Sample Size	720	721	721
R-squared	0.568	0.570	0.568

Next, a moderation analysis was performed to examine whether internal governance environment factors (i.e., board size and independent director proportion) affect the relationship between enterprise innovation and environmental performance. Table 5 presents the results for the moderating role of independent director ratio. The first and second columns show the relationship between listed companies' innovation and environmental performance under large and small proportion of independent directors, respectively. Under a large ratio of independent directors, the innovation and environmental performance of listed companies in China are significantly and negatively correlated. However, in the sample group with a small ratio of independent directors, there is a significant positive correlation between the innovation and environmental performance of listed companies in China ($p < 0.01$). Therefore, H2a and H2b were confirmed. Likewise, in Table 6, Columns 1 and 2 show the impact of different board sizes on the innovation—environmental performance link. There is a significant positive relationship between corporate innovation and environmental performance in Chinese listed companies with a large board size. In contrast, there is

no significant relationship between these companies' innovation and environmental performance when the board of directors is small. In summary, the empirical results supported hypothesis H3a and hypothesis H3b.

Table 5: The moderating impact of independent director proportion on the relationship between enterprise innovation and environmental performance

	(1)	(2)
EP	Large proportion of independent directors	Small proportion of independent directors
CI	-0.002 (-0.0193)	0.226** (2.546)
SIZE	0.731*** (6.652)	0.673*** (4.519)
ROA	7.057*** (3.652)	3.361* (1.931)
LEV	0.022 (0.0345)	1.186 (1.614)
TQ	-0.351*** (-4.082)	-0.362*** (-2.669)
TOP1	1.458** (2.420)	-0.445 (-0.666)
Industry Effect	Control	Control
Constant	-7.467*** (-3.130)	-12.270*** (-4.242)
Sample Size	359	361
R-squared	0.661	0.549

Note: ***, ** and * represent significance levels of 1%, 5% and 10% respectively.

Table 6: The moderating impact of board size on the relationship between enterprise innovation and environmental performance

	(1)	(2)
EP	Large board size	Small board size
CI	0.167** (2.317)	0.037 (0.333)
SIZE	0.759*** (6.920)	0.616*** (4.039)
ROA	2.119 (1.428)	7.751*** (3.082)
LEV	0.514 (0.889)	0.007 (0.00800)
TQ	-0.304*** (-2.720)	-0.370*** (-3.673)
TOP1	-0.462 (-0.867)	2.758*** (3.339)
Industry Effect	Control	Control
Constant	-12.889*** (-6.063)	-5.779* (-1.899)
Sample Size	497	223
R-squared	0.574	0.653

Note: ***, ** and * represent significance levels of 1%, 5% and 10% respectively.

5. DISCUSSION

This study manually collated data on listed companies in China from 2005 to 2020 to examine the correlation between firms' innovation and environmental performance under the boundaries of two

internal governance factors, namely independent director proportion and board of director size. The results revealed the significant positive impact of innovation on environmental performance, which is strengthened by a large board of directors and a small proportion of independent directors. These findings can be used as a reference to guide the practices of listed companies in the future. For example, enterprises should pay attention to the positive effects of innovation while developing and expanding themselves. Specifically, they should integrate green governance into corporate governance processes, increase the proportion of green governance decisions, consider green environmental protection in innovation, and achieve a balance between corporate interests and public responsibility. From the perspective of the internal governance environment, companies should properly control the size of their board of directors and the ratio of their independent directors to better stimulate innovation behavior and R&D investment, which play a key role in promoting environmental performance.

The limitations of this research are reflected in the following aspects. First, this research does not distinguish between enterprise types. As such, the impact of innovation on the green performance of state-owned enterprises and non-state-owned enterprises in the internal governance environment needs to be discussed further. Second, considering that the full perspective of internal governance is not clear from secondary data alone, future research can combine a questionnaire survey with other methods to obtain first-hand data and triangulate the findings. Finally, this paper only studies a single scenario of internal governance and does not explore the impact of enterprise innovation on environmental performance under multiple scenarios. Supplementary research in various contexts can be done in the future to address this limitation.

6. CONCLUSION

With China to strengthen regional economic ties, more and more multinational companies set up companies in China, and China's domestic political characteristics requires multinational companies have understanding and attention to China's policy, this article through to the domestic companies under the policy implications of carbon to the peak, from the perspective of internal corporate governance how to influence the innovation of the enterprise, to focus on Then it explores the governance structure form which is favorable to the innovation of Chinese domestic companies and provides guidance and suggestions for Asian companies to set up governance structure in China.

Due to the particularity of China's domestic system of corporate governance, the board of supervisors and independent director system as the regulatory system of corporate governance in China run at the same time, therefore, in addition to the size of the board of directors, independent director for enterprise innovation and the impact of environmental performance has also been taken into consideration, the comprehensive governance structure for the enterprise provides a more intuitive reference and advice.

In addition, with China's concern for the environment and its responsibilities in the international community, the Chinese government will introduce more and more environmental policies to restrict and regulate the development of enterprises. At the present stage, there has been a corresponding reward and punishment mechanism for the types of establishment of domestic enterprises and their impact on the environment. For institutions and individuals who want to develop business and set up companies in China in the future, their company positioning, and industry should meet China's domestic environmental requirements. In addition, China's state requirements for enterprises to transform from labor intensive to technological innovation. Therefore, China's national policies will encourage and favor innovative enterprises, especially those that have a positive impact on ecological and environmental performance. It is suggested that both local and multinational enterprises should develop in the direction of innovation and environmental protection. Even though today's industry is relatively traditional, it should focus on its own innovation and try to reduce its impact on the environment

Moreover, with the determination and implementation of China's national policies, China's domestic labor-intensive enterprises will carry out strategic transfer, which will not only increase the human cost, but also involve the related problems of raw materials and environment. At the same time, extensive and in-depth cooperation with ASEAN will allow China's labor-intensive enterprises, which have previously been its domestic strength, to expand abroad. Due to the proximity of the land source

environment and the emergence of more Chinese enterprises, the existing domestic policies will enable more Chinese enterprises to display similar structures, and relevant reference will be made to countries and regions that want to introduce Chinese enterprises

Therefore it is necessary to explain the impact of enterprise innovation on environmental performance from the perspective of corporate internal governance, because from this perspective, foreign enterprises or governments are usually unable to accurately understand or obtain the corresponding data, and it is easy to make corresponding judgments according to the situation in their own countries. It is objective and true to the regions that introduce Chinese domestic enterprises or the institutions or individuals that want to set up companies in China

REFERENCE

- AL-SMADI, M. O. 2019. Corporate governance and risk taking of Jordanian listed corporations: the impact of board of directors. *Investment management and financial innovations*, 79-88.
- BITNER, M. J., OSTROM, A. L. & MORGAN, F. N. 2008. Service blueprinting: a practical technique for service innovation. *California management review*, 50, 66-94.
- CHEN, S., FU, F., XIANG, T. & ZENG, J. 2020. Do government subsidies crowd out technological capabilities? Effects on Chinese high-tech firms' invention outcomes. *Chinese management studies*.
- CHIOU, T.-Y., CHAN, H. K., LETTICE, F. & CHUNG, S. H. 2011. The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, 47, 822-836.
- CLARKE, D. C. 2006. The independent director in Chinese corporate governance. *Del. J. Corp. L.*, 31, 125.
- CUCARI, N., ESPOSITO DE FALCO, S. & ORLANDO, B. 2018. Diversity of board of directors and environmental social governance: Evidence from Italian listed companies. *Corporate Social Responsibility and Environmental Management*, 25, 250-266.
- DU, J., PENG, S., SONG, W. & PENG, J. 2020. RELATIONSHIP BETWEEN ENTERPRISE TECHNOLOGICAL DIVERSIFICATION AND TECHNOLOGY INNOVATION PERFORMANCE: MODERATING ROLE OF INTERNAL RESOURCES AND EXTERNAL ENVIRONMENT DYNAMICS. *Transformations in Business & Economics*, 19.
- DUBEY, R., GUNASEKARAN, A. & ALI, S. S. 2015. Exploring the relationship between leadership, operational practices, institutional pressures and environmental performance: A framework for green supply chain. *International Journal of Production Economics*, 160, 120-132.
- FAKHRUNNAS, F. & RAMLY, Z. 2017. Board of directors and risk-taking behavior of Islamic banks in South East Asia. *Tazkia Islamic Finance and Business Review*, 10.
- FENG, B., SUN, K., CHEN, M. & GAO, T. 2020. The impact of core technological capabilities of high-tech industry on sustainable competitive advantage. *Sustainability*, 12, 2980.
- FERANITA, F., KOTLAR, J. & DE MASSIS, A. 2017. Collaborative innovation in family firms: Past research, current debates and agenda for future research. *Journal of Family Business Strategy*, 8, 137-156.
- FU, Y. 2019. Independent directors, CEO career concerns, and firm innovation: Evidence from China. *The North American Journal of Economics and Finance*, 50, 101037.
- GAO, Q., WU, C., WANG, L. & ZHAO, X. 2020. The entrepreneur's psychological capital, creative innovation behavior, and enterprise performance. *Frontiers in Psychology*, 11, 1651.
- GARCÍA-SÁNCHEZ, I. M. & MARTÍNEZ-FERRERO, J. 2017. Independent directors and CSR disclosures: The moderating effects of proprietary costs. *Corporate Social Responsibility and Environmental Management*, 24, 28-43.
- GARCÍA-SÁNCHEZ, I. M. & MARTÍNEZ-FERRERO, J. 2018. How do independent directors behave with respect to sustainability disclosure? *Corporate Social Responsibility and Environmental Management*, 25, 609-627.
- HABBASH, M., XIAO, L., SALAMA, A. & DIXON, R. 2014. Are independent directors and supervisory directors effective in constraining earnings management? *Journal of finance, accounting and Management*, 5, 125.
- HASSEL, L., NILSSON, H. & NYQUIST, S. 2005. The value relevance of environmental performance. *European Accounting Review*, 14, 41-61.

- HEAL, G. 2005. Corporate social responsibility: An economic and financial framework. *The Geneva papers on risk and insurance-Issues and practice*, 30, 387-409.
- HU, H. W., TAM, O. K. & TAN, M. G.-S. 2010. Internal governance mechanisms and firm performance in China. *Asia Pacific Journal of Management*, 27, 727-749.
- HUANG WEN-ZE, L. Y. 2021. Diversification of the Board of Directors and Corporate Social Responsibility Information Disclosure. *CHINA FORESTRY ECONOMICS*.
- HULL, C. E. & ROTHENBERG, S. 2008. Firm performance: The interactions of corporate social performance with innovation and industry differentiation. *Strategic management journal*, 29, 781-789.
- ISIK, O. & INCE, A. R. 2016. Board size, board composition and performance: An investigation on Turkish banks. *International Business Research*, 9, 74-84.
- JENSEN, M. C. & MECKLING, W. H. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics*, 3, 305-360.
- JIA, J., WANG, G., ZHAO, X. N. & YU, X. 2014. Exploring the relationship between entrepreneurial orientation and corporate performance: The role of competency of executives in entrepreneurial-oriented corporations. *Nankai Business Review International*.
- JONES, P., COMFORT, D. & HILLIER, D. 2005. Corporate social responsibility and the UK's top ten retailers. *International Journal of Retail & Distribution Management*.
- KHAN, R., KHIDMAT, W. B., HARES, O. A., MUHAMMAD, N. & SALEEM, K. 2020. Corporate governance quality, ownership structure, agency costs and firm performance. Evidence from an emerging economy. *Journal of Risk and Financial Management*, 13, 154.
- KIM, S. H., CHA, J. M., CICHY, R. F., KIM, M. R. & TKACH, J. L. 2012. Effects of the size of the board of directors and board involvement in strategy on a private club's financial performance. *International Journal of Contemporary Hospitality Management*.
- LAWSON, H. A. 2005. Empowering people, facilitating community development, and contributing to sustainable development: The social work of sport, exercise, and physical education programs. *Sport, education and society*, 10, 135-160.
- LI MENGYA, Y. T., HAO CHEN 2021. Venture capital, innovation output quality and enterprise performance ——Based on the adjustment role of regional institutional environment. *Science Research Management*, 168-175.
- LI TAO, L. A. 2019. Enterprise Innovation and Environmental Performance ——Based on the Perspective of External Governance Environment. *Journal of Industrial Technological Economics*, 92-100.
- LITTLEWOOD, D. 2014. 'Cursed' communities? Corporate social responsibility (CSR), company towns and the mining industry in Namibia. *Journal of business ethics*, 120, 39-63.
- LIU, H., KE, W., WEI, K. K. & HUA, Z. 2013. Effects of supply chain integration and market orientation on firm performance: Evidence from China. *International Journal of Operations & Production Management*.
- LIU, Y., MILETKOV, M. K., WEI, Z. & YANG, T. 2015. Board independence and firm performance in China. *Journal of corporate Finance*, 30, 223-244.
- MCCABE, M. & NOWAK, M. 2008. The independent director on the board of company directors. *Managerial Auditing Journal*.
- NULKAR, G. 2014. SMEs and environmental performance—A framework for green business strategies. *Procedia-Social and Behavioral Sciences*, 133, 130-140.
- NUNES, S. & LOPES, R. 2015. Firm performance, innovation modes and territorial embeddedness. *European Planning Studies*, 23, 1796-1826.
- PETRA, S. T. 2005. Do outside independent directors strengthen corporate boards? *Corporate Governance: The international journal of business in society*.
- RACHDI, H. & AMEUR, I. G. B. 2011. Board characteristics, performance and risk taking behaviour in Tunisian banks. *International Journal of Business and Management*, 6, 88-97.
- REHMAN, S. U., KRAUS, S., SHAH, S. A., KHANIN, D. & MAHTO, R. V. 2021. Analyzing the relationship between green innovation and environmental performance in large manufacturing firms. *Technological Forecasting and Social Change*, 163, 120481.
- ROUD, V. 2018. Understanding the heterogeneity of innovation modes: Performance effects, barriers, and demand for state support. *Technological Forecasting and Social Change*, 133, 238-253.

- SONG, H., ZHAO, C. & ZENG, J. 2017. Can environmental management improve financial performance: An empirical study of A-shares listed companies in China. *Journal of cleaner production*, 141, 1051-1056.
- TAN, J. & WANG, R. 2021. Research on evaluation and influencing factors of regional ecological efficiency from the perspective of carbon neutrality. *Journal of Environmental Management*, 294, 113030.
- TANG, P., YANG, S. & BOEHE, D. 2018. Ownership and corporate social performance in China: Why geographic remoteness matters. *Journal of Cleaner Production*, 197, 1284-1295.
- UZKURT, C., KUMAR, R., KIMZAN, H. S. & EMINOĞLU, G. 2013. Role of innovation in the relationship between organizational culture and firm performance: A study of the banking sector in Turkey. *European Journal of innovation management*.
- WANG, C.-J. 2012. Board size and firm risk-taking. *Review of Quantitative Finance and Accounting*, 38, 519-542.
- WU, Y. & DONG, B. 2020. Independent director network and corporate innovation: evidence from a natural experiment in China. *Applied Economics Letters*, 28, 559-564.
- WU, Y. & DONG, B. 2021. The value of independent directors: Evidence from China. *Emerging Markets Review*, 49, 100763.
- XIE, X., HUO, J. & ZOU, H. 2019. Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research*, 101, 697-706.
- YAN, X. & ZHANG, Y. 2021. The effects of green innovation and environmental management on the environmental performance and value of a firm: an empirical study of energy-intensive listed companies in China. *Environmental Science and Pollution Research*, 1-10.
- YU, F., SHI, Y. & WANG, T. 2020. R&D investment and Chinese manufacturing SMEs' corporate social responsibility: The moderating role of regional innovative milieu. *Journal of Cleaner Production*, 258, 120840.
- ZHANG, C. 2017. Political connections and corporate environmental responsibility: Adopting or escaping? *Energy Economics*, 68, 539-547.
- ZHENG JINGLI, W. X., LI YI. 2021. Corporate social responsibility, government subsidies and innovation intention. *Journal of Chongqing University(Social Science Edition)*.
- ZHOU, L. 2011. The Independent Director System and Its Legal Transplant into China. *J. Comp. L.*, 6, 262.
- ZHU, C., LIU, A. & CHEN, G. 2018. High performance work systems and corporate performance: the influence of entrepreneurial orientation and organizational learning. *Frontiers of Business Research in China*, 12, 1-22.