

Green technology innovation, media attention and enterprise performance

Mingming Liu^{1,a}, Hongjie Zhang^{2,b*}

¹School of Management, Dalian Polytechnic University, Ganjingzi District, Dalian, Liaoning, China

²School of Management, Dalian Polytechnic University, Ganjingzi District, Dalian, Liaoning, China

Abstract. This paper selects domestic A-share listed companies from 2010 to 2019 as the research sample, and makes an empirical analysis on the impact mechanism of green technology innovation and enterprise performance, as well as the intermediary role of media attention. It is found that green technology innovation has a significant promoting effect on enterprise performance, and green technology innovation also has a significant promoting effect on media attention, which plays a significant intermediary role between green technology innovation and enterprise performance.

1 Introduction

Environmental problems caused by global pollution are becoming more and more serious, so the global environmental protection atmosphere and consumers' awareness of environmental protection are increasing. In the global context, green technology is booming. In order to achieve sustainable development and gain competitive advantage in international competition, green technology innovation has become an inevitable choice for enterprise development. The report of the 19th National Congress of the Communist Party of China clearly pointed out that China's modernization construction must be the modernization of harmonious coexistence between man and nature, and adhere to the concept that green water and green mountains are golden mountains and silver mountains. Promoting green innovation and low-carbon development is the focus of China's economic development. Green technology innovation is a channel for enterprises to save resources and reduce costs. At the same time, it can gain market recognition and improve enterprise performance. Therefore, in the case of increasingly serious environmental pollution, how to maintain the coordinated development of environment and economy has become the focus of attention from all walks of life.

General secretary Jinping Xi stressed that information is everywhere, nothing is impossible, and no need is needed. We should speed up the development of media convergence, and enable the mainstream media to have strong communication, guidance, influence and credibility, so as to comprehensively enhance the ability of media to guide public opinion. With the rapid development of media technology, its role in economic activities has become increasingly prominent, and its influence can not be underestimated. Media is the main body of social information collection and release, and plays the role of

social "opinion leader" through the production and dissemination of information. As an important information intermediary, news media can help enterprises understand the demands of stakeholders and social dynamics, so as to change the decision-making and route of enterprises. With the green technology more and more penetrated into daily life, the media pay more and more attention to green technology innovation. On the one hand, green technology innovation will attract media attention, on the other hand, it will be supervised and restricted by media attention. Through media attention, green technology will be more widely exposed in the public view, so media attention also has a part of the supervision and promotion of green technology innovation. In addition, media attention will also affect the performance of enterprises. On the one hand, media attention can enhance the market recognition of enterprises and make them understood by more consumers; on the other hand, it can restrict the development of enterprises to a certain extent. At present, most of the existing studies focus on the impact of green technology innovation on enterprise performance, lack of research on the intermediate impact mechanism, and lack of certain empirical research. Therefore, this paper uses media attention as the intermediary variable to make an empirical study on green technology innovation, media attention and enterprise performance.

The possible marginal contributions of this paper are as follows: first, in terms of research methods, this paper focuses on the empirical analysis of the impact of green technology innovation on enterprise performance, which further enriches the literature in the field of green technology innovation. Secondly, this paper expands the research content, analyzes and tests the effect of green technology innovation on corporate performance of domestic A-share listed companies, and introduces media attention as an intermediary variable, which helps to understand the mechanism of green technology innovation

^adoubleming618@163.com

* Corresponding author: ^b15776563099@163.com

more deeply.

2 Theoretical basis and research hypothesis

2.1. The impact of green technology innovation on enterprise performance

In the face of competition and environmental pressure, in order to seek development, enterprises choose green technology innovation. Many studies show that the relationship between green innovation and enterprise performance is significant. Russo & Pogutz [1] research shows that: in the short term, green innovation behavior of enterprises can improve financial performance and help enterprises improve market value. Marin [2] studied the Italian manufacturing industry and found that under the environmental regulation, green technology innovation can indeed produce compensation effect and increase the profits of enterprises. Scholars who hold a strong "Porter Hypothesis" view believe that although the strict environmental regulation increases the environmental protection investment and emission reduction cost of enterprises due to the consideration of environmental protection and resource conservation, it also stimulates the technological innovation of enterprises, and the innovation compensation effect can not only make up for the environmental regulation cost, but also improve the enterprise performance by improving the competitiveness of enterprises. Ilker [3] used structural equation model to analyze the data of 140 manufacturers in Turkey. The results show that green product innovation has a significant positive impact on enterprise performance and competitiveness. Xie [4] take manufacturing industry as the research object, and find that green innovation has a significant promoting effect on financial performance. Based on the above analysis, this paper puts forward research hypothesis 1 :

H1: Enterprise green technology innovation will promote enterprise performance

2.2. The impact of green technology innovation on media attention

As the fourth power independent of legislation, administration and judiciary, media plays an increasingly important role in economic activities. As an important extra legal system, media is one of the main groups to promote the sustainable innovation of enterprises. Foulon [5] pointed out that the use of information technology such as media can help enterprises improve their environmental performance by supervising the disclosure of environmental information. As the environmental problems are becoming more and more serious, the requirements for green technology and environmental protection of enterprises are also increasing. Therefore, green technology innovation of enterprises may increase the media attention. The media tend to pay more attention to the problems that the public attach importance to and the government emphasizes. Therefore, the green

technology innovation of enterprises will attract the attention of the media and enhance the media attention. Based on the above analysis, this paper proposes hypothesis 2:

H2: Green technology innovation will enhance the media attention of enterprises

2.3. The mediating effect of media attention on green technology innovation and enterprise performance

As an important intermediary, media has two sides of influence on enterprises. On the positive side, enterprises will positively treat the information provided by media attention, continue to make behaviors in line with the requirements of social values in order to gain reputation and image, actively improve the company's system, and promote the growth of enterprise performance. On the negative side, high-intensity media attention leads to the limitation of public opinion pressure itself, which limits the behavior of enterprises to a certain extent. Negative news will lead to the damage of enterprise image and affect the development of enterprise performance.

Because the reports on green technology innovation are likely to be negative reports, it is likely to cause the decline of corporate reputation and affect the further development of enterprises. In order to stabilize the market position and maintain the competitive advantage, enterprises are likely to make efforts to carry out green technology innovation, which can not only maintain the competitive advantage, but also obtain positive media reports, government support and public trust, so as to achieve the purpose of enhancing enterprise performance. Based on the above analysis, this paper proposes hypotheses 3:

H3: Media attention plays a significant mediating role in the relationship between green technology innovation and enterprise performance.

3 Research design

3.1. Samples and data

This paper selects the domestic A-share listed companies from 2010 to 2019 as the initial research sample. According to the research practice, this paper selects the initial sample data as follows: (1) eliminates the sample of ST and delisted companies; (2) eliminates the key variables and enterprises with serious data loss. (3) In order to prevent some company data from being abnormal, all continuous variables are Winsorize by 1%. Finally, 14602 sample observations were obtained. The financial data of listed companies, green technology data and media attention data used in this paper are from the CSMAR.

3.2. Model establishment and variable definition

3.2.1 Model establishment

Based on the mediating effect test method, this paper uses

the mediating effect test model to test whether green technology innovation has an impact on enterprise performance in domestic A-share listed companies, and whether media attention plays a significant mediating role. The following three equations are established to test.

$$ROA_{i,t} = \alpha_0 + \alpha_1 GTI_{i,t} + \alpha_2 controls_{i,t} + \varepsilon \quad (1)$$

$$MEDIA_{i,t} = \beta_0 + \beta_1 GTI_{i,t} + \beta_2 controls_{i,t} + \varepsilon \quad (2)$$

$$ROA_{i,t} = \gamma_0 + \gamma_1 GTI_{i,t} + \gamma_2 MEDIA_{i,t} + \gamma_3 controls_{i,t} + \varepsilon \quad (3)$$

Among them, $ROA_{i,t}$ refers to the performance of enterprise i in the t -th year; $GTI_{i,t}$ refers to the green technology innovation of enterprise i in the t -th year; $MEDIA_{i,t}$ refers to the media attention of enterprise i in the t -th year; $controls$ refers to other control variables; ε is the random interference item, representing the unpredictable random error caused by subjective and objective reasons.

3.2.2 Variable definition

Explained variable: This paper uses the return on assets (ROA) as the basic financial index to measure the financial performance of the company. ROA refers to the ratio of the company's net profit to the average total assets of the year. It is an index to measure the profitability of an enterprise. The larger the index value is, the higher the financial performance level of an enterprise is.

Explanatory variable: referring to the research method of Luo [6], the natural logarithm of the sum of technological transformation investment and R&D internal expenditure is used to measure the level of green technology innovation.

Intermediary variable: This paper uses the natural logarithm of the number of research reports published by securities analysts as the measurement index.

In order to eliminate the influence of other unknown factors as far as possible, the following control variables are selected according to the previous research results and the characteristics of this study.

Table 1 variable description

Variable	Symbol	Measurement method
financial leverage	lev	(net profit + income tax expense + financial expense) / (net profit + income tax expense)
Asset liability ratio	debt	Total liabilities / Total assets
Enterprise scale	size	Natural logarithm of total assets
Ownership concentration	most	Proportion of shares held by the largest shareholder of listed companies
Nature of enterprise	cat	If the enterprise is state-owned or state-owned holding enterprise, it is 1, otherwise it is 0

4 Empirical results and analysis

4.1. Descriptive statistical analysis

Table 2 shows the descriptive statistical results of related variables of 14602 observations from 2010 to 2019. It can be seen from table 2 that the average ROA of enterprise performance is 0.058, which indicates that the overall return on assets of Chinese enterprises is relatively low and the utilization of assets is not sufficient. The average value of green technology innovation index is only 1.545, the difference between the maximum value and the minimum value is large, indicating that the overall level of green technology innovation of Chinese enterprises is low and unstable. The range of enterprise performance (ROA), green technology innovation (GTI), media attention (MEDIA) and other variables is large, which indicates that there are obvious differences in financial performance, media attention and green technology innovation level among enterprises.

Table 2 Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
GTI	17.857	1.545	7.409	25.025
MEDIA	2.526	1.109	.693	5.537
ROA	.058	.048	-.019	2.637
lev	1.525	20.059	-81.344	2402.774
debt	.384	.196	.008	.984
size	22.183	1.34	19.057	29.185
most	.356	.147	.022	.891
state	.301	.459	0	1

4.2. Regression analysis

Table 3 shows the empirical test of the intermediary model. From the data results in column (1) of the regression result, we can see that the regression coefficient of green technology innovation (GTI) in the model (1) is positive, and it passes the significance test at the 1% level, which means that green technology innovation (GTI) has a significant positive effect on enterprise performance (ROA), so hypothesis 1 is verified. From the data results of regression result (2), we can see that the coefficient of green technology innovation (GTI) in model (2) is significant at 1% level, and the regression coefficient is positive, indicating that green technology innovation (GTI) has a significant positive effect on media attention (MEDIA), so hypothesis 2 is verified. From the data results in column (3), we can see that the coefficient of green technology innovation (GTI) in model (3) is significant at 1% level, and the coefficient of media attention (MEDIA) is also significant at 1% level, and the regression coefficients are all positive, which means that both green technology innovation and media attention

have a positive impact on enterprise performance. According to the mediating effect model, the results show that media attention has a significant mediating effect on the relationship between green technology innovation and enterprise performance, and hypothesis 3 is verified.

Table3 Regression model of mediating effect

VARIABLES	(1)	(2)	(3)
	ROA	MEDIA	ROA
GTI	0.003*** (11.72)	0.122*** (18.14)	0.001*** (5.58)
MEDIA			0.013*** (45.95)
lev	-0.011*** (-28.05)	-0.202*** (-17.59)	-0.009*** (-23.08)
debt	-0.079*** (-38.27)	-0.710*** (-12.24)	-0.070*** (-36.10)
size	0.002*** (4.73)	0.325*** (34.04)	-0.002*** (-7.59)
most	0.025*** (12.27)	-0.104* (-1.79)	0.027*** (13.81)
state	-0.006*** (-7.85)	-0.322*** (-15.61)	-0.002** (-2.44)
Constant	0.010 (1.60)	-6.196*** (-36.26)	0.088*** (14.85)
R-squared	0.256	0.190	0.350

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5 Research conclusion

This paper takes China's domestic A-share listed companies from 2010 to 2019 as the initial research sample, uses the mediating effect test model to study the impact of green technology innovation on enterprise performance through media attention, and puts forward research hypotheses. It is found that enterprises actively carry out green technology innovation can effectively improve enterprise performance. In addition, further analysis of the mediating effect of media attention shows that green technology innovation has a positive impact on the media attention of enterprises, and the relationship between media attention, green technology innovation and enterprise performance has a significant mediating effect. There are still some deficiencies in this study: it does not consider the lag of the impact of green technology innovation on enterprise performance. Only considers the intermediary role of media attention, and does not consider the impact of other factors. Future research can further consider the effect of other factors and enrich the literature research in the field of green technology innovation.

At the same time, this study provides important decision-making reference for Chinese enterprises, government and other social groups, including: correctly facing the facts reported by the media, paying attention to improving the internal requirements of enterprises and solving their own problems; actively carrying out green

technology innovation is not only conducive to the healthy development of society, but also can improve the performance level of enterprises.

Reference

1. A. Russo, S. Pogutz, Briarcliff Manor, Academy of Management, **1** (2009)
2. G. Marin, Research Policy, **43**, 301 (2009)
3. M. Ilker, Research Policy, **62**, 24 (2012)
4. Xuemei. Xie, Jiage. Huo, Hongwei. Wang, Research Management, **3**, 64 (2019)
5. J. Foulon, P. Lanoie, B. Laplante, Journal of Environmental Economics & Management, **44**, 169 (2002)
6. Enyi. Luo, Research and Exploration, **10** (2020)