



The Impact of Executives' Green Cognition on Corporate Green Innovation Performance

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Abstract. How enterprises fulfill their social responsibilities and promote ecological protection and green innovation has become the key to sustainable survival and development of enterprises. This paper argues that the environmental awareness of executives will affect the green strategic decisions of enterprises. Therefore, this paper takes Shanghai-Shenzhen A-share listed companies from 2013 to 2023 as research samples to empirically test the relationship between executives' green cognition and green innovation performance. The results show that the executives' green cognition can promote the green innovation performance of enterprises. Enterprises should strengthen the green training of existing executives to improve the positive impact of green cognition on the green innovation performance of executives.

Keywords: Executive green cognition, Green innovation performance, Enterprise innovation

1 Research Background

The frequent occurrence of "black swan" events, the global spread of the new coronavirus, and the withdrawal of Luckin Coffee's financial fraud incident have made environmental issues the focus of attention of the international community. In order to improve the environmental performance of enterprises, it is particularly important to build a sustainable development mechanism. Executives play an important role in the decision-making and execution process. The cognitive ability of managers not only plays a key role in the quality of information processing, but also has a guiding influence on their decision-making process [5].

Objectively speaking, scholars have conducted a lot of research on the relationship between executive cognition and corporate performance, which provides a reference for the writing of this paper. However, it is necessary to further explore whether executives' green cognition will have an impact on enterprises' green innovation performance, which has important research theoretical value and practical significance for solving environmental protection problems, accelerating the transformation of economic development mode at the cost of damaging the environment, and realizing green development.

2 Hypothesis Formulation

2.1 Analysis on the Influence Mechanism of Senior Executives' Green Cognition on Corporate Green Innovation Performance

According to the theory of high ladder team, managers are often unable to have a comprehensive and in-depth understanding of all fields in practical work, and their ability to interpret information and make decisions is largely limited by their personal cognitive level and professional background. At present, many enterprises are actively transforming and upgrading to green, and the depth of understanding of the concept of green environmental protection and the accuracy of interpretation of relevant policies by senior managers of enterprises will undoubtedly have a profound impact on the path of green development and practical results of enterprises.

The depth of understanding of the concept of green environmental protection and the interpretation of relevant policies by senior managers of enterprises will have an important impact on the path of green development and the actual effect of enterprises. The deeper the corporate executives' ecological cognition, including environmental knowledge and perception of environmental issues, the more positive their behavior [4].

The green cognition of executives can first enhance the possibility for executives to identify the long-term and hidden benefits brought by corporate green innovation [3]. Second, managers can promote cooperation with external environmental organizations and institutions to achieve resource sharing and technology exchange and promote sustainable development. Finally, executives with green cognition are more likely to identify stakeholders' ethical requirements in terms of environmental protection and sustainable development, and will take the initiative to implement green innovation strategies to maintain or improve the company's environmental reputation [1]. Therefore, research hypothesis H1 is proposed:

H1: Executive green cognition can promote enterprises to improve green innovation performance.

3 Research Design

3.1 Variable Selection and Data Source

Explained variable: Corporate green Innovation Performance (Patent). The natural logarithm of the number of green patent applications plus 1 is adopted to measure [2].

Explanatory variable: Executive green perception (EGP). According to the personal resume information published on the Sina financial website, the number of green executives is counted, and the natural logarithm is added by 1 [6].

Control variable: The selection of control variables in this paper refers to the existing research [4, 6, 7].

3.2 Model Construction

To verify hypothesis H1 and H2, this paper constructs models (1) to (3).

$$\text{Patent}_{i,t} = \beta_0 + \beta_1 \text{EGP}_{i,t} + \sum \beta_j \text{Controls}_{i,t} + \Sigma \text{Year} + \Sigma \text{Ind} + \varepsilon_{i,t} \tag{1}$$

4 Empirical Analysis

4.1 Descriptive Statistics

In this paper, Stata 17.0 statistical software was used to perform descriptive statistics on variables, as shown in Table 1. Secondly, the Hausmann test was carried out in this paper, and the result was Prob > chi2=0.0000<0.05, indicating that the fixed effect was adopted. In addition, after multicollinearity test for each quantity, the variance inflation factor (vif) is less than 10, indicating that there is no multicollinearity problem between variables, and regression analysis can be performed.

Table 1. Descriptive statistics of variables.

VarName	Obs	Mean	SD	Min	Median	Max
Patent	6303	0.725	1.150	0.000	0.000	4.963
EGP	6303	0.275	0.476	0.000	0.000	1.792
Size	6303	23.288	1.286	19.863	23.177	26.452
Lev	6303	0.451	0.187	0.046	0.458	0.902
Roa	6303	0.057	0.062	-0.373	0.047	0.247
Growth	6303	0.188	0.378	-0.654	0.126	4.024
Board	6303	2.163	0.198	1.609	2.197	2.708
Indep	6303	37.755	5.604	28.570	36.360	60.000
Dual	6303	0.238	0.426	0.000	0.000	1.000
Top1	6303	36.795	15.582	8.020	35.058	75.525
FirmAge	6303	2.923	0.317	1.792	2.944	3.611
RD	6303	0.043	0.048	0.000	0.033	0.274

4.2 Main Effect Analysis

Columns (1)~(3) of Table 2 show that at 0.1% level, the regression coefficient between senior executives' green cognition (EGP) and corporate green innovation performance (Patent1) presents a significant positive correlation at 1% level. It can be seen that executives' green cognition can significantly promote green innovation performance. Therefore, the hypothesis H1 is verified in this paper.

Table 2. Regression result.

	(1)	(2)	(3)
	Patent	Patent	Patent
EGP	0.404*** (11.31)	0.320*** (9.68)	0.142*** (4.98)
Size		0.251*** (15.43)	0.274*** (19.15)
Lev		0.556*** (5.88)	0.352*** (3.59)
Roa		1.217*** (5.13)	1.210*** (4.97)
Growth		-0.142*** (-4.80)	-0.183*** (-5.31)
Board		0.173* (1.92)	0.194** (2.53)
Indep		-0.001 (-0.22)	0.003 (1.08)
Dual		0.052 (1.60)	0.052* (1.74)
Top1		0.000 (0.51)	0.002* (1.95)
FirmAge		-0.088** (-1.98)	0.095** (2.05)
RD		4.733*** (14.62)	2.247*** (6.36)
Constant	0.614*** (38.99)	-5.836*** (-14.26)	-6.857*** (-19.02)
Observations	6,303	6,303	6,300
R-squared	0.028	0.138	0.327
Ind FE	NO	NO	YES
Year FE	NO	NO	YES

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

5 Conclusions

Executives' green cognition can promote enterprises' green innovation performance. Managers with high green awareness are willing to promote green innovation activities.

First of all, the government should constantly improve environmental protection policies, guide enterprises to green development, and improve managers' awareness of environmental responsibility and green competitive advantage. The government should design and optimize and improve environmental protection norms according to the specific business and actual needs of enterprises, and establish and improve the corresponding reward and punishment mechanism. The government has the responsibility to actively guide enterprises to find the most suitable development path, accelerate the transformation and upgrading of enterprises, and can provide a series of preferential policies for these enterprises to encourage and support the green development of enterprises. The second is to train more talents with green cognition to better serve the green innovation of enterprises. Third, enterprises should strengthen green professional education and training for existing executives.

This paper only studies the impact of executives' green cognition on corporate innovation performance. There may be other avenues of influence, such as media attention and agency issues. Secondly, this study mainly analyzes green-related keywords in the resumes of senior executives to measure their green cognition, which may not fully reflect the different differences in the source and formation of individual green cognition, such as the difference in the length of individual green cognition. In the future, it can be studied more deeply.

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