The Impact of Executives' Overseas Experience on Green Innovation in Chinese Automobile Manufacturing Enterprises

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Abstract. The frequent occurrence of various types of extreme weather has caused countries around the world to pay more and more attention to environmental protection and sustainable development. China's government has responded positively by putting forward the "dual-carbon" target and vigorously promoting the green transformation of enterprises. At the same time, top managers with overseas experience have an important influence on corporate green innovation decisions. However, existing studies on green innovation have paid little attention to the influence of management groups on corporate green innovation. By constructing an econometric model and selecting the panel data of listed companies in China's automobile manufacturing industry from 2012 to 2021, this study empirically explores the impact of top managers' overseas experience on the green innovation of automobile manufacturing companies. The study finds that: executives' overseas experience has a significant positive effect on corporate green innovation; market competition promotes the positive effect of executives' overseas experience on green innovation.

Keywords: executives' overseas experience; green innovation; market competition.

1 Introduction

Resource scarcity, ecological deterioration and global warming have become global challenges, and countries around the world are attaching more and more importance to environmental protection and sustainable development. At present, more than 150 countries have proposed carbon neutrality target, and China is among them. Nowadays, China's economy has entered the stage of high-quality development, and promoting the greening and low-carbonization of economic and social development has become a key link. In this context, green innovation has become one of the important ways for modern enterprises to realize sustainable development[1]. The production and operation activities of traditional manufacturing enterprises are one of the major causes of environmental degradation, and therefore a key focus of green transformation. Among them, the automobile manufacturing industry is not only a pillar industry of China's national

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economy, but also an important hand in promoting industrial carbon reduction and emission reduction.

Top management, as the main body of major decisions of enterprises, run through the activities of enterprises. According to the upper echelons theory, the characteristics of executives will affect their values and ways of thinking, which in turn will affect the green innovation decision-making of the enterprise. Executives with overseas experience accept a more diverse culture, may have an international perspective[2], and understand advanced management thinking[3] and cutting-edge technologies, thus influencing corporate green innovation. Existing studies on the impact of green innovation are rich, but most of them focus on external factors, such as environmental regulations, and less on the internal factors. Therefore, exploring the impact of executives' overseas experience on corporate green innovation can expand the research on green innovation.

In addition, under the environment of fierce global competition, enterprises need to pay attention to changes in the external market environment while focusing on the organization's own capabilities and behaviors. Therefore, this paper poses the following research questions: first, how do executives' overseas experiences affect corporate green innovation? Second, how does market competition affect the relationship between executives' overseas experience and corporate green innovation?

2 Literature Review and Hypothesis Development

2.1 The Impact of Executives' Overseas Experience on Corporate Green Innovation

Top management, as the main body of major decisions of enterprises, run through the activities of enterprises. The upper echelons theory suggests that the characteristics of executives such as age, gender[8], and experience affect the values and mindset of executives, which in turn affects corporate green innovation decision-making. Currently, most existing studies affirm the positive effect of executives' overseas experience on corporate green innovation. Executives with overseas experience accept a more diverse culture and have a broader international perspective[2], which contributes to the diversity of the executive team and the comprehensiveness of strategic decisions[6], and can provide more resources for corporate green innovation[7]. In addition, the overseas experience can help to enhance the risk appetite and green awareness of managers, and promote green innovation.

H1:executives’ overseas experience has positive effect on corporate green innovation.

2.2 The Moderating Role of Market Competition

In an environment of intense global competition, enterprises need to pay attention to changes in the external environment while focusing on the organization's own capabilities and behaviours[4]. Some scholars have argued that high market competition promotes green innovation activities and innovative capabilities[5]. In markets with a low degree of competition, enterprises face less existential threat and competitive pressure,

managers are prone to develop opportunistic tendencies, and hold conservative attitude towards high-risk innovation investments. Executives with overseas experience are more willing to accept new things and risks, therefore, in a competitive market environment, in order to maintain the existing market share and obtain product differentiation advantages, managers will be more inclined to carry out innovation. In addition, as consumers' awareness of environmental protection continues to increase, green products will be more competitive and companies will be more inclined to increase green investment.

H2: Market competition promotes the positive effect of executives' overseas experience on corporate green innovation.

With the hypotheses proposed, the conceptual framework is constructed in Figure 1.

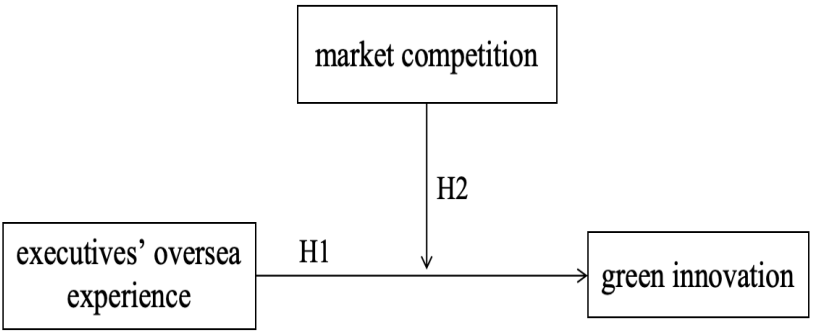

Fig. 1. The mechanisms of Executives' Overseas Experience Impact Green Innovation.

3 Methods

3.1 Sample and Data Sources

This study selects listed companies in the automobile manufacturing industry from 2012 to 2021 as the research object and excludes the samples with seriously missing key data. The data related to green innovation are from the China Research Data Services Platform, and the data on executives' overseas experience and market competition are from the China Stock Market&Accounting Research Database.

3.2 Variable Measurement

Dependent Variable.

Refer to Muzhar et al. (2023), we choose the number of green patents to measure the green innovation. Since design patents are weakly creative and do not have much green effect, this paper only considers invention patents and utility model patents. In addition, considering the relatively serious lag in patent authorization and approval, this paper adopts the number of patent applications to measure the green innovation activities of enterprises.

Independent Variable.

Since the institutional and cultural aspects of China's Hong Kong, Macao, and Taiwan are quite different from those of the mainland, this study categorizes them as overseas background. Based on the existing literature, this paper will use a dummy variable to measure the returnee executives, which is assigned a value of 1 if there is at least one returnee executive in the firm's executive team in the current year, and 0 if the opposite is true.

Moderating Variable.

In measuring the degree of market competition, existing studies often use Lerner index and Herfindahl index, but Herfindahl index focuses on measuring the degree of market concentration and has limitations in measuring market competition. Therefore, this paper focuses on Lerner index as a measurement indicator.

Control Variables.

With reference to the studies of Shuman et al.(2023)[9], Sorensen and Stuart(2000)[10], Gearing ratio, Profitability and Board size are controlled.

4 Empirical Analysis

4.1 Descriptive Statistical Analysis

Table 1 shows the descriptive statistics of each variable. The difference between the maximum and minimum values of green innovation is large, and the standard deviation is also large, indicating that the green innovation of the sample enterprises varies greatly. The mean value of green innovation is 13.86, saying that most enterprises do not carry out green innovation activities, but some enterprises have high green innovation performance. According to Table 2, the correlation coefficients between the variables as a whole are low, indicating that the possibility of multicollinearity is relatively small.

Table 1. Descriptive statistics

	Mean	Std	Min	Max
Green	13.86	47.03	0	479
Oversea	0.583	0.493	0	1
Lerner	0.0591	0.0246	0.0121	0.302
Lev	0.450	0.194	0.0483	1.461
Roa	0.0312	0.0907	-1.639	0.221
Board	8.653	1.893	4	18

Table 2. Correlations matrix

	Green	Oversea	Lerner	Lev	Roa	Board
Green	1					
Oversea	0.144***	1				
Lerner	-0.024	-0.017	1			
Lev	0.230***	0.007	0.038	1		
Roa	-0.020	0.001	0.065**	0.315***	1	
Board	0.152***	0.220***	0.074**	0.223***	0.005	1

4.2 Results

According to the empirical test results in Table 3, it can be seen that H1 and H2 are supported. According to model 1, the coefficient of executive overseas experience is positive and significant, indicating that executives' overseas experience has a significant positive effect on corporate green innovation, so H1 is supported. According to Model 2, the coefficient of the interaction between executives' overseas experience and market competition is positively significant, and the coefficient of executives' overseas experience is positively significant, therefore, market competition promotes the positive effect of executives' overseas experience on corporate green innovation, so H2 is supported.

Table 3. model estimation

	Green	Green
	Model 1	Model 2
_cons	-22.1114***	-5.3164
Oversea	5.4182*	4.8820*
Lerner		-1.5e+02***
Oversea*Lerner		496.7069***
Lev	39.7800***	35.0671***
Roa	1.9850	-0.7573
Board	1.5496*	0.9258

4.3 Robustness Test

This study will test the robustness of the findings by changing the sample capacity. This study will select the data of listed companies in the automobile manufacturing industry from 2016 to 2021. According to the empirical test results in Table 4, the findings are consistent with the above, and H1 and H2 still hold.

Table 4. model estimation

	Green	Green
	Model 3	Model 4
_cons	-45.6854***	-28.8685**

Oversea	6.9781**	6.5216**
Lerner		-1.3e+02**
Oversea*Lerner		450.4447***
Lev	31.5883***	27.0048***
Roa	0.8629	-1.3970
Board	5.0265***	4.2559***

5 Conclusions

5.1 Results

First, executives' overseas experience has a significant positive impact on corporate green innovation. This may be due to the fact that executives with overseas experience accept more diverse cultures, have broader international perspectives[2], understand more advanced management thinking[3], and are able to provide more resources for corporate green innovation[7]. Moreover, the overseas experience can help to enhance the risk appetite and green awareness of managers and promote green innovation.

Second, market competition promotes the positive effect of executives' overseas experience on corporate green innovation. This may be due to the fact that in a competitive market environment, managers will be more inclined to carry out innovations in order to maintain the existing market share and gain product differentiation advantages.

5.2 Implications

First, this paper reveals the positive impact of executives' overseas experience on corporate green innovation. Enterprises should establish a perfect recruitment system and formulate policies to attract high-level overseas talents. Meanwhile, local governments should promote more favorable policies to attract overseas talents and create a favorable talent environment. Second, in terms of talent training. Enterprises can provide subsidies to encourage management to study abroad to learn cutting-edge technology and management thinking, in-depth understanding of the international market. Or assign executives to overseas branches to improve the comprehensive management skills of managers.

Secondly, this paper reveals the moderating role of market competition between executives' overseas experience and enterprises' green innovation, which effectively reveals that enterprises should increase green investment and enhance product competitiveness when they face a fierce external environment.

5.3 Limitations and Future Research

This study still has some limitations. First, this study uses data from the automobile manufacturing industry, so the conclusions have industry limitations. Second, this paper uses a proportional variable to measure the overseas experience of executives, and

subsequent studies can divide the variable in more detail, such as the length of time spent studying or working overseas and the number of countries.

This paper mainly analyzes the impact of executives' overseas experience on corporate green innovation, and finds that executives' overseas experience has a positive impact on green innovation, but the mechanism of influence is not clear, so the role of R&D investment in the relationship between executives' overseas experience and green innovation could be examined subsequently.

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